

# VAYU

III/2013

## *Aerospace & Defence Review*



**Pre-Paris Air Show Issue**

**Global Players in Indian Skies**

**Airbus: TMB'13 and AID'13**

**Pampering the Passenger**

**Endless Possibilities**

**'Exercise Live Wire 2013'**

AgustaWestland



Airbus A330 MRTT on take off  
(photo from Airbus)

# VAYU

## Aerospace & Defence Review

III/2013

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### 30 Global Players in Indian Skies

Recent developments in Civil Aviation are reviewed by Monica Arora, also decoding the recent Jet-Etihad deal which has set a precedent following the relaxed norms in FDI. Indian aviation experts are increasingly buoyant about these developments even as Air Asia India marks re-entry of the Tata Group into the aviation world.



### 40 Exercise Live Wire 2013

On heels of the IAF's biggest fire power demonstration, 'Iron Fist' on 22 February, came 'Exercise Live Wire 2013' which was a three week effort culminating on 4 April 2013, as close as possible to the 'real thing'. Virtually, the IAF's entire order of battle was exercised with more than 400 fighters, 200 transport aircraft and over 100 helicopters.



### 46 Endless Possibilities

The Boeing Company has had a 70 year relationship with Indian operators, both civil and defence, with the first P-8I for the Indian Navy flying into the country in mid-May 2013.

Indian air carriers have been operating Boeing Commercial aircraft for several decades and Air India's massive purchase of Boeing jetliners in 2005 marked a major milestone. The IAF is to shortly also receive Boeing C-17 mega airlifters while Harpoon missiles will arm maritime strike aircraft.



### 52 Sign of the Times

There are implicit lessons for India in the US budget sequestration 2013. Angad Singh writes on the effect of the sequester on US military forces, particularly the United States Navy which have been hardest hit of the Services, with four Carrier Air Wings directly affected. The USAF are also having to ground nearly a score of squadrons.



### 56 First to the Last

The book 'First to the Last : 50 years of MiG-21s with the IAF', compiled by Air Marshal Philip Rajkumar and Pushpinder Singh and published by *The Society for Aerospace Studies*, was released by the CAS Air Chief Marshal NAK Browne at the Akash Air Force Officer's Mess on 20 April 2013. Special guests from India and Russia were present at this seminal occasion.



### 60 'The First Supersonics' are 50

Exactly a week later, on 27 April 2013, the 'Illustrated History of No.28 Squadron' was released by Air Marshal Arup Raha at Jamnagar. Also authored by Pushpinder Singh and published by *The Society for Aerospace Studies*, the Golden Anniversary was an occasion graced by many of the pioneers and battle heroes.



### 66 TMB 13 and AID 2013

On eve of the 50th International Paris Air Show at Le Bourget, Vayu's Managing Editor visited both Seville and Toulouse as part of the Trade Media Briefing 2013. The first leg was to Airbus Military in Spain, where the A400M and A330 MRTT are built, tested and delivered. A few days later, he was with Airbus in France for on-the-spot briefings on the commercial side : it's been another good year for the Company !

### 81 Pampering the Passenger !

Vayu was at Hamburg for the *Aircraft Interiors Expo 2013*, the 14th edition of this highly respected and now well-established Show. Key airline decision makers from around the world visited the stands of some 500 exhibiting companies where an array of cabin interior products and services were on display.



### 88 Vive la France !

Vayu was invited by the French Ministry of Defence for a concentrated visit to Cazaux, Mont-de-Marsan and Marignane, which focused on future technologies in aerospace, military operations and new generation helicopters.

### 98 Mirage 2000 + LGB = Victory at Kargil

Recalling the summer of 1999 when IAF Mirage 2000s with laser guided bombs carried out precision attacks on enemy targets in the high Himalayas, aerial tactics were rewritten. Some first hand accounts by those who took part.

**Also :**  
China's Depsang move;  
Courage in Question; LIMA 2013;  
PFW at 100; Sand, Sea and Wind;  
Airborne in Africa.

### Regular features :

Commentary, Focus, Opinion, Aviation & Defence in India, World Aviation & Defence News, Vayu 25 years back, Tale Spin.

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## Poised for takeoff

The decision of the ministry of civil aviation to allow airlines to unbundle services and charge passengers separately for check-in baggage, sports and musical instruments as part of baggage, choice of seating, snacks and meals, use of airline lounges and the like is a positive step. This move, which is in line with global practice, will not only allow wider choice to fliers, it will also allow airlines to work out new revenue streams and pare losses even while keeping ticket prices low for those who opt for basic services. This will hopefully end the slump in air traffic in recent months and maybe even reverse the trend.

The impact of these changes in airline regulations can be substantial as it follows other far reaching policy measures, like the bilateral agreement signed for boosting air traffic on the Gulf route. The Jet-Etihad deal, which is leveraged to take full advantage of the potential, may now encourage more international airlines to take a larger stake in the Indian civil aviation pie. Other similar bilateral tie-ups with countries in the Far East will add to the competition. The new budget airline venture between AirAsia, Tata Sons and Telestra Trade Place is a good beginning in this direction.

But a full turnaround can happen only if other basic problems such as high fuel taxes and high infrastructure costs are addressed. Categorising aviation fuel as a declared good can dramatically push down tax rates. A buoyant economy boosted by a dynamic aviation sector will fetch more revenues than taxes on aviation fuel. Rising air traffic will in turn ensure more efficient use of airports and bring down infrastructure costs. It will be a win-win game for both fliers and airlines.

*From : The Times of India*

## Not just a flight of fancy

Abu Dhabi-based Etihad Airways' purchase of nearly a quarter of Jet Airways marks the first equity injection into India's financially strained airlines after the government eased norms last September, allowing overseas carriers to part-own Indian carriers. Etihad's offer, concluded after months of hectic negotiations, came with a 32% premium over Jet Airways' share price mirroring the importance that the Gulf-based carrier places on the Indian market.

The logic of this faith in the Indian economy is pretty straightforward. The Indian growth story has been propelled by domestic consumption and it augurs well for the growth of aviation in the country. Estimates suggest that if India grows at its median trend rate, it would be the fifth largest consumer market by 2025. The consumption spree of the Indian middle-class, which is projected to swell to 600 million in the next 10 years, could reshape global markets. As a corollary, discretionary spend on travel will jump manifold making aviation a booming sector for corporations seeking to maximise profits and bolster their balance sheet with high returns on investment.

If the reasoning for investing in India is sound, equally robust and pervasive are the likely benefits that will accrue to the traveller from such cross-border deals in India's aviation firmament. To

begin with, it would not be illogical to expect fares to come down as the airline will likely offer attractive introductory schemes to lure passengers. Fare rationalisation is expected to be the highest on planes that cart passengers to cities in the Gulf, North America and Europe. Jet Airways plans to connect 23 Indian cities with hundreds of international destinations within Etihad's global network and the greater seats on offer and resultant competition will help keep fares down.

Much of the future growth in India's economy, indeed for the aviation sector, lies not in the big metropolitan centres, but in smaller towns. Putting these towns on the map would save thousands of passengers the hassle of travelling to a metropolis before flying out overseas. There will also be other attendant spin-offs that may come from co-opting of frequent-flyer and other programmes of both the airlines, although no details have yet been spelt out yet.

The Jet-Etihad deal follows Malaysia-based budget carrier AirAsia's announcement that it will start operations in India and more such deals could well be in the works. The total losses of India's local carriers topped Rs. 10,000 crore last year, reason enough to explain why most of them, hobbled by lack of capital, are clamouring to sell stake to foreign airlines. At present, only 3% of India's population use airlines as mode of transport. In a population of 1.2 billion, that's just a speck and reason enough for foreign carriers to clamour for a pie of India's aviation space, despite mounting losses.

*From : Hindustan Times*

## Let Indian airports also benefit

The Indian economy and travellers from and to India stand to gain from any increase in the number of seats on offer for travel between India and another country under their bilateral air services agreement. So, the sharp increase in the weekly seat capacity between Abu Dhabi and India from 13,300 to 49,970 is welcome. At the same time, this move could hurt Indian carriers and Indian airports. To the extent possible, the government should act to mitigate such injury by taking appropriate remedial action.

Let us see what happens when the capacity between Indian airports and point B in a foreign country increases rapidly, without any increase in the capacity in other sectors, and B happens to be well-connected to the rest of the world. India's globetrotters, underserved by the existing capacity from Indian airports, would make B their hub for international travel. Indian airports would lose out, as would Indian carriers.

Among those hurt would be foreign carriers who have access to Indian airports but not as much to B. Now, if India were to simultaneously grant bilateral rights to all other major countries as well, this skew would be removed. As capacity increases on all sectors, more seats would be available from Indian airports to the rest of the world and Indians would use some Indian airport or the other for their journeys abroad. B and carriers with privileged access to B would stop benefiting at the expense of the rest.

All those airlines and their host governments would applaud such a move to level the playing field. This is what India needs

**Sikorsky**

to do now, at the earliest. It must increase capacity on all routes, letting foreign carriers offer as many seats as they want to India from all directions. The travel requirements of Indian economy's globalised growth would become most competitive. Indian airports would have a level playing field, as would all airlines. Indian carriers would have to compete on the basis of price and quality of service, rather than on competition aborted by policy. So what?

*From : The Economic Times*

## Chinese Checkers

Smarter diplomacy and shoring up international partnerships are the key to dealing with China. The incursion by Chinese troops in Ladakh's Depsang area represents the first major test for India-China ties following the recent change of guard in the Communist Party leadership in Beijing. The last few months have seen intense speculation about the new leaderships approach to foreign policy, especially in the context of China's multiple territorial disputes with a host of countries in the region. But as the Ladakh incident which has seen Chinese troops set up camp 10 km inside Indian territory and China's ongoing stand-off with Japan and Taiwan over the disputed Senkaku / Diaoyutai islands show, the new Xi Jinping-led regime is unlikely to deviate from the policy of its predecessors.

Having said that, the latest Chinese incursion need not be blown out of proportion. While New Delhi would do well to reaffirm its territorial claims and press the intruding Chinese troops to retreat, any talk of escalating the issue to a conflict-like situation must be avoided. It is a fact that such incursions stem from differing perceptions of the Line of Actual Control. These irritants are bound to continue until the 4,000 km-long border is fully resolved and demarcated. That would require smart diplomacy on India's part. It is unfortunate that New Delhi's foreign policy continues to lurch from crisis to crisis. In order to negotiate from a position of strength with China, our foreign office must become more proactive. Shoring up our Look East policy is a good place to begin. There are several South-East and East Asian nations ranging from Vietnam to Japan that are concerned about China's territorial ambitions.

*From : The Times of India*

## Pulling back

After weeks of eyeballing each other in eastern Ladakh, it is welcome that the intruding Chinese troops and the Indian armed forces have decided to pull back to their original positions. The intrusion had seen Chinese military personnel breach the Line of Actual Control and set up tented camps 19 km inside Indian territory. That the incident took place just ahead of foreign minister Salman Khurshid's upcoming visit to Beijing - and the subsequent high-value visit of new Chinese Premier Li Keqiang to New Delhi - had significantly raised the stakes on both sides. With the new leadership in China in the

process of firming up its foreign policy, the border row was justifiably seen as a test for Indo-Sino ties.

While the immediate dispute appears to have been resolved, many issues remain. It is yet not known as to what forced the Chinese to back off. While the government is in self-congratulatory mode, it is difficult to see the Chinese troops withdraw without a face-saver. During the initial flag meetings between local commanders, the Chinese were insistent that India dismantle its border outpost in Chumar. If New Delhi has indeed conceded to the demand, it could pave the way for future Chinese intrusions.

New Delhi would do well to learn its lesson and pursue a more proactive China policy. In this regard, it would be well advised to make concerted efforts towards resolving the 4,000 km border - a major source of irritants for both countries. Pressing China on a river water sharing treaty - akin to the one with Pakistan - is also a good idea. Meanwhile, pushing for a contact group on China with countries such as Japan, Taiwan and Vietnam is prudent, as a hedge. A successful India-China relationship is instrumental for a prosperous Asia. To realise that, New Delhi must sharpen its China strategy.

*From : The Times of India*

## The Ghosts of Kohima

They fought them at the beaches, they fought them on the seas and oceans, but perhaps only once in British history did they fight them on the tennis courts. In a poll conducted by the National Army Museum, the Battle of Kohima has been voted Britain's greatest battle, a surprise win, considering that proverbial favourites like D-Day and Waterloo were in the running. British and Indian troops defeated the armies of Imperial Japan in 1944, in a battle fought at such close quarters that the scene of action was whittled down to the tennis lawns of the district commissioner's bungalow at one point. Netaji loyalists may be affronted as the advancing Japanese were accompanied by troops of the Indian National Army. But one might say that Kohima was where Japan's imperial army met its Waterloo.

The forgotten war fought in the hills of the Northeast resonated far beyond its immediate theatre of conflict. It broke the myth of Japanese invincibility. It also halted the Japanese advance into Asia, becoming the first of several major losses suffered by the Imperial army. Kohima has been called the 'Stalingrad of the East', as it mirrored Nazi reverses in Russia. Had the Allied forces lost the battle, Japan might have pressed forward into India.

Historian Robert Lyman calls Kohima 'the last real battle of British Empire and the first battle of the new India'. Yet in India, the role of its soldiers in World War II has receded into a collective amnesia. About 2.5 million Indians fought in the war but their stories are rarely told. Outliers in the great Indian narrative of the freedom movement, they remain unclaimed by history.

*From : The Indian Express*

**Airbus Military**

FOCUS:

# China's Depsang move



Western end of Pang Gong Lake, eastern part of which adjoins Chinese Tibet, not far from Chushul which is on the southern shore of the Lake.

Dr Manoj Joshi writes on China's new activism on the border dispute which could provide an opportunity to take stalled negotiations forward.

The People's Liberation Army's decision to dismantle its encampment on the Depsang plain abutting Aksai Chin makes it a bit easier to assess the motivation and goals of recent Chinese actions. If the Chinese action on the ground on the Depsang plains, initiated on 15 April, is taken in conjunction with President Xi Jinping's 29 March statement in Durban that the border issue should be resolved "as soon as possible", we can conclude that China is signalling a new activism in its border dispute with India. This also becomes evident through Beijing's official statements of the earlier two weeks that accompanied their three week-long non-threatening, but provocative, military action.

China steadfastly refused to acknowledge that its forces had in any way breached the Line of Actual Control (LAC) but agreed that the issue could be resolved through diplomacy and negotiations. "The two sides are in communication through the working mechanism for consultation and coordination on boundary affairs... for a solution to the incident..." Chinese Foreign Ministry spokesperson Hua Chunying told reporters on 3 May.



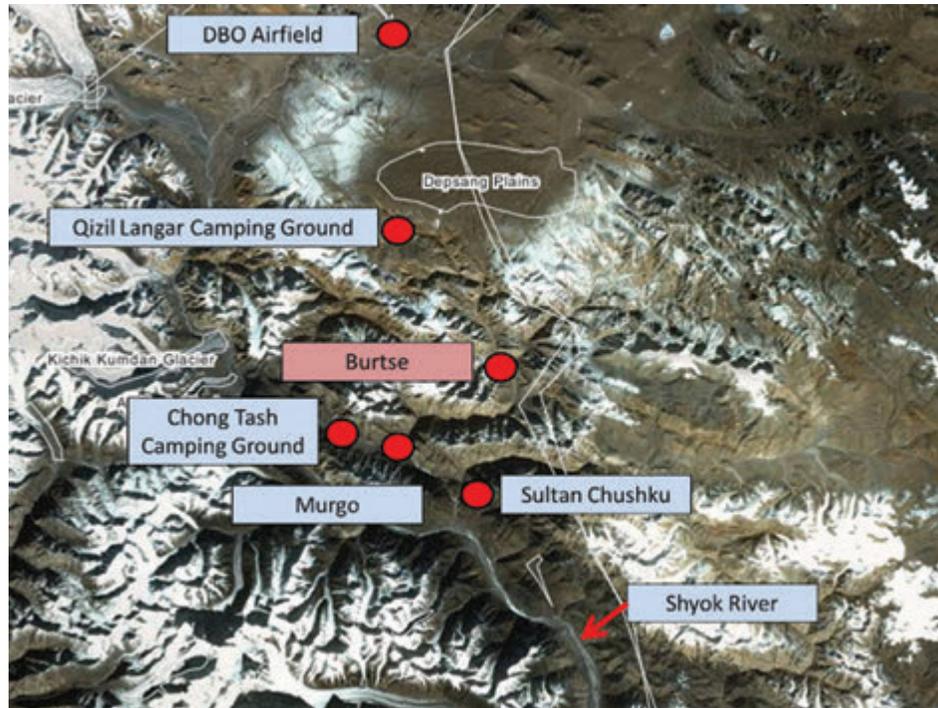
She added that both countries were "committed to resolving disputes, including the boundary ones, through peaceful negotiations and [to] try to ensure that this kind of dispute will

not affect the development of bilateral relations".

The Chinese action needs to be viewed at two levels. The first is an established pattern where the PLA keeps nibbling at



Indian troops disgorge from Army ALH in Ladakh.



IAF Mi-17V5 in support of army troops in Ladakh



Army Chief General Bikram Singh with GOC-in-C Northern Command and other senior officers at Leh.

Indian territory to create new “facts on the ground” or a “new normal” in relation to their claimed LAC. They do this, as they have done in the past — occupy an area, then assert that it has always been part of their territory, and offer to negotiate. In this very sector, Chinese claim lines have been varying since 1956. At that time, for example, the entire Chip Chap and Galwan river valleys were accepted by China as being Indian territory. But in 1960 China insisted that these areas were within their claim line and occupied them following the 1962 war. The April 2013 Depsang encampment seemed to be pushing even further westward. The fact that the border is neither demarcated nor inhabited, and there is no agreement on the alignment of the LAC in many areas, aids this process. We need to keep a sharp watch in the coming months to see if this pattern is repeated in other areas where there are differing perceptions as to the LAC’s location.



Chinese EC-135 helicopter seen over Ladakh.



*The forward IAF airfield at Thoise in Ladakh.*



*IAF An-32 of No.48 Squadron landing at Daulat Beg Oldi.*

## The Indian build-up

At another level, China appears to be expressing its unhappiness over the Indian military build up on the Sino-Indian border. In the past five years, India has activated forward airfields in the Ladakh sector, completed important road building projects in the Chumar sector, begun work on the road to link Daulat Beg Oldi with Leh, and moved high-performance fighter aircraft to air bases proximate to Tibet. In addition, it has raised two new mountain divisions, plans to establish two armoured brigades across the Himalayas and may raise a new mountain strike corps. In other words, the Indian posture is moving from the purely defensive vis-à-vis the PLA in Tibet, to one which could also include offensive action. In addition, India's strategic forces have begun to mature with the test of the Agni V and launch of the INS *Arihant*.

If you faced a country with which you have a disputed border, you would not be happy about its growing military profile. But China seems to have developed some amnesia here. After all, its own infrastructure and military build up has outpaced that of India's by at least a decade and a half. In this period, China has developed a railway, an extensive road network in Tibet and Xinjiang. In addition it has deployed powerful forces, which include armour, rocket artillery and battlefield support missiles. They have developed new airfields and have conducted as many as four major military exercises in Tibet in 2012.

It is useful to look back at the last major crisis which took place in 1986-1987 over the Sumdorong Chu. This coincided with 'Exercise Chequerboard' involving the movement of Indian forces from the plains of Assam to the Arunachal mountains. When the panicked Chinese moved forward their forces, India began 'Op Falcon' and used its heavy helicopter lift capability to build up rapidly across the entire LAC and even deployed infantry combat vehicles and tanks in some areas.

## Far-reaching agreements

The result was the 1993 and 1996 confidence building agreements. They are far reaching and important, and yet they have never been seriously implemented. For example clause 2 of the 1993 agreement accepted that there should be ceilings on forces on either side, that the two sides would reduce their forces along the LAC and that the "extent, depth, timing, and nature of reduction of military forces" would be determined through mutual consultations. Article 3 of the 1996 agreement specified that the major category of armaments such as tanks, infantry combat vehicles artillery guns, heavy mortars, surface-to-surface and surface-to-air missiles would be reduced with the ceilings to be decided through mutual agreement.

However, to implement such an agreement required one key step spelt out in Article 10 of the 1996 agreement — that the two sides would work out a common understanding of the alignment of the LAC. But the Chinese have balked at working this out and so the key clauses of the agreements remain in a limbo.



*Chinese troops with a banner reading "You've crossed the border, please go back" in the Daulat Beg Oldi sector of Ladakh.*

Indian chicken hawks who have been advocating a military response to the Chinese action on the LAC are wrong on two counts. First, we are in the middle of our modernisation cycle, lacking vital elements such as mountain artillery and heavy lift helicopters. Second, an over-the-top military response to what was a non-threatening military action on the part of the PLA would have needlessly escalated the situation. In the last count there appeared to be five tents and seven men and a dog in the Chinese encampment. In retrospect, the handling of the situation which involved a symmetrical non-threatening military response by Indian forces, along with patient diplomacy, paid off.

The message from China right now seems to be that it is ready to engage India across the entire spectrum, which includes the disputed border. There is nothing in Chinese actions suggesting that they are looking for a fight. New Delhi needs to firmly tell the Chinese not to put the cart before the horse, and that it cannot and will not freeze its border dispositions or its modernisation schemes.

The Indian visit of Chinese Premier Li Keqiang should be used to push the long pending exchange of maps detailing the Chinese and Indian versions of the LAC as a prelude to working out a common alignment of the LAC in a time-bound manner. Only this will ensure peace and tranquillity on the Sino-Indian border and open up the possibility that the border dispositions are not only frozen, but actually drawn down as per the 1993 and 1996 agreements. This in turn could give life to the stalled *Special Representative* process which was set up in 2003 to work out a mutually agreed border.

## MBDA



*The Air Chief introducing Air Commanders to the Defence Minister*

# COURAGE IN QUESTION

**Retrospective downgrading of military awards taints service ideals: Air Mshl (R) Brijesh D. Jayal**

**T**he highlight of an annual Republic Day parade is at the beginning, with the nation honouring yet more of its brave sons or daughters who have displayed courage in the highest traditions of the military. They are conferred the Param Vir Chakra or the Ashok Chakra. After the brief ceremony, festivities take over, giving little opportunity for us to ponder on what culminates in just one or two individuals from over a million-and-a-quarter in uniform to be so honoured and what spirit drives them to make the supreme sacrifice.

The honour and award system is part of military establishments across the world. Across the country, the armed forces

remain forever vigilant, safeguarding national air, sea and land frontiers, combating insurgencies, training for war and putting their lives at risk. On an average the nation loses some 100 brave men and women each year in the line of duty— in peace time.

Within the ranks of each of the Services the process of identifying those to be awarded is an annual feature. The unit commanding officers initiate the process with the names moving up the chain of command with strict scrutiny and pruning at various levels until the final names are vetted and shortlisted at the service headquarters and put up to the ministry of defence, which, after further examination,

makes recommendations to the President.

On Republic Day, the list of military personnel who are conferred awards for bravery and distinguished service by the president and supreme commander is announced. This list, along with the citation of each awardee, is then promulgated in the Gazette of India, which is an authorised legal document of the government containing the mode of operations under the law of the land. Under normal circumstances for any change to take place, thereafter, it would need the President's assent and a consequent Gazette modification.

In India, the Sena series (Sena, Nao Sena and Vayu Sena) of medals is awarded

for courage or exceptional devotion to duty as relevant to the respective service. The institution of the Vayu Sena medal by the president in recognition of such “individual acts of exceptional devotion to duty or courage as have special significance to the IAF” was promulgated in a Gazette notification in 1960. Till 1994, there was no distinction in the medals awarded for courage or devotion to duty; the citation itself covered the reason. Many a time a display of courage was also accompanied by devotion to duty: the two are not mutually exclusive.

From 1998, a policy change resulted in the Vayu Sena medal award being notified separately for courage and devotion to duty, making them two different categories within the same medal. It is possible that this change was driven by the fact that the fifth pay commission conferred some financial benefits/relaxations to gallantry award winners and the defence ministry wanted lists to be pared. According to the Indian Air Force, there were 753 Vayu Sena medal awardees prior to 1994. It is estimated that around 450 of these citations covered courage as one of the deserving acts.

Any change on an issue as sensitive as this should have been implemented prospectively, but the system thought it best to introduce it retrospectively. The morally upright thing to do would have been to designate all those awardees that had earned the distinction for courage as Vayu Sena medal (Gallantry) with the others for “devotion to duty”.

But for reasons impossible to fathom, it was decided to revisit all the award citations some two to three decades after the events with none of the personalities of the time on the scene to assist in this bureaucratic sleight of hand! Two committees in the headquarters were tasked to examine all the citations of pre-1994 awardees and recommend in which category each should be placed. According to the air force, “the citations were critically examined in original and in true spirit” after which the air force certified to the defence ministry that 320 of these be converted to Vayu Sena medal (G). By this act Air HQ in its wisdom turned its back on some 130 air warriors of yesteryear, who had selflessly displayed courage for which



their then superiors up the chain of command to the supreme commander had accorded them recognition. In the moral and ethical space within which the armed forces live to a contract of unlimited liability to their country, this act of downgrading a citation for courage to one of devotion to duty, appears to this writer as sacrilegious.

For those so dishonoured (this writer admits to being one twice over) whose citation has been unilaterally downgraded by some administrative genius, the feeling of being stripped of an honour, duly accorded, is deeply humiliating and disturbing. One wonders if both the defence ministry and the air force chose to remain silent rather than to inform the awardees of their awards being so downgraded. Does one see in this a quality lacking in moral fibre? Worse still, what about those deceased whose widows and families are now learning that the military-civil bureaucratic system is so heartless that it does not hesitate to derecognise the courage of their loved ones even after death? Could not the families of the dead at least have been spared this humiliation?

On a professional plane, the action taken to downgrade a presidential citation, decades after the event, for administrative reasons is untenable. Equally, changing a citation of a presidential award without

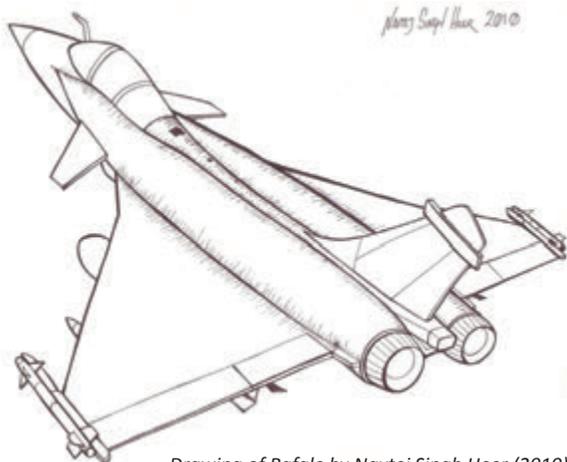
presidential review amounts to an irregularity undermining presidential authority. Finally, superseding a Gazette notification through administrative fiat will not stand legal scrutiny.

On the moral plane, how can a “critical examination in original and true spirit” by committees deny acts of courage some two or more decades after the happenings and in the absence of inputs from the then commanders and their entire higher chain of command, who were responsible for the recommendations in the first place? Does the air force leadership truly believe that this action of arbitrarily downgrading and dishonouring awardees retrospectively is in the finest moral traditions of the air force? What impact will this have on those who are displaying courage daily in the line of duty? Could they or their families suffer a similar fate decades hence?

Finally, there is an ethical dilemma. Are the service headquarters becoming handmaidens of the defence ministry bureaucracy and being driven to take steps that are not in line with the moral and ethical practices expected from their own rank and file? We have the recent case of the Augusta Westland helicopter where operational requirements were changed by the air force after pressure from external agencies. The present case seems to be another one !

## “MMRCA deal crucial for IAF”

Chief of the Air Staff Air Chief Marshal NAK Browne has articulated that the medium multi-role combat aircraft (MMRCA) programme, pertaining to acquisition of 126 aircraft at a cost of around Rs 45,000 crore, was crucial in the wake of the fact that MiG-21 aircraft were being phased out even after their extension in service to 2019-20.



*Drawing of Rafale by Navtej Singh Heer (2010)*

The CAS was addressing CAC commanders at Bamrauli on 22 April 2013. "To replace the phased out aircraft, it must be understood that we will need new aircraft by 2019-20. If the MMRCA deal is signed this year, we will be having adequate number of aircraft by the time the old ones are all phased out."

Maintaining that there was "adequate support" from the MoD and the government on the issue, the Air Chief said, "Everybody agrees this is the right approach. This will have to be done," he said. The Air Force Chief further added that the IAF would become a fully modernised and networked Air Force by 2022.



*Air Chief Marshal NAK Browne.*

According to various sources, over the past few months, MMRCA negotiations have reportedly hit 'roadblocks' with the French company Dassault, which will be providing the aircraft, seeking some changes in the terms of engagement with Hindustan Aeronautics Limited. In his presentation at the LM Katre Memorial Lecture at Bangalore, HAL Chairman Dr RK Tyagi said that the MMRCA programme will be a "challenge" for HAL, which will have to "master 12 new technologies and have to interact with 70 OEMs in France."

## Indian Navy's MiG-

Several years after the first MiG-29Ks were delivered to the Indian Navy at its premier naval air station INS Hansa in Dabolim, Goa, the designated squadron INAS 303 ('Black Panthers') were formally commissioned on 11 May 2013, the warrant read out by Captain Ajay Daniel Theophilus, first Commanding Officer of INAS 303. Defence Minister AK Antony inspected the squadron with personal lined up in front of the MiG-29K/KUBs at the squadron dispersal.

Earlier, special invitees had witnessed ceremonial salutes to the visiting FOC-in-C West, Vice Admiral Shekhar Sinha (who is also the 'Grey Eagle'), Vice Admiral Anil Chopra FOC-in-C East, Vice Admiral Satish Soni, FOC-in-C South before arrival of Chief of Naval Staff, Admiral DK Joshi. Following the Defence Minister's inaugural speech was a special flypast by all aircraft types with the Indian Navy, led



*Personnel of INAS 303 lined up with MiG-29K/KUBs at INS Hansa*



*Defence Minister AK Antony inspecting the parade along with Admiral DK Joshi, CNS*

# 29K squadron commissioned



MiG-29K/KUBs of INAS 303 lined up at squadron dispersal

by Chetaks and followed by Sea Kings, Ka-31s and Dhruv helicopters before the fixed wing element which comprised Kirans, Dornier 228s and single examples of the Il-38SD, and Tu-142M. Three Sea Harriers in close formation were followed by another two Sea Harriers flanking a MiG-29K which then pulled up and executed a 'Vertical Charlie'.

(Full report in next Issue of *Vayu*)



Defence Minister AK Antony receives plaque from Captain Theophilus, with Vice Admiral Shekhar Sinha at the centre



Captain Ajay Daniel Theophilus, CO INAS 303 with Rear Admiral Balvinder Singh Parhar, FONA/FOGA at the RM's Press Conference



Sea Harriers of INAS 300 peel off before MiG-29K of INAS 303 executes a vertical climb

## Reduced Defence Budget may impact on MMRCA

In its report for demands for grants (2013-2014) of the Standing Committee on Defence, the capital modernisation budget for the IAF has Rs 35,038.62 crores allocated for “Committed Liabilities” leaving only Rs 2010.44 crores for “New Schemes”. It can therefore be analysed that this will be completely inadequate to cover major procurements planned for this year. The MMRCA programme itself, which will cost upwards of \$12 billion would require approximately 10% of the contract value as advance and hence the \$372 million under “new schemes” can at best cater for other projects such as helicopters, radar and other equipment.

## Steady expansion in IAF Sukhoi Su-30MKI force levels

The Sukhoi Su-30MKI air-dominance fighter remains on track to become backbone of the IAF’s combat order of battle, with nine squadrons of a planned total of fourteen already in service, with a tenth due to be formed by end of this year. By 2017, the year by which all MiG-21 variants and MiG-27s (except for the MiG-21 Bison) are to be phased out, the 14-squadron Su-30MKI force level should have been achieved.



Photo by Simon Watson

The IAF has so far inducted over 170 of the 272 Su-30MKIs ordered, with two squadrons each equipped with the type based at Pune and Bareilly plus single squadrons at Tezpur, Chabua, Halwara and Jodhpur, which will be augmented by additional squadrons as they are received from HAL Nasik. A squadron will reportedly also be based at Sirsa.

Recently made public is that a Su-30MKI squadron will eventually be based at Thanjavur in Tamil Nadu, this new airbase being inaugurated by Defence Minister AK Antony on 27 May, to become the first combat airbase in southern India, with requisite techflight hangars, avionic bays, electronic labs, fuel and weapon

dumps, plus other infrastructure to be established in the next few years. According to reports, the IAF will meanwhile detach fighter and transport aircraft to Thanjavur, which will get its ‘permanent’ Su-30MKI squadron in 2017.

Meanwhile, the decade-old aircraft will undergo modernisation to the so-called ‘Super Thirty’ standard, with new radar, avionics and EW equipment, to ensure that the fighter’s capabilities remain at the cutting edge of modern warfare. Although not initially intended or designed to deliver nuclear or strategic weapons, reports suggest that an initial batch of 40 Su-30MKIs will be modified to carry the air-launched variant of the BrahMos supersonic cruise missile and possibly also the in-development *Nirbhay* long-range cruise missile.

## MiG-21s to continue in service till 2019-20

MiG-21 variants currently equip 12 frontline squadrons of the Indian Air Force (including six with the MiG-21 bison) and according to the RRM making a statement in Parliament in 2012, the last MiG-21 squadron would be phased out in 2017. However, Chief of Air Staff Air Chief Marshal NAK Browne has made a public statement at the Akash Air Force Officers’ Mess in New Delhi (during the launch ceremony on 20 April 2013, of the book commemorating 50 years of the MiG-21 in IAF service) that, in fact, MiG-21s will continue in service till 2018-19, or even a year beyond.



Photo by Simon Watson

Reiterating this when visiting Central Air Command at Bamrauli, two days later, the Air Chief confirmed that of the MiG-21 variants, the Type 77 (with the OCU) would be phased out in end-2014, while the remaining Type 96, Type 75 and the Bison would gradually be taken out of service between 2016-2019. The CAS emphasised that “To replace the phased out aircraft, it must be understood that we will need new aircraft by 2019-20. If the MMRCA deal is signed this year, we will be having adequate number of aircraft by the time the old ones are phased out.”

## Boeing

## Russia 'hopeful' of MiG-35 deal with India

Even as the 50th anniversary of MiG-21s in service with the IAF was being marked at a special event in New Delhi, Sergei Korotkov, CEO of Russian Aircraft Corporation (RSK) MiG, spoke about the company's cooperation with India and its plans for the future. In this context and answering a direct question on future co-operation between RAC-MiG and India, Mr Korotkov focussed on the MiG-35. "Despite conceding the tender to supply the IAF with 126 multirole fighters, RAC-MiG fulfilled all the requirements put forward by the tender



Sergei Korotkov, CEO of Russian Aircraft Corporation (RSK) MiG along with Col Michael Globenko DDG RAC-MiG at the MiG-21 book launch.

committee. The aircraft demonstrated good results, occasionally surpassing expectations. As part of the knowhow that India picked up in the course of the tender, I would like to see the MiG-35 continue to feature against the backdrop of our shared history and 50-year partnership. We expect India to consider the option of concluding a contract for the supply of the MiG-35, and we will be able to fulfil it!"

## T-50 FGFA design completed: "R&D contract soon"

According to reports from Russia, design of the fifth-generation fighter aircraft (FGFA), known variously as the T-50 in Russia and PMF in India, is moving forward and the design "fully developed". The Sukhoi Company and HAL, along with Rosoboronexport are expected to formalise the next steps by end-2013, which include comprehensive flight testing from 2014, integration of specific systems and weaponry, leading to its certification by 2017. The first T-50s will be delivered to the Indian Air Force in 2015-16 for intensive flight trials at Nasik.



Sukhoi T-50 prototype under construction

The government of India are allocating some \$35 billion for the FGFA programme, with 144 aircraft to be ordered.

## 'Red Flag' lowered in 2013

With the US economy in shambles and mandatory budget cuts, including deep cuts to defence spending in force from 1 April 2013 onwards (see 'Sign of the Times' in this issue), the US Air Force has had to drastically scale back training efforts, including large scale exercises such as the famed *Red Flag* meets, which are held at Nellis AFB near Las Vegas, Nevada. The Indian Air Force was scheduled to attend the July edition of the *Red Flag* exercise for the first time in five years (see *Vayu V/2008*) but with this called off, the eight Su-30MKIs, two C-130Js, two Il-78MKIs and one Il-76 earmarked to leave for the USA in late June 2013 have had to be stood down.



The government of India and the IAF have been careful in planning exercises and long overseas deployments, so as to control expenditure, but planning for *Red Flag 13-4* began two years ago and the cancellation has come as an unfortunate surprise for the Air Force.

## Dassault

## First P-8I for Indian Navy



The first IN Boeing P-8I makes its maiden landing at INS Rajali on 15 May 2013

The first of eight P-8Is (tail number IN321) landed at INS Rajali, the Indian Naval Air Station at Arakkonam in Tamil Nadu shortly before noon on 15 May 2013, the crew including Commander HS Jhajj, Officer-in-Charge, P-8I. The formal induction ceremony was presided over by Vice Admiral Bimal Verma, Chief of Staff, Eastern Naval Command and attended by Commodore Puneet Bahl, Commanding Officer, INS Rajali, along with representatives from the Command and Integrated Headquarters, Ministry of Defence (Navy).



Vice Admiral Bimal Verma, Chief of Staff Eastern Naval Command receives Commander HS Jhajj, Officer-in-Charge P-8I project.

The P-8I aircraft is based on the Boeing 737-800(NG) airframe and is the Indian Naval variant of the P-8A Poseidon that Boeing has developed for the US Navy. The aircraft is equipped with sophisticated sensors for maritime reconnaissance, anti submarine warfare and electronic intelligence missions. The P-8I



Tupolev Tu-142M (Bear-Foxtrot) of INAS 312 during flypast over Dabolim.

has eleven 'hard points', for weapons carriage, two under each wing for Mk.82 depth bombs or anti-ship missiles (Harpoon) plus five Mk.54 torpedoes (manufactured by Raytheon) inside the weapons bay. There are two hard points at front for SAR equipment or additional depth bombs. (see *Vayu* Issue VI/2012).

An initial eight P-8Is are on order with another four on option. The second and third aircraft will be delivered in August and November 2013 while the balance five will arrive in 2014-15. The P-8Is will be operated by a separate Flight of INAS 312 'Albatross' from INS Rajali alongside the remaining five Tupolev Tu-142Ms of this Squadron.

## More orders for HAL-Dornier 228s

HAL's Transport Aircraft Division (TAD- Kanpur) has so far produced 116 Dornier 228s and has recently received orders for another four aircraft from the Indian Coast Guard, raising its inventory to 40 Do-228s. Meanwhile, with 16 Do-228s ordered by the Indian Air Force, the IAF too will have 40 of these aircraft, which are operated for light logistic tasks and staff transportation. The type is also extensively employed for multi-engine conversion training at Yelahanka.



Photos by Angad Singh

The Indian Navy operates some 24 HAL-Dornier 228s for specialist maritime tasks including reconnaissance and information warfare. Single examples of the HAL-Dornier 228 have been supplied to 'friendly' countries such as the

Seychelles, while the Mauritius Coast Guard have operated the type for several years. There is a sizeable potential export market for the HAL-built light transport aircraft including to the Philippines, Vietnam, Thailand and Venezuela.

## WAC Station Commanders' Conference

In his address to commanders of all formations under Western Air Command and Principal Staff Officers of WAC, Air Marshal Arup Raha, AOC-in-C Western Air Command on 25 April 2013 stated that, "The accelerated pace of development of operational infrastructure and new inductions have helped the Command to achieve enhanced firepower and consequently a high level of operational preparedness. The dedication and commitment displayed by our personnel in making the newly inducted Su-30, C-130J and MI-17 V5 squadrons, air defence sensors and communication systems fully operational in a short span of time, deserves appreciation. These latest inclusions into the Command arsenal have increased our potency manifold and catapulted our offensive potential to newer heights". He added that the IAF



was fast becoming a technology-driven, network-centric force, boasting of an impressive array of technological acquisitions. Moreover, he felt that in order to effectively contribute in this transformational phase of the IAF, the Commanders needed to have an absolute clarity of vision, single-minded approach to mission accomplishment and right prioritisation of tasks.

Emphasising the need for maintaining a balanced perspective amidst this rapid capability enhancement, he said that the technological advancements in the IAF demanded high standards of technical expertise and an excellence oriented approach from all our personnel. He said that in order to exploit our fighting potential to the fullest, we need to concentrate our efforts towards qualitative improvement of the workforce in terms of professional skills and acumen. "We must commit ourselves to a progressive

growth in professional efficiency of our personnel through continued training and by affording opportunities for significant exposure and experience", he remarked.

Acknowledging the collective efforts of the stations in meeting the increasing operational demands of this Command, he said that the emerging security environment of the region calls for persistent focus and relentless vigil. He said that optimum utilisation of our resources and safety and security of our valuable assets would give us an advantage as a cutting-edge fighting force and would augment our endeavours in meeting newer and bigger challenges.

During the tenure of this Conference, the Commanders focussed on key issues such as operations, infrastructure development, inductions, aerospace safety and human resource development. Jointmanship with the three affiliated Army Commands was also discussed and reviewed to bring greater synergy in air-land operational plans and concepts.



Defence Minister AK Antony with IAF Commanders during the Air Force Commanders' Conference held at Air Headquarters (Vayu Bhawan), New Delhi on 16 April 2013.

## Defence Procurement Procedure 2013 hailed by FICCI

The Federation of Indian Chambers of Commerce and Industry (FICCI) has welcomed the announcement by MoD of the Defence Procurement Procedure (DPP) 2013 as "a major step forward". The Defence Acquisition Council (DAC) has laid emphasis on indigenous development and self reliance in defence production. These include preferential treatment to categories of procurement, favouring indigenous development and domestic manufacturing, rationalisation of taxes and duty structure so as to create a level-playing ground for the private sector and sharing public version of the Long Term Integrated Perspective Plan (LTIPP) amongst a host of other steps.

"Clarity in the definition of indigenous content and resolution of issues related to taxes and duties with respect to the private sector are welcome steps. Industry will look forward to the fine print and hopes that issues related to loading of taxes and duties on Indian offset partners where system integration is done within India by the private sector as also domestic industry being granted purchase preference over foreign OEMs are addressed", said Dr A Didar Singh, Secretary General, FICCI.

## India ranked 8th amongst 'most powerful nations'

According to a study conducted by the New Delhi-based Foundation for National Security Research (FSNR), which judged "national power" by various indices, including energy security, population, technological capability, India is among the top "10 most powerful countries in the world" amongst a group of 27 most powerful nations.

This had an interesting index of national power, judged by "foreign affairs capability", which included self-reliance in defence, membership of multilateral groupings, role in global rule-making and soft power. Interestingly, though China comes out as the second most powerful nation in the world after the US, Chinese foreign affairs' capability is comparable to India's, even though in terms of total power New Delhi comes way below Beijing.

Professor Satish Kumar, introducing the study, said, "The Group of Experts evolved a criterion consisting of the following elements for the selection of countries which could be regarded as actually or potentially the most powerful: Population above 50 million; GDP above \$ 500 billion; and defence expenditure above \$ 5 billion."

The US is by far the world's most powerful nation, several notches ahead of its nearest competitor, China. The study observes, "China is still much lower than the US in energy security, technological capability and foreign affairs capability. Even in economic and military fields, the indexed value of China's capabilities is much lower than that of US. Therefore, any notion that China will pose a threat to the supremacy of the US in the near future has to be tempered with caution."

According to the study, "India's economic capability stands at the eighth position and military capability at the seventh position. In technological capability, it ranks low, at the 17th position, and in energy security still lower at 20th position." Despite boasting a formidable array of foreign policy experts, the study found that in foreign affairs capability, India holds the 11th position and has a long way to go "(to) be able to discharge responsibilities commensurate with its large size and geopolitical importance."

India ranks very low in "military equipment, power projection, cyber and space security, as well as in its capability pertaining to doctrinal issues. Again, with regard to technological capability, particularly in the area of control over critical technology, India ranks extremely low."

## RFP issued for 'Avro' replacement

On 10 May 2013, the MoD issued RFPs to eight designated aircraft companies, inviting bids for 56 medium transport aircraft to replace the IAF's ageing fleet of HAL-built (Avro/Hawker Siddeley) 748s. Over the period beginning in 1961, HAL's Kanpur Division manufactured 89 'Avros' mostly for the Indian Air Force, while 17 were delivered to the erstwhile Indian Airlines, which in turn transferred some to the Border Security Force and Indian Coast Guard.



According to the MoD, the intention is "to ensure inflow of production technology to the selected Indian Production Agency IPA in phases, wherein the value addition in the manufacture by the IPA will gradually increase from 30% to 60%. The IPA will also obtain the Transfer of Technology for Maintenance (MToT) which will enable the IPA to provide lifetime product support and maintenance up to Depot level."

## Distinguished Service Awards to IAF officers



Air Marshal Arup Raha receiving the PVS Medal from President Pranab Mukherjee.

The President of India presented distinguished service awards to eleven Indian Air Force officers at the Defence Investiture Ceremony on 27 April 2013. Air Marshal Arup Raha, AVSM VM ADC along with recently retired Air Marshal Anil Chopra were awarded the Param Vishisht Seva Medal (PVSM).

The Ati Vishist Seva Medal (AVSM) were given to Air Marshals HB Rajaram and BBP Sinha, as also Air Vice Marshals DK Pande, RK Singh Bhadauria, Sardar Harpal Singh and Air Commodores Manavendra Singh, Ashwini Kumar Nabh, RN Gaekwad and Radhakrishna Radish.



*Marshal of the Air Force Arjan Singh DFC with Dr Manmohan Singh, Prime Minister of India and General Bikram Singh, Chief of the Army Staff, at Rashtrapati Bhawan on 27 April 2013.*

**Nexter**

## Anand Sharma moots higher FDI in Defence

Commerce and industry minister Anand Sharma has been promoting an increase in foreign direct investment in the defence sector, which is currently restrained to 26%. According to an official, “a composite view on FDI issues in various sector including in defence can only be taken after High level consultation, taking in the views of all stakeholder on a discussion paper and after the input from the relevant ministries and departments”. A formal cabinet note on the issue would be prepared only after these consultations.

“We (should) look at each FDI cap. If the cap is serving a purpose, we should continue with the cap, if the cap is no longer serving the purpose then we should either relax the cap or remove the cap...The FDI caps were laid down historically at different points of time...we are now into 22nd year of liberalisation...These caps must be looked into again,” Finance Minister Chidambaram had said at an earlier occasion. The panel is expected to finalise its recommendations by May.

## Night Fighting Capability (NFC)

“There is a need to change the approach from ‘acquiring technology’ to ‘development of technology’ in order to achieve desired level of indigenisation and the aim should be to equip the Indian Armed forces with state of the art equipment to bring them at par with the world leaders,” stated RRM Jitendra Singh, while inaugurating a two-day Seminar on Night Fighting Capability at DRDO Bhavan, on 25 April 2013. He was addressing senior officials from armed forces, production agencies, industry from India and abroad and scientists from DRDO and academia. Appreciating the strides made in indigenous design and development and production of equipment to enhance night fighting capabilities, Jitendra Singh also emphasised the need of greater synergy among different stakeholders in the process of development, being the DRDO, Public sector and private industry. Stressing on the need to further improve indigenous capabilities in this area, he said, “We are facing incursions from across the land borders and there is need to have early warning systems to handle such situations more effectively.”

Tracking the development of night vision devices by DRDO from its earliest days, Dr. V K Saraswat, Scientific Adviser to Defence Minister, Secretary Deptt. of Defence R&D and DG DRDO highlighted the achievements of DRDO in the field of electro-optics. He also mentioned about the development of ‘Thermal Imaging’ based commander’s sight for T-72 and T-90 tanks as well as BMPs, thus encountering problems caused by the ‘night blindness’ of these Armoured Fighting Vehicles. Mentioning about the progress made by IRDE in this critical area, he gave the example of recently developed Integrated Multi Functional Sight that weighs within 3.5 kg, as compared to the 1st generation devices of similar nature that used to weigh around 55 kg.

Delivering the keynote address, Lt. Gen. SK Singh, Vice Chief of Army Staff briefed about the Army’s acquisition plans for the next decade and hoped that DRDO would match the

expectations of the armed forces. The partnership of private industry could be crucial, he emphasised. The Services today are looking for innovative technological solutions to stay ahead of their adversaries. Sensor Fusion in Electro Optics /Infra-Red bands and network centric operations will be the order of the day in future military operations.

In his special address, Anil Kumar, CMD, BEL put forth the industry’s perspective. He assured that BEL centres were always ready to support the indigenisation efforts of the country and would deliver the quality instruments in time to the armed forces.

## Commissioning of new Coast Guard ships

The Indian Coast Guard has commissioned a number of new vessels in April-May 2013. On 9 April 2013, Indian Coast Guard Ship H-191, the fifth of the series of twelve Air Cushion Vehicles (ACVs) built by Griffon Hoverworks of the UK was commissioned at Mumbai by Vice Admiral Anurag G Thapliyal, AVSM Director General Indian Coast Guard.

On 22 April 2013, Indian Coast Guard Ship Rajdoot, the sixth in the series of eight Inshore Patrol Vessels (IPVs) designed and built by Garden Reach Shipbuilders and Engineers was commissioned at Kolkata by Arunava Dutt, IDAS, the Controller General of Defence Accounts.



In the third week of April, Indian Coast Guard Ship C-402, the second of the series of thirty-six Interceptor Boats designed and built by Larsen&Toubro, Surat was commissioned at Mumbai by Sanjeev Dayal, IPS, Director General Police, Maharashtra. This was followed on 27 April by commissioning of Indian Coast Guard Ship C-425, at Paradip by Bijaya Kumar Patnaik, IAS, Chief Secretary, Government of Odisha.

On 9 May 2013, ICGS *Rani Avantibai*, an Inshore Patrol Vessel (IPV), second in the series of five IPVs designed and built by HSL, was commissioned on 9 May 2013 at Visakhapatnam. The IPV is equipped with the “most advanced and sophisticated navigational and communication sensors and equipment”. The ship is propelled by three MTU 4000 series Diesel engines of 2720 KW capacity at 2100 rpm each coupled with three 71S2 Rolls Royce Kamewa Jets to a maximum speed of 31.5 Knots.

With the commissioning of these vessels, force level of the Coast Guard has increased to 82 ships and boats and with near-future planned inductions, force levels would double by 2018.

### IAC-I launch on 12 August 2013

Defence Minister AK Antony has announced that India's first indigenous aircraft carrier (IAC-I) being constructed at Cochin shipyards will be launched on 12 August 2013. The Minister was holding a press conference in Goa after the commissioning of INAS 303, the Indian Navy's first MiG-29 K squadron.



IAC-I under construction.

Most likely to be named INS *Vikrant*, this was formerly known as *Project 71* or *Indigenous Aircraft Carrier (IAC)*, which are being built by Cochin Shipyard Limited (CSL), the largest warships as well as the first aircraft carriers to be designed and built in India. The first ship of the class INS *Vikrant* will displace about 40,000 metric tons (39,000 long tons), be 262 metres (860 ft) long and have a tailored air group of up to thirty aircraft.

Preparations for building the lead vessel of the class started in 2008, and the keel was laid in February 2009. The carrier was floated out of its dry dock on 29 December 2011. The scale and complexity of the project caused problems which delayed the commencement and timeline of construction for the carrier. Technical difficulties, the huge cost of refitting the Russian-built carrier *Admiral Gorshkov*, and billions in cost overruns has seen the lead vessel now entering service in 2017 rather than a previous in service date of 2014. Additional problems which led to the delay included the inability of Russia to supply the AB/A grade steel. Finally, the DMRL and SAIL created facilities to manufacture the carrier-grade steel in India.

### Cryogenic Engines from HAL

On 27 April 2013, Dr. K. Radhakrishnan, Chairman, Indian Space Research Organisation (ISRO) stated that the manufacturing facilities for integrated cryogenic engines will be established at HAL's Aerospace Division in Bangalore. Delivering the seventh LM Katre Memorial Lecture "Indian Space Programme: Emerging Frontiers" at HAL Convention Centre he said that HAL will continue to play an important role in the future programs of ISRO.

In his speech, Dr RK Tyagi, Chairman, HAL stressed that creativity and innovation are key to success in aerospace sector. He said HAL is the biggest investor in defence R&D in India as it spent about 12 percent of its turnover on research activities, far ahead of other PSUs and private players. Dr. Tyagi also said civil aircraft development should be a national priority as India is slated to emerge as the third largest aviation market by 2020.



Dr RK Tyagi, Chairman, HAL speaking at the Katre Memorial Lecture held at HAL Convention Centre, Bangalore. Dr K Radhakrishnan, Chairman ISO (second from right) is also seen alongwith Mr PS Krishnan, Director ADE.

Not only this, India has the potential to be an maintenance, repair, and overhaul (MRO) hub due to the growing aircraft fleet, location advantage and availability of cost effective talent. With established quality systems, infrastructure, dedicated overhaul division, etc. HAL can contribute in a big way in all these segments, he added. Mr. P.S. Krishnan, Chairman, Aeronautical Society of India (Karnataka chapter) also spoke on the occasion, largely focusing on the role of DRDO.

### Jet sell 24% equity to Etihad

In a watershed move, Jet Airways board has cleared 24% preferential allotment of shares to Etihad Airways of Abu Dhabi, for which the latter will pay some \$380 million (Rs2050 crore). Etihad will get two board seats while Mr Naresh Goyal will retain 51% stake and continue as non-executive chairman of Jet Airways. Etihad (which means unity in Arabic), will additionally take majority shares in JetPrivelege, which is the frequent flier subsidiary of Jet Airways, for \$150 million. Almost immediately after the Jet-Etihad deal, India and Abu Dhabi agreed to increase their weekly flying rights four times by allowing airlines to add 36,670 seats over the next three years. Etihad and Indian carriers, including Jet, can now hike their weekly capacity by 11,000 seats by 2013-end.

Earlier, Etihad had acquired stakes in other airlines including Air Berlin, Air Seychelles, Aer Lingus and Virgin Australia Holdings, with Etihad President and CEO James Hogan, credited with many unconventional strategies. As he says, "Etihad is looking at airlines worth saving and investing in, then striking deals to gain access to those markets without having to use their own assets or airplanes."



Naresh Goyal and James Hogan after signing the deal.

## India Aviation 2014 announced



Mr Ajit Singh and Naina Lal Kidwai lighting the lamp at the function.

Being organized by FICCI, and supported by the DGCA, AAI, Pawan Hans and Air India, the 4th International Exhibition & Conference on Civil Aviation was 'launched' at a function in New Delhi on 3 May 2013, where Mr Ajit Singh, Minister of Civil Aviation was Chief Guest.

The event is scheduled to take place at Begumpet Airport in Secunderabad (Hyderabad) from 12-16 March 2014, this venue now virtually synonymous with the show. In her welcome address, Ms Naina Lal Kidwai congratulated the Minister for major policy decisions including clearance for foreign carriers to pick up 49% stake in Indian airlines, direct import of ATF by airlines, liberalizing the acquisition of aircraft by abolishing 'Aircraft Acquisition Committee' which will give impetus to the growth and expansion of airlines in India and other policy measures for providing affordable air connectivity to remote and interior areas of the country.

In his address, the Minister of Civil Aviation Mr Ajit Singh announced that considerable emphasis is being given to Civil Aviation infrastructure expansion in the 12th and 13th Plan period (2012-2022). So as to facilitate expansion, several industry-friendly policies have been introduced and regulatory reforms announced to encourage private participation and investments in the sector.

The air transport network is sought to be expanded manifold so as to handle 336 million domestic and 85 million international passengers by 2020, making India the third largest aviation market in the world. An investment of \$ 12.1 billion in the airports sector would cater for new airports, expansion and modernisation of existing airports plus supporting infrastructure and air navigation services.

Various airlines are expected to add another 370 airliners (worth \$ 37.5 billion) by 2017, expanding the total fleet to over 1000 aircraft by 2020. In addition it is forecast that 1000 general aviation aircraft will be in service by 2020. Significant measures are underway for providing 'affordable' air services to remote and hitherto unconnected areas of the country, particularly in the north eastern region as also Tier-II and Tier-III towns.

### Civil Aviation programmes of the future

Minister of Civil Aviation Ajit Singh, has said that efforts will be made to get HAL's Advanced Light Helicopter (ALH-Dhruv) certified by Federal Aviation Administration (FAA) in the near future. Inaugurating the FAA - Asia Pacific bilateral partners' meeting hosted by HAL on 16 April 2013, the Minister felt that a mechanism needs to be evolved to benefit the bilateral countries involved in such agreements so that they could export or import aeronautical parts mutually. Meanwhile, it is learnt that the ALH is midway in obtaining the European EASA certification which is likely to be received in the second half of 2014.

Mr Ajit Singh also confirmed that "we also have a national civil aircraft development programme for 100-seat medium transport aircraft. Some of the country's leading aeronautics and space scientists are spearheading the project".

Dr. RK Tyagi, Chairman HAL said that the Company had been focusing on military aviation but now plans to diversify into civil market. "We have made a humble beginning with the Dhruv civil variant as an offshoot of the military programme. We now propose to play a leading role in India's national civil aircraft development programme as we have dedicated facilities at our transport division in Kanpur", he added.



The international participants with the Civil Aviation Minister, Ajit Singh at HAL's Ghatge Convention Centre in Bangalore on 16 April 2013.

### AirAsia India to launch operations

**A**irAsia India, the newly established low cost carrier LCC involving the Tata group, Malaysia-based AirAsia and another Indian investor, have filed an application with the Civil Aviation Ministry seeking permission to formally start operations later in 2013.



Tata Sons has nominated R. Venkatraman, former executive assistant to Ratan Tata, and Bharat Vasani, chief legal counsel of the Tata group, on the board. AirAsia would be represented by Tony Fernandes and Kamarudin Bin Meranun, who are among the largest shareholders in AirAsia Bhd, while Arun Bhatia would represent Telstra Tradeplace. The joint venture received a formal approval from the Foreign Investment Promotion Board earlier this month to set up the company.

The airline will have an initial small fleet of Airbus A320s and commence services in southern India.

### Promoting regional air connectivity

**T**he Ministry of Civil Aviation have revived plans to boost regional air connectivity from 89 small towns that either have small airports or airstrips, the ministry planning to provide subsidies to airlines for initiating such services. For this, the existing route dispersal guidelines (RDG) that mandate that airlines fly a certain percentage of their flights to the northeast, Kashmir and some other areas may be phased out in the next two to three years.

"We expect an annual subsidy of Rs 400 crore would be required for airlines for flying to these otherwise commercially unviable areas. To fund this, a reasonable cess of about Rs 50



HAL-Dornier 228 at Cochin airport.

will be levied on all domestic tickets. There will be a bidding process for the flights linking the small towns to bigger cities. Airlines with lowest viability gap funding would be given those routes," said a senior official.

The ministry will not 'force' airlines but 'nudge' them to provide such regional connectivity, which will logically require them to operate small turboprop airliners. It may be recalled that Vayudoot was set up in the 1980s for just such services but lack of policy and control on expansion without basis and infrastructure soon meant that this IIIrd Level airline went into financial bankruptcy and had to be merged with Indian Airlines. This time around, the ministry is more circumspect: "the next round of growth will come from small town India. Big metro airports have high charges, including airport user charges. The model we are designing will ensure a steady flow of flyers from small towns. Since subsidy will be provided, there will not be dynamic ticket pricing but steadily low fares," said the official. "While states will not have to bear the subsidy burden, they too will have to chip in to ensure good regional connectivity".

### Air India recommences Dreamliner flights

**O**n 10 May 2013, Air India started initial test flights of its Boeing Dreamliner after the aircraft had been fitted with new battery packs and cleared by DGCA, the regulatory authority. The Boeing 787s were grounded earlier in January 2013 after certain critical battery problems in the fleet operated by other airlines around the globe. Upon completion of the battery improvement tasks by the Boeing team, Air India's Dreamliner took off from Mumbai in a flight to New Delhi, back-tracked to Mumbai and then a round trip to Ahmedabad that formed part of pilot training. The 787 Dreamliners are also being test flown between Delhi and Amritsar.



### Other Gulf airlines interest in "acquiring" Indian carriers

**G**ulf carriers Qatar Airways and Air Arabia are most likely to invest in Indian carriers following the lead of Etihad, which acquired a 24% stake in Jet Airways for Rs 2,058 crore in April 2013. Qatar is learnt to be looking at investing in an existing Indian carrier with SpiceJet and GoAir being the obvious targets. However, there are no indications that IndiGo has any interest in diluting their stakes.



Reliable sources had indicated that Kingfisher Airlines, presently in suspension, had earlier approached Qatar Airways to sell equity but this did not progress. Meanwhile, Sharjah-based LCC (low-cost-carrier) Air Arabia is exploring options of tying up with an Indian partner for investing in a new start-up such as the AirAsia India JV between the Malaysian budget carrier and the Tata Group.

The Jet-Etihad deal has led to the grant of massive flying rights between India and Abu Dhabi, giving a push to Etihad, which in 2011-12 still displayed modest performance. With the Jet Airways deal, it's a win-win situation as described by an industry source: "The problem was for Etihad as it could not get more capacity to India and increase its market share. The Jet deal will catapult it to the top and make it compete directly with Emirates. Qatar could also follow the same route." While Emirates has 185 flights a week from 10 cities, Qatar has 95 flights per week from 12 cities and Etihad has 63 flights a week to nine cities, a figure which will be ramped up fast.

## Air India to emerge as "cash surplus company" next fiscal

Air India is likely to emerge as a "cash surplus company" in the next financial year with a net earning of over Rs 1,000 crore because of high passenger revenue and sale and lease back of Boeing 787 Dreamliners. In mid-March 2013, the Air India board finalised the annual budget for 2013-14, weeks after government approved the equity infusion of Rs 5,000 crore.

"The company is expected to be EBITDA (Earnings before Interest, Tax, Depreciation and Amortisation) positive in the year 2013-14 by about Rs 1040 crore," an Air India official has stated, which is owed to an increase in operating revenue by Rs 3,235 crore as a result of increase in capacity by 24 per cent. "The total revenue next year is budgeted at Rs 19,393 crore, which is an increase of 20 per cent over the previous year," the official added.

The Board had also approved the sale and lease back proposal for the Boeing 787 and sale of Boeing 777-200 LR aircraft which would bring down the overall costs for Air India. In the financial year 2013-14, the passenger load factor is expected to be around 72.5 per cent on the network, which is better than that envisaged in the Turnaround Plan (TAP). The airline is expected to carry 16.12 million passengers in 2013-14, a growth of 14.7 per cent vis-a-vis 2012-13. Air India also plans to operate new air links in 2013-14 on the domestic and international sectors, besides improving connectivity from Delhi to tier II and tier III



cities. Meanwhile, the national carrier is planning to expand to Australia, more destinations in Europe as well as to South East Asia in the next fiscal.

## Jet Airways lease Boeing 777s to Turkish Airlines

Even as Jet Airways are in the process of finalising a stake sale deal with Etihad Airways and plans to extend its code share agreement with the Abu Dhabi-based carrier to the Mumbai-Brussels-Newark route, the airline is to dry lease three of its Boeing 777s to Turkish Airlines.

According to an airline executive, "We have five Boeing 777s on lease with Thai Airways. Three of these aircraft are completing the lease period by June-July. We have entered into an agreement with Turkish Airlines for one year dry-lease," he said. The remaining two aircraft will come back to the airline by October-November, he said adding, "These planes will be used on Jet network."

## 55th million passenger milestone for SpiceJet

SpiceJet reached its 55th million passenger milestone on 7 May 2013, encouraging the airline's CEO Neil Mills to thank the airline's "esteemed guests, who chose SpiceJet as their preferred airline". SpiceJet began operating in May 2005 and currently has a 20.4% of market share in Indian domestic market. The airline currently operates more than 350 daily flights to over 45 Indian cities and 8 international destinations and the fleet strength comprises 37 Boeing 737-800/900ER and 15 Bombardier Q400 airliners.



## **The Indian Defence Budget 2013-14** (based on an analysis by Dr Laxman Kumar Behera)



### **Downward Revision of Defence Budget 2012-13**

Although the defence budget 2013-14 has been increased by a modest 5.3%, the growth rate still is a hefty 14.1% over the revised allocation for 2012-13. The difference in these growth rates is due to cut of \$2.7 billion (or 7.7%) from the original allocation for 2012-13. Of the total reduction, 67% is accounted for by capital expenditure (most of which is spent on modernisation) which has been cut by \$1.8 billion (12.6%). Of the total reduction in capital expenditure, 65% is accounted for by the Navy whose modernisation budget has been reduced by \$1.2 billion (26.9%), partly because of slippage of delivery of the aircraft carrier INS Vikramaditya by almost one year, to late 2013. The revenue expenditure (or the running or operating expenditure) on the other hand is revised downward by \$0.9 billion (4.3%).

### **Share of Army, Navy, Air Force, DRDO and OFs**

India's official defence budget is meant for five main organisations that include the three armed forces (Army, Navy and Air Force), the state controlled Defence Research and Development Organisation (DRDO) and the 40-odd Ordnance Factories (OF). Among the organisations, the Army with a budget of \$18.3 billion accounts for 49% of total 2013-14 defence budget. The Air Force follows the next with a budget of \$10.6 billion (28.2 per cent). The Navy, the smallest service among the armed forces, has a budget of \$6.7 billion (17.8%). The allocation for DRDO's 50-odd laboratories is pegged at \$1.9 billion (5.5%); the Ordnance Factories have a reduction of \$0.1 billion. Among the armed forces, the Air force has received a lift of 19.3% over the previous year's allocation, whereas the Army has only a 2.5% hike. On the other hand, the Navy's budget has actually been cut by 2.6%.

### **Impact on modernisation**

The Indian armed forces are on a massive modernisation process. Besides the existing ones, contracts worth several billion dollars are expected to be signed in the current financial year. Among the services the Air Force - the most capital intensive service - is expected to sign the much awaited \$15-20 billion contract for 126 French Rafale fighters. The first 18 will come in fly-away condition from France and the remaining 108 will be licence manufactured by Hindustan Aeronautics Ltd (HAL). Besides the Rafale, the air force has already selected prospective supplies for at least three more

big contracts: 22 Boeing AH-64D Apache Longbow attack helicopters (\$1.2 billion); 15 Boeing CH-47F Chinook heavy lift helicopters (\$1.4 billion), and six Airbus A330 Multi Role Tanker Transport (\$1.0 billion), all of which are expected to be contracted for in the near future. The Navy is also expected to sign the \$1.0 billion contract for 16 multi role helicopters which is at advance stage of vendor selection. The Army is hoping that its much delayed artillery modernisation programme finally gets going in 2013, with the contract in place for 145 units of BAE Systems' M777 155 mm/39 calibre light weight howitzers (\$647 million). The army was also expected to choose between the Kamov Ka-226T and Eurocopter AS 550 C3 Fennec for its 197 helicopter tender, valued at \$550 million (but, again, the helicopter programme has run into controversy with MoD reportedly deferring the decision pending "investigations") and there is no clear way ahead.

Given the long-list of new acquisitions, the question is how much the new defence budget caters to it. It is noteworthy that most of India's defence modernisation budget is spent on 'committed liabilities' (contracts already signed) with little money available for the 'new schemes' (or new contracts). For instance for the years from 2011-12 to 2012-13, the overall ratio between the committed liabilities and new schemes stands at roughly 85:15. Assuming the same ratio for the new allocation, total available funds for the new schemes would be little over \$2.0 billion, which is probably enough for the first stage payment towards the Rafale deal.

This means there is a very little money available for new schemes including of the Air Force, which despite having a 30% hike in its modernisation budget would still need more money to sustain its modernisation drive. The attack and heavy lift helicopter programmes and the tanker deal may well be postponed, if additional money does not come forth. For the Army and Navy, the resource constraint is more severe, with the negative growth in their respective modernisation budgets. Between the latter two, the Navy is likely to face the resource crunch most. A part of its last year's modernisation budget, which remained unutilised due to the postponement of delivery of Admiral Gorshkov, would be paid this year. Considering that Navy has already placed orders for construction of over 40 ships (for which substantial part of its modernisation budget will be used), this leaves little money for signing new contract.

# GLOBAL PLAYERS IN INDIAN SKIES



Jet Airways A330.

## Recent developments in civil aviation

**D**ecoding the Jet-Etihad deal, we begin by examining some vital statistics behind the joint venture: as per the agreement, Jet Airways will sell a 24 per cent stake to Abu Dhabi-based carrier Etihad Airways for about Rs 2,058 crore, which entails that Jet will sell 27.26 million shares in a preferential offer to Etihad at Rs 754.74 apiece. The sale price is 31.7 per cent higher than Jet's last traded price of Rs 573.85 on the BSE.

Setting a worthy precedent following the relaxed norms in terms of foreign investment in the private sector, Jet Airways has thus become the first Indian airline to benefit from these. The aviation sector has been steeped in losses. Airlines have strived to continue operations and some have nearly wound up. Indian carriers have been on a hunt for global investors ever since the government opened the sector to 49 percent foreign direct investment in September 2012.

Aviation experts are increasingly buoyant about this positive development. "This is a welcome deal and a good step for future investment," remarked Captain

Gopinath, the founder of Air Deccan. The aviation industry in India has lost over \$10 billion in the past six years and Indian carriers need funds for expansion and to clear large debts from their balance sheets. Kapil Kaul of the *Centre for Asia Pacific Aviation* cites three ills ailing the sector: a negative cost regime; poor regulatory framework in the civil aviation sector; and lack of planning for developing infrastructure, which coupled with a drop in passenger traffic, following the global economic downturn, Indian airlines have been struggling to manage operations.

According to aviation expert Cyrus Guzder, this deal appears to be 'godsend' for Jet, which has faced stiff competition from IndiGo and SpiceJet in the domestic circuit and has borne the brunt of opulence on its international flights. But, if Jet moves to Abu Dhabi from its present global hub in Brussels, it is bound to lose international traffic to Etihad. However, this may well turn out to be a blessing given that Jet desperately needs to refocus its attention on the Indian market, which is its mainstay. "If Jet keeps expanding

international flights and continues to get hurt in the domestic market, it's no good for them," Guzder adds.

However, travellers will now have a choice of flying from smaller cities directly to Abu Dhabi and thereon to any of the carrier's global destinations. There is also expected to be a price war between Etihad and its Gulf competitor, Emirates, as both will be competing for the same Indian passenger who will be the ultimate beneficiary.

The government has agreed to give Etihad this permission to fly to 11 more cities in India in addition to the nine it already flies to; both Etihad and Jet will get an additional 37,000 seats a week, up from the present 13,000. Jet plans to connect close to a dozen mid-sized and smaller cities of India to destinations across the world through Etihad's home base of Abu Dhabi, which will inevitably become the new hub for the Indian carrier.

"People from Tier 2 and 3 cities will see enhanced global connect, which may give a fillip to trade and tourism in those locations. They can expect more



*Etihad Boeing 777 (photo: Greg Kieca)*

competition, better regional connectivity, higher efficiency and lower fares,” says Amber Dubey, Partner and Head-Aviation at global consultancy firm KPMG. Within three years from now, Jet Airways plans to connect 23 cities to the world through Abu Dhabi. The cities include Patna, Baroda, Jaipur, Lucknow, Kozhikode, Amritsar, Baroda, Jaipur and others, including the metro cities. A Jet Airways source said that there are plans to induct 54 new aircraft over a period of three to five years to support their expansion plans.

The year 2013 is also going to witness the much-hyped entry of Tata-Air Asia alliance in the budget carrier space. In early March 2013, the Foreign Investment Promotion Board (FIPB) cleared the investment proposal of Malaysian budget carrier AirAsia to launch a new airline in partnership with the Tata Group and Arun Bhatia’s Telestra Tradeplace. AirAsia, through its investment arm, AirAsia Investment Ltd (AAIL), intends to own 49 per cent in the new airline with the remaining stake held by the other two Indian entities.

Soon after FIPB cleared AirAsia’s proposal, the civil aviation minister sought clarity on the FDI policy in the aviation sector which allowed such investment in an existing Indian carrier and not a new one. “The commerce ministry should change the rules to bring about clarity. Overall, I don’t see a problem in the AirAsia joint venture (JV). Our ministry will see that the joint venture adheres to the laid-down rules,” Mr Ajit Singh said.

AirAsia will be the first foreign carrier to enter India’s civil aviation sector since the government changed its rules in September 2012 to allow foreign carriers pick up to 49 per cent stake in domestic airlines. Chairman Emeritus Ratan Tata emerged from recent retirement to meet civil aviation minister Ajit Singh, while a high-level team of the Tata Group and AirAsia executives met senior ministry officials to fast-track clearances. Tata Sons, holding company of the \$100 billion salt-to-software conglomerate, would hold 30 per cent in the joint venture but will not have any operating role in the airline, while Telestra Tradeplace would hold 21

per cent stake. This now marks the return of Tatas to the aviation sector.

AirAsia will thus be a 49:30:21 JV with Tata Sons and Telestra Tradeplace to launch the new airline, with initial investment of the AirAsia led joint venture, which would be around Rs 80 crore. AirAsia is planning to start flying operations from June 2013 with 3-4 aircraft and headquarters in Chennai, focussing on domestic connectivity to Tier-II and Tier-III cities. The proposed airline would not fly on international routes for sometime as current rules allow only those airlines to operate on international routes which have completed five years of domestic operations and have a minimum fleet of five aircraft.

AirAsia has been given the Ministry of Corporate Affairs approval for the name AirAsia (India) Private Ltd, registered in the state of Maharashtra in early March 2013. The company is now in the process of completing other formalities, the filing process for the new venture being completed on a fast-track basis.

Beginning with an initial investment of \$14.5 million, AirAsia India would now



Indigo Airbus A320 (photo: Rainer Bexten).



Spicejet Bombardier Dash 8Q 400 (photo: Andrew Stevens)

compete head-on with existing carriers Jet Airways, Spicejet, IndiGo, Go Air and Air India. AirAsia India also marks the re-entry of Tatas into the aviation world after 60 years of JRD Tata-founded Air India being nationalised in 1953. The company is finalising its senior executive team and

hiring other employees and plans to start operations later this year.

According to aviation analysts, AirAsia's entry into India with this new partnership will help the domestic aviation industry grow and provide better deals for passengers. "It is a very

positive move for the industry and the passengers. As more players would help in development of the industry which is at a very nascent stage," feels Ankur Bhatia, chairman, Confederation of Indian Industry's (CII) national committee on civil aviation.



“If the stakes are attractive in existing airlines and an opportunity exists, foreign carriers may seek to buy in,” said Rajiv Chib, associate director, PricewaterhouseCoopers. Experts also feel there will not be any real threat to existing airlines by AirAsia’s entry as the new

airline will focus on tier-II-III cities. “In the short run, there is no real threat to existing players as AirAsia plans to start with a small fleet. However, other Indian passenger carriers would sooner or later need to focus on the emerging traffic from tier-II, tier-III cities,” stated Sharan Lillaney, aviation analyst at broking firm Angel Brokin.

AirAsia is yet to appoint their CEO for its India foray, more than a month after AirAsia Group Chief Tony Fernandes tweeted that he had selected a person for the top job. Meanwhile, it is also learnt that the Malaysian carrier has not yet applied for the flying licence to the sector regulator, even though it has already received the FIPB approval.

Meanwhile, SpiceJet, which currently flies to Guangzhou from Delhi, will add three destinations in China this year, according to CEO Neil Mills. The carrier also plans to shift towards international routes, to triple their contribution to revenue up to 20% over the next 18 months.

SpiceJet may also fly to CIS nations and start flights to Thailand. Despite withdrawing an application to fly to Abu Dhabi, SpiceJet aims to fly more Middle East routes, Mills added.

At the other end, Kingfisher Airlines’ woes seem to prolong indefinitely as Vijay Mallya’s United Spirits’ much-awaited deal with Diageo was almost done when a final hurdle cropped up, which is the

winding up petition that eight creditors have filed against the company. These creditors, including BNP Paribas, Rolls Royce and Wells Fargo Bank have filed the petition against UB Holdings in the Karnataka High Court, the creditors alleging that the company owes them over Rs 300 crores while UB Holdings has sought the court’s permission for the stake sale to Diageo. The court asked the company to file all key documents including details of encumbered and unencumbered shares and the break-up of the amount it owes to all the creditors.

### Infrastructure and Taxes

In other developments, the Federation of Indian airlines (FIA) and German carrier Lufthansa have challenged an order of airport economic regulator AERA, approving hike in various charges at Mumbai airport. The airport economic regulatory authority (AERA) appellate tribunal will hear the petitions of FIA and Lufthansa on 18 July 2013. AERA had in a 15 January 2013, order approved a hike in various charges such as landing, housing and parking, aerobridge and other infrastructural inputs.

The Aviation MRO industry has called for attention on rational policy as lack of aircraft maintenance, repair and overhaul (MRO) business is hampering growth of the segment. As per estimates,



Go Air Airbus A320 (photo: T.Laurent)

aircraft MRO business is currently worth \$500 million and is likely to grow to over \$1.5 billion by 2020. (India, currently, constitutes only one per cent of the global MRO market worth \$45 billion).

ASSOCHAM had also called for streamlining of taxes to encourage aviation MRO facilities as the country has potential to become a major hub because of low cost benefits and favourable geographical location. “Though the government is taking several steps to boost the aviation sector in the country, but the service tax makes this less competitive, despite companies having world class facilities and capability to meet global standards in the country itself”, said an industry source.

Servicing of an aircraft at a local MRO helps an airline to save 30 to 40% in maintenance costs, despite the tax regime on import of spares into the country.

### Regional Air Connectivity

In a move to connect north-eastern areas, the Airports Authority of India is developing three airports at Daparizo in Arunachal Pradesh, Tura in Meghalaya and Kamalpur in Tripura for operating small regional airliners. AAI is also developing civil enclaves at Along, Passighat and Ziro in Arunachal Pradesh and Rupsi in Dhubri district of Assam. Operationalisation of Tezu airport has also been taken up.

Minister of State for civil aviation KC Venugopal recently informed Raja Sabha that the AAI had undertaken a study through Rail India Technical and Economic Services (RITES) for improving air connectivity in the northeast

which includes air connectivity to state capitals and other important remote locations of the NE region. Air India is operating three flights every week on the Aizwal-Imphal sector and eight flights on Aizwal-Kolkata route with A-319s.

Meanwhile, the Ministry of Civil Aviation has released a first tranche of Rs 800 crore to Air India as part of the turnaround plan to infuse equity for revival of the cash-strapped national carrier. A senior official at the ministry said, “We reviewed the performance of the airline and are satisfied with the feedback we have received. Since the Finance Bill is yet to be passed, as per norms we have released 16% of the budgeted amount to Air India.” The airline was allocated Rs 5,000 crore as equity infusion in the Union Budget this FY.

Of the Rs 800 crore released, Rs 500 crore would be utilised by the airline to clear dues to oil companies, the remaining resources for payment of interest on non-



convertible debentures (NCDs) issued last year. The remaining amount of Rs 4200 allocated in the Budget to Air India would be released on a quarterly basis. With the Federal Aviation Administration recently approving modification of batteries on the grounded Dreamliners, all six Boeing 787s owned by Air India will resume flights in May. “The first flight will be operational on 12 May. Two more aircraft would be ready by mid-May. All six aircraft would be deployed on domestic routes initially”.



*Soon in Indian skies? An Air Asia A320 (photo: Christopher Schneider)*

On 13 March 2013, the Government received application from 15 private companies for starting regional airline services but none from any of the state governments. Since 2010, the Civil Aviation Ministry has granted permission to nine companies to begin scheduled services.

In 2010, five applications were received with permission granted to three of the companies; in 2011, four companies had applied and three were given nod to operate. In 2012, there were five applications and four were cleared, while in 2013 only one company has applied so far.

At present, there are 463 airports and airstrips in the country of which 281 are operational. Of these, 97 function under the Airports Authority of India (AAI), 138 belong to Defence, 161 to state governments, six are in joint venture and 61 are private. Of the 281 operational airports and airstrips, 65 are of AAI, 90 of Defence, 67 of state governments, 53 of private and six are joint ventures.

According to Civil Aviation Ministry as on 31 December 2012, there were 390 aircraft and operating permits. Of these, Air India has 99 aircraft, Air India Charters and Alliance Air 22 each, Jet Airways 96, JetLite 15, SpiceJet 48, IndiGo 62, GoAir 13, Blue Dart 8, while recently launched Religare Aviation's Air Mantra have two and Quikjet has just one aircraft.

Ironically, while more players are preparing to join the fray, domestic air traffic is experiencing a downward spiral as an increasing number of domestic travellers

are switching back to rail travel. The air travel figures for December 2012 showed Ahmedabad as having the greatest drop in domestic fliers. In December 2012 registered a fall of 19.5% in domestic fliers as compared to December 2011. Airport officials said the number of passengers has been dropping and in October 2012, the number of domestic fliers fell by 32 % while a fall of 17.2% was registered in November 2012.

Even metros like Delhi and Mumbai airports have registered a drop in the number of passengers during April-December 2012. However, a latest survey by IATA (International Air Travel Association) indicates that for the next 12 months, an increase in cargo traffic is most likely for domestic airlines.

**Monica Arora**



*Air India Boeing 777 (photo: Karsten Stoll)*

# New Defence Procurement Policy (DPP) announced

As per an official statement issued by the Ministry of Defence at New Delhi, “there are twin objectives of infusing greater efficiency in the procurement process and strengthening the defence manufacturing base in the country. The Defence Acquisition Council, the apex decision making body of the MoD, took a series of decisions on 20 April, including amendments to Defence Procurement Procedure (DPP).”

According to the Defence Minister AK Antony, who chaired the Council meeting, “the only way forward for the country is rapid indigenisation of defence products, with both the public and the private sectors playing pivotal roles in this endeavour”. Mr Antony said that “the government will make all efforts to create genuine level playing field for Indian manufacturing industries vis-à-vis global players”.

Highlights of the amendments to the DPP-2011 are :

### **Prioritisation of various categories for capital acquisitions under DPP**

Preference for indigenous procurement in the Defence Production Policy 2011 has now been made a part of DPP through an amendment that provides for a preferred order of categorisation, with global cases being a choice of last resort. The order of preference, in decreasing order, shall be: (1) “Buy (Indian)”; (2) “Buy & Make (Indian)”; (3) “Make”; (4) “Buy & Make with ToT”; and (5) “Buy (Global)”. Any proposal to select a particular category must now state reasons for excluding the higher preferred category/ categories.

### **The Long Term Integrated Perspective Plan (LTIPP)**

The DAC has approved release of a public version of its 15-year perspective document (LTIPP), outlining the “Technology Perspective and Capability Roadmap” (TPCR) against LTIPP 2012-2027. The TPCR will provide useful guidance to the Indian Defence Industry for boosting its infrastructural capabilities and directing its R&D and technology investments.

### **Maintenance ToT (MToT) no longer through nomination**

MToT has been hitherto reserved largely for OFB and DPSUs through the nomination process. A DPP amendment has been approved that does away with nomination by the Department of Defence Production and facilitates selection of MToT partners by the Indian bidders. This measure is expected to have a positive impact on private sector participation in maintenance, repairs and overhaul work.

### **Advance consultations for “Make” procedure**

The DAC has approved an amendment mandating consultations to begin sufficiently in advance of actual procurement by Service Head Quarters (SHQs), so that capital acquisition plans can be translated into national defence R&D and production plans. In addition, a high-level Committee has also been constituted for simplification of “Make” procedures, with a view to unleash the full potential of this important category.

### **Simplification of “Buy & Make (Indian)” procedure**

The DAC has approved an amendment further simplifying this complex category. Its procedures have been brought on par with other categorisations, resulting in faster processing of cases under this category.

### **Clear definition of indigenous content**

Increased indigenisation is important for our Armed Forces, in order that they have access to reliable supply chains in times of urgent need.

Indigenous content has now been defined in an unambiguous manner, providing requisite clarity and a common understanding.

### **Ensuring faster progress in “Make” and “Buy & Make (Indian)” cases**

The Ministry has a limited number of acquisition cases under “Make” and “Buy & Make (Indian)” categories, with an estimated value of Rs. 1,20,000 crore. Instructions have been issued for speedier conclusion of these cases.

### **Defence items list**

Indian defence industry was opened up in May 2001 for 100% private sector participation subject to licensing. The Defence Items List has been finalised by the Ministry and sent to DIPP for notification, which will bring required clarity in the licensing process.

### **Licensing for dual use items**

The Ministry has categorically clarified to DIPP that dual-use items will not require licensing, thereby bringing added clarity to the licensing process.

### **Consultations on security guidelines for Indian defence industry**

*Draft Security Guidelines* that will apply to all licensed defence industries have been circulated for consultations with various stakeholders. It is expected that a complete security framework for Indian private industries participating in defence cases will be in place in the near future.

### **Resolution of tax-related issues**

Resolution of deemed exports status for certain defence projects and rationalisation of tax and duty structures impinging on the Indian defence industry has been taken up by the MoD with the Ministry of Finance.

### **Funds for MSMEs in the defence sector**

The Defence Production Policy 2011 requires the setting-up of a fund to provide necessary resources for development of defence equipment. In order to ensure regular supply of funds to MSMEs involved in manufacturing of defence products, SIDBI has decided to earmark an amount of Rs. 500 crore for providing loans, and further, a fund of Rs. 50 crore for equity support out of “India Opportunities Fund” managed by its subsidiary, namely, SIDBI Venture Capital Ltd.

### **Efficiency and transparency in defence procurement**

A stipulation to freeze the SQRs before the “Acceptance of Necessity” (AoN) stage has been accorded, and the validity of AoN has also been reduced from two years to one year. These measures are expected to expedite the acquisition process and increase transparency.

### **Enhanced Delegation of Financial Powers**

The financial powers of Service Chiefs/ DG Coast Guard have been enhanced from Rs. 50 crore to Rs. 150 crore for capital acquisition cases.

### **Powers to DAC**

Approval for all deviations from the Defence Procurement Procedure will henceforth be sought from the Defence Acquisition Council instead of the Defence Minister.

# Airlines anticipate 3.6 billion passengers in 2016



## “2012 best in history of continuous safety improvements”

The International Air Transport Association (IATA) has released its traffic forecast showing that airlines expect to fly some 3.6 billion passengers in 2016. According to an industry traffic forecast released by the International Transport Association (IATA), the airlines are expecting a boom in business with 3.6 billion passengers travelling by air in 2016. That would be about 800 million more than the 2.8 billion passengers carried by airlines in 2011. These figures are based on the perceived growth rate of 5.3% per annum between 2012 and 2016. The 28.5% increase in passenger numbers over the forecast period will see almost 500 million new passengers travelling on domestic routes and 331 million new passengers on international services.

### Safety by the numbers

- ❖ Close to 3 billion people flew safely on 37.5 million flights (29.8 million by jet, 7.7 million by turboprop)
- ❖ 75 accidents (all aircraft types, Eastern and Western built), down from 92 in 2011
- ❖ 15 fatal accidents (all aircraft types) versus 22 in 2011
- ❖ 6 hull loss accidents involving Western-built jets compared to 11 in 2011
- ❖ 3 fatal hull loss accidents involving Western-built jets, down from 5 in 2011
- ❖ 414 fatalities compared to 486 in 2011
- ❖ Fatality rate slightly increased to 0.08 per million passengers from 0.07 in 2011 based on Western-built jet operations
- ❖ IATA member airlines outperformed the industry average for accidents of all aircraft types (0.71 accidents per million flights compared to 2.01), accounting for 13 of the 75 accidents

International freight volumes will grow at 3% per annum to total 34.5 million tonnes in 2016 which is 4.8 million tonnes more of air cargo than the 29.6 million tonnes carried in 2011. The emerging economies of Asia-Pacific, Latin America and the Middle East are likely to see the strongest passenger growth. China is going to take the lead, accounting for 193 million of the 831 million new passengers over the forecast period. Of these 159 million will be using domestic routes while the remaining 34 million will travel internationally. Passenger growth within the Asia-Pacific region alone is expected to add around 380 million passengers over this period.

Boeing's Next-Generation 737-800



The United States, on the other hand, will continue to be the largest single market for domestic passengers, around 710.2 million, in 2016. In the same year, passengers on international routes connected to the US will total 223 million,

making it the largest single market for international travel as well. Reflecting the maturity of the US market, growth rates of 2.6% for domestic and 4.3% for international, will be well below the international average amounting to

## Successful 2012 for Bombardier's Q400 and Q400 NextGen programmes



**B**ombardier Aerospace says that its Q400 and Q400 NextGen aircraft programme wrapped up a successful 2012 with up to \$2.7 billion US in orders including 50 firm orders and 31 option aircraft, while welcoming seven new customers, operators and leasing companies.

“In 2012, the Q400 NextGen aircraft order book grew significantly with orders from first-time customers – WestJet and Eurolog – as well as from repeat customers looking to enhance their fleets with the only turboprop that accommodates more passengers and route possibilities,” said Mike Arcamone, President, Bombardier Commercial Aircraft. “The Q400 aircraft spread further into secondary markets and, together with the Q400 NextGen aircraft, brought new customers, operators and leasing companies from almost every continent into the Bombardier turboprop family. “This demonstrates the flexibility and performance capability of the aircraft.”

## ATR: record turnover in 2012



In 2012 ATR recorded its highest turnover, 1.44 billion dollars. The turboprop aircraft manufacturer also achieved a record annual delivery level of 64 aircraft, an increase of 18% over 2011 deliveries. To these results can be added the sale in 2012 of 115 aircraft (74 firm orders and 41 options), enabling ATR to hold the largest backlog of all manufacturers of up-to-90-seats regional aircraft. ATR recorded these 74 firm sales, plus 41 options, with 11 customers. These sales include contracts enabling it to consolidate its leadership in Asia and the Pacific (Malaysia Airlines, TransAsia Airways, Lao Airlines, Avation) and open up new markets in Central and South America (Avianca-TACA).

ATR also renewed its success with airlines operating island networks (Air Tahiti, LIAT in the Caribbean) and once again confirmed its appeal for aircraft leasing companies such as Air Lease Corporation (ALC), or Nordic Aviation Capital (NAC). In Europe, ATR for the first time delivered aircraft to an Austrian airline (InterSky) and once again won the confidence of the Irish airline Aer Arann.

Since the programme started in 1981, ATR has received net orders for 1,254 aircraft (437 ATR 42 and 817 ATR 72), more than half of them since 2005. By the end of 2012, ATR had delivered 1,033 aircraft (422 ATR 42 and 611 ATR 72).

Filippo Bagnato, Chief Executive Officer of ATR, declared himself to be “very proud of ATR’s results in 2012, of our ability to ramp-up production and of these new records, given the current global economic climate. Our production ramp-up in 2012 is a perfect illustration of the strong market demand for ATR aircraft”. And he added: “We are delighted to contribute to customers and operator’s growth, that face traffic increase and fleet renewals by introducing the new ATR-600 series. Once again, this year, the latest generation ATRs received the top evaluation ratings, not only from the regional operators, but also the investors. The popularity of ATRs with leasing companies is a further illustration of this. This collaboration has enabled us to penetrate strategic markets such as Japan, with the regional carrier Link, where ATRs have an outstanding potential”.

5.3% for international travel and 5.2% for domestic traffic. “Despite the current economic uncertainty, expected demand for connectivity remains strong. That’s good news for the global economy. Growing air transport links generate jobs and underpin economic growth in all economies. But exploiting these will require governments to recognise aviation’s value with policies that do not stifle innovation, tax regimes that do not punish success and investments to enable infrastructure to keep up with growth,” said Tony Tyler, IATA’s Director General and CEO. Globally, aviation supports some 57 million jobs and \$2.2 trillion in economic activity.

The International Air Transport Association (IATA) has also announced that the 2012 global accident rate for Western-built jets was the lowest in aviation history. The 2012 global Western-built jet accident rate (measured in hull losses per million flights of Western-built jets) was 0.20, the equivalent of one accident every 5 million flights. This represented a 46% improvement over 2011, when the accident rate was 0.37, or one accident for every 2.7 million flights. IATA’s 240+ member airlines recorded no Western-built jet hull losses in 2012.

“The industry’s 2012 record safety performance was the best in history. Each day approximately 100,000 flights arrive safely at their destination. Airlines, airports, air navigation service providers, manufacturers and safety regulators work together to ensure every flight is as safe as possible. Their dedication and cooperation has made air travel remarkably safe. Nevertheless, there is still work to do. Every accident is one too many and each fatality is a human tragedy. The first commercial airline flight took place on 1 January 1914. Since then the very first flight the airline industry has made continuous improvement in safety its top priority,” said Tony Tyler, IATA’s Director General and CEO.



# The IAF: Preparing for all Contingencies



MiG-27UPG firing 57mm rockets



Chief of the Air Staff Air Chief Marshal  
NAK Browne monitoring the Exercise  
from an A-50E AWACS

## Exercise Live Wire 2013

**I**t seems that the Indian Air Force is always at war ! There are no moments of peace ever, for such are the demands of eternal vigilance and readiness for a prompt, not-a-minute-too late response to any threat from an adversary which every air warrior, men and women in blue, must act according to the duty and role assigned them. Every

opportunity is taken to convert concepts and doctrines into real and palpable action with aircraft and other concomitant assets on the ground, operationalised and tested in terms of their dependability, endurance and effectiveness.

The Indian Air Force had staged its biggest ever, day and night Fire Power Demonstration (FPD) code-named 'Iron

Fist' on 22 February 2013 (see *Vayu II/2013*). This had its inherent element of all fighter aircraft types and helicopters put to severe test, but was also the IAF's 'show window' to important spectators, top political leaders of the country including the President of India, Supreme Commander of the Defence Forces, the Prime Minister, the Defence Minister, and



MiG-29Bs in formation



others. Air and Defence attaches were also invited from many countries including China – but not Pakistan ! The FPD went off as meticulously as planned and deservedly was given a hearty ‘shabash’ !

However, what was to follow soon thereafter was as close as to the ‘real thing’. The IAF proceeded on a three-week operational exercise without any appurtenance of viewership, launching ‘Exercise Live Wire 2013’ on 18 March 2013 which culminated on 4 April 2013.

As enunciated by a senior IAF officer, “the aim was to exercise the entire Air Force in its ability to undertake effective operations from all airbases, in the west, north and east in response to likely contingencies” (read : a two front war). The aim was to validate the IAF’s concept of operations, standard operating procedures (SOPs) for warlike operations in networked environment.

Virtually the IAF’s entire order-of-battle was exercised, with nearly all

operational squadrons participating: more than 400 fighters, some 200 transport aircraft and over 100 helicopters took part in ‘Live Wire’. The Exercise began with simulated attacks on specific targets at air and ground firing ranges. A salient feature of the Exercise was that all combat assets were swiftly moved to assigned locations in specified time, some 2000 tonnes of load being ferried in 100 missions, arguably the largest ever such effort by the IAF.



*Mirage 2000Hs preparing for take off*



In terms of offensive operations, 'Long Package Missions' involving some 60-80 fighter aircraft were carried out with extensive use of force multipliers, both (AWACs and in-flight refuellers). Air Defence Operations were conducted around the clock to validate the IAF's *Networked Air Defence Concept*.

Reminiscent of An-12s used in the 1971 war for carpet bombing missions, this time An-32s were employed in a similar bomber role. All helicopter types, including Mi-17s and Mi-35s carried out missions by day and night in support of ground forces. The latest transport acquisition of the IAF, the C-130J Super Hercules was employed to good effect.

There was accent on 'Joint Operations': transportation of troops to distant theatres and landing at forward ALGs for immediate deployment; slithering operations were carried out by commandos (Garuds) from Mi-17V5s on critical missions as also large-scale casualty evacuation.

'Live Wire' was not limited to any one part or sector of the country. All Advance Landing Grounds in the North East were activated. Joint operations were also carried out with Indian Naval ships off the Karwar coast. Simulated targets on the western seaboard



MiG-27 with long range tanks



*C-130J Super Hercules making a low pass*

were engaged. And perhaps, for the first time the Airports Authority of India co-ordinated with the IAF for flexible use of airspace.

‘Exercise Live Wire’ was characterised by high tempo surgical operations. Operations were carried out from numerous air bases including dual use civil airfields. The total number of hours flown by the range of aircraft and helicopters exceeded 8000 and, importantly, the Exercise did not interfere with the normal peace-time air defence vigil.

‘Live Wire’ validated the IAF’s two-front deployment capability to deploy ‘swing forces’ from the western theatre right across the subcontinent to the north east, indicating readiness to take on the twin-threats posed by India’s obvious adversaries. In equal operational measure came about validation of net-centric operations and the principles of jointmanship.

One would conclude that ‘Exercise Live Wire’ was not just preparation for an armed conflict, but a positive and well-planned endeavour to emerge victorious if and when a threat indeed confronts the country for which India’s air power literally has to rise to the occasion !

*JCM*

*[Photographs by Simon Watson]*



*Mi-35 in low flyby*



*Su-30MKI being ‘bombed up’*



*Ilyushin Il-76MDs were extensively employed for moving vital equipment to operational bases.*



*Il-76MD on landing back at base (Photo by Angad Singh).*



*Para commandos disgorging from a C-130J.*



*MiG-21bison at a fighter base in the western sector (Photo by Simon Watson).*



*Jaguar fully loaded with bombs takes off for strike mission (photo by Simon Watson).*



*An-32 at Nyoma ALG in NE Ladakh.*



*The CAS with AWACS aircrew*



*The CAS visiting a forward fighter base*



*Air Chief Marshal NAK Browne with the 'Tigers' of No.1 Squadron*

*[Above three images from PRO, IAF]*

# Endless possibilities



**Boeing and India have a growing partnership that includes much more than the company's military and commercial products.**

**B**oeing's 70-year relationship with India has gone into high gear. Jetliner sales have increased dramatically, a growing defence market has emerged and new technology partnerships have been formed.

That relationship began in the early 1940s, when India's Tata Airlines began flying DC-3 aircraft, built by Boeing heritage company Douglas Aircraft. While Boeing continued to sell airliners to Indian

Airlines over the years, the creation of Boeing India in 2003 gave the company a big boost in India's rapidly growing defence market.

Military sales to India have evolved since the mid-2000s when agreements and closer strategic ties between the United States and India allowed US based defence firms to compete for India's business. Since that time, India has been a major customer for C-17

airlifters and P-8I long-range maritime reconnaissance aircraft. Details are also being discussed for the purchase of various Boeing helicopters.

"Our strategy to leverage the entire Boeing enterprise to partner with India has been highly successful, and this has been especially true over the past five years," said Shep Hill, president, Boeing International and senior vice president, Business Development and Strategy.



*This P-8I, pictured during flight testing over Washington state, is one of three maritime patrol aircraft that are being delivered to the I.N. in 2013 (John Parker/Boeing).*

“India represents a very important market for us. It’s the second-most populous nation in the world, and it has one of the fastest-growing economies.”

Hill pointed out that India has long been a steady customer for Boeing Commercial Airplanes. But Air India’s 2005 purchase of 68 Boeing jetliners, he said, marked a milestone in India’s rapidly growing demand for commercial air travel. Then, in 2009, Boeing opened a new

research and technology facility in India. That same year, the Indian government made its first major purchase of Boeing defence products.

In addition to being a major market for commercial airplanes, India is committed to increasing its defence capabilities, Hill said, adding that India will have a continuing need for commercial and military aircraft and an array of services to support these aircraft.

Headquartered in New Delhi, Boeing India has approximately 300 locally-based employees, with all but a few being Indian nationals. They work in the company’s commercial and military operations as well as subsidiaries and the research and technology facility.

In December 2012, Boeing announced the appointment of Pratyush Kumar as the new President of Boeing India. He replaced Dinesh Keskar, who has rejoined Boeing Commercial Airplanes as SVP, Sales, Asia Pacific and India. Keskar had served as President of Boeing India since 2009. Prior to joining Boeing, Kumar was based in New Delhi serving as president and chief executive of GE Transportation for South Asia.

Kumar said that Boeing has built a solid partnership with India that spans a broad range of business activities. “India, with its rapidly expanding economy, has aspirations to become a leading economic force on the world stage,” Kumar said. “Boeing’s growing presence in India is founded on common goals in advancing technology, innovation and local manufacturing. We also see exciting new opportunities for the sale of military and commercial products.”

The government of India selected Boeing to provide eight P-8I maritime reconnaissance aircraft for the Indian Navy, with the first three to be delivered in 2013. The P-8 is a modified 737-800. India’s Ministry of Defence also has signed an agreement with the US government to acquire 10 Boeing C-17 mega airlifters even as Boeing has sold Harpoon missiles to both the Indian Navy and Air Force.

In addition, Boeing and the Indian government are discussing final details for the purchase of both Apache and Chinook helicopters. “We see India as a key long-term partner with potential for product sales, services and collaboration with suppliers,” said Dennis Swanson, VP International Business Development, India, and head of Boeing Defence, Space & Security’s sales effort there. “An important barometer of our success will be our ability to offer the right solutions, execute to plan on our existing programmes and build trust with our customers and partners.”

The Indian government has forecast a budget of \$100 billion in defence-related equipment over the next 10 years.



*A 787 painted in Air India colours takes off from Boeing's plant in North Charleston, S.C. (Alan Marts/Boeing).*

Swanson sees a growing market for unmanned systems, security solutions, support services, training and network-centric systems. “They’re acquiring new defence products to replace many of their aging platforms,” Swanson said. “Boeing has a unique set of products to support the Indian military.” Boeing’s services and support business, Swanson added, is expected to gather significant traction in India as operators seek to ensure the long-term operational readiness of their aircraft.

India’s demand for commercial aircraft also is going strong. “India has a rapidly growing economy and an expanding middle class,” Keskar said. “As a result, its commercial airplane fleet has roughly tripled over the past seven years.”

Air India’s order for 68 Boeing airliners included 23 777s and 27 787 Dreamliners, as well as 18 737-800s for Air India’s wholly owned subsidiary Air India Express. In September 2012, Boeing and Air India celebrated the delivery of the airline’s first Dreamliner.

Two private Indian carriers, SpiceJet and Jet Airways, have also been strong Boeing customers. SpiceJet, which began service in 2005, then placed an order for 20 Next-Generation 737-800 airplanes and has since expanded its 737 fleet. Jet Airways, which began service in 1992, operates a fleet that includes both 737 and 777 airliners.

Boeing forecasts that India will need 1,450 new commercial aircraft valued at

\$175 billion over the next 20 years. As a result, India’s commercial aviation fleet is likely to grow to more than 4.5 times its current size by 2032.

Boeing is enhancing support services to keep pace with this growth. For example, it is working in partnership with Air India to build a maintenance, repair and overhaul facility in Nagpur, which is scheduled to open in mid-2013.

Another milestone in Boeing’s relationship with India was the opening in March 2009 of Boeing Research & Technology–India in Bangalore. This centre works with research and development organisations throughout India—including universities, government agencies and the private sector—to

**India is “part of the modern world, while retaining the values of the past. ... we are excited about our growing partnership with India and exploring its many possibilities.”**

**Pratyush Kumar, President, Boeing India.**





*This 777 is among the Boeing aircraft flown by Jet Airways, a private carrier that began service in 1992. (Tim Stake/Boeing)*



*Boeing is on schedule to deliver five C-17s to the Indian Air Force in 2013 and five additional aircraft in 2014. (Sally Aristei/Boeing)*

develop new technologies that can be applied to Boeing products.

Bala Bharadvaj, Managing Director of the Boeing research centre, said India has much to offer. “There are many technically-savvy people in India and they have a lot of enthusiasm for aerospace,” Bharadvaj said. “Their analytical skills are outstanding, both in terms of modeling fundamentals and developing software. We are working with them to focus these talents on solutions.”



*SpiceJet, which began services in 2005, has been a strong customer for the Boeing 737. (Jim Anderson/Boeing)*



*Boeing will supply the Indian Navy with a total of eight P-8I aircraft, a modified 737-800 for anti-submarine and maritime patrol missions. (John Parker/Boeing).*

Boeing has collaborated with the Indian Department of Science and Technology to form the National Centre for Aerospace Innovation and Research, a partnership to create a world-class aerospace industry in India. Boeing also leads a collaborative effort to conduct network systems research and development in India.

Boeing's relationship with Hindustan Aeronautics Limited (HAL) began in 1991 when the company became a single-source producer of 757 overwing exit doors. It has continued to support Boeing in both commercial airplane and military aircraft programmes.

Boeing also has partnered with Bharat Electronics Limited (BEL) on the P-8I and F/A-18 programmes, as well as the Boeing Phantom Works Analysis and Experimentation Centre in Bangalore, which engages India's armed forces to understand future capability needs. Indian suppliers such as HAL, BEL, Avintel, Electronics Corporation of India, Dynamatic Technologies and Tata Advanced Materials provide components that will be integrated into the US Navy's P-8A and Indian Navy's P-8I aircraft.

Since 1997, Boeing has also worked with some of India's premier software development companies to set up centres of excellence in various areas, including systems re-engineering and development, test and evaluation, business systems, analytics, and Commercial Aviation Services information technology applications.

Boeing's Indian presence is further strengthened through its subsidiaries—Jeppesen in Hyderabad, NARUS in Bangalore and Continental Data Graphics in Chennai—which are also expanding in the country.



Boeing has had an active corporate citizenship programme in India for more than six years, with a focus on health care and education. It has included both corporate funding and volunteer support. “We have actively engaged with more than 15 organisations and self-help community groups at eight locations throughout the country,” Kumar said. “We estimate that approximately 85,000 people have benefited from these efforts over the past five years, including 16,000 in 2012 alone.”

In India, Boeing has been a dedicated supporter of *Operation Smile*, which provides

free surgeries to children born with cleft lip, cleft palate and other facial deformities. Education programmes supported by Boeing include *Building Blocks*, which provides early learning opportunities for children ages 3 to 6 from impoverished families. *Save the Children India*, also supported by Boeing, is a vocational skills development programme for women and adolescent girls in Sarai Kale Khan Village, New Delhi.

Kumar said the Indians are proud of their heritage, which dates back 5,000 years. However, the country is focused

on the future and becoming an important player in the global economy. Many leaders have Western university education. “They’re part of the modern world, while retaining the values of the past. Their beliefs, which have been passed on from generation to generation, are still intact,” Kumar said. “At the same time, they are very comfortable blending into the Western world. We are excited about our growing partnership with India and exploring its many possibilities.”

*Bill Seil*  
(Courtesy: Boeing Frontiers)

# SIGN OF THE TIMES

## The US budget Sequestration 2013 – lessons

For over two years, the United States of America has wrestled with an increasing budget deficit – the result of a decade spent at war and an economy gutted by the recession of 2008. This problem was exacerbated by passage of the Budget Control Act of 2011, which mandated stringent cuts to the federal budget if the government should fail to control the widening gap between revenue and debt. The problem came to a head late in 2012, but crisis was narrowly (albeit briefly) averted, in order to allow Democratic and Republican lawmakers to reach a long-term solution to the debt-ceiling issue. However, as of 1 April 2013, with no consensus in sight, the deep budget cuts (known as ‘the sequester’) came into force, slashing an estimated \$86 billion from the federal budget in the year 2013. If a solution is not found by the end of this fiscal, the situation will turn more dire, as the budget will shed some \$1.3 trillion over the next decade.

While effects of the sequester have not yet impacted on functioning of the government, that being secured by a separate bill until 30 September 2013, it has immediately and dramatically devastated the US military, which stands to lose a mammoth \$41 billion (estimated) over the course of this US fiscal year, ending on 30 September 2013. The Army, Navy, Air Force and Marines are all affected to varying degrees but the consensus is that the cuts will hamper service strengths in the short term and will only add to costs in the long term, as the services ramp up to pre-sequester levels of readiness and capability.

The US Navy, the hardest hit of the Services, had already stated that four Carrier Air Wings would be grounded in the event of sequestration and has done exactly that. CVW-2, part of the USS *Ronald Reagan* Carrier Strike Group has already been grounded, and if the sequestration is not lifted, the remainder of 2013 will see three more CVWs shut down, these being CVW-7 with USS *Dwight D. Eisenhower*, CVW-9 with USS *John C. Stennis*, and CVW-17 with USS *Carl Vinson*.

US Navy officials clarified that groundings do not imply the disbanding or dis-establishment of these units. According to a spokesman, “aircraft will be prepared for long-term storage, minimising required maintenance, and no flight training will take place. Assigned personnel will perform administrative and other duties and conduct other general military training not involving flight.”

But the effects of the cuts go deeper still, with CVW-1 (USS *Theodore Roosevelt*) and CVW-11 (USS *Nimitz*) being reduced to “minimum readiness” levels, which will see them reduce flying to the barest levels, just enough to maintain safe qualification.

This leaves CVW-3 (USS *Harry S. Truman*), CVW-5 (USS *George Washington*), CVW-8 (USS *George H.W. Bush*) and CVW-14 to continue normal operations under the current plan. However, given that CVW-14 is presently land-based, stationed at NAS Lemoore

in California, the US Navy is reduced to just three fully-operational Carrier Strike Groups worldwide – the lowest level since the 1960s !

General James Amos, Commandant of the US Marine Corps, has said that the Marines’ ability to deploy forces for training and overseas operations would be limited due to their reliance on US Navy vessels. The Marines have also deferred maintenance at their US West Coast facilities in an effort to save money. Amos held no words back as he stated that the US Marine Corps is already “a lean and frugal service” and that “every reduction from this point forward will cut into bone – we are beyond muscle.” Although the Commandant vowed not to cancel contracts, fiscal realities may eventually have more say in the matter.

The Secretary of the Navy, Ray Mabus announced that the Navy and Marines would not be screening any new pilots

USS *Ronald Reagan* (CVN-76) will lose its carrier air wing (CVW-2)



## for India?

in the month of April, but did not mention whether this would continue for the duration of the sequester. Additionally, several missile-defence destroyers, in conjunction with other ships, will see early ends to their deployments and be recalled to port. The Navy will also begin negotiating contract modifications to de-obligate efforts for any investment programmes for which the remaining unobligated balance will be insufficient after the sequestration reduction is applied. Major programmes affected include the *Virginia*-class SSN and Joint High Speed Vessel (JHSV).

The most visible indicator of the cuts to the Navy, however, will be the absence of public flight demonstrations at air shows and major sporting events. The US Navy 'Blue Angels' aerobatic team has already cancelled all April events, and the situation will be periodically reviewed.



## List of grounded USN units

### Carrier Air Wing Two (CVW-2)

<i>Unit</i>	<i>Aircraft Type</i>
Strike Fighter Squadron VFA-2 "Bounty Hunters"	F/A-18F Super Hornet
Strike Fighter Squadron VFA-34 "Blue Blasters"	F/A-18C Hornet
Strike Fighter Squadron VFA-137 "Kestrels"	F/A-18E Super Hornet
Strike Fighter Squadron VFA-86 "Sidewinders"	F/A-18E Super Hornet
Carrier AEW Squadron VAW-113 "Black Eagles"	E-2C Hawkeye
Electronic Attack Squadron VAQ-131 "Lancers"	EA-6B Prowler
Fleet Logistics Support Squadron VRC-30 Det. 2 "Providers"	C-2A Greyhound
Helicopter Sea Combat Squadron HSC-4 "Black Knights"	MH-60S Seahawk
Helicopter Maritime Strike Squadron HSM-78 "Blue Hawks"	MH-60R Seahawk

### Carrier Air Wing Seven (CVW-7)

<i>Unit</i>	<i>Aircraft Type</i>
Strike Fighter Squadron VFA-83 "Rampagers"	F/A-18C Hornet
Strike Fighter Squadron VFA-103 "Jolly Rogers"	F/A-18F Super Hornet
Strike Fighter Squadron VFA-131 "Wildcats"	F/A-18C Hornet
Strike Fighter Squadron VFA-143 "Pukin' Dogs"	F/A-18E Super Hornet
Carrier AEW Squadron VAW-121 "Bluetails"	E-2C Hawkeye
Electronic Attack Squadron VAQ-140 "Patriots"	EA-6B Prowler
Fleet Logistics Support Squadron VRC-40 Det. 3 "Rawhides"	C-2A Greyhound
Helicopter Anti-submarine Squadron HS-5 "Nightdippers"	SH-60F Seahawk

### Carrier Air Wing Nine (CVW-9)

<i>Unit</i>	<i>Aircraft Type</i>
Strike Fighter Squadron VFA-14 "Tophatters"	F/A-18E Super Hornet
Strike Fighter Squadron VFA-41 "Black Aces"	F/A-18F Super Hornet
Strike Fighter Squadron VFA-97 "Warhawks"	F/A-18C Hornet
Strike Fighter Squadron VFA-192 "Golden Dragons"	F/A-18C Hornet
Carrier AEW Squadron VAW-112 "The Golden Hawks"	E-2C Hawkeye
Electronic Attack Squadron VAQ-133 "Wizards"	EA-6B Prowler
Fleet Logistics Support Squadron VRC-30 Det. 4 "Providers"	C-2A Greyhound
Helicopter Sea Combat Squadron HSC-8 "Eightballers"	MH-60S Seahawk
Helicopter Maritime Strike Squadron HSM-71 "Raptors"	MH-60R Seahawk

### Carrier Air Wing Seventeen (CVW-17)

<i>Unit</i>	<i>Aircraft Type</i>
Strike Fighter Squadron VFA-22 "Fighting Redcocks"	F/A-18F Super Hornet
Strike Fighter Squadron VFA-25 "Fist of the Fleet"	F/A-18E Super Hornet
Strike Fighter Squadron VFA-81 "Sunliners"	F/A-18E Super Hornet
Strike Fighter Squadron VFA-113 "Stingers"	F/A-18C Hornet
Strike Fighter Squadron VFA-94 "Shrikes"	F/A-18C Hornet
Carrier AEW Squadron VAW-125 "Tigertails"	E-2C Hawkeye
Electronic Attack Squadron VAQ-139 "Cougars"	EA-18G Growler
Fleet Logistics Support Squadron VRC-40 Det. 5 "Rawhides"	C-2A Greyhound
Helicopter Sea Combat Squadron HSC-15 "Red Lions"	MH-60S Seahawk
Helicopter Maritime Strike Squadron HSM-73 "Battlecats"	MH-60R Seahawk



*Large numbers of F/A-18Fs such as this VFA-122 aircraft will be grounded (photo: Angad Singh)*



*A-10Cs such as this one will be grounded (photo: Angad Singh)*

## Grounding of USAF combat squadrons

The US Air Force is required to reduce 203,000 flying hours, 18% of typical annual hours flown. The bulk of this will come from the grounding of an unprecedented seventeen combat aircraft squadrons in addition to its ‘Thunderbirds’ aerobatic demonstration team. USAF Chief of Staff, General Mark A Welsh III, said that cuts will mainly affect operational training and that they are structured to “protect flying operations in Afghanistan and other contingency areas, nuclear deterrence, and initial flight training.” However, approximately two-thirds of active-duty combat units will see reduced training at their home stations. The combat units to be grounded beginning in April include one F-22 Raptor squadron, four F-15E Strike Eagle Squadrons, six F-16 Fighting Falcon squadrons, two A-10C Thunderbolt II squadrons, two B-1B Lancer bomber squadrons and one B-52 Stratofortress bomber squadron.

A number of other squadrons will maintain a reduced readiness level called “basic mission capable” until the end of the 2013 fiscal year, reducing the USAF to its lowest capability level in decades. Ironically, top USAF officials estimate that it will cost enormous amounts of time and money to return these squadrons to previous readiness levels.



*The Blue Angels display team will be sorely missed at high-profile events across the USA (photo: Angad Singh)*

The reduction in flying hours will also affect the USAF’s ability to conduct large-scale exercises such as the famed ‘Red Flag’ series held at Nellis AFB in Nevada. The Indian Air Force was scheduled to participate in *Red Flag* in June 2013, but with the USAF unable to host the exercise, the IAF will have to wait for another opportunity at an undefined date.

Crucially, a series of acquisition programmes have been delayed but

not cancelled. This includes a delayed purchase of F-35s intended for the 2013 fiscal year. The future long-range strike bomber (LRS-B) programme also escaped the cuts relatively unscathed, with programme restructuring and rescheduling saving it from any drastic action.

For the USAF, the sequester will also affect its public face most directly, with the service electing to ground all aerial demonstration teams and curtail aviation



*F-22 Raptor of the now-grounded 94th Fighter Squadron (photo: Angad Singh)*



*This F-16C of the 421st Fighter Squadron will only be "basic mission capable" until September 2013 (photo: Angad Singh)*



## List of affected USAF units by aircraft type

### F-22 Raptor

94th Fighter Squadron "Hat in the Ring"

### F-15E Strike Eagle

336th Fighter Squadron "Rocketeers"  
391st Fighter Squadron "Bold Tigers"  
48th Fighter Wing (2 squadrons)

### F-16C/D Fighting Falcon

USAF Thunderbirds (57th Wing)  
77th Fighter Squadron "Gamblers"  
555th Fighter Squadron "Triple Nickel"  
158th Fighter Wing (1 squadron)  
169th Fighter Wing (1 squadron)  
187th Fighter Wing (1 squadron)  
354th Fighter Wing (1 squadron)

### A-10C Thunderbolt II

442nd Fighter Wing (1 squadron)  
917th Wing (1 squadron)

### B-1B Lancer

2nd Bomb Wing (2 squadrons)

### B-52 Stratofortress

2nd Bomb Wing (1 squadron)

support at public events for the remainder of the fiscal. The USAF had already disbanded all but one single-aircraft type demonstration teams in December 2011, but the grounding of the 'Thunderbirds' means the Air Force, like the Navy, will have meagre public outreach for the rest of the year.

The Army will suffer similarly low levels of readiness, with Army Chief of Staff General Raymond Odierno stating

that the estimated \$17 billion cuts to his service will result in "extremely low levels of readiness in the next six months."

Cuts to Army Aviation flying hours will result in 500 fewer pilots available by the end of September 2013, a need that will need to be urgently addressed after the effects of sequestration are lifted. Like the Navy, Marines and Air Force, the Army also intends to reduce operating expenses by cutting back on maintenance and

training, and has also put on hold several acquisition programmes.

Given the bleak appraisals of the sequester by serving and retired military personnel, it may come to pass that the short-term financial savings from the spending cuts may come back years from now to wreak havoc on force readiness as well as government chequebooks.

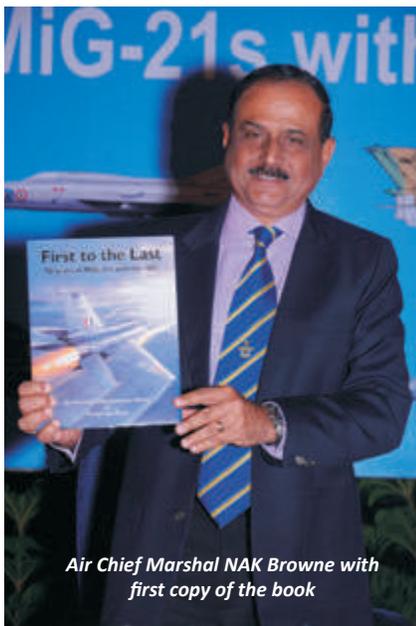
*Angad Singh*



With the mounted MiG-21 at entrance to the Akash Mess : (left to right) Mr Sergey Korotkov, Air Marshal Philip Rajkumar, Air Marshal Denzil Keelor, Air Chief Marshal NAK Browne, Flt Lt S Dutta, Air Marshal Sharad Deshpande, Air Chief Marshal Anil Tipnis and Air Commodore Suren Tyagi

# 'First to the Last'

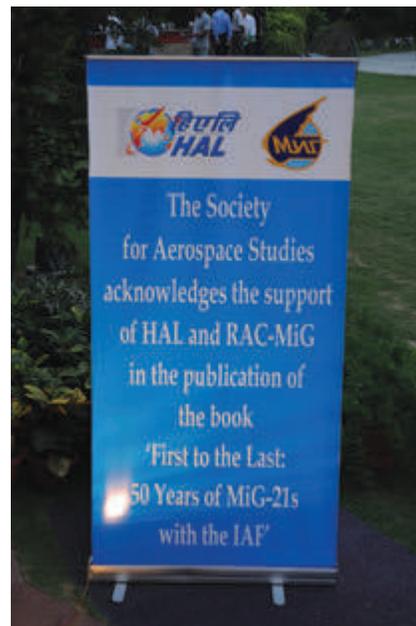
## GOLDEN TRIBUTE TO MiG-21s OF THE IAF



Air Chief Marshal NAK Browne with first copy of the book

“The MiG-21’s invaluable contribution towards moulding the IAF’s operational psyche cannot be matched by another fighter – past or present. Over the last five decades, this valuable fighter has literally nurtured generations of fighter pilots as they learned the ropes of combat aviation and grew up to become capable and confident fighter pilots. As the first combat aircraft of non-Western origin, its induction represented a watershed moment in the IAF’s history. The induction of the first MiG-21s into 28 Squadron (‘First Supersonics’) in 1963 began a historic association which has grown stronger with each passing year. It is no surprise, therefore, that IAF fighter pilots swear by the combat versatility of this delta wing marvel of aviation history.”

These significant words extracted from the foreword by Air Chief Marshal NAK



Browne, Chief of the Air Staff, to the book 'First to the Last : 50 Years of MiG-21s with the IAF'', sum up tributes to the MiG-21 on its golden jubilee of operational service with the IAF.

This seminal work, compiled by Air Marshal Philip Rajkumar (retd) and Pushpinder Singh and published by *The Society for Aerospace Studies*, was ceremonially released by Air Chief Marshal NAK Browne, Chief of the Air Staff, at a glittering function at the Akash Officers Mess in the heart of New Delhi on 20 April 2013.

The audience included 'who's who' of the IAF: serving and retired Air Rank Officers including former Chiefs of the Air Staff, AOC-in-Cs of IAF Commands and, among others, Principal Staff Officers at Air Headquarters. Also exuding reminiscences of operational bonding with this tailed-delta fighter was Air Marshal Denzil Keelor, one among the eight chosen fighter pilots of the first batch selected for training on this type in the USSR, along with Air Commodore SS Tyagi who has flown more than 6000 sorties on this classic fighter. Equally applauded was presence of one of the IAF's youngest MiG-21 pilots : Flt Lt S Dutta of No.108 Squadron who has just logged a score of hours on type.

The IAF's Brass Band, playing 'Sound Barrier' amongst other martial tunes during the evening created the right 'atmospherics' and touched many chords of those present and sending out a clear message that this fighter aircraft, having been the backbone of the IAF for near half a century, still has the zest, lethality and capability to hold its own amongst new generation types in the IAF's inventory.

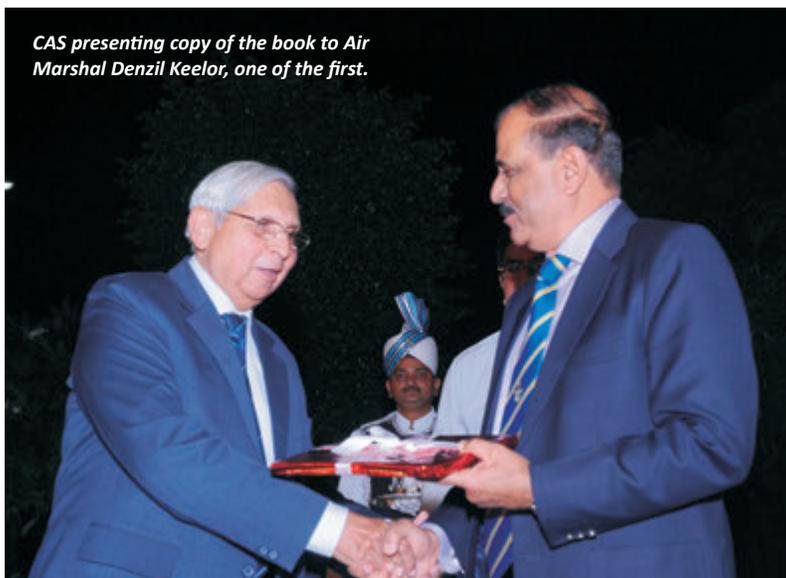
The bonds between India and Russia which were established in the early years of Independence and reinforced with ready transfer of defence-related technology, were recalled and refreshed with the presence, at Akash Mess, of the Russian Ambassador, H.E. Alexander Kadakin along with Sergey Korotkov, Director General RAC-MiG as also several senior officials of the Russian Embassy and the Industry.

In his brief speech after releasing the book, Air Chief Marshal NAK Browne recalled the contribution of HAL, pointing out that of over 600 MiG-21 aircraft manufactured by it, 264 are still flying and will remain part of the active fleet till 2018-19 (two years beyond the earlier statement by the RRM in Parliament). The MiG-21 has always had an aggressive edge "which served the country brilliantly during the 1971 war and three decades later, during the 1999 Kargil conflict".

In his address, Dr RK Tyagi, present Chairman of HAL, recalled that with production of the MiG-21, began a successful partnership with Russian agencies in the aviation sector. "I am proud to say



*Mr Sergey Korotkov presenting model of the MiG-29UPG to the CAS*



*CAS presenting copy of the book to Air Marshal Denzil Keelor, one of the first.*



*Air Marshal Sharad Deshpande receives the book from CAS*

that the MiG-21 project stands as a beacon not only in the history of HAL, but also as a close-knit partnership between the IAF and HAL”, he added, commenting that the MiG-21 signified not only the Indian Air Force’s air superiority and growth of HAL in the ‘60s but an effective development of the aerospace and defence industry in India. HAL has produced some 657 MiG-21 aircraft under licence.

Mr. Alexander Kadakin, Ambassador of Russia in India, welcomed production of the book which had just been released by Chief of the Air Staff to mark 50 years of service by the MiG-21 in the IAF. He said that Russia and India have had “an unparalleled level of maturity and confidentiality in military and technological co-operation and their ties are time-tested, mutually beneficial and trustworthy”. Since the 1960s, interaction between India and Russia in military aviation has grown “from strength to strength” and currently the IAF operates over 500 Soviet-and Russian-origin aircraft. The Ambassador also referred to the change from a ‘seller-buyer relationship’ to setting-up of joint ventures, induction into the IAF of the Sukhoi Su-30MKI, the MiG-29K/KUB carrier-borne fighter and the ensuing Multi-functional Transport Aircraft (MTA) programme. “No doubt, this 170-page volume will serve as a fine tribute to Russian-Indian friendship and co-operation, as a monument to the illustrious heroic workhorse—the MiG-21”, he concluded.

Thereafter, Mr Sergey Korotkov, Director General RAC-MiG spoke about the contribution made by the MiG-21 to the “strength and sinews of the IAF in the past 50 years”. His speech, in Russian was ably translated by Col Mikhail Globenko, Deputy Director General of RAC-MiG.

The Akash (‘aerospace’) Air Force Officers Mess, located in the heart of New Delhi, not far from India Gate in New Delhi, was an ideally appropriate venue for launch of the book, with a real-life MiG-21 brilliantly displayed on a high pedestal adorning entrance to the Mess. This MiG-21 served as an awesome backdrop for a photo-op that no one could afford to miss, especially towards end of the function, with soaring spirits stimulated by the endless bonhomie amongst MiG-21 enthusiasts gathered for this special celebration !

The 170-page book published by *The Society for Aerospace Studies* (also publishers of the *Vayu Aerospace & Defence Review*) is an exhaustive compendium of information on various aspects of the MiG-21 in service, its technology and performance, production and support with various IAF squadrons during the past five decades. In its exquisitely illustrated pages are featured articles and reminiscences by Air Chief Marshal Anil



*The ‘MiG-21 record holder’, Air Commodore SS Tyagi with the CAS*



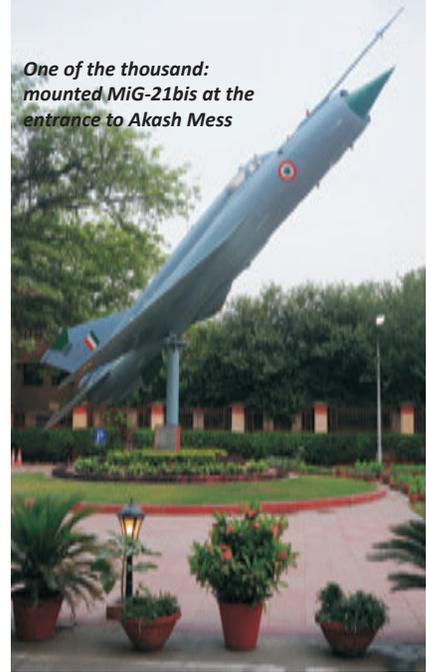
*‘The young one’, Flt Lt S Dutta being given the book by CAS*



*A toast to the MiG-21 ! Dr. RK Tyagi and H.E. Mr. Alexander Kadakin flank Air Chief Marshal NAK Browne*



*Eve of the function at the splendid Akash Mess lawns*



*One of the thousand: mounted MiG-21bis at the entrance to Akash Mess*

Tipnis, Air Marshal Philip Rajkumar, Air Marshal PK Dey, Air Marshal Brijesh Jayal, Air Marshal Sharad Deshpande, Air Marshal Satish Inamdar, Air Commodore Parvez Khokhar, Air Commodore Nayani

In his overview, Pushpinder Singh (author of several books on the Indian Air Force, including the trilogy on its history ‘Himalayan Eagles’) traced the 50 years in frontline service of the MiG-21 fighter

photographs of MiG-21s at various IAF airbases, from the western desert to the jungles of Assam. In a statistical summary, HAL’s manufacturing programme is recorded, listing each of the Type 77s,



*Launch of the book at Akash Air Force Officer’s Mess, 20 April 2013. Air Chief Marshal NAK Browne at the centre with (left to right) : Gp Capt JC Malik, Air Marshal Philip Rajkumar, Dr RK Tyagi, the CAS, Mr. Alexander Kadakin, Mr Sergey Korotkov, Mr. Pushpinder Singh.*

Harish, Air Commodore Suren Tyagi, Wg Cdr BR Madhav Rao and followed by 7 Appendices, verily a treasure of information.

with the Indian Air Force from 1963 to 2013 – and still flying high ! Phil Camp and Simon Watson, the intrepid IAF enthusiasts have contributed an array of

Type 96s and Type 75s, produced in India from 1966-67 to 1986-87, “first to the last” .

**JCM**



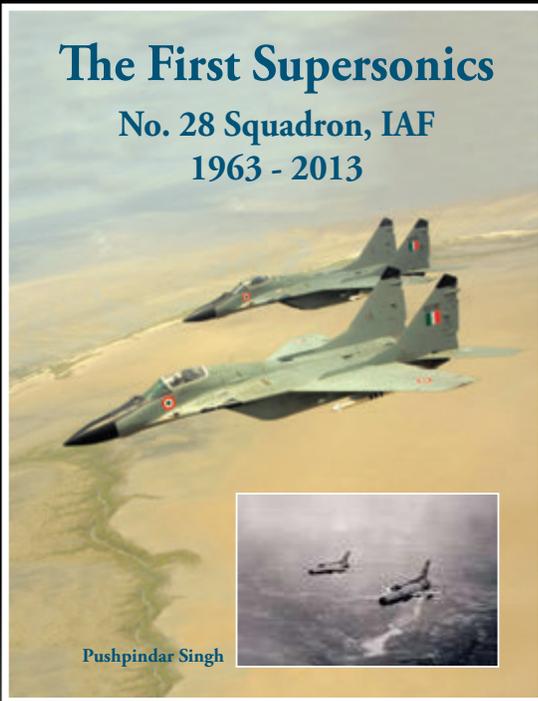
*Before the spread was laid !*



*Backdrop to the stage : depicted are variants of MiG-21s with the IAF. Top left to right : Type 74, Type 77, Type 69. Bottom left to right : Type 96, Type 75 and Bison*

## The First Supersonics

No. 28 Squadron, IAF  
1963 - 2013



# The First Supersonics are 50

Two Saturdays in a row ! During the second half of April 2013, two books published by *The Society for Aerospace Studies* were released at special events which (near simultaneously) marked 50 years of MiG-21s with the Indian Air Force and 50 years of No.28 Squadron, 'The First Supersonics'.

No.28 Squadron of the Indian Air Force celebrated their 50th (or Golden Jubilee) Anniversary in late April 2013. That they are 'The First Supersonics' is virtually a cliché and their spirit 'determined to destroy' is evident as they go about their professional tasks every day. Raised on 1 March 1963 at Chandigarh with a handful of MiG-21F-13s (Type 74), No.28 Squadron soon came of age and were 'blooded in action' in September 1965. However their moment of glory was to come in another shooting war, during December 1971 where they played a stellar role in the Bangladesh campaign.

After near quarter century of operating the MiG-21, essentially the Type 77 from 1966, No.28 Squadron were re-equipped with the MiG-29B in 1987 with which type they continue to 'touch the sky with glory', now awaiting the upgraded MiG-29UPG to be received in the near future.

No.28 Squadron have been led by many distinguished Commanding Officers, from Wg Cdr Dilbagh Singh (later Air Chief Marshal and Chief of the Air Staff) in March 1963 to the present



28 Squadron personnel with MiG-29Bs.



MiG-29Bs with CCMs over the Saurashtra Coast.

(24th) CO Wg Cdr Harbinder Singh who had the privilege of organising and hosting the Golden Jubilee events at their home base in April, in the presence of Air Vice Marshal Paul Upot, the present Commodore Commandant.

And what a turn out ! From near and far came former COs and many others who had distinguished themselves in service with ‘The First Supersonics’ :

Air Vice Marshal BK Bishnoi (of December 1971 fame) along with Air Commodore Manbir Singh who too was awarded the VrC in 1971 ; Air Marshals Teju Asthana, Subhash Bhojwani (last CO with MiG-21s) and Harish Masand (first CO with MiG-29s) and ‘Polly’ Mehra, all of whom are now retired but full of josh and nostalgia ! Also making it ‘just in time’ was Air Vice Marshal

VR Chaudhari who commanded ‘The First Supersonics’ in 2001-2003 and has recently taken over Deputy Commandant at the Air Force Academy, Dundigal.

The functions began on Friday 26 April with the *Bada Khana* at the Squadron Complex followed next morning by inauguration of the renovated Museum by Air Vice Marshal Paul Upot, at which time Air Vice Marshal BK Bishnoi presented a



Welcome to the celebrations !



Stone icon commemorating No.28 Squadron's 50th anniversary, unveiled by Air Marshal Arup Raha and Air Vice Marshal Paul Upot on 27 April 2013.



The Squadron Complex

'war trophy' commemorating the December 1971 operations by No.28 Squadron in East Pakistan, specifically the pinpoint attack on the Governor's House in Dacca.

The grand reunion dinner party took place at the Officer's Mess that evening when the book on 'The First Supersonics' authored by Pushpindar Singh of *The Society for Aerospace Studies* (publishers of the *Vayu Aerospace Review*) was released by Air Marshal Arup Raha, AOC-in-C Western Air Command, who had joined No.28 Squadron as a young officer on its conversion to MiG-29s.

The Golden anniversary cake was ceremonially cut by the 'oldest' and 'youngest' *First Supersonics* : Air Vice Marshal BK Bishnoi and Fg Ofr Dinesh Kamboj respectively. This was followed by presentations to the veterans present and speeches by many of them, reliving the glorious years gone by.

After the Indian Naval band had completed their excellent repertoire, it was time to disco and 'The First Supersonics' were as vigorous on the dance floor as they are in the air !



Mig-29Bs of No. 28 Squadron over the Arabian Sea (photo by Peter Steinemann).



*Cutting the anniversary cake : Air Vice Marshal BK Bishnoi and Fg Ofr Dinesh Kamboj.*



*Wg Cdr Harbinder Singh, CO No.28 Squadron presenting plaque to Air Marshal Arup Raha*



*Air Marshal Arup Raha releasing the 'First Supersonics' book, authored by Pushpinder Singh*



*Left to right : Air Marshal Harish Masand (retd) with Air Vice Marshals VR Chaudhari and D Choudhury at the lawns of the Mess.*



*In brilliant red, wives of the 'First Supersonics' with the Squadron crest created in rangoli*



*Painting by Gp Capt Deb Gohain of 28 Squadron MiG-21FL attacking Government House in Dacca, December 1971.*



*War trophy presented to the Squadron Museum by Air Vice Marshal BK Bishnoi (retd).*

Photographic Essay by Simon Watson  
visiting 'The First Supersonics'







50<sup>th</sup> INTERNATIONAL  
PARIS AIR SHOW  
LE BOURGET  
JUNE 17-23, 2013

# THE REIGN IN SPAIN

## Visit to Airbus Military in Seville

Trade Media Briefing



A330MRTT

### Yayu's Managing Editor visited Airbus at Seville and Toulouse in May-June 2013.

Usually spread out over a calendar year, this time the Airbus Military TMB-13 (Trade Media Briefing) and the Airbus Commercial AID (Airbus Innovation Days) were just a week apart and both 'just in time' before the Paris Air Show to be held later from 17 June 2013 at Le Bourget. Both the visits are a treasure trove of information but to put it all together is a task by itself!

In this first article, I shall review the visit to Airbus Military in Seville in Spain and in the second, the visit to Toulouse in France.

Taking place over two days 29-30 May, we visited Airbus Military's facilities in Seville. On arrival at the San Pablo plant, we were straight away given an insight on the market for military and civic/humanitarian transport aircraft which was followed by a review on their aircraft products in operation worldwide. After the MRTT/Derivatives programme update, there was a technology and innovation session, followed by briefing on the EIS A400M training and overall customer services. The next day was

focused on the A400M programme as well as the flight test update. All in all, a well put together schedule with the right amount of information partaken, even though in concentrated form.

Airbus Military is the "only military and civic/humanitarian transport aircraft manufacturer to develop, produce, sell and support a comprehensive family of airlifters ranging from three to 45 tonnes of payload". The product range includes the three to nine tonnes payload 'Light and Medium' Family, comprising the C212, the CN235 and the C295 "workhorses", the all new 37 tonne A400M as well as the A330 MRTT.

Altogether, Airbus Military has sold more than 1,000 aircraft to some 130 military, civilian and governmental customers. More than 800 of these aircraft have been delivered.

Headquartered in Madrid (Spain), the company's facilities are essentially based in Spain. Its main sites are at Getafe, close to Madrid, where civil Airbus A330 airframes are converted into Multi Role Tanker Transport (MRTT) aircraft, and



Seville, where the San Pablo factory, south of the airport, hosts the A400M Final Assembly Line opened in 2007, as well as the complete production and final assembly of the C212, CN235 and C295.

Airbus Military was formally created in April 2009, following integration of the former Military Transport Aircraft Division (MTAD) and Airbus Military Sociedad Limitada (AMSL) into Airbus. This integration allows for a single and streamlined organisation. Airbus Military has its own P&L accounting, and employs more than 5,000 people.

We start with latest developments on the A400M. The Company has received full Type Certification for the A400M new generation airlifter, marking a critical step towards delivery of the first aircraft to the French Air Force. Award of the Type Certificate makes the A400M the world's first large military transport to be designed and certified to civil standards from its inception. Military Initial Operational Clearance is imminent paving the way towards first delivery.

The Type Certificate was presented to Airbus Military by European Aviation Safety Agency (EASA) Certification Director Dr. Norbert Lohl. As Airbus

## Airbus Military A400M undergoes extreme cold weather tests

The Airbus Military A400M has successfully undergone a renewed series of cold weather tests in a production-representative configuration. During a week-long deployment to Iqaluit, Canada, the flight test-team demonstrated the capability of equipment such as the cargo system and production-standard engines, which were not available during earlier tests in Sweden. Tests conducted over 5 days on Grizzly 5 / msn6 included engine runs after a 24-hour cold-soak to -32°C, use of all the cargo bay equipment, taxiing, and a development flight.



*A400Ms lined-up.*



Military CEO Domingo Ureña Raso said: "I would like to thank everyone in Airbus, Airbus Military and at EASA who has worked so hard to achieve this certification. It is an enormously gratifying moment to have confirmation that the A400M has fully demonstrated its compliance with the most stringent airworthiness standards. This is an aircraft that is going to transform the military airlift world in the years ahead and we look forward with great excitement to the first delivery."

Cedric Gautier, Airbus Military Head of A400M programme, continued "Certifying the A400M to civil as well as military standards has been a huge challenge for us, our suppliers and EASA itself. But by providing a firm framework for certification from day one, to globally accepted standards, both we and the operators will see important benefits as the aircraft matures in service and new customers join the programme."

During the certification programme, the A400M has undergone exhaustive testing of its handling qualities throughout the flight envelope in normal and failure conditions; demonstrated outstanding performance in high heat of the Gulf, extreme cold of Sweden and Canada, and at the high altitude of La Paz, Bolivia, having satisfactorily completed more than 300 hours of function and reliability

testing to demonstrate the robustness of its TP400 engines and systems.

Additionally it has begun tests of more advanced military functions such as air-to-air refuelling, air-dropping of supplies and paratroopers, and low-level flight – all with highly encouraging results. The five-strong fleet of 'Grizzly' development aircraft has now completed some 4,800 hours in the air during more than 1,600 flights and will continue intensively to expand the A400M's military capabilities.

The A400M can perform missions which previously required two - or more

- different types of aircraft, and which even then provided an imperfect solution. Its fuselage external width of 5.64 metres (18 ft 6 in) is equal to that of the A330/A340 wide-body. The inside usable width of four metres / 13ft, height of four metres (13ft), and usable length of nearly 18m (59ft), allows it to carry numerous items of outsize cargo including, for example, an NH90 or a CH-47 Chinook helicopter, or two Stryker infantry carrier vehicles (ICV) of 17 tonnes each for military purposes. It can also carry a 25 tonne semi-articulated truck with a 6m (20ft) container, or a rescue boat, or large lifting devices, such



as excavators or mobile cranes needed to assist in disaster relief.

Furthermore, the A400M is the only airlifter that can fly these items directly to the site of the action thanks to its unique landing characteristics. With its 12-wheel main landing gear designed for operations from stone, gravel or sand strips, its efficient absorption of shockloads into the airframe structure, and its minimised risk of foreign object damage, the A400M is able to land on, and take-off from, short, soft and rough unpaved airstrips meeting up to the CBR4 standard. These characteristics allow it to ensure, for example, that swift humanitarian aid can arrive on the spot in the very short timeframe needed after a disaster.

Thanks to these new technologies, the A400M has the ability to fly distances up to 4,700 nm (8,700 km), at a cruising altitude up to 37,000 ft, and at a speed of up to Mach 0.72 - very similar to that of a jet powered airlifter, which gives it the potential for strategic-logistic missions.

Moving on to the A330 MRTT. Airbus Military's A330 Multi Role Tanker Transport programme ended the year 2012 with another success, with its selection by the Indian Air Force (IAF) as the planned new generation tanker/transport as also rapid progress being made by the Royal Australian Air Force and the UK's Royal Air Force in deploying the type in operational service.

The IAF's selection of the A330 MRTT means that the aircraft has won every major procurement competition outside the USA since launch, cementing its status as the definitive new generation tanker/transport for leading air forces of the world.

India, with which contractual negotiations are now underway for an envisaged six aircraft, becomes the fifth nation to select the A330 MRTT following Australia, Saudi Arabia, the United Arab Emirates and the UK. France has already indicated its intention to place an order for the aircraft and other campaigns are running worldwide, notably in Singapore.

All five aircraft ordered by Australia have now been delivered and the RAAF has stated its intention to declare Initial Operating Capability very soon. Already however the aircraft, known in the RAAF as the KC-30A, has already been flying intensively on both transport and refuelling missions and performed highly

## Airbus Military C295 demonstrates release of MBDA Marte missile

**A**irbus Military and MBDA have successfully demonstrated the release of an instrumented Marte MK2/S anti-ship inert missile installed under the wing of the C295 maritime patrol aircraft. This flight was the last of a series of trials performed in a joint Airbus Military – MBDA collaboration to validate the aerodynamic integration of Marte on C295, its handling qualities and performance tests.

The installation of weapons under the wings provides new operational capabilities to the C295 MPA allowing the aircraft to perform new missions demanded by customers. In the anti-submarine warfare (ASW) role, the C295 is already in-service carrying the MK46 torpedo. The Marte Mk2/S is already integrated on the AW-101 and the NFH (Naval NH90) helicopters in service with the Italian Navy and integration activities for the Marte ER on the Eurofighter Typhoon are currently underway.

The MBDA Marte MK2/S missile is a fire-and-forget, all-weather, medium-range sea-skimming anti-ship weapon system, equipped with inertial mid-course guidance and radar homing terminal guidance, and capable of destroying small vessels and heavily damaging major vessels. The missile has a weight of 310 Kg and is 3.85 m long.



successfully in the international Exercise Pitch Black 2012.

In the UK, through AirTanker, three aircraft are now in service with the RAF with three more to be delivered by mid-2013. Airbus Military is on track to deliver the "core fleet" of nine to the UK and have them in squadron service by mid-2014, followed by further deliveries to get to the full fleet of 14. Availability

and on time performance for the Voyager in service have been excellent with operational figures for the year to date showing an aircraft availability of 96%, while AirTanker achieved an on-time performance of almost 98% : a level of service comparable to that of any commercial airline.

Uniquely the RAF has concluded follow on flight trials if at entry into



service, it wishes to use a different drogue for the underwing hose-and-drogue system used for refuelling, rather than the equipment in-service with the Royal Australian Air Force and Royal Saudi Air Force (RSAF). This has resulted in some delay to release in service for air-to-air refuelling which is now expected to take place” very shortly.” But the Voyager is already playing an expanding role in

shouldering the RAF’s transport burden, capitalising on its ability to carry some 290 passengers on a main-deck left clear by the A330 MRTT’s unique feature of requiring no additional fuel tanks to conduct AAR.

Elsewhere, deliveries of the initial batch of three aircraft for the RSAF will be completed early in 2013, to be followed by the three aircraft ordered by the UAE in the

coming months. The second batch of three for the RSAF, which were options that were subsequently firmed are due for delivery after a gap following the first batch.

The result is that by mid-2013 as many as 17 A330 MRTTs are expected to be in service with four air forces, marking the beginning of a transformation of air-to-air refuelling abilities across the globe.

Those operators will benefit from the aircraft’s unprecedented load-carrying capability, optimised mixture of boom and hose refuelling, vastly improved crew operating conditions, and exceptional reliability and life-cycle costs originally designed to meet the exacting demands of commercial airlines.

As earlier stated, Airbus Military produces a comprehensive range of airlifters offering payloads from three to 45 tonnes. In the light and medium tactical segment there is the family of three models



*A330 MRTT of the Royal Australian Air Force (RAAF)*



*The C295 is turning out to be a real ‘workhorse’.*

- the C212, CN235 and C295 - offering from three to nine tonnes of payload. The operational qualities built into the aircraft make them not only the most capable machines for typical military missions, but also give them the versatility to undertake that growing group of non-defence tasks that may be described as “civic” missions. These include humanitarian aid, but also law enforcement, surveillance, search and rescue (SAR), environmental control and many others.

In the transport role the aircraft all feature a rear ramp to allow easy loading and unloading, especially in ill-equipped operating locations and a cargo compartment that is completely unobstructed and adaptable to operators’ needs. They have hardened cabin floors to cope with concentrated loads and STOL performance with robust landing gear designed to handle soft (CBR2) and unpaved terrain.

For maritime patrol, anti-submarine warfare, and surveillance missions the aircraft have low-level flying characteristics with up to 3g manoeuvrability and, for the CN235 and C295 in particular, a cruise

speed optimised for persistent surveillance and wide area coverage. In the search and rescue (SAR) role they benefit from wide field-of-view bubble windows and safe low-speed flying characteristics.

The Airbus Military C295 is a new generation, very robust and reliable, highly versatile tactical airlifter able to carry up to nine tonnes of payload or up to 71 personnel, at a maximum cruise speed of 260 kt (480 km/h). Fitted with a retractable landing gear and a pressurised cabin, it can cruise at altitudes up to 25,000 ft, while retaining short take-off & landing (STOL) performance from unprepared short, soft and rough airstrips, as well as having low level flight characteristics. Powered by two Pratt & Whitney Canada PW127G turboprop engines, the C295 provides hot and high performance, low fuel consumption and consequently a very long endurance of up to 11 hours in the air.

The C295 is also available in an Anti Submarine Warfare (ASW) version. Derived from the Surveillance and Maritime Patrol Aircraft (MPA) version of the C295, the C295 ASW is equipped with a tactical system proven during

MPA/ASW missions, and under-wing stations to carry weapons and other stores.

Airbus Military is now developing an Airborne Early Warning & Command (AEW) version of its C295. The primary sensor of the AEW&C to be fitted into the six metre (20 ft) rotodome, will be the IAI/ELTA 4th Generation Active Electronically Scanned Array (AESA) Radar with integrated IFF. The C295 AEW&C is to provide high quality 360° surveillance, creating in real-time an integrated Air and Maritime Situation Picture and Electronic Order of Battle. The AEW&C Situation Picture is to be shared with friendly forces via Network Centric data links. A C295 fitted with a rotodome demonstrator has been conducting flight trials from Airbus Military’s Seville facility since early June 2011.

Finally, but not in the least, I would like to thank the entire team at Airbus Military as well as Avian Media in India for organising this timely and meaningful visit. Look forward to TMB-14!

VSC

## **C295W with enhanced performance launched**

Announced at TMB’13, was this new series of the C295 that will be available in 2014 featuring winglets and updated engines as standard. The new model will provide operators with enhanced performance in all flight phases but is particularly aimed at those operating at “hot and high” airfields where payload increases in excess of 1,000kg are promised. In intelligence, surveillance and reconnaissance (ISR) roles such as airborne early warning (AEW) the enhancements will increase endurance by 30-60min and permit an operating altitude up to 2,000ft higher than now. The new features will also provide an overall reduction in fuel consumption of around 4% depending on configuration and conditions.

The C295W, assembled in Seville, Spain, is being offered to the market from now on and will be the standard version of the aircraft in all versions from the fourth quarter of 2014. Certification is expected in 2Q14. Airbus Military is committing to the C295W following flight-trials with winglets fitted to its company development aircraft which showed positive results for a weight penalty of only around 90kg. The engines are the Pratt & Whitney Canada PW127 turboprops which power all versions of the C295.

Airbus Military Head of Programmes, Light & Medium, and Derivatives, Rafael Tentor said: “The C295 has consistently been the market leader in all sectors in which it is offered. By investing in continuous development of the aircraft we are committed to maintaining its leadership through the introduction of substantial operating benefits. We very much look forward to discussing the C295W with existing and prospective customers.”





50<sup>TH</sup> INTERNATIONAL  
PARIS AIR SHOW  
LE BOURGET  
JUNE 17-23, 2013

# Airbus Innovation Days



*With its main structural assembly and system connections complete, the first A350 XWB flight test aircraft (designated MSN1) was moved from the main assembly hall to the adjacent indoor ground test station at Airbus' final assembly line in Toulouse, France.*

## Visit to Airbus facilities in Toulouse, France

**N**ow moving on to Vayu's visit to Airbus' facilities in Toulouse in France. Barely four days after getting back to India on 1 June from the Airbus Military visit, jetlag notwithstanding, we flew into Toulouse, France to begin the two day session (5-6 June) with the Airbus commercial team at the AID'13, an annual event! First the statistics :

It's been another good year for the Company. Infact, things are only getting better for the civilian airliner manufacturer. Airbus has delivered a company record of 588 aircraft to 89 customers (17 new) and exceeded its order target of 650 by winning 914 gross orders for 2012. These orders include 305 320s, 478 320neos, 82 A330/A340s, 40 A350 XWB and nine A380s. Airbus' backlog has infact set a new industry-wide record of 4,682 aircraft valued at over US\$638 billion. Deliveries were 10 per cent higher than the 2011 record (534) and 2012 was the 11th year in a row of increased production. In single aisles, Airbus

set a new record of 455 deliveries (421 in 2011). Widebody deliveries reached a record 103 aircraft (87 in 2011), underlining the success of the A330 Family which is being produced at the highest monthly production rates ever (9.5 in 2012 rising to 10 in Spring 2013). The A380 delivery target of 30 was achieved setting a new company record for the type (26 in 2011).

Airbus' share of total aircraft sales by value (above 100 seats) in 2012, is 41 per cent gross (41.5 percent net). Net orders reached 833 aircraft worth US\$96 billion. These include 739 A320 Family aircraft taking Airbus past the 9,000th single aisle order. Of these, 478 are for the NEO, confirming its over 62 per cent market dominance since launch. In the widebody market, 58 A330s and 27 A350 XWB were ordered. The A350-1000 won major endorsements from leading airlines through significant upsizing of orders. In the very large aircraft segment, Airbus won nine out of 10 orders demonstrating the market's preference for the A380.

# (AID) 2013



During 2012, the A350 XWB progressed well. The final assembly line became fully operational, the structural assembly of the first A350 XWB that will fly was completed and “electrical power on” of the aircraft was accomplished (more later).

Airbus recruited 5,000 employees in 2012 increasing the global employee figure to 59,000 and targets recruiting some 3,000 in 2013 to support all programme developments. “Looking back over 2012, we can proudly say it was a fantastic year. We delivered a record number of aircraft which highlights our increasing efficiency, and the market again demonstrated its confidence in all our products. In 2012, we delivered the first Sharklet aircraft, and with a commanding lead in the single aisle market, the dividends from our strategic decision to invest in the kind of innovation which generates value for our customers, is paying off,” stated Fabrice Bregier, Airbus President and CEO.



*A Rolls-Royce Trent 900 engine is mated to Thai's first A380 on the Airbus final assembly line.*

“We are keeping our production rates at a manageable pace, which is good for our supply chain, and bodes well for our long term profitability and bright future,” he continued.

Over the last 40 years, customer focus, commercial know-how, technological leadership and manufacturing efficiency have propelled Airbus to the forefront of the industry. Airbus today consistently captures about half of all commercial airliner orders. Airbus’ comprehensive product line comprises the families of aircraft ranging from 100 to more than 500 seats: the single-aisle A320 Family, including the A320neo, “best selling aircraft in aviation history”, the wide-body long-range A330 Family including the freighter and MRTT, the all-new next generation A350 XWB Family, and the double-deck A380. “Across all its aircraft families Airbus’ unique approach ensures that aircraft share the highest commonality in airframes, on-board systems, cockpits and handling characteristics. This significantly reduces operating costs for airlines”, stated company officials.

Airbus has sold over 12,000 aircraft to more than 500 customers/operators and has delivered over 7500 aircraft since it first entered service in 1974. Headquartered in Toulouse, France, Airbus is a global enterprise of some 59,000 employees, with fully-owned subsidiaries in the United States, China, Japan and in the Middle East, spare parts centres in Hamburg, Frankfurt, Washington, Beijing, Dubai and Singapore, while Airbus Military is headquartered in Madrid (Spain). Airbus also has training centres in Toulouse, Miami, Hamburg, Bangalore and Beijing, as well as Seville for Airbus Military, and more than 150 field service offices around the world. Airbus also relies on industrial co-operation and partnerships with major companies all over the world, with a network of some 2,000 suppliers (for the flying parts alone) in more than 20 countries.

Now to the A350XWB ! Airbus has installed on the first flight-test A350 XWB (MSN001) its two flight-ready Rolls-Royce Trent XWB engines and is also installing the new Honeywell HGT1700 auxiliary power unit (APU) at Airbus’ production facilities in Toulouse. The new Trent engines were received from UTC Aerospace Systems (formerly Goodrich) which had recently prepared the fully integrated powerplants prior to their installation on the aircraft’s pylons. Recently the Trent XWB received Engine Type Certification from EASA, confirming that the engine had fulfilled EASA’s airworthiness requirements for flight. The Trent XWB has already powered a series of test flights on Airbus’ A380 Flying Test Bed (FTB) aircraft since February 2012, demonstrating a high level of maturity.

In parallel to mounting of the two Trent XWB engines in Toulouse, the A350 XWB was also fitted with its new specially developed APU – the Honeywell HGT1700 which has greater power density and higher efficiency than the previous generation APUs. With the installation of its engines and also the APU, the A350 XWB MSN001 becomes essentially a ‘completed’ aircraft. Following the ongoing ground tests, other preparations and also painting, MSN001 will then be handed over to the Airbus Flight Test team to commence preparations for ground runs and maiden flight in the summer.

The A350XWB has also been through lightning strike evaluations. These so-called ‘electromagnetic hazard’ evaluations – which took place mid-April at Airbus’ Clément Ader facility in Colomiers, France – involved the second A350 XWB flight test

## Construction begins on Airbus’ U.S. assembly line

Airbus manufacturing in the United States advanced another step closer to reality in Mobile, Alabama, as construction of the company’s A320 Family Assembly Line has officially begun. The new assembly line, which is the company’s first U.S.-based production facility, will be located at the Mobile Brookley Aeroplex and will facilitate assembly of A319, A320 and A321 aircraft. Major construction of the facility will begin this summer, with aircraft assembly planned to begin in 2015, with first delivery of a Mobile-assembled aircraft in 2016. At full production, the assembly line and associated facilities would produce up to four aircraft a month which directly translates into employing as many as 1,000 high-skilled workers.



President and CEO Fabrice Brégier underscored the significance of Airbus’ U.S. A320 Family final assembly line during the 8 April 2013 groundbreaking ceremony in Mobile, Alabama.

aircraft, MSN3, to demonstrate necessary protection levels in case of lightning strikes while airborne. The A350 XWB’s aerostructure is primarily made of composite materials (carbon fibre reinforced plastic), providing more electrical resistance than an aerostructure consisting mostly of metallics. To ensure the A350 XWB aerostructure safely manages lightning strikes, Airbus developed a solution where metallic foils are embedded in the aircraft’s composite panels – increasing the aerostructure’s electrical conductivity and protecting harnesses with metallic conduits.

Metallic foils have already been used on the A380 rear fuselage section, however as the A350 XWB includes a higher percentage of composite materials, it is important to confirm that such foils provide adequate protection for systems and equipment.

The A350 XWB ‘electromagnetic hazard’ testing on MSN3 lasted around three days, consisting of lightning strike simulations and follow-up measurements of induced voltage/current levels on selected harnesses. These evaluations use a low-level current injection rather than the actual electrical current level generated by a lightning strike, with the measured voltages and current then

## **Airbus: demand spurs need for over 28,000 aircraft in the next 20 years**

**A**irbus' latest Global Market Forecast (GMF) identifies a need for some 28,200 passenger and freighter aircraft (of 100 seats or more) between 2012 and 2031 worth nearly \$4.0 trillion, reconfirming an upward trend in the pace of new aircraft deliveries. Of these over 27,350 will be passenger aircraft valued at \$ 3.7 trillion.

Passenger traffic will grow at an average annual rate of 4.7 percent in the next 20 years, during which some 10,350 aircraft will be replaced by new efficient models. By 2031 the world's passenger fleet will have expanded by 110 percent from slightly over 15,550 today to over 32,550. In the same period, the world's freighter fleet will almost double from 1,600 to 3,000 aircraft.

In value terms, the single biggest market is China followed by the US, UAE and India. Demand for twin-aisle aircraft (250 to 400 seats), like the A330 and the A350 XWB, some 6,970 new passenger and freighter aircraft will be delivered valued at some US\$ 1.7 trillion. Of these, 6,500 are passenger aircraft valued at US\$ 1.6 trillion (44 percent by value of passenger deliveries, 24 percent of units). Leading demand is Asia Pacific (46 percent), Europe (17 percent) and the North America (13 percent).

extrapolated to the real threat of 200,000 amperes. This testing will be continued by similar but longer tests on the MSN4 aircraft in 2014, fulfilling a requirement for type certification of Airbus' A350-900 version.

The A350 XWB Family consists of three passenger versions with long-range capability of flying up to 8,500nm/15,580km. In a typical three-class configuration, the A350-800 will offer 270 seats while the A350-900 and the A350-1000 will offer 314 and 350 seats respectively. The A350 XWB offers a "very quiet and extremely comfortable cabin". At 220 inches/5.58 meters from armrest to armrest, the cabin provides a wide 18 inch seat in-line with the best comfort standards. Passengers will enjoy more headroom, wider panoramic windows, and larger overhead storage space. Crews will be able to relax when off-duty in extremely comfortable crew rest compartments located in the crown area, well outside the revenue generating cabin space.

Airbus recognises the need for sustainable development of air travel. Next generation Rolls-Royce Trent XWB engines and state-of-the-art aerodynamics help reduce emissions well below current and anticipated future regulatory levels. Carbon dioxide (CO<sub>2</sub>) emissions per passenger will be up to 25 percent lower than with current generation aircraft in this category and exterior noise levels will be as much as 15 EPNdB (Effective Perceived Noise Decibel) below ICAO Chapter-4 requirements.

## **Turkish Airlines places its biggest ever order**

**T**urkish Airlines, the largest airline in Turkey, has signed a contract for up to 117 A320 Family aircraft (25 A321ceo, 4 A320neo, 53 A321neo and options for 35 additional A321neo aircraft).



## **Lion Air orders 234 A320 Family aircraft**

**I**ndonesia's Lion Air has placed a firm order with Airbus for 234 A320 Family aircraft, comprising 109 A320neo, 65 A321neo and 60 A320ceo. The deal sees the carrier become a new customer for Airbus. Lion Air Group will use the aircraft to meet growth requirements on its expanding domestic and regional route network. The carrier will announce engine selections for the aircraft in the near future.





## Frame by frame, the A350XWB emerges !



*Airbus has installed its two flight-ready Rolls-Royce Trent XWB engines and the new Honeywell HGT1700 APU on the first flight-test A350 XWB (MSN001).*



*During lightning strike evaluations.*



*Airbus' first A350 XWB moved to the next phase of ground testing with its transfer from the final assembly line to the Clément Ader area 'Station 18' in Toulouse, which is primarily dedicated to fuel, pressure and radio navigability evaluations.*



*Fuselage sections for the third A350 XWB – which will be used for a wide range of evaluations in the flight test programme – were joined at the A350 XWB Final Assembly Line in Toulouse, France.*



*Painting of the first A350 XWB (MSN001) is fully complete as it emerges in its Airbus livery out from the paintshop in Toulouse. This latest milestone shows that MSN001 is progressing well on its route to first flight. The aircraft painting was achieved in less than seven days and follows the recent completion of MSN001's flight-test-instrumentation (FTI) verification.*

Now onto the A380. In its sixth year of commercial service, the A380 is flying with nine airlines. To date, the worldwide fleet has carried some 36 million passengers in 100,000 flights. Previous generation Very Large Aircraft (VLA or 400 seats and above) would have required 140,000 flights. This reduction in flights brings essential relief to airport-congestion and the environment. The corresponding saving of 5.7 million tonnes of CO<sub>2</sub>, demonstrates that A380 generates more revenue whilst minimising emissions and noise. The A380 fleet performs over 140 flights per day and carries over one and a half million people each month. Passengers can hop on board one of the A380s which are either taking off or landing every six minutes at one of the 32 international airports where it operates to date. On top of these, more than 50 other airports are getting prepared to accommodate the A380 and answer the airlines' need for more A380 destinations.

Over the next 20 years, more than 1,700 VLA, such as the A380, will have been delivered. Asia Pacific leads demand (45 percent) for these high capacity aircraft, followed by the Middle East (23 percent) and Europe (19 percent).

Typically seating 525 passengers in three classes on two decks, the aircraft is capable of flying 8,500 nautical miles or 15,700 kilometres non-stop, carrying more people at lower cost and with less impact on the environment. The spacious, quiet cabin and smooth ride have made the A380 a firm favourite with passengers, resulting in higher load factors wherever it flies.

Since 2006 the A380 has registered repeat orders by customers every year, bringing the total order book to date to 262 from 20 customers.

Moving on to the A330 Family, these span 250 to 300 seats, and includes Freighter, VIP, and Military Transport/Tanker



*A380 of Thai Airways International.*



*The livery for British Airways' first A380 includes approximately 10,000 individual dots on the tailfin that make up its Union Flag graphic.*



*John Leahy, Airbus Chief Operating Officer - Customers, with a scale model A380. "We expect more than 1,700 Very Large Aircraft – such as the 21st century A380 flagship – to be delivered by 2031".*

variants, which have now attracted more than 1,240 orders. Thanks to the introduction of numerous product improvements, it still remains the "most cost-efficient aircraft in its class". With more than 920 aircraft delivered to over 90 operators, the type is achieving average dispatch reliability above 99 percent. The

## **Lufthansa Board gives "go-ahead" for major orders**

The Lufthansa's Supervisory Board has approved the acquisition of 100 A320 Family aircraft (35 A320neo, 35 A321neo and 30 A320ceo with Sharklets) and two A380s worth approximately US\$ 11.2 billion at list prices. The Lufthansa Group remains Airbus' biggest operator worldwide with 385 Airbus aircraft currently in service. These include 271 A320 Family, 41 A330s, 63 A340s, and 10 A380s.



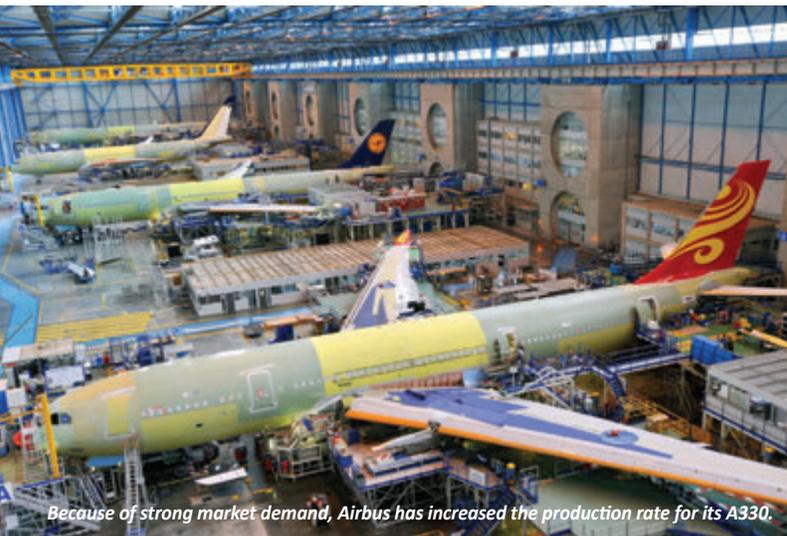
A330-200 variant has the versatility to cover all ranges from short-haul to true long haul – ideal for point to point operations. Currently, as more A320 Family ‘single-aisle’ operators discover the “advantages of stepping-up” to the ‘twin-aisle’ A330-200, they become new A330 operators who “recognise its merits” as a compelling, alternative to larger long-range airliners with a potential for growth with the A330-300.

Airbus now offers further enhanced performance for this airliner family by increasing the maximum takeoff weight capability up to 242 metric tonnes, which will first be applied to the larger A330-300 model and subsequently to the A330-200.

The new take-off weight capability combined with the fuel capacity increase enables operators of these new A330-300s to carry additional payload on longer missions. Overall, the full payload range now increases by around 500nm over today’s 235 tonne A330-300, and by around 350nm over today’s 238 tonne A330-200.

The A330-300’s optional fuel capacity increase will be achieved by activating the centre wing tank for the first time on this model. The centre tank and its associated systems have always been present as standard on its longer-range sibling – the A330-200.

The A330 has recently been certified by EASA for extended ETOPS from 180 to 240 minutes. This will help operators further by allowing higher payloads and schedule reliability, lower fuel burn, CO<sub>2</sub> emissions and flight-times. Airbus is also incorporating other technical improvements directed towards improving eco-efficiency and reducing the cost of operation. A good example includes navigation upgrades such as ATSAW (Airborne Traffic Situational Awareness), leading to shortened routings at optimum flight levels and facilitating more precise approaches.



*Because of strong market demand, Airbus has increased the production rate for its A330.*

## The single-aisle family

With over 9,100 aircraft ordered and more than 5,400 aircraft delivered to over 380 customers and operators worldwide, the A318, A319, A320 and A321 make up the “world’s best-selling single-aisle aircraft family” and are the “preferred choice” with traditional airlines and passengers, as well as with the fast-growing low-cost carrier market for which it is now the reference.

## Airbus delivers 100th Airbus to Japan

With the latest delivery of an A320 to Jetstar Japan, the total number of Airbus aircraft delivered to Japanese carriers has risen to 100, underscoring the rapidly growing number of Airbus single-aisle aircraft in the country. In just nine months since beginning of operations in July 2012, Jetstar fleet has grown to 10 aircraft. Airbus delivered its first aircraft to a Japanese carrier in 1980 (an A300B2) and in the last two years deliveries have accelerated rapidly. In 2012, Airbus delivered a total of 16 A320s, and in 2013 nearly 30 A320s will be delivered to four Japanese operators.



The A320neo (new engine option) is the latest of many product upgrades as Airbus continues to invest around 300 million euros a year on the A320 Family. These new A319, A320 and A321 models were announced in December 2010 and feature new engines (the PurePower PW1100G from Pratt and Whitney or the LEAP-1A from CFM) and large wingtip devices known as Sharklets. Together they result in a 15% fuel burn reduction, corresponding to an annual CO<sub>2</sub> reduction of 3,600 tonnes per aircraft.

Meanwhile, Sharklets are available as a forward-fit option since the end of 2012 and are expected to result in up to 4% percent reduced fuel burn over longer sectors, corresponding to an annual CO<sub>2</sub> reduction of around 1,000 tonnes per aircraft. The A320 is the first model fitted with Sharklets.

Airbus also offers operators of earlier A320 Family aircraft the option of retrofitting the fresh new look, significant increase in overhead stowage capacity, ambience lighting options and noticeable noise reduction of its latest factory standard of cabin.

A320 Family operators now can also benefit from enhanced ‘Required Navigation Performance – Authorisation Required’ (RNP-AR) combined with ‘Required Time of Arrival’ (RTA) time management. This allows the aircraft to conduct a ‘continuous descent approach’ (CDA) which is more efficient than the traditional ‘dive and drive’. The net benefits are lower noise and

fuel burn since less thrust is required. RNP-AR also enhances accessibility by enabling specially trained and authorised pilots to fly to lower altitudes with a more precise and efficient route into the airport, saving fuel and emissions and helping reduce the impact of bad weather on scheduled services.



*Airbus is offering airlines entirely new options for configuring the floor space offered by the A321neo. These allow more flexibility and thus increase the number of seats at the same comfort standard. In addition, the maximum exit limit is raised beyond 220 seats.*



*German flag carrier Lufthansa took delivery of its first A320 outfitted with fuel-saving Sharklets on 1 March 2013, and will receive 21 more A320 Family aircraft equipped with the wingtip devices by 2015.*

### **Airbus Research & Technology**

Since the introduction of jet engine aircraft, the air transport industry has achieved enormous improvements in economic efficiency and environmental performance of aircraft. For instance, in the last 40 years, the aviation industry has cut fuel burn and CO<sub>2</sub> emissions by 70%, NOx emissions by 90% and noise by 75%. During that time, innovation has been a key driver in Airbus' success : from the A300 to the A350 XWB, Airbus has been continually implementing new ideas.

Environmental and safety considerations have long been an integral part of the company's activities at all levels, and are a key priority in the development of all new techniques, products and processes. Through innovation, and out-of-the-box thinking,

Airbus will continue to meet its eco-efficiency goals, and ensure that air travel continues to be one of the safest, and most eco-efficient means of transportation. This is where Research and Technology (R&T) comes in.

More than 3,000 people at Airbus are working either directly or indirectly on over 100 major R&T projects. Above 90 percent of Airbus' annual investment in Research and Development (R&D) of over two billion euros has environmental benefits for current and future aircraft : Airbus files more than 500 patent applications each year.

Over the next 40 years, R&T cooperation and investment will be even more crucial because energy sources are set to become increasingly scarce and expensive, yet fuel remains the single biggest element of airline operating costs (30% for Single Aisle and 40% for Long Range aircraft), so reducing consumption (and therefore emissions) and finding new alternative sources remains a key industry driver. The aeronautics industry needs further step-changes in economic and environmental performance throughout the aircraft lifecycle to address such challenges.



*The Airbus 'Concept Plane' - shown here above a virtual New York City - is an "engineer's dream" to meet the expectations of future passengers.*

## **100th A380 delivered**

Malaysia Airlines (MAS) and Airbus have marked a major achievement, with the hand-over of the 100<sup>th</sup> A380 to MAS at Airbus' Henri Ziegler Delivery Centre in Toulouse, France. The aircraft is the sixth A380 for MAS.



## CleanSky and ACARE

As part of the European Union's Joint Technology Initiative *CleanSky*, Airbus is currently co-leading with Saab of Sweden a seven-year (the European Framework Programme 7: 2007 – 2013) Smart Fixed Wing Aircraft (SFWA) Integrated Technology Demonstrator (ITD) project, which aims to develop a range of fuel-efficient, low-emission vehicle sub-systems. *CleanSky*'s objectives are closely linked to the Advisory Council for Aeronautics Research in Europe's (ACARE) Vision 2020, which seeks to reduce fuel consumption and CO<sub>2</sub> emissions by 50 percent, reduce perceived external noise by 50 percent and reduce NO<sub>x</sub> by 80 percent, all by the year 2020 compared to year 2000 levels.

As 2020 approaches, Airbus and several industrial partners have renewed their commitment for continued and increased investment in research and technology on a European level. Industry foresees a continuation of the current *CleanSky* programme in the next European Research Framework to run from 2014 to 2020. The Memorandum of Understanding (MOU) on the *Clean Sky 2* programme signed in September 2012, highlights industry's commitment to increase R&T investment, for seeing an investment of €1,8bn for *Clean Sky 2* within the the next EU Framework Programme *Horizon 2020*, which will allow Airbus and its industrial partners to ensure the maturity and integration of new step-changing technologies that have been developed within the previous Framework Programme 7.

Beyond 2020, Airbus believes that there is a real need to work towards even wider-ranging R&D development goals, which are laid out in ACARE's 'Flightpath 2050'. This long-term vision places future R&D development at the heart of meeting aviation-related societal and market needs, maintaining industrial leadership as well as protecting the environment and the energy supply. Towards this end, Airbus fully supports ACARE's Strategic Research and Innovation Agenda (SRIA), a strategic roadmap for aviation research, development and innovation designed to ensure that Flightpath 2050's goals can be met through adequate public and private support and funding.



*Zero emission ground operations – which is a component of Airbus' Smarter Skies campaign launched in September 2012 – supports optimised terminal space and will help remove runway and gate limitations.*

## VSC

*Vayu would like to thank the entire Airbus team at Toulouse for the generous, highly informative and wonderfully organised tour as well as a big thanks to Avian Media in India for all their help, logistics and co-ordination.*

## Hawaiian Airlines orders 16 A321neos

Following a Memorandum of Understanding in January 2013, Airbus has announced a firm order for 16 A321neo aircraft from Hawaiian Airlines – the first single-aisle order of Airbus aircraft for the carrier.



## IAG and British Airways select the A350

International Airline Group (IAG) and British Airways have signed a Memorandum of Understanding (MoU) to buy 18 Airbus A350-1000 aircraft plus 18 options, as part of the airline's on-going long-haul aircraft fleet renewal and modernisation strategy. IAG, owner of both British Airways and Iberia, has also secured commercial terms and delivery slots that could lead to firm orders for Iberia. The choice of the A350-1000 follows British Airways' decision in 2007 to buy 12 Airbus A380s, the first of which will be delivered this summer.



# Pampering the Passenger !



*Recaro's new concept of a futuristic business class seat, which builds upon an exclusively designed compartment to offer space for stretching out in a relaxed sitting position, getting undisturbed sleep and providing a cozy corner.*



*Hamburg's TV Tower dominates the Messe area, the older buildings being incorporated within the massive superstructure so as to preserve the past while showcasing the future.*

## Aircraft Interiors Expo 2013

Vayu Aerospace Review visited the 'Free and Hanseatic City of Hamburg', the second largest city of Germany and where the Aircraft Interiors Expo 2013 was held during the second week of April. Situated on the river Elbe, the port of Hamburg is the second largest in Europe and tenth largest worldwide. As a member of the medieval Hanseatic League and as a free imperial city of the Holy Roman Empire before the 1871 Unification of Germany, Hamburg enjoyed the status of being a fully sovereign state of its own—and it showed !

Hamburg continues as one of the most affluent cities in Europe, a media and industrial centre, with plants and facilities

belonging to Airbus, Blohm+Voss and Aurubis. It was therefore appropriate that when the Aircraft Interiors Expo moved from its earlier location at Cannes, the Messe Convention Centre at Hamburg was not only an excellent site, with its superior infrastructure, extensive space and efficient organisation, enthusiastic participants showered much praise on the decision. Hamburg's geographical location apart, this is the home of Lufthansa Technik and where Airbus single-aisle aircraft as also the A380 mega airliner are built.

Organised by Reed Exhibitions, Aircraft Interiors Expo 2013 took place at the Hamburg Messe from 9 to 11 April and lived up to its well earned reputation

for excellence. As Kaite Murphy, Event Director for Aircraft Interiors Expo 2013 said "it is reassuring to know that the cabin interiors industry continues to evolve and grow with the estimated revenue for the global aircraft refurbishing market alone expected to increase from \$3.04bn in 2012 to \$4.26bn in 2017. Growth is being fuelled by a range of factors including increasing passenger numbers, especially in regions such as Asia-Pacific, and the continuing drive to create fuel efficiency through replacing old airliners with newer ones, and of course, fitting them with the latest lightweight equipment and materials."

According to a recent research report, the IFE business sector is expected to grow

from \$2 billion in 2012 to \$3 billion by 2017 with an estimated compound annual growth rate of 6.67% during the same period, predominantly driven by higher deliveries of wide-body and very large aircraft, and will pamper the passenger with an array of games, music, satellite communications and software surprises!

At the 2013 event, key airline decision makers from around the world visited the stands of some 500 exhibiting companies spread over approximately 18,000 sqm. A wide array of cabin interior products and services were on display, covering the spectrum from whole interior design concepts, through seating systems across the different cabin classes, to galley equipment, lighting, textiles, flooring and in-flight entertainment. There were more than 60 new exhibitors displaying their products and services at Aircraft Interiors Expo 2013, including four Inflight Entertainment (IFE) software companies.

### The Airliner seat market

Even as Airlines have been ordering new airliners, some have attempted to continue with older passenger seats, retrofitting the cabin in an adhoc fashion but at end of the day, it is crystal clear that the only real 'contact' a passenger has with the aircraft he flies in, is the seat he sits on for hours. So give them the best !

Leading aircraft seat manufacturers have continued to work on innovations, bringing about a near revolution in terms not only of comfort but critical saving of weight. If the new seat can save upto 5 kg over the older seat it replaces, this comes to virtually one tonne saved in a 200-seat airliner which is translated into savings in fuel or payload or both and could well make the difference between profit and loss—indeed survival of an airline itself !

The leading manufacturer of airline seats, Recaro Aircraft Seating of Germany unveiled their latest innovation for long-haul, economy class flights at the Aircraft Interiors Expo 2013. The CL3710 was created by an ambitious team of more than 50 engineers, ergonomists and designers, product managers, prototype builders and experts from the supply chain, the validation & verification and operations divisions. The project team integrated their vision of the future into this totally new seat generation.

According to Recaro Aircraft Seating CEO Dr Mark Hiller, the new seat generation is a key component of Recaro's innovation and product strategy. "In view of new types of aircraft, such as the Airbus A350 and the Boeing Dreamliner, long-range economy class is clearly market with the highest growth potential. Recaro Aircraft seating has always been recognised as an innovator in this segment. That's why we've taken the time and invested a lot in this development with an unusually large team. We are confident that our CL3710 will set a new benchmark in long-range seating."

In his review of the world seat market, Rick Lundstrom writing in *Pax International* has stated that development of the A380 has led to innovations in the cabin and the 787 Dreamliner, current difficulties notwithstanding, has also contributed to a brand new environment in the aircraft cabin. With development of the A350 continuing apace, seat makers are

bullish about the future of their business in the years ahead.

"The retrofit market is still very active" felt Jeffrey Forsbrey, Vice President of Sales and Marketing at EADS Sogerma. "With those carriers not yet with a fully-flat business class product upgrading their fleet to meet the challenge of the market" Forsbrey cited two other trends. Though some airlines have eliminated their first class cabins, many will still continue first class for the foreseeable future, creating a core group for the years ahead. North American carriers are beefing up their transcontinental services and one seeing the need for lie-flat seats for their business travelers taking the 'red-eye'.

"As the industry continues to innovate, we must support product development with new ideas and apply new technology to our current and future products to reduce weight and continuously offer the best products and services to our customers," said Forsbrey.



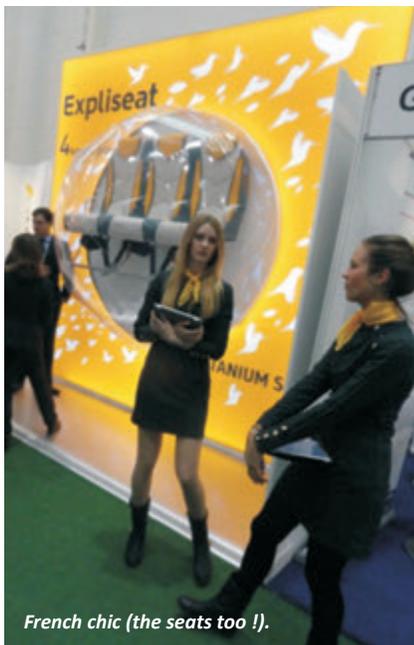
# Aircraft seatings on display (or under wraps)



Relaxing on the new Recaro seats



An overview of the open Recaro stand



French chic (the seats too!).



The new Geven offering



The enclosed Zodiac stand



No comment !



No entry !

## Futuristic business seat options

Even while the Recaro stand was open to all, with the company proudly displaying their CL3710 in a world premiere event, not all others were so inclined. In fact the Zodiac organisation, which now combines the previous Sicma, Weber and Contour Aero Seats, had their display enclosed within a near-fortress stand, with high walls and off limits to all but specific invitees. So too were the B/E seats, not visible to the visitor unless specially invited !

EADS Sogerma recently took the company's full range of passenger seating to the United States for the Aircraft Interiors Expo in Seattle. The company has taken more steps to break into the North American market. Recently, EADS Sogerma hired Mathieu Marrand des Grottes as director of sales for the Americas "and we are convinced Mathieu will develop both North and South American regions in the coming year;" said Forsbrey. The company's most successful economic base has remained Europe, with steady customers among several airlines, among them Alitalia and Iberia.



EADS Sogerma business seats at AIX 2013



Pitch: new kid on the block

Avio, which brought the 'Deck Chair' concept seat to *Aircraft Interiors*, had a new innovation to this year's event, launching their Leonardo seat developed with another Italian company, Lamborghini Engineering and making use of the company's experience in manufacturing carbon composite parts. The Leonardo seat has been 18 months in development and came to Hamburg with a weight saving of three kilograms less per passenger than the company's Columbus family of seating.

On the numerically rare day of 12-12-12 (12 December 2012) seat maker Recaro had 'broken ground' on a new production facility in Qingdao, China. The move was also significant by the fact that Recaro was the first

international supplier of airline seating to establish a production facility in China. "This means that we will have manufacturing facilities in each of the key aviation markets in Asia, Europe and America," said the company's CEO, Dr. Mark Hiller. He said much of the product will be made when the China plant opens in mid-2013 would go toward airline orders for the A320 and B737. The company had developed its model BL3520 for the short-and medium-haul market, which it sold to approximately 20 airlines since market launch. The other economy class seats in the short-range market is Recaro's SL3510 which weighs in at only 9 kilograms.

Like others, Hiller sees the North American market as strong for retrofit possibilities in the years to come. Normally, he said seats are replaced in an aircraft every six to eight years. However, with the extended economic downturn now showing signs of lifting, airlines will be anxious to replace products that have been flying far longer.

Amongst new players is Pitch Aircraft Seating, in the process of obtaining certification for its PF2000. What the company brings to the retrofit market is a simple, lightweight seat that is thin enough to give passengers a feeling of comfort "that can make a 28 inch pitch seem like a 30 inch pitch."

The PF2000 is also designed to fit into a market that is becoming ever more dependent on customisation with new materials and inflight entertainment. With relatively simple construction and modular design, materials and IFE hardware can be routed through a back pack that gives passengers a choice of specification options to integrate its IFE systems.

## Airbus showcases innovations

As has become expected of them, Airbus once again showcased their cabin innovations at *Aircraft Interiors Expo 2013*. "Passenger comfort has been an article of faith and a major design consideration at Airbus. With their wider cross-sections, Airbus airliners offer an 18" wide seat in economy class and trends in demographics with the continuous desire to meet passenger needs, led Airbus to innovate with 'Extra-Wide-Seat' for the A320 Family", said an Airbus spokesman.

Cabin efficiency for the A320 Family was presented at AIX 2013 with display of the new production-standard mock-up of 'Space-Flex', the innovative rear cabin configuration which will enter service this year with an unnamed "launch customer". Ingenuity of this product and the step change in comfort especially for persons of reduced mobility was apparent.

The latest updates on A350 XWB were also available at the Airbus stand, and the efficient and passenger-conscious 'flat-floor' architecture was demonstrated. As for the Airbus flagship - the A380- there was a 85" screen with new high-definition cabin



visualisation as also a large cut-away model. Airbus' space-efficient concepts go beyond new products: Airbus Upgrade Services presented its range of retrofit solutions and services with cabin experts and executives available for dedicated media briefings and interview opportunities each day.

### Thales wins Crystal Cabin Award

The Thales Eye Tracking and Gesture Control solution won the award for 'Passenger Comfort Systems' category at the annual Crystal Cabin Awards 2013 ceremony in Hamburg.

*Eye Tracking and Gesture Control* has been heralded as an important new technological development as the IFE market



draws ever newer consumer technologies. The features contained in the system are enhancements to the passenger user experience in a far-reach seat configuration (or pod seat) as typically found in premium cabins, utility eye tracking and gesture control technologies to control the IFE system without the use of remote controls. "The combination of eye tracking and hand gesture technologies gives passengers a very user friendly and natural way to engage with their in-flight entertainment".

The Thales Eye Tracking and Gesture Control was amongst the 21 innovative products and concepts that made it into the final round of the Awards, the award being presented to Alan Pellegrini, Thales Vice President and Chief Executive of Thales USA and Thales In-flight Entertainment & Connectivity at a gala event hosted at the Hotel Atlantic in Hamburg on 9 April.

### 'Connectivity' for Qatar A350 and A380 fleet

Doha-based Qatar Airways Airbus A350 and A380 fleets are to be line-fitted with both Mobile OnAir and Internet OnAir connectivity. The Airline's OnAir's GSM service have been working on their A320s for over three years and with the latest decision, over 150 Qatar Airways' aircraft will have OnAir connectivity, including on the carrier's Boeing 787s.

"Qatar Airways' passengers have the choice of using either the GSM network or wi-fi can use their mobile phones and tablets for calls, texting, emailing, updating social media and surfing the Internet, with these services billed as 'international roaming'." They can also access the Internet using any Wi-Fi enabled device. "We have been operating Mobile OnAir for more than three years on some of our aircraft and it's clear that our passengers want, and are coming to expect, inflight connectivity," according to CEO Akbar Al Baker, CEO of Qatar Airways.

As OnAir CEO Ian Dawkins pointed out, "passengers are becoming more demanding regarding the use of their mobile devices on board. They expect that whatever happens on the ground happens in the air. They don't want to change their habits just because they're on an aircraft!"

"Carriers are additionally looking to connect all parts of their operation", continued Dawkins, citing its Crew Tablet application that allows crew to better manage their activities using the wireless network. "Airlines spend millions on IT to co-ordinate passengers, but that all ends when it comes onto the aircraft and everything is on paper," he concluded.



50<sup>TH</sup> INTERNATIONAL  
PARIS AIR SHOW  
LE BOURGET  
JUNE 17-23, 2013

# Airbus ACJs: making further inroads



*A bedroom configuration in an Airbus VIP widebody aircraft.*



*Widebody conference and dining configuration.*

An Airbus ACJ319 with the fuel-saving Sharklet option has been ordered by a Chinese customer, in the first deal for this version from the country. The order builds on the strong Airbus corporate jet presence in greater China, where there are around 25 orders to date. Airbus corporate jets such as the ACJ318 and ACJ319 are already in widespread service in China, with operators such as BAA Jet Management, Beijing Airlines, China Eastern Executive Aviation, Comlux Asia, Deer Jet, Hong Kong Jet and TAG Aviation.

“China is a relatively new market for corporate jets, as well as having one of the highest economic growth rates, making it a bright spot in today’s business jet market, especially at the top end where Airbus corporate jets serve with distinction,” pointed out Airbus Chief Operating Officer, Customers, John Leahy. “The Chinese business jet market also favours the ability to carry larger groups, for which Airbus corporate jets are especially well suited.”

Airbus offers a comprehensive corporate jet family giving customers the choice of wide and spacious cabins. Its corporate jets range from the Airbus ACJ318 all the way up to the double-decker ACJ380, allowing customers to select the comfort they want-in the size that they want !

The family begins with the Airbus ACJ318, ACJ319 and ACJ320, which feature cabins that are the widest and



*Airbus ACJ330-200 cabin layout.*

# in China—and across the globe.

tallest of any corporate jet—around twice as wide as traditional high-end business jets, while having a similar external length and wingspan. Typically seating 19 to 50 passengers in settings that can be tailored to be as simple or elegant as the customer wishes, the Airbus ACJ318, ACJ319 and ACJ320 have the capacity to carry more passengers than traditional business jets—as well as flying them in much greater comfort. This makes them ideal for carrying groups of employees, extended families and government delegations.

And because Airbus' ACJ318, ACJ319 and ACJ320 have that much more space to offer, passengers can be working in one part of the cabin without being disturbed by others that are perhaps socialising in another—unlike in traditional business jets—allowing everyone to make the best use of their time.

The Airbus ACJ318, ACJ319 and ACJ320 have intercontinental range, allowing them to fly nonstop on routes such as Beijing-Moscow, Jeddah-London or Paris-New York, as well as nonstop within continents, all in unprecedented comfort and space.

For corporate jet customers that want to carry even more passengers than the Airbus ACJ318, ACJ319 and ACJ320, Airbus offers a full family of VIP widebodies, derived from the rest of its modern airliner family. These widebodies comprise the Airbus ACJ330, ACJA340, ACJ350 and ACJ380.



*Hotel lobby or an aircraft lounge?*

All Airbus aircraft also come with Category 3B autoland, which allows them to get their passengers where they are going, even when poor visibility means that other aircraft have to divert. They also have “richer” specifications that deliver many features as standard, such as more navigational aids, fuel-saving wingtip fences, and weight-saving carbon brakes. In addition to proven reliability in widespread airline service, Airbus corporate jet customers also benefit from a global network of technical advice, spare parts and training that serves thousands of aircraft and more than 490 customers and operators, as well as a more personalised service that understands their needs.

More than 170 Airbus corporate jets have been sold to date, comprising over 110 Airbus ACJ318s, ACJ319s and ACJ320s, plus more than 60 VIP and government widebodies. Airbus corporate jets are flying on every continent, including Antarctica.

VSC



# Vive la France !



*The DGA: 60 years, 2,000 graduates, 400 foreign graduates from 24 countries!*

*The DGA has 40 test bed aircraft with over 5000 flight hours of activity. Seen here is the Dassault Rafale instrumented for testing certain parameters etc.*

## Showcasing French technological innovations in Aerospace and Defence

**W**ith less than a few weeks to go for the 50th edition of the Paris Airshow (17-22 June at Le Bourget), the French Ministry of Defence along with its major aerospace and defence companies (Safran, Dassault, EADS Eurocopter, Thales, Nexter and MBDA), organised a four day visit to various facilities in France to showcase their latest technological innovations.

### Visit Diary

Starting 14 May till the 17th, Vayu visited the Cazaux Flight Test Base (BA120), Mont-de-Marsan (Rafales, airborne missiles, air defence systems, space imagery and defence telecommunications as well as intelligence technologies), the

### Units housed at BA 120

- The operational transition Squadron 1/8 "Saintonge" on Alphajets based in Cazaux since 1964.
- The operational transition Squadron 2/8 "Nice" on Alphajets based in Cazaux since 1964.
- The Helicopter Squadron 1/67 "Pyrenees" with Puma and EC725 Caracal based in Cazaux since 1972.
- The Centre of Expertise in Embedded Arms (00 331 SEAC) which since 1 September 2009 replaced Experimentation Centre and Shooting Instruction in Air (Ceita), 200-250 French and foreign trainees annually.
- Group Instruction Flight Safety (GISV) of the National Gendarmerie, from 1 September 2010.
- A DGA test site in Flight (formerly CEV Cazaux).
- Technicians Training Centre Safety of Air Force (CFTSAA) 00/308
- No.150 Squadron of the Republic of Singapore Air Force.

Military Air Experiment Centre (CEAM) in Mont-de-Marsan and then Eurocopter in Marignane (industrial facilities, Caracal, NH90, Tigre helicopters as well as helicopter training at Helisim). In essence, the visit focused on three main areas: future technologies, military operations and helicopter in action.

On landing at Charles De Gaulle airport in Paris, and a few hours at l'Ecole Militaire, we drove to the Creil airbase (outside Paris) from where we were flown to Cazaux. Here, the next day, we were briefed on flight testing and then transferred to air base 120 (BA120), where we visited helicopter squadron EH 1/67 and we given details on SAR (Search and Rescue) and C-SAR (Combat Search and Rescue) missions. A live C-SAR demonstration was carried out employing EC725 Caracals.

We then flew from Cazaux to Mont-de-Marsan where on 15 May, the focus was on the French Air Warfare Centre.



Mirage 2000D with the MBDA Scalp/ Storm Shadow at BA 120 which has extensive test areas with a dedicated and secure area nearby (the Atlantic Coast) which is 200 km long and 80 km wide, with an air-surface test range, that requires large safety zones. All tests are conducted jointly by the DGA and French Air Force.



France's Direction Générale de l'Armement (DGA) has qualified the laser-guided variant of Sagem's AASM (Armement Air-Sol Modulaire/Modular Air-to-Ground Armament) for service with the French air force and navy. The qualification follows completion of a series of flight tests flown from the French Air Force's air base at Cazaux in western France using a Dassault Rafale-F3 aircraft. The laser-guided version of the AASM, which has the designation SBU-64, is the last of the AASM series weapons guidance kits scheduled for service with the French armed forces. There are now three versions of the Hammer : INS/GPS, INS/GPS + IR imager and INS/GPS + laser seeker.

We visited the Control and Air Defence Instruction Centre and were later briefed on the Radio Communication System by Satellite Syracuse. In the afternoon we learnt about ground and air missile

systems (SAMP/T) and the Rafale recce NG, receiving information on the Optical Observation System by the Satellite Pleiade.

On 16 May, we visited fighter squadron 2/30 Normandie-Niemen with presentations on the Rafale and its M-88 engine, Sagem's AASM Hammer and its versions, MBDA weaponry and maintenance concepts. This was followed by a



*Lineup of aircraft used for the DGA testing: Falcon 20, Mirage 2000D, Alphajets and a Dauphin helicopter. The main role of the DGA is to provide aeronautical expertise/ support, structure armament programmes, carry out flight testing and assessment including simulation assets for the French military with their operations/ technical support and finally deal with safety issues related to aircraft flights.*

Mission Departure presentation and visit to the Air Traffic Centre, before we flew on to Marignane.

The 17th was spent with Eurocopter around its facilities and then were taken to the Helisim simulator and assembly lines of NH-90, EC225 and AS 332 Puma/Super Puma family. Details on the Tigre attack helicopter and NH-90 were followed by a walk around the logistics centre. A special Tigre (Tiger) demonstration was carried out for us. Details were shared on the Tiger's turreted gun system THL-30 that is developed by Nexter Systems as well as mission planning using Sagem systems.

Trip over, we flew back to Creil and spent the night in Paris before return to India.

**Cazaux Air Base (Base Aereinne BA 120)**

This is a *Armee de l'Air* (ALA) base located approximately 35 miles (56 km) southwest of Bordeaux, essentially for armament training over the Bay of Biscay. Stationed at BA 120 are Alphajet advanced jet trainers which are operated for training

future fighter pilots of the French and Belgian Air Forces. Since 1998, the base has also hosted No. 150 Squadron of the Republic of Singapore Air Force, earlier equipped with A-4 Skyhawks and

recently with Aermacchi M-346s, before pilots are assigned to RSAF F-16 and F-15 operational units. Approximately 2,600 military and civilian personnel are stationed at the Cazaux air base.



*DGA Flight Training assets include ground assets like EWS station, trajectography, piloted simulation, integration test bench and air assets including fighters, large aircraft and helicopters. In the photo is a Eurocopter Tigre (Tiger) attack helicopter fitted with test instrument avionics.*



Missions at BA 120 are very diverse and structured around many areas, with over 45,000 sorties flown per year and over 2,500 trainees on site. Cazaux Air Base is involved both for pilot training, as also operational maintenance and futuristic planning but foremost, this is a training centre for pilots of the French, Belgian and Singapore Air Forces plus training for technical, survival and rescue procedures (CSAR). Another major mission of this base is experimentation and qualification of French airborne weaponry (CEV and industrial). Research and development studies are conducted on air weapons (CEITA), experimentation in the CBRN field, technical testing and monitoring of new equipment on the EC 725. Operations include search and rescue (SAR), training against maritime terrorism, these special operations being assigned to the squadron EH 01067 'Pyrenees'.

*Covered in the next issue of Vayu will be the visit to Mont-de-Marsan (with its Rafales and other squadrons) as well as Eurocopter facilities at Marignane.*



*New system under development from TDA and Thales is the one metre CEP rocket for precision guidance. Weighing 8.8 kgs, it is laser—guided with a blast and fragment effect. Designed for firing from the Tiger attack helicopter, this ensures low collateral damage. Studies being carried out to form the common basis for future metric accuracy munition developments which lead to the acquisition of low cost and common technological 'bricks' for control and SAL terminal guidance compatible with an integration in various types of munitions (120 mm mortar, 102 mm battle tank gun, 155 mm field artillery, LRU and helicopter rockets).*



*TDA (Thales) are prime contractors for the UM TER (Ground Armaments Management Unit). DGA FT oversees in-flight evaluation on the Tiger helicopter*

# C-SAR operations at Helicopter

The conflict in northern Mali began in 2012 and as the 'Islamic' forces threat to the capital Bamako became serious in early January 2013, the Mali Government requested foreign military intervention. The UN Security Council passed a French

Revolution approving and African-led force to assist the army of Mali in for defence against the rebels. On 11 January 2013, the French military launched Operation 'Serval' which included the use of both ground and air units. From Cazaux were deployed special forces with Tigers,

Caracals, Pumas and Gazelles. Vayu was briefed on their role, operations and successful tenure.

Helicopter Squadron EH 01-067 has its origins in the French 22nd Helicopter Wing which took part during the War in Algeria. At the end of those operations in 1962, the



Major Vernet Guillaume, Director of Operations of Pyrenees. Vayu was given a detailed brief on the squadron's C-SAR capabilities and performance in real combat situations over Afghanistan and Mali.



Getting ready to embark on the demo mission.



Range of sophisticated equipment that the C-SAR team carries on missions.



C-SAR Caracals being wheeled out of the hangars to carry out a live demonstration!

# Squadron I/67 Pyrenees, Cazaux

Squadron reorganised in 1964, but retained its traditions even as it first operated Alouette IIIs followed by Pumas. The 'Red Leopard', insignia is proudly carried by the Squadron.

Later deploying in 1972 to Cazaux, the nomenclature EH01067 'Pyrenees' was adopted, the squadron tasked for

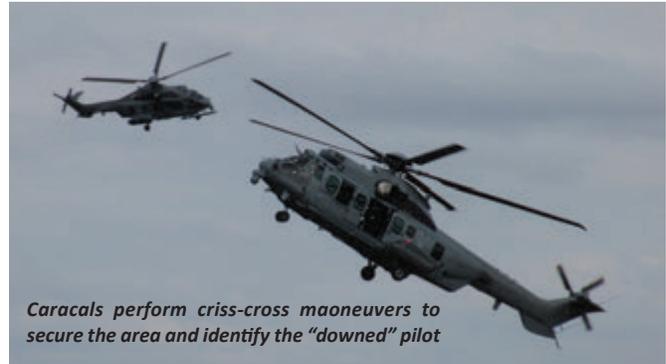
search and rescue, both land and sea and also taking part in support to civil administration. As the CSAR missions are joint, the squadron has also Army and Navy personnel and has deployed in several overseas missions, including to Al Asha in Saudi Arabia during the second Gulf War and to Brindisi

in Italy during operations in Bosnia which continued for over three years. Squadron helicopters have deployed in Afghanistan since re-equipment with the Caracal.

Vayu witnessed CSAR (Combat Search and Rescue) demonstrations, as seen in the series of photographs.



*Sagem's JIM-LR equipment in use for C-SAR missions*



*Caracals perform criss-cross maneuvers to secure the area and identify the "downed" pilot*



*Special mission soldiers get to the ground rapidly.*



*Snipers with specialised weapons*



*And off they go! The second Caracal continues to secure the area while the rest of the team is carried away to safety.*



*Securing the area before the "wounded" airman is carried away*

# With Eurocopter at Marignane: progress on the Tiger HAD and the Caracal

**E**urocopter's first production Tiger helicopter in the HAD attack configuration has been delivered to the DGA armament procurement agency for operation by French Army Aviation units. This milestone followed DGA qualification of the Tiger HAD version on 10 April and marked startup for



*French Army Aviation Tiger HAD now handed over to the DGA.*

Eurocopter's latest variant of the rotorcraft product line which has already been combat proven during military operations in Afghanistan, Libya and now in Mali. "With the Tiger HAD, Eurocopter further expands the operational capabilities of a combat helicopter family which has demonstrated its mission effectiveness and performance in highly challenging military deployments," said Dominique Maudet, the Eurocopter group's Executive Officer for France, and Vice President of Global Business and Services.

The French Government has ordered 40 Tiger combat helicopters in HAD configuration for French Army Aviation units. Another 24 helicopters have been ordered by the Spanish government to equip the Spanish Army (which includes six Tiger HAP support and escort versions retrofitted for fire support and attack missions). Feature improvements of the Tiger HAD variant include two enhanced MTR390 turboshaft engines that provide 14 percent more power, improved ballistic protection, a new optronic sighting system, the capability to target and launch Hellfire air-to-surface missiles, an evolved electronic warfare suite, and an IFF interrogation system. 97

multi-role Tiger family helicopters currently are in service with France, Germany, Spain and Australia, a total of 206 helicopters.

Meanwhile, Eurocopter and Turbomeca (Safran) have signed an industrial cooperation agreements with Wojskowe Zakłady Lotnicze No. 1 (WZL-1) for the creation of two separate full assembly lines in Poland for the EC725 Caracal helicopter and its Makila 2 turboshaft engines in framework of country's tender for 70 new multi-role helicopters.

"As the world's leading helicopter manufacturer, Eurocopter will offer the solution best suited to meet Poland's operational mission requirements with the EC725 Caracal, which has proven its reliability and efficiency on many battlefields," said Olivier Lambert, Eurocopter's Senior Vice President for Sales and Customer Relations.

The EC725 Caracal is a modern, multi-role 11-metric-ton-class helicopter designed for armed operations, troop transport, rescue duties and logistics support. Equipped with a five-blade main rotor system and the latest in avionics and systems, it carries up to 29 passengers in addition to the flight crew. Flight endurance is 5.5 hours with the helicopter's large fuel capacity. Current EC725 Caracal customers range from France, Brazil and Mexico to Malaysia, Indonesia and Thailand.

A detailed report on the visit to Eurocopter's Mariagnane facilities will be covered in next issue of the *Vayu*.



*EC725 Caracal: Its capabilities were validated by combat deployments with French forces in Afghanistan and in supporting France's role during NATO-led operations for the Libyan military campaign and at Mali.*

# Nexter Systems' **THL-30** gun

**N**exter (formerly known as GIAT Industries or Groupement des Industries de l'Armée de Terre, Army Industries Group) is a French government-owned weapons system company. The GIAT group was founded in 1973 by combining the industrial assets of the technical direction of Army weapons of the French Ministry of Defence. The company was nationalised in 1991 and in September 2006 GIAT became core of the new company Nexter.

Nexter continues to produce several GIAT small origin arms, cannon, and anti-armour weapons one such being the Wasp 58, a low cost, one man anti-armour/assault weapon system. successes include recent modernisation of the Leclerc Main Battle Tank (MBT) and several other armoured platforms. In 2006 the THL-20 gun turret was selected by Hindustan Aeronautics Limited for integration with the HAL Light Combat Helicopter and weaponised ALH Rudra, incorporating the 20 mm M621 cannon

The lightweight and highly accurate THL 30 gun-turret has been developed for the latest generation of attack helicopters. It can fire all NATO standard ammunition, is fully integrated in the weapon system of the helicopter and may be aimed by a helmet-mounted sight. The THL 30 has a 30mm 30 M 781 gun and this gun-turret has been mated with the Tiger attack helicopter. The turret system is in service on the Eurocopter Tiger with France, Spain and Australia.



*The Tiger's THL-30 turret system seen here at the DGA flight testing centre at Cazaux.*



*The Tiger and its THL-30 at the Marignane facilities.*



*The THL-20 seen here on HAL's weaponised Dhruv ALH (photo: Angad Singh).*



# SAMP/ T System (MAMBA) from Eurosam (Thales/MBDA)



Media including the Vayu at Base Professionnelle Aérienne BA118 Mont-de-Marsan. In the background is the SAMP/T – MAMBA missile launcher.

Eurosam was established in June 1989 by three major European aerospace companies (Aérospatiale, Alenia and Thomson-CSF) and we know today as MBDA Missile Systems with Thales. Development and initial production of Eurosam’s air-defence systems was funded by the French and Italian ministries of defence on a 50:50 basis, and today Eurosam’s ownership is shared between MBDA and Thales. Eurosam is the prime industrial contractor and system design authority for the development, production, marketing and sales of a range of medium/long-range naval and ground-launched air-defence missiles also known as *Famille de missiles Sol-Air Futurs* (FSAF), or Future Surface-to-Air Family of missile systems.

“These systems were developed to meet operational requirements of modern air defence. These requirements called for naval and ground launched missiles capable of threats defeating as diverse as high-speed tactical missiles (supersonic sea skimmers, air-launched, anti-radiation, cruise, TBM and other types) and highly-maneuvring aircraft, in saturation attack scenarios.

Government oversight and contract management is the responsibility of a joint programme office known as the DP/FSAF OCCAR, also based south of Paris”, stated Alain Deudon, SAMP/T Project Manager.

SAMP/T is a theatre anti-missile system designed to protect battlefield and sensitive tactical sites (such as airports and sea ports) against current and future airborne threats, including cruise missiles, manned and unmanned aircraft and tactical ballistic missiles in the 600 km range class, and to contribute to ‘air superiority’. The system comprises a fire control system based on the Arabel multi-function electronic scanning radar and a vertical ground launcher capable of firing eight Aster 30 Block 1 missiles in rapid sequence.

During recent firing on 6 March 2013, a French Air Force SAMP/T (called MAMBA by the French Air Force) system successfully intercepted a target representative of a ballistic missile, the third successful ATBM firing with a SAMP/T system. The system deployed in Biscarrosse (France) was operated by a joint French/Italian crew and connected through a L16 to the NATO C2 BMD in Ramstein (Germany) thus validating the interoperability features of SAMP/T is the first European anti-ballistic weapon system in operation and SAMP/T is the cornerstone of France and Italy’s contributions to the North Atlantic Alliance tactical ballistic missile defence capability. The French Air Force currently owns nine MAMBA systems whilst the Italian Army owns five systems. Operational evaluation of the system has been conducted successfully with a series of test firings in France and Italy and SAMP/T is now in operational service with French and Italian forces.

SAMP/T comprises a fire control subsystem based on the Arabel multi-function electronic scanning radar. Arabel is a surveillance and fire control radar with two variants: a land-based version for the radar and IFF functions of SAMP/T naval version is installed on the French Navy’s *Charles de Gaulle* aircraft carrier as well as on frigates.



Aster-30 on launch.



Thales Arabel multi-function electronic scanning radar.

## **HYD airshow**



*Mirage 2000TH of the IAF over the high Himalayas.*

# The Mirage 2000 + LGB =

The IAF had re-written aerial tactics during the summer of 1999 and it is required that the key factors be recorded for posterity. IAF Mirage 2000s were originally supplied with Thomson-CSF Laser Designator Pods, known as Atlis for use with Matra 1000 lb LGBs, which were purpose-built for the destruction of reinforced targets. These weapons, although highly capable, are very expensive. The IAF decided to augment their capability by employing the standard 'dumb' 1000 lb bomb coupled with Paveway II laser-guided bomb kits, the IAF having ordered a number of these earlier, but supplied with an incorrect part, which was later put on the embargo list. Unable to get the correct parts sent as replacements, IAF technicians had to

consequently remanufacture this particular part in order to make the Paveway compatible for use with the Mirage 2000.

LGBs utilise a common laser guidance and control subassembly, with only the aerodynamic surfaces (control fins and aerofoil group) changed to match the particular size bomb. This allows standoff capability while providing precision weapons delivery against a wide spectrum of targets. The original Paveway bomb conversion kits become known as Paveway I and with the introduction of a new set of components in 1978, the latter became known as Paveway II.

The guided bomb kit directs the weapon toward a target which has been illuminated by laser energy. The desired target may be selected by the bombing

aircraft, a companion aircraft, or even a ground observer. The laser energy is reflected from the target and detected by the laser semi-active guidance system. The system processes the information, computes appropriate control commands and applies these commands to movable surfaces to effect changes in trajectory, thereby guiding the weapon to the target. The system requires no electrical connection to the unmodified delivery aircraft and is delivered in the same manner as a conventional bomb. There is no requirement for tracking or lock-on before launch, which minimises the time required for delivery with concomitant reduction in aircraft exposure to hostile ground fire.

When on 30 May 1999, Air Headquarters decided to commit Mirage



*Laser seeker head fitted on 1000-lb bomb.*

# Victory at Kargil, 1999

2000s to the Kargil operations, these aircraft had already been moved to forward operating locations in their air defence role. The status 'as of early June' was that the Mirage 2000s, their pilots and technicians were spread around certain Western Air Command airfields and their home base at Gwalior. The Mirage 2000 aircraft had always been regarded as an air defence fighter with limited ground attack capability and consequently lacked certain resources such as bombs, hardpoint pylons, tooling, testers and ground crew experience in such matters. A major effort was initiated at Gwalior, under the AOC Air Commodore Padamjit Singh Ahluwalia, to get the platforms prepared and by 12 June the Mirage 2000s were ready for special operations.

The 'backroom boys', however, were 2000 kilometres away from the scene of action, the Aircraft System Testing Establishment (ASTE), at Bangalore, at that time in the process of integrating the Israeli Litening pod, a recce and target acquisition system, onto the Mirage 2000 and Jaguar. The trials were at a reasonably advanced stage, but the pod was still some time away from being inducted into service. ASTE Commandant Air Cmde Parvez Khokar, a veteran of the 1971 war in the western theatre and a seasoned test pilot, called upon collective wisdom of the professionals and the ASTE and then offered to make the Litening pod available to be used in Kargil.

ASTE identified a team which would integrate the Litening system onto the

Mirage 2000 with the weapons to be carried and also train a few No.7 Squadron pilots and technicians in order to enhance weight of attack. The three test pilots were Wg Cdr R 'Nambi' Nambiar, Sqn Ldrs Rohit Verma and 'Tee Vee' Tiwari with Sqn Ldr Mantha, a flight test engineer, as technical authority on the pod. Along with group of highly trained and motivated armourers, these officers formed the core team, their charter identified and honed by professional discussions at the ASTE.

Sufficient equipment was obtained to clear Mirage 2000s for attack at any given time, capable of delivering LGBs. However enough 'dumb' bombs were not readily available, so a search was made of the IAF inventory. 'Vintage' 250kg bombs from the 1970s made-in-Spain for HAL Ajeet



*Then Wg Cdr R Nambiar (now Air Vice Marshal and Commandant ASTE).*

aircraft and since in storage were found and made available. A one-off trial was carried out from Jaisalmer over the Pokhran Ranges and was deemed to be successful. These were immediately rushed into service with the Mirages of No.7 Squadron. Initial missions were flown only using dumb bombs. The mission would depart and meet up with Mirage 2000 escorts and then fly into Kashmir, with MiG-29s operating as top cover. The attacks took place initially on Pt 5140 near Tololing in the Dras Sector, with four strikes taking place over three days.

Daily interaction between the trials team and the ASTE formulated a strategy to put the pod into action expeditiously. The Mirage 2000 centre line pylon was modified to carry a 1000 lb bomb along with a Paveway II LGB kit instead of the Matra LGB, which was prohibitively expensive and therefore limited in number, hence the prudent decision by Air HQ to save them for higher value targets should the conflict escalate into a full fledged war. Credit must also be attributed to JWO BP Sharma, Sgt RP Singh, Sgt Kartar Singh and some other armourers who worked tirelessly to ensure the success of this 'garage' modification, then training of No.7 Squadron personnel and arming of the aircraft during the operations.

Tiwari and Nambiar were in the forefront of the attacks. The use of Laser Guided Bombs (LGB) in Kargil, Dras, Tiger Hill and many other targets with lethal accuracy, changed the entire complexion of the war and future operations. Video footage showed the enemy abandoning their strongholds on hearing sound of aircraft, well before the weapons were even released. The high resolution FUR sensor recce capability of the pod was ably demonstrated by the accurate marking of co-ordinates of the Muntho Dhalo camp, the largest and main supply and reinforcement camp which was subsequently attacked with pin point accuracy and completely devastated.

Notable amongst No.7 Squadron's some 200 plus attack missions were the airstrikes on Muntho Dhalo, Tiger Hill and Point 4388 in the Dras Sector. On 16 June, the major enemy supply depot at Muntho Dhalo in the Batalik Sector was sighted by a Mirage on the LDP. The following day this was hit and destroyed by aircraft using dumb bombs. This camp was the major re-supply base in the Batalik Sector and this devastating attack left over 100 dead and 50 structures destroyed.

On 24 June, enemy command bunkers on Tiger Hill peak were hit by two Mirage 2000s employing the 'Paveway' Laser

Guided Bomb (LGB). This was the first operational use on an LGB by the IAF. In another mission on the same day Mirages struck the same target using dumb bombs. This strike proved to be particularly effective causing severe damage to the enemy and also gave Indian Army troops on nearby hills a tremendous morale boost, this mission witnessed by the Air Chief himself who was flying backseat in another Mirage 2000TH.

As Nambiar (now Air Vice Marshal and Commandant ASTE) recalls, *'Morning Met briefing on the 24th was at 0500 h and by 0530 h a short brief was carried out with the CAS in attendance. The plan was for a three aircraft mission with the two lead aircraft armed with an LGB each, while the third aircraft would follow behind with the CAS in the backseat. The plan was to hit Tiger Hill first and then proceed to recce Point 4388 located 30 km NW of Tiger Hill. By 0600 h we had walked to the aircraft. Walking to the aircraft is a tedious task in war time. We were overloaded with our G-suits, helmets and had to lug our Makarov 9mm pistols along with the various essential items necessary for a successful sortie, such as maps, call-sign cards, MIPs, EW MIPs, INU plans, authentication tables- all in all a very cumbersome procedure.*

Wheels roll was at 0630 and we joined up with our escort Mirages from Ambala about 300 km from the target. The RV point had been selected well away from the border to remain outside the enemy radar cover. The RV as before was uneventful. We maintained R/T silence and meticulously went over the attack drill to ensure all our EW systems and weapons were up and ready. The passage of the magnificent scenery below was barely noticed. We were on the alert checking our systems and all perked up as Tiger Hill was spotted from about 50 km distance in the Litening Pod and we were thrilled to see there was not a speck of cloud around. Things then moved at a rapid pace. I had altered heading to place the aircraft track directly at a set of seven Artic tents perched precariously on the south face of Tiger Hill. The white tents made good camouflage sense in winter, but in summer, with most of the snow melted away, they stood out in stark contrast against the black rock formation. Tiger Hill is at an altitude of 16,600 ft, and the pre-briefed altitude for the attack was 28,000 ft, to which we quickly descended. A glance at the INU indicated that the winds at this altitude was 70 kts in a westerly direction and at 90 deg to our planned track. This was excessive and

outside the release envelope for the LGB. Going up was not an option as the Laser was known to switch off automatically at around 30,000 ft. A different direction was also not viable as the target would be shadowed. A quick decision was therefore taken to descend down to 26,000 ft, placing us within the envelope of shoulder fired SAMs. The crosswinds however were more tolerable at 50 kn and just within the envelope of the LGB. We had IR flares with us and considered this as an operational risk which we were willing to take. The CRM was excellent and Monish knew exactly what to do.

At 28 km I pulsed the laser to designate the target for the first time. The Litening Pod instantly ranged the distance to target. We had by then accelerated to a ground speed of 550 kn (1018 kmph) and the distance to the release point rapidly reduced. I repeatedly re-designated the target as it became more discernable when we closed in. At the release range I pressed the trigger and we felt the aircraft jerk upwards as it suddenly shed 600 kg of load. I immediately commenced a hard turn to the left at 4g and stated flaring. Monish took over pod steering and pointed the laser directly at the target while I concentrated on the turn and monitored the video image. The Laser was steadily

flashing and we waited anxiously for the target to explode thus signalling a successful delivery. The time of flight of an LGB under the delivery conditions that we had dropped it in was under 30 sec, but to us in the cockpit it appeared as an eternity. Our joy knew no bound as the entire video image of the target burst out into a soundless explosion.

I had by then rolled out on a westerly course and reversed right climbing back to 30,000 ft and monitored the air to air TACAN with the other strike aircraft. The plan was to gather together and then set course for Pt 4388. I noticed the distance between the two of us had started to build up as we turned towards the North West. Our faithful escorts from 1 Squadron were however with us so we decided to press on with the remaining mission. A quick R/T call to check gravy and intention revealed that the other members had already set course back to base. We continued and scanned Pt 4388 for targets. On return, 15 min later, we routed back via Tiger Hill to film the Hill from close to assess the damage. The target area had been blown to smithereens, so we filmed the rest of the hill for any other visible signs of the enemy. Gravy was sufficient so we accelerated to our limit speed to get back to Base by 0800 h.



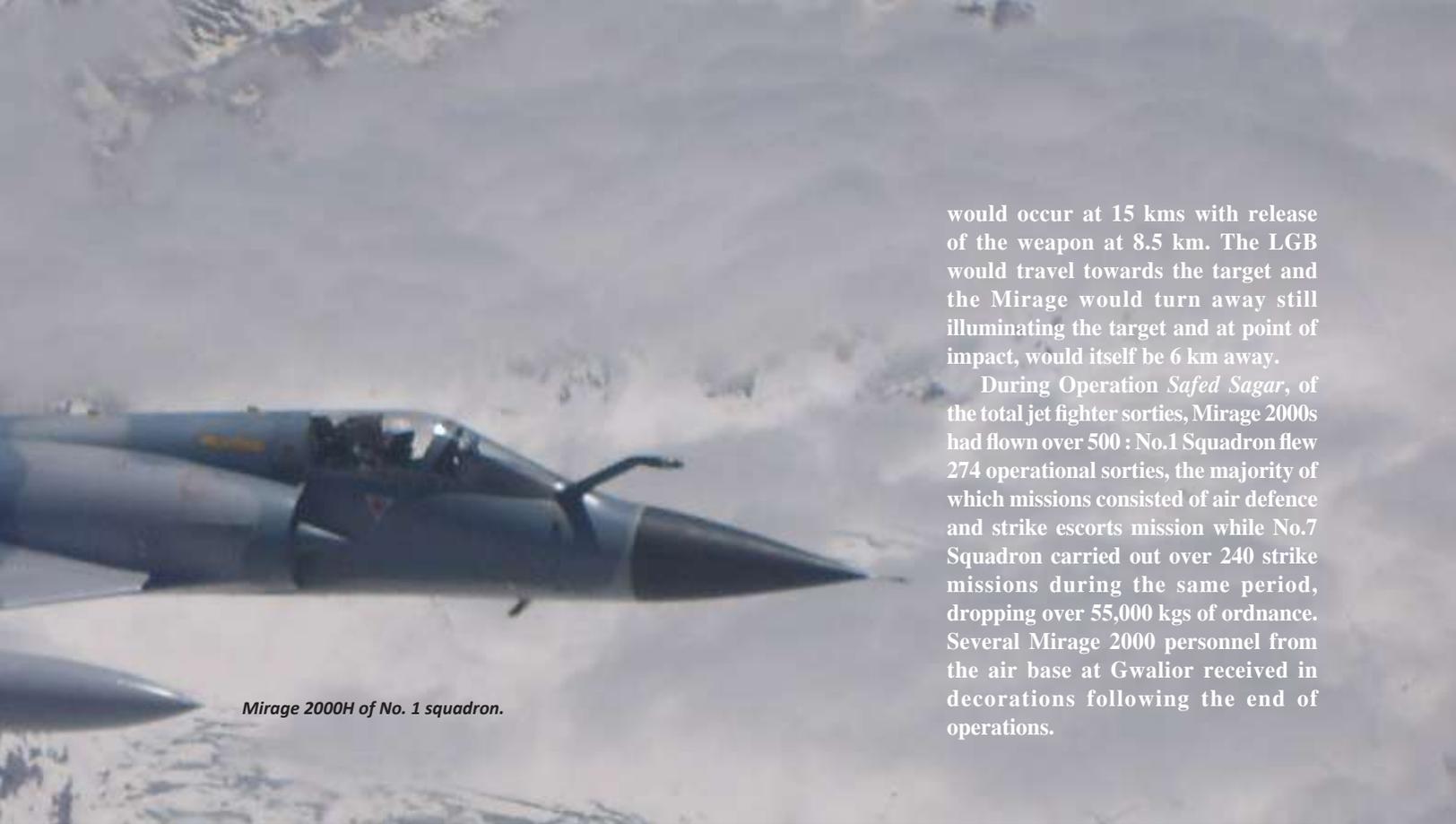
Air Commodore N Tiwari at No. 7 Squadron anniversary function (now Air Attache with the Indian Embassy in Paris).

On 4 July a strike with iron bombs was made for the first time on gun positions and a supply camp at Pt.4388 in the Dras Sector, which proved to be highly successful and culminated in serious degradation of the enemy supply chain. The series of attacks on Point 4388 was an excellent example of how lethal air strikes combined with good reconnaissance detected the enemy plans to shift to alternative supply routes, which were then attacked, so strangling their supply arteries. Follow up attacks were made by Mirages on 6 July, four aircraft dropping twenty four iron bombs and on 10 July, three aircraft dropped fifteen iron bombs. These attacks broke the enemy resistance and because of the high casualty rate amongst officers, seriously degraded their command and control leading to the overrunning of their position by the Indian Army.

A typical bombing mission would involve four Mirage 2000Hs from No.7 Squadron loaded with freefall iron bombs departing base together with a two-seat Mirage 2000TH loaded with a LGB and Laser Designating pod. These would rendezvous with 3 aircraft of No.1 Squadron carrying BVR missiles (Matra Super 530D), operating from another base. Over the target the Mirages with dumb bombs would visually acquire the target and drop their bombs while the two-seater, which would be filming the whole affair from behind, would use the LGB only if required to do so.

In fact, just 9 LGBs were dropped during the entire Kargil war, 8 by Mirage 2000s and one by a Jaguar. Standard Operating Procedures employed during the dumb bomb attacks was for the aircraft to commence a dive at about 30,000 feet and designate the target at 15 kms distance. At 8 kms distance anything from 6 to 12 bombs would be despatched towards the target. Procedure for a LGB attack would differ in that the target would be acquired at 20 km distance, designation





*Mirage 2000H of No. 1 squadron.*

would occur at 15 kms with release of the weapon at 8.5 km. The LGB would travel towards the target and the Mirage would turn away still illuminating the target and at point of impact, would itself be 6 km away.

During Operation *Safed Sagar*, of the total jet fighter sorties, Mirage 2000s had flown over 500 : No.1 Squadron flew 274 operational sorties, the majority of which missions consisted of air defence and strike escorts mission while No.7 Squadron carried out over 240 strike missions during the same period, dropping over 55,000 kgs of ordnance. Several Mirage 2000 personnel from the air base at Gwalior received in decorations following the end of operations.



*Mirage 2000 TH over the Karakorams.*

## French Defence Plan 2014-2025

A total of Euros 364 billion (\$475 billion) will be allocated for defence between 2014 and 2025, as outlined in a White Paper published by the French Government on 29 April. The *Livre Blanc* process represents the first strategic defence review to have been conducted by France since 2008. Of the planned total spend, some Euros 179 billion will be allocated for the 2014-2019 period. In comparison, France's defence spending for 2013 is estimated at Euros 14 billion.



The planned force structure outlined in the paper, calls for the French Air Force and Navy to operate a combined fleet of 225 combat aircraft, including those operating from the lone aircraft carrier *Charles de Gaulle*. Its present inventory of fighters includes Dassault Rafales, Mirage 2000s and Super Etendards, with 25 of the latter type remaining in naval service.

The Air Force should also have a fleet of 50 tactical transports by the end of the budget period, with 50 Airbus Military A400M transports on order. Alongside these will be seven surveillance aircraft and 12 Airbus Military A330 multirole tanker transports, to be acquired from 2014. The unmanned air system inventory should also have 12 theatre surveillance types.

French army aviation assets will comprise 140 reconnaissance and attack helicopters, 115 utility helicopters and about 30 tactical unmanned air vehicles. Other projects will include upgrading the Navy's Dassault ATL-2 Atlantique maritime patrol aircraft, a replacement for MBDA's Mica air-to-air missile, and development of the MBDA helicopter-launched anti-ship FASGW/ANL missile in conjunction with Britain.

## RAF's A400M Atlas training contract

In a long-term commitment, the Royal Air Force will get 18 years of support from Airbus Military and Thales UK for training services for the Airbus Military A400M Atlas transport aircraft. The multi-million pound sterling training services programme will be operated by A400M Training Services Ltd (ATSL), a joint venture between Airbus Military and Thales UK,

which will include design, construction and management of the A400M Atlas training school, the installation and maintenance of full-flight simulators and all synthetic training equipment, plus support to the RAF's course design team and training staff. The training school will be based at RAF Brize Norton, Oxfordshire, and should be operational by spring 2014. The School will train a range of aircrew and ground crew on operation and maintenance of the RAF's 22 A400M Atlas aircraft, which will also be based at Brize Norton.

## RAF Leuchars handed over to Army

The UK Secretary for Defence, Philip Hammond has confirmed in a statement to the House of Commons that RAF Leuchars will be handed over to the Army by 2015, but that "50 RAF personnel will remain to operate the runway as a relief landing ground for RAF Lossiemouth." The Typhoon squadrons presently based at Leuchars are to be redeployed at Lossiemouth by the end of 2013.

## Polish Army to buy 12 Attack Helicopters

The Polish Army's Aviation Arm will procure upto 200 new helicopters by 2035, being 90 utility, 54 medium utility and 32 attack and 24 heavy transport helicopters. To begin with is the supply of 12 gunships and a decision is likely to be announced by the end of 2013. These first 12 will be split between the land forces (eight) and the air force special forces (four), the latter to replace Mi-24Ws. Then there is a requirement for 48 medium utility helicopters to replace ageing Mi-8/17s; ten more for search and rescue (SAR) so the PZL W-3s can be phased out plus 12 in a SAR/anti-submarine warfare (ASW) configuration to replace Mi-14s and SH-2 Seasprites.

## \$6.9 billion to upgrade Raptor Fleet

The US Air Force has awarded Lockheed Martin a \$ 6.9 billion contract, to be completed by February 2023, to modernise its fleet of F-22A Raptor 5th generation air superiority fighters which is "a continuation of a previous ten-year upgrade contract awarded in 2003".

Ongoing Increment 3.1 modifications include adding a synthetic aperture radar, ground-mapping capability and the facility to carry eight 250lb (113kg) GBU-39 small diameter bombs. Increment 3.2A will include an improvement in the F-22's electronic warfare capabilities plus an upgrade to its Link 16 datalink, fusing it with the Raptor's integrated sensors and allowing secure data transfer with allied nations' aircraft. Increment 3.28, which is expected in 2017, will enhance the Raptor's geolocation and electronic protection systems while also enabling full AIM-9X and AIM-120D air-to-air missile capability to be achieved. Increment 3.2B will also include the Enhanced Stores Management System as well as an intra-flight datalink (IFDL) improvement to increase IFDL bandwidth.

## First Operational F-35B flight

A Lockheed Martin F-35B Lightning II of the USMC undertook an operational flight on 21 February, marking a major step in the type's operationalisation. Marine Fighter Attack Squadron 121 (VMFA-121) 'Green Knights' (at Yuma, Arizona) is expected to take delivery of a further 11 Lightning IIs over the next eight to 12 months, with the squadron anticipating having 16 F-33Bs on strength and in service by the end of 2013.



## 36 F-16s for Iraq

The Iraqi Air Force is procuring 36 F-16 Block 52s in two batches, each comprising 12 single-seat F-16Cs and six twin-seat F-16Ds with initial deliveries planned for September 2014. Training of Iraqi pilots has been underway with the US Air Force/Arizona Air National Guard's 162nd Fighter Wing at Tucson, Arizona since August 2012. Under the current contract between the US and Iraq, 27 Iraqi pilots will be trained on the type. After the six-to-eight month basic course, they will continue through flight lead upgrade training and instructor pilot certification.

## Nepalese Army get more Mi-17s

Approval for the purchase of two additional Mi-17 helicopters for the Nepalese Army Air Service has been given, which followed a meeting of the Council of Ministers in Kathmandu. The Council approved funding amount to 3 billion Nepalese rupees (\$34.7 million) to cover acquisition of the two armed helicopters. Currently the Nepalese Army inventory includes a Mi-7, a Mi-17-1V and a Kazan-built Mi-17V5.

## Used ATR72 for Pak Navy

A used ATR72-212A has been acquired by the Pakistan Navy, previously operated by Spanish commercial airline *Binter Canarias* and now based at Pakistan Naval Station Mehran, Karachi. The Pakistan Navy had issued an RFP in October 2012 for a single combi-configured ATR72-500, which was required to be delivered within six months. The tender specified requirement for an aircraft with a large cargo door, plus an air-openable rear door for air drop of relief goods and rescue personnel.



Although the RFP only specified one aircraft, previous reports had suggested that an order for two was likely so as to replace two of the Navy's weary Fokker F.27 maritime patrol aircraft. It has been planned to acquire the ATRs initially in a basic configuration for crew training, converting them later for the MPA role.

## More Su-30MK2s for Indonesian Air Force

Two more Sukhoi Su-30MK2 fighters have been delivered to the Indonesian Air Force, flown to Makassar-Sultan Hasanuddin Air Base on 22 February on board an Antonov An-124-100. These aircraft are the first of six additional Su-30MK2s ordered by the Indonesian Ministry of Defence under a \$470 million contract signed with Rosoboronexport on 29 December 2011. The remaining four are scheduled for delivery in June and July 2013. The additional aircraft will join ten other Sukhoi fighters in TNI-AU service with Wing 5's *Skadron Udara* 11 at Hasanuddin, comprising two Su-27SKs, three Su-27SKMs, two Su-30MKs and three Su-30MK2s.



## Polish AJT competition

In Poland's advanced jet trainer (AJT) contest, four bidders have been shortlisted: the Czech Aero Vodochody L-159T1; Alenia AerMacchi M-346 Master; BAE Systems Hawk AJT; and Lockheed Martin with the T-50 Golden eagle, developed jointly with Korea Aerospace Industries. Poland is interested in acquiring eight newly-manufactured AJT aircraft. Unofficially, technical negotiations are to start in mid-July and final offers should be submitted in November, the winner to be chosen by year-end, with the subsequent agreement to span the period from 15 January 2014 to 30 November 2017.

## Brazilian F-X2 delays continue

The Brazilian Air Force's F-X2 programme continues to be delayed. According to Maj Gen Carlos de Almeida Baptista, technology transfer opportunities have taken a "prominent position" in the F-X2 selection process and have "contributed greatly" to its delay. The shortlisted types remain the Boeing F/A-18E/F Super Hornet, Dassault Rafale and Saab Gripen, but a new priority is to be placed on addressing the air force's lack of operational capacity.

During a state visit to Paris, France in December 2012, Brazilian president Dilma Rousseff had said the F-X2 selection "may take some time" and linked the acquisition process to the progress of the nation's economy. The Air Force had expected to sign a contract in 2009.

## Raytheon radar for ROKAF

South Korea has selected the Raytheon Advanced Combat Radar (RACR) as part of a major upgrade to its fleet of Lockheed Martin F-16C/D combat aircraft as announced by Raytheon on 10 April. "This win ensures the Republic of Korea's KF-16 combat aircraft remain relevant in a constantly evolving threat environment and builds on our legacy of providing enhanced combat capabilities for global allied forces," said Rick Yuse, president of Raytheon Space and Airborne Systems.

Once the US government gives the go-ahead for the acquisition, Raytheon will deliver 134 of the active electronically scanned array (AESA) RACR systems to South Korea with deliveries to commence in late 2016, at a cost of some \$ 1 billion. The Republic of Korea Air Force has active fleet of 118 F-16C fighters and 51 D-model trainers.

## P-8 Poseidon completes test phase

According to Boeing officials, the P-8 Poseidon has successfully completed operational testing and is set to deploy for the first time later this year with the US Navy. The aircraft is also set to enter full-rate production in 2013.



The first USN operational squadron will deploy in December 2013, the only developmental task left to complete being full fatigue life testing on the Boeing 737-derived airframe. Production is ramping up to 10 aircraft in 2013, from seven in 2012. Three of the year's examples are being built for the Indian Navy, its first P-8 having arrived at Arkonnam on 15 May. Two more will follow during the third quarter under an eight-aircraft order.

## Swiss "outraged" over axing of Patrouille Suisse

The Swiss public is "outraged" by Swiss Defence Minister Ueli Maurer's statement that the Swiss Air Force aerobatic team *Patrouille Suisse* should be disbanded at the end of 2015, after 50 years of existence. Speaking to the Parliamentary security policy commission in context of the purchase of 22 JAS-39 Gripen E fighters, Maurer argued that when these begin to replace the Northrop F-5E/F Tigers from 2016 onward, there would no longer be sufficient funding to continue with the team. "We will not have 'planes simply for folklore!'" he told the commission, which prompted outrage among parliamentarians from different political factions, as well as aviation enthusiasts. "Maurer is underestimating the symbolic importance of the *Patrouille Suisse*," said Martin Landolt, head of the conservative Swiss Democratic Party. Others opined that "the aerobatic team is the best business card Switzerland has."



Some feel that to save costs, a joint display team with Sweden could be considered. "We need the team to represent the army and the air force to our people and taxpayers," it was argued.

## New platform approach system for Sikorsky S-92

The Federal Aviation Administration (FAA) has approved a new functionality on the S-92 helicopter to provide offshore oil operators with an automated approach that reduces cockpit workload by 60 percent and allows safer operations under challenging weather and operating conditions. Sikorsky, a subsidiary of United Technologies Corp. developed the new safety feature in close collaboration with PHI, Inc., an important Sikorsky customer that is operating S-92 and S-76 helicopters in the Gulf of Mexico, providing transportation to offshore oil workers to the platforms there.

The multi-mission S-92 helicopter incorporates numerous safety features, including a flaw-tolerant design. In February, the global fleet achieved the half-million flight-hour milestone. Off



shore oil operators fly the aircraft for an average of 90–110 hours per month often in challenging environment. The S-92 helicopter also performs Head of State missions, search and rescue (SAR) operations as well as a variety of transportation missions for utility and airline passengers. Since entering service in September 2004, the S-92 fleet has grown to 170 aircraft and logged more than 530,000 flight hours to date.

### Turkey orders 17 EC135s

Eurocopter's EC135 will perform medical airlift duties throughout Turkey with a fleet of 17 helicopters to be flown by the Turkish Aeronautical Association's THK Gökçen Aviation commercial arm, marking the latest major contract for this twin-engine rotorcraft in the international emergency medical services (EMS) marketplace.

Operations are to begin in August 2013 with an initial five EC135s, followed by a build-up to the full complement of 17 rotary-wing aircraft. The EC135 was selected for these life-critical



services by the team of THK Gökçen Aviation and Saran Holding, which won a five-year air ambulance service tender from the Turkish Ministry of Health.

Approximately 25 percent of all EMS helicopter operations are performed with the EC135. To date, some 500 of these rotorcraft have been delivered in EMS configurations out of the total 1,095 EC135s in service around the world.

### First F-15SA for Royal Saudi Air Force

Boeing has rolled out the first F-15SA, the newest variant of the F-15, which provides improved performance and increased survivability at a lower life-cycle cost, beside two additional wing stations for increased payload and capability. "We look forward to receiving the advanced capabilities of the F-15SA aircraft to continue to protect the security and stability of the Kingdom of Saudi Arabia," said Lt. Gen. Mohammed Bin Abdullah Al-Ayesh, Chief of the Royal Saudi Air Force. "Our relationship with the US Air Force and The Boeing Company has helped to ensure the Royal Saudi Air Force remains among the best-equipped air forces in the world." Flight testing commenced in 2013 on the F-15SA.

### German SAR transferred to the Army

All German Armed Forces (*Bundeswehr*) search and rescue services have been transferred from the German Air Force (*Luftwaffe*) to the German Army Aviation (*Heeresflieger*) as part of the helicopter forces transfer programme (*Fähigkeitstransfer Hubschrauber*).



For the next two years the UH-1D SAR crews will continue to operate from Penzing, Norvenich and Holzdorf under command of the army's *Transporthubschrauberregiment* (THR - Transport Helicopter Regiment) 30. The SAR service is expected to receive to NH90 in 2016 with the UH-1D completely withdrawn by 2017.

### Selex M-LRFD for US Army Apache

Selex ES has formally handed over the first of its Modernised Laser Rangefinder/Designators (M-LRFDs) to its customer and prime contractor Lockheed Martin to be installed on US Army Apache helicopters. The Company is under contract to supply the first three production lots of M-LRFDs, which have been awarded



under the US Army Modernised Target Acquisition Designation Sight/Pilot Night Vision Sensor (M-TADS/PNVS) Modernised Day Sensor Assembly (M-DSA) Obsolescence Replacement programme. The M-LRFD tactical laser provides longer ranges and improved targeting for the Apache helicopter. It supports future weapons and provides an eye-safe laser that gives soldiers the capability to train like they fight.

### Predator XP for UAE Armed Forces

An unarmed export version of the General Atomics Predator Unmanned air vehicle (UAV), has been ordered by the United Arab Emirates. The UAVs will be used in the intelligence, surveillance and reconnaissance role.

This modified version of the Predator has no weapon hard points and cannot be armed, which opens up a wider export market for the type purely as a surveillance UAV. This will thus bypass US Government export restrictions that apply to the armed Predator.



### IAI contracts with Lockheed Martin to produce F-35 wings

Israel Aerospace Industries (IAI) has signed a contract with Lockheed Martin to produce wings for the F-35 fighter, delivering the first F-35 wings in 2015. The contract's duration is for about 10-15 years, with potential sales reaching \$2.5 billion.

The contract marks a key milestone in the existing F-35 cooperation between IAI and Lockheed Martin. Both companies recently began assembling an F-35 wing production line, with IAI investing in the required advanced systems and technologies.

### Alenia Aermacchi to produce F-35 parts

Alenia Aermacchi has been awarded a \$ 141 million contract by Lockheed Martin for production of components and assembly of the first complete wing for the F-35 JSF (Joint Strike Fighter) programme. Alenia Aermacchi will provide components for the JSF central fuselage, wing and wing box. The components will be produced at Alenia Aermacchi's plants in Foggia and Nola, as well as at its newly opened plant in Cameri, Italy. The contract also includes non-recurring activities of up to \$ 60 million for production tools. Alenia Aermacchi manages the second wing production line of the JSF programme, which other production line is managed by Lockheed Martin.

### F-35s for the Netherlands

The second Lockheed Martin F-35 Lightning II for the Netherlands was rolled out of the F-35 production facility on 2 March 2013, the latest step in the production process leading to its eventual assignment to Eglin AFB, Fla., later this summer.



The Netherlands is planning to use this conventional takeoff and landing (CTOL) jet, known as AN-2, for training and operational tests for pilots and maintainers. AN-2 will also undergo functional fuel system checks before being transported to the flight line for ground and flight tests later in 2013.

## Saab receives second development order for Gripen E from FMV

Within framework of the agreement with the Swedish Defence Materiel Administration (FMV) that was made public on 15 February 2013, Saab has received a development order amounting to SEK 10.7 billion for operations during 2015-2023. It includes the development and modification of the Gripen E for Sweden during the period 2013-2026 as well as a possible order for new production of Gripen Es for Switzerland.



FMV have now placed an order for the remaining development work for Gripen E corresponding to SEK 10.7 billion. The order includes definition and development work as well as adaptation of test and trial equipment, simulators and rigs. The total value of possible orders under the agreement amounts to a total of SEK 47.2 billion, of which SEK 13.2 billion has been received, which will be booked when each order is received. Remaining orders within the agreement are expected in 2013-2014.

## First upgraded Tornado ECR delivered

Alenia Aermacchi, in collaboration with BAE Systems and Cassidian, its Panavia consortium partners, has delivered the first upgraded Tornado ECRs. (Electronic Combat/Reconnaissance) to the Italian Air Force, Alenia Aermacchi, as technical and programme leader, being in the process of upgrading the avionics and systems of 15 Tornado ECRs. The Tornado ECR MLU is the upgrade of the ECR version currently in use by the Italian Air Force, where main function is to localise and suppress hostile air defence radar emitter sources by anti-radar missiles.

The aircraft upgrade includes several subsystems and functionality additions as well as modifications to the on-board systems, avionics equipment and mission software.

The Tornado ECR MLU features an integrated IN-GPS navigation system supported by a Multi-Mode Receiver (MMR) system for approaches and ILS blind landings. The new



communication and identification system embodies the latest standards of secure communication capacities as well as a data transmission/reception capacity via Data-Link (MIDS), which integrates TACAN navigation functionalities.

## VIP S-92s for Turkish National Police

Sikorsky has delivered the first of two VIP S-92 helicopters to the Turkish National Police (TNP) for service to the Turkish Prime Ministry, under a contract signed in 2011. The new helicopters will support the Head of State function currently served by one S-92 helicopter operated by the TNP since 2005. The two S-92 helicopters will join a large fleet of more than 140 Sikorsky helicopters operating in Turkey including well over 100 Black Hawk helicopters. Sikorsky's medium commercial helicopter, the S-76, also is operating in the country. The second S-92 helicopter is also expected to be delivered in 2013.

## Upgrade of Swedish ground-based air defence

Saab has received two new orders from the Swedish Defence Materiel Administration (FMV) worth MSEK 600, for an upgrade of Sweden's ground based air defences. The orders include delivery of both upgrades of existing units and new units with functions for ground based air defence Command, Control and Communication (C3), based on the Giraffe AMB multifunctional radar and C3 system. The systems feature command units, which can be co-ordinated with NATO's tactical data link (Link 16), communication systems, combat management terminals, as well as an upgrade of existing radar and command units.

## Swiss as suppliers of Gripen E components

Saab has taken the strategic decision to find Swiss companies to develop, produce and assemble major components of the Gripen E aircraft, including its rear fuselage. More than 35 per cent of the work will be placed in the French- and Italian-speaking regions, which will create business volume for Swiss industry of approximately 200 MCHF and more than 500,000 man hours of work. The decision to expand the Gripen E supplier base in Switzerland is an important step for Saab's Swiss Industrial Participation (SIP) programme. It demonstrates the company's willingness and commitment to deliver major direct SIP packages for Gripen E and results from a continuous dialogue with Armasuisse, Swissmem, GRPM (*Groupe Romande Pour le Matériel de Défense et de Sécurité*) and the Swiss Gripen Group (SGG for Direct Industrial Participation DIP).

As a Gripen E supplier and partner, the Swiss industry's participation is not limited to the Swedish and potential Swiss aircraft, but includes future orders of Gripen E. The Swiss partner companies will have full access to the technology involved in the work package. The transfer of knowledge will provide the companies with the skills and competence to compete for major orders from other aircraft manufacturers in the civil and defence sectors.

## IAI selected by the Brazilian Air Force

Israel Aerospace Industries (IAI) has been selected by the Brazilian Air Force to execute a large-scale air refueling project for several Boeing 767-300 aircraft. Joseph Weiss, president and CEO of IAI, said "We are very pleased to have won the bid to provide the Brazilian Air Force with Multi-Mission-Tanker & Transport aircraft capable of performing air-to-air refueling, strategic troop and cargo transport, and aeromedical evacuation. We see the Brazilian Air Force as a very important and strategic customer."



Joseph Weiss, IAI's President & CEO

## Raytheon delivers 8th AN/TPY-2 radar

Raytheon has delivered its eighth AN/TPY-2 radar to the Missile Defence Agency (MDA) in support of US combatant commands. An integral capability of the ballistic missile defence system (BMDS), AN/TPY-2 is a mobile, X-band phased-array radar "that helps protect the US-deployed forces and allies by searching, acquiring and tracking threat ballistic missiles and discriminating between threats and non-threats". The AN/TPY-2 radar Raytheon delivered will serve in terminal mode as the fire control radar for the US Army's Terminal High Altitude Area Defence missile defence system. Other forward-based AN/TPY-2s that are deployed around the globe cue the BMDS by



detecting, tracking and discriminating enemy ballistic missiles in the ascent phase of flight. AN/TPY-2 is a high resolution, mobile, rapidly deployable X-band radar, capable of providing long-range acquisition, precision track and discrimination of all classes of ballistic missiles, from short-range ballistic missiles to intercontinental ballistic missiles.

## V-22 engines for US Marine Corps and Air Force

Rolls-Royce has been awarded an \$83.7 million contract for engines to power 19 V-22 aircraft operated by the US Marine Corps and Air Force. The contract, modification of a prior agreement, includes a total of 38 Rolls-Royce AE 1107C engines manufactured in Indianapolis (Indiana), the contract awarded through the Naval Air Systems Command in Patuxent River, Maryland. As Tom Bell, Rolls-Royce, President Defence, said, "this contract demonstrates the trust US Marine Corps and Air Force have in the Rolls-Royce AE 1107C engines which power their V-22 fleets. Delivering reliable power is our constant focus at Rolls-Royce and we are dedicated to keeping those fleets mission ready for our customers."



## F/A-18E/F Super Hornet, EA-18G Growler and systems for Australia

The Government of Australia has confirmed acquisition of up to 12 F/A-18E/F Super Hornet aircraft, 12 EA-18G Growler aircraft, 54 F414-GE-402 engines (48 installed and 6 spares) 2 engine inlet devices, 35 AN/APG-79 Radar Systems. Also, 70 AN/USQ-140 Multifunctional Information Distribution System Low Volume Terminals (MIDS-LVT) or RT-1957(C)/USQ-190(V) Joint Tactical Radio Systems, 40 AN/ALQ-214 Integrated Countermeasures Systems, 24 AN/ALR-67(V)3 Electronic Warfare Countermeasures Receiving Sets, 72 LAU-127 Guided Missile Launchers, 15 M61A2 Vulcan Cannons, 32 AN/AVS-9 Night



Vision Goggles or Night Vision Cueing Device System, 40 AN/APX-111 Combined Interrogator Transponders, 80 AN/ARC-210/RT-1990A(C) Communication Systems, 100 Digital Management Devices with KG-60s, 36 Accurate Navigation Systems, 30 AN/AYK-29(V) Distributed Targeting Systems (DTS), 4 AN/PYQ-21 DTS Mission Planning Transit Cases, 24 AN/ASQ-228 Advance Targeting Forward Looking Infrared (ATFLIR) Pods, 40 AN/PYQ-10 Simple Key Loaders (SKL), 80 KIV-78 Mode 4/5 Module, 48 COMSEC Management Workstations (CMWS), 24 AN/ALE-47 Electronic Warfare Countermeasures Systems, 80 Joint Helmet Mounted Cueing Systems (JHMCS), and 400 AN/ALE-55 Fibre Optic Towed Decoys.

The estimated cost of this multi-dimensional project is near \$3.7 billion.

## MBDA considers Gulf partnership

MBDA is proposing efforts to expand the capabilities of its anti-ship missiles “The growth potential of [the] Marte anti-ship missile family has attracted the interest of an Arabian Gulf industrial partner, looking to jointly develop the new extended-range version of the family,” according Antonio Perfetti, managing director of the MBDA’s Italian branch and executive group director sales and business development.

The Marte ER is planned to operate at ranges in excess of 100km and be capable of being carried by medium-to-heavy

helicopters. It should also be possible to launch the equipment from fixed-wing combat and maritime patrol aircraft, have comparable life cycle costs to the current version and offer growth potential, including a man-in-the-loop and land attack strike with a heavier warhead.

Tawasun Precision Industries entered into an agreement with MBDA during the 2011 IDEX exhibition in Abu Dhabi to manufacture various components for the Marte family. The company produces the newly developed canister for the Mk2/N ship-launched version of the missile, which part of the equipment of the UAV naval forces *Ghannatha* fast boat, the first of which has been delivered.

Tawasun Precision Industries also inked a supply agreement with Selex ES at the IDEX 2013 exhibition in February to manufacture various components for the Finmeccanica subsidiary’s RF seekers, a key component in the MBDA Italy Marte/Otomat antiship missile family. Apart from the extended range and naval (Mk2/N) versions, the Marte missile family includes the helicopter-based (Mk2/S) and aircraft-launched (Mk2/A) models.

## SAMP/T system deployed by Italian Army and French Air Force

On 6 March 2013 the Italian Army and the French Air Force deployed their SAMP/T medium range air defence systems for the first time within a NATO framework in successfully intercepting a target representative of a theatre ballistic missile. After about 300 km of ballistic flight, the target (which had been launched from an aircraft) was destroyed by the Aster 30 interceptor missile. This success marks another step achieved in demonstrating capabilities of the SAMP/T weapon system to counter a ballistic threat within a NATO framework and follows on from two other successful firings carried out in October 2010 and November 2011 against the same type of threat.



### First A350 rolls out

Airbus rolled out the first flyable and fully-painted A350 airliner on 13 May 2013, as engineers prepared the aircraft for a maiden test flight in coming weeks. The A350-900 bearing the registration F-WXWB is painted in house colours with a blue Airbus logo and the A350 name painted onto a white fuselage.



The official target for first flight remains “mid-2013” but if the European manufacturer could get the aircraft airborne by the Paris Air Show in mid-June this year, it would be a coup not unlike the same show in 2011, where Airbus bagged orders worth some \$44bn.

Regardless of a potential Paris Air Show debut, the aircraft is scheduled to enter service in 2014 with Qatar Airlines, and a successful test programme and entry into service will be crucial to its success, especially in light of the troubles faced by recent aircraft projects such as the A380 and Boeing 787.

Unusually, Airbus did not conduct the traditional large, public event that marks the rollout of a new aircraft type, instead inviting only a portion of the Airbus workforce to view the new airliner on the evening of 13 May.

### Four S-76Ds for S&R mission in China

China’s Ministry of Transport’s (MOT) Rescue and Salvage Bureau has signed a contract for the supply of four Sikorsky S-76D search and rescue helicopters, with an option for another four in 2014, to further enhance MOT’s maritime search and



rescue capabilities. The S-76D helicopter is the newest product from Sikorsky Aircraft, the Federal Aviation Administration (FAA) having awarded Type Certification of the S-76D model in October 2012. The helicopter continues its envelope expansion as the first models move through final modifications for customer deliveries in early 2013.

### CAE’s full-flight simulators for China

CAE has announced sale of seven full-flight simulators (FFSs) and a series of training devices and simulator update services, including two Airbus A320 FFSs and a Boeing 737 FFS to Shanghai Eastern Flight Training Centre (SEFTC); an A320 to the Zhuhai Flight Training Centre; and a Boeing 737 FFS, an Airbus A320 FFS and a Boeing 787 FFS to “undisclosed customers”. The contracts are valued at more than C\$95 million at list prices and bring the total FFS sales that CAE has announced to date during fiscal year 2013 to 30.

### Recaro Aircraft Seating achieves sales increase

Recaro Aircraft Seating has achieved slight growth in 2012: the Schwaebisch Hall-based aircraft seating supplier generated sales of 309 million Euros in the last business year and aims to increase its sales to 500 million Euros by 2017. In 2012, Recaro Aircraft Seating, with over 1,600 employees, generated sales of 309 million Euros, a slight increase over the previous year (2011: 304 million Euros). “Although there has been a lot of movement in the market which has required maximum flexibility from us, we have not only been able to maintain our level of sales, but even to increase it, thus continuing our growth path”, stated Dr. Mark Hiller, Chief Executive Officer of Recaro Aircraft Seating.

The increase in sales can be attributed to Recaro’s innovative product portfolio. For example, the company’s BL3520 economy class seat continued its success story in 2012. Since its launch in late 2010, international airlines – such as All Nippon Airways, Scandinavian Airlines and Alaska Airlines – have ordered more than 150,000 units of the seat. Airbus has now transferred complete quality control responsibility for long-haul seats to Recaro: the seating supplier’s own qualified inspectors are now permitted to approve its products on behalf of Airbus.

### EC135 T2 for Tokyo’s National Police Agency

Eurocopter Japan has delivered an EC135 T2 to the National Police Agency (NPA), the first EC135 to be deployed by the Metropolitan Police Department (MPD) for law enforcement missions in the Tokyo prefecture. The NPA and its police departments across Japan currently own a fleet of 28 Eurocopter helicopters, which includes seven units of EC135 and 13 BK117s (EC145). These aircraft are operated by the police to guard security interests of their respective prefectures. The newly



acquired EC135 T2 will be the first EC135 to be deployed to the MPD, which also operates an EC155 B1 for a wide range of police activities, including life-saving operations, transportation, crime-prevention, security patrols and investigative search.

## Rolls-Royce Trent XWB awarded EASA type certification

Rolls-Royce has been awarded engine type certification from the European Aviation Safety Agency (EASA) for the Trent XWB that will power the Airbus A350 XWB aircraft. The certificate was formally handed over by EASA Executive Director Patrick Goudou to Rolls-Royce Trent XWB Programme Director Chris Young at EASA headquarters in Cologne at Germany on 7 February 2013. Certification confirms that the engine has fulfilled EASA's airworthiness requirements for flight and is the last major engine milestone prior to first flight of the Airbus A350 XWB, later in 2013. The engines that will power the aircraft have been despatched from Derby to be prepared prior to installation of the fully integrated powerplant on the aircraft's pylon. The Trent XWB has powered a series of test flights on an Airbus A380 Flying Test Bed (FTB) aircraft since February 2012.

## Development continues for GE's next gen engines

Research and development efforts continue on new technology for next-generation turbofan and turboprop engines for regional airliners, GE Aviation spending about \$1 billion annually on research and development efforts. The NG34 technology development programme is focused on advances to lower specific fuel consumption (SFC) by at least 15 percent compared to current engines in this segment, up to 15 percent lower cost of ownership and 35 percent margin to CAEP/6 NOx emissions and 15 EPNdB margin to Stage 4 noise requirements. At present, testing is underway on the third eCore demonstrator. GE's eCore programme is the technology cornerstone for the next-generation turbofan engines and features a higher pressure ratio compressor and other advanced technologies and material.

The CPX turboprop technology development programme is targeting the next-generation 70 to 90 seat turboprop airframe. The programme will feature at least 15 percent lower SFC and

will be designed for severe environments. The simple, modular design will incorporate proven GE technologies and GE can provide an integrated turboprop propulsion system with one support team. Research on the CPX technologies continue in 2013 with a focus on enhanced propulsion system aerodynamics for noise and efficiency benefits.

## Saab Gripen E developments

The agreement between Saab and Sweden's Defence Material Administration (FMV – Forsvarets Materialverk) was announced on 15 February which covers the development and/or modification of Gripen E for the Swedish Air Force (*Svenska Flygvapnet—SAF*) between 2013 and 2026. The deal includes will have a key bearing on the proposed order for the type from the Swiss Air Force.

The initial \$400 million contract covers research and development on the new single-seat Gripen E variant during 2013-2014, as also additional orders that will be placed. These will include SEK10.6 billion (\$1.67 billion) for remaining Gripen E development work for Sweden. A further contract will cover modification of 60 existing SAF Gripen Cs to Gripen E standard, with deliveries running from 2018 to 2026.

Another contract will cover mission-specific equipment, support and maintenance for Sweden's Gripen ES, with signature of this element anticipated in or before the fourth quarter of 2014. The agreement will also include provision for production and delivery of 22 brand-new Gripen Es and related equipment to the Swiss Air Force (*Schweizer Luftwaffe*), once Switzerland clears to procure as 'go-ahead' for this acquisition is still subject to approval by the Swiss parliament and these orders, including the possible Swiss acquisition, will amount to \$7.5 billion its Gripen E purchase.

As Saab President and CEO Hakan Buskhe noted, "our existing customers that operate the Gripen C/D version will also be able to take advantage of some of the development [work] in their future upgrades."

## Philippine Airlines evaluating A350 & B777X

Philippine Airlines are reportedly evaluating both the proposed Boeing 777X as well as the Airbus A350 as part of its



expansion plans, with the carrier planning to induct 10-20 of either aircraft type. The flag carrier has ordered 34 A321s, 10 A321neos and 20 A330-300s and had previously announced its intention to purchase 100 new aircraft and retire its older and uneconomical wide bodies to compete more effectively in the long-haul market stated.

However, judging by the development schedule of the General Electric GE9X, the exclusive powerplant Boeing has chosen for the 777X, the aircraft will probably enter service only after mid-2019. The A350-1000, powered by Rolls-Royce Trent XWB engines, is intended to enter service in 2017 and is directly compete to future B-777 variants. San Miguel, holds 49% stake in PAL.

## Lufthansa decision imminent on long-range airliner

Lufthansa German Airbus are expected to place a 'large' order for long-range aircraft to replace its Airbus A340s and Boeing 747-400s in the fourth quarter of 2013. According to Jurgen Weber, chairman of Lufthansa's supervisory board, "We will make the decision on long-range aircraft in the last quarter of this year", however Weber declined to specify the number of aircraft the airline would order but said two-thirds will be replacement jets for its A340s and 747-400s, while the remaining third will be for growth. The choice will be between the Boeing 777X and Airbus A350.



Airbus plans first deliveries of the A350-900 to take place in the second half of 2014 while the longest-range variant of the A350, the -1000, will enter into service in 2017. Lufthansa presently operates 48 A340s plus 18 747-400s and is due to take delivery of 15 Boeing 747-8s, seven A380s, three A330s and five B-777Fs in 2013-2016.

## Airbus, PTDI to develop NC212

According to reports from Indonesia, Airbus Military and PT Dirgantara Indonesia (PTDI) have signed a comprehensive agreement for the development of the NC212i, an upgraded version of the C212 light transport. The companies will be long-term, risk-sharing partners with engineering and manufacturing being led by PTDI, supported by Airbus Military and certification being an Airbus Military responsibility, "the aircraft will be delivered from Bandung in Indonesia and will be promoted and supported by PTDI and Airbus Military teams worldwide" according to Airbus.

The NC212i will feature new digital avionics and a new autopilot, and have capacity for up to 28 passengers in its civilian version. Airbus Military forecasts a market for 400-450 aircraft of this size in the next decade.

## Order for Finmeccanica's commercial helicopters

AgustaWestland (a Finmeccanica company) has gained orders worth EUR 350 million for commercial helicopters during Heli-Expo 2013 (HAI) held in Las Vegas (USA) between 4-7 March 2013. British company Sloane Helicopters, have ordered two GrandNew and two AW169 helicopters, while Bristow Group



Inc. which is expanding its fleet of AW139 helicopters, are adding six more aircraft plus options. In addition, Waypoint Leasing signed a multi-year agreement covering different models of GrandNew, AW169, AW139 and AW189, while Caverton added three AW139s to its offshore-configured fleet to be operated in Nigeria.

Furthermore, Finmeccanica has sold two AW139 to customers in the USA for VIP/corporate transport purposes, one additional GrandNew to the Japan National Police Agency and one AW119Kx to the Australian company Wagners Development Company Pty Ltd, the first in Australasia. The contracts signed confirm the expanding presence of the AgustaWestland range of commercial helicopters in the world market. The AW119Kx and GrandNew offer operators inimitable capabilities in terms of avionics, performance, cabin space and safety standards.

### A350 to fly 'after Paris show'

Airbus chief executive Fabrice Bregier has said the A350s first sortie will be “around mid-year, just after Paris or a week later. It’s difficult to say.” He said : “There are many, many tests to pass. So far the progress is good. We are on track.”



### Comac ARJ21 closer to certification

According to reliable reports, the Chinese carrier Comac has completed crosswind validation tests for its ARJ21 regional jet. It has also begun test flights at night on the regional jet to verify that the cockpit and external lighting systems meet airworthiness standards. Comac has also met with launch customer Chengdu Airlines to begin preparations for the type’s entry into service. The manufacturer, together with major system suppliers will ensure on-site support for the customer in the initial period following its arrival.

Certification is targeted for the first half of 2013, with delivery to Chengdu by 2014.

### Aer Arann’s first ATR 72-600

Aer Arann took delivery of its first ATR 72-600 turboprop aircraft in early May 2013. The aircraft is the first of eight ATR 72-600s ordered by the airline in a contract valued at some



\$ 187 million. Seven other aircraft are scheduled to be delivered in 2013 and 2014, which will replace the older existing fleet of ATR 72-200s and ATR 42-300s. With 3 ATR 72-500s currently in service, the new aircraft will bring to 11 the total fleet of ATRs operated by Aer Arann. The first airlines starts service in May, with remaining aircraft expected for delivery over the next 11 months. The aircraft will fly in the livery of Aer Lingus Regional, based on a franchise relationship between Aer Arann and Aer Lingus.

### AgustaWestland AW189 selected for UK S&R

AgustaWestland’s AW189 Search & Rescue (SAR) helicopter will play a pivotal role in the provision of SAR services in the UK. Bristow Helicopters Ltd., which has been awarded the contract by the UK Department for Transport to provide SAR services for 10 years, has selected the AW189 SAR variant as one of the central platforms for its SAR programme, in addition to which, AgustaWestland will provide related training, maintenance and support services. A total of 11 AW189s will be operated by Bristow in the UK, with a phased-in starting period



between 2015 and 2017. The programme for AgustaWestland is valued at over 275 million euro.

The AW189, the latest helicopter type produced and equipped by AgustaWestland to undertake SAR missions, builds on the Company’s heritage and expertise in search and rescue both in the UK and abroad. The iconic Sea King, which has been operational for over 30 years, is currently providing the bulk of Search and Rescue missions in the UK alongside the AW139 which has undertaken the same role, primarily on Britain’s south coast, for the Maritime & Coastguard Agency.

### Turkish Airlines selects GE CF6 for its A330 Fleet

Turkish Airlines (THY) have ordered additional GE CF6-80E1 engines to power its new two Airbus A330-300 aircraft, with options for an additional three A330 aircraft. The maintenance, repair and overhaul of these additional CF6-80E1 engines will be covered under THY's 12-year OnPointSM solutions agreement, announced in November 2012. The total value of the engines and OnPoint solutions agreement for the five CF6-powered A330s is more than \$300 million. This order follows an order in November 2012 for CF6-80E1 engines to power the fleet of 15 A330-300 aircraft.



### S-76D helicopters for the Bristow Group

Sikorsky will sell up to 26 S-76D helicopters to the Bristow Group for offshore oil transport mission. "This agreement represents the S-76D helicopter's introduction into operations in the Gulf of Mexico and other international arenas later this year and it also further strengthens the more than 40-year relationship between the Bristow Group and Sikorsky Aircraft," said Sikorsky is President Mick Maurer. "Bristow has consistently shown its consideration for safety, leadership, and commitment to its worldwide customers by seeking the latest state-of-the-art equipment, and their choice of the S-76D affirms their commitment to providing the best value to its customers."

### Two decades of Dassault Falcon 2000s

First flight of the Dassault Falcon 2000 business jet took place in March 1993 in Bordeaux-Mérignac (France). Since its certification, Dassault has delivered nearly 500 Falcon 2000s worldwide and the global fleet has achieved close to two million flying hours, making it one of the world's most widely used business jets in operation. Dassault marked the aircraft's 20th anniversary at the Abu Dhabi Air Expo 2013, where the company presented its range of business jets including the next generation Falcon 2000LXS.



The original Falcon 2000 was the first business jet in the world to be designed using a fully digital mockup, with the Dassault design team responding to Falcon operator requirements in those days, which helped define the aircraft's initial performance, the ideal range (which was a perfect fit for the US 'coast-to-coast' market) and operating costs. Since the original design, there have been six versions of the Falcon 2000, including the 2000LXS introduced in October 2012.

### AviancaTaca Airbus A320neos with CFM engines

Panama-based AviancaTaca Holdings has selected LEAP-1A engines to power 33 Airbus A320neo family aircraft, in addition to ordering CFM56-5B engines to power an additional 18 Airbus A320ceo family aircraft. The airline has also opted for a comprehensive engine maintenance service package, with the combined agreement valued at \$2.7 billion. AviancaTaca signed a 15-year RPFH (Rate per Flight Hour) agreement to support both the new CFM56 and LEAP engine fleets under which CFM will guarantee maintenance costs on a dollar per engine flight hour basis. Deliveries of the A320neos are scheduled between 2014 and 2016, while the A320ceos will be delivered in the 2017-2019 timeframe.

### CAE upgrade contracts

CAE has gained a series of services and upgrade contracts during the first two months of its fiscal year 2013 valued at approximately C\$90 million. These include contracts to provide C-130 training support services, upgrades for the United States Navy's MH-60S helicopter simulators and training devices, maintenance and support services for the German Armed Forces and a contract extension to provide in-service support services for "an undisclosed customer". Gene Colabattisto, Group President, Military Products, Training and Services of CAE said, "we are also seeing increased opportunities for simulator upgrades and updates as defence forces look for ways to increase the amount of training done in a synthetic environment."

## Raytheon's dual-band datalink tested with Thales radar

Raytheon has tested its company-funded dual-band datalink with a Thales Nederland Advanced Phased Array Radar (APAR). The test took place at a shore-based Dutch facility and marked a key step toward enabling more European ships to employ the full range of missiles within the Standard Missile family, including the Standard Missile-3.

Using both sending and receiving signals, the test validated the ability of the dual-band datalink to communicate with the APAR X-band radar, which is part of a radar suite used by Danish, Dutch and German navies. Integrating a dual-band datalink into any of the standard missiles is a 'drop in' replacement for the current hardware. In 2009, a joint US-Netherlands study concluded that SM-3 could be integrated with the Signal Multibeam Acquisition Radar for Tracking-L and Advanced Phased Array Radar (SMART-L/APAR) sensor suites, providing non-AEGIS ships a viable missile defence capability.

## Two CAE CC-130J simulators for RCAF certified

Two CC-130J full-mission simulators built by CAE for the Royal Canadian Air Force (RCAF) have been certified by Transport Canada to Level D, the highest qualification for flight simulators. The two CC-130J simulators are located at the new Air Mobility Training Centre (AMTC) at Canadian Forces Base Trenton in Canada. CAE is the prime contractor for the Operational Training Systems Provider (OTSP) programme, under which the company is providing a comprehensive aircrew training capability for Canada's CC-130J and CH-147F aircraft. At the new AMTC, CAE and its pan-Canadian team of subcontractors are delivering a full suite of CC-130J academic and synthetic training systems to be used for qualification, conversion, refresher and mission rehearsal training. CAE will also provide 20 years of in-service support for the AMTC in Trenton.



## Boeing selects GE for 777X Studies

Boeing's development study on the 777X will include GE as the engine partner on the twin-aisle airplane expected to enter service near end of the decade. "This decision to work with GE going forward reflects the best match for the development programme, schedule and airplane performance," said Bob Feldmann, vice president and general manager, 777X Development, Boeing Commercial Airplanes. "We are studying airplane improvements that will extend today's 777 efficiencies and reliability for the next two decades or longer, and the engines are a significant part of that effort. Our focus is on providing the most competitive offering to our customers in the large twin aisle market."

Development work on the next-generation 777 continues and includes 777 customers from around the world. "We have had strong and productive engagement with a broad set of customers in the marketplace to understand their future needs. We are pleased with where we are in the process," Feldmann said. "We are aggressively moving forward on our plan and will continue to refine requirements with customers."

## Mi-38's world records officially registered

Records set in 2012 by second prototype of the Mi-38 helicopter have been officially registered as world records by the *Fédération Aéronautique Internationale*, FAI. It was verified and officially confirmed that five world records were set in 2012 by the Mi-38 prototype. On 26 August 2012, during the 14th World Helicopter Championship, test pilots from the Mil Moscow Helicopter Plant (part of Russian Helicopters) set three world records with the Mi-38 in the E1h class (the FAI category for helicopters weighing 10,000 to 20,000 kg).



The first record was for altitude (flying to an elevation of 8,620 metres without payload). The second record was for climbing speed (reaching a height of 3,000 meters in 6 minutes). The third record was also for climbing speed (reaching a height of 6,000 metres in 10 minutes and 52 seconds).

Thereafter, on 10 September 2012, at the testing centre of the Mil Moscow Helicopter Plant, another two world records were set: an altitude record for flying with a 1000 kg payload (7,895 metres) and altitude record for flying with a 2,000 kg payload (7,020 metres).

## Sagem design study on inertial guidance systems

French defence procurement agency DGA has awarded Sagem (Safran) a design study contract concerning inertial navigation systems for new-generation tactical missiles, according to which Sagem is responsible for the design and construction of inertial reference units for these missiles. Based on vibrating gyro technology, this work will eventually lead to the development and production of more cost-efficient inertial navigation systems for use on all types of missiles, including air-to-air, surface-to-air, anti-tank and anti-ship.

Sagem develops and produces the Hammer AASM (*Armement Air-Sol Modulaire*) modular guided weapon and working with prime contractor MBDA, Sagem also makes the sights and seeker for the Mistral air defence missile, and the seeker for the infrared version of the Mica air-to-air/surface-to-air missile. In addition, Sagem was selected to develop and produce the infrared seeker for the MMP medium-range missile and MBDA's air-to-surface and light anti-ship missiles.

## Northrop Grumman sensors for Hawk ADS

Northrop Grumman has launched its Fourth Generation Tracking Adjunct Sensor (4G TAS), the latest upgrade to the company's range of high-resolution electro-optical/infrared (EO/IR) sensors for the Hawk air defence system. Northrop Grumman's 4G TAS, the only approved EO/IR upgrade available to Hawk customers worldwide, detects and tracks low and fast targets both during day and night and passes them to the Hawk's fire control radar. Northrop Grumman's upgrades to the baseline configuration include a new 640 x 480 pixel infrared sensor that will more than double the resolution of the current system. The upgrade will also include a new charged-coupled device camera that will increase resolution and enhance operation in low-light environment. The upgrades also include more reliable and sustainable electronics to ensure continued logistics support for the system. All existing TAS, Improved TAS and Advanced Infrared TAS systems can be upgraded to the 4G TAS configuration.

## Russian Helicopters' ascending revenues

Russian Helicopters has announced its consolidated operating and audited financial results for the year ended 31 December 2012 under IFRS. Helicopter deliveries in 2012 increased to 290 units, or 10.7% up compared to 2011. The Company delivered nine types of helicopters to operators in 19 countries during 2012. The Company's firm backlog reached 817 units and its value exceeded RUB 359.9 billion in 2012. In 2012, the Company signed several significant contracts for the supply of helicopters in 2012-2016 to customers in India, China and Brazil.

As Dmitry Petrov, CEO of Russian Helicopters, commented: "Last year was another year of steady growth and successful

achievements for the Company. We continued to increase deliveries to our customers, which demonstrates the growing global demand for our helicopters. In 2012 we delivered 290 helicopters of nine different types to our clients from 19 countries – a 10.7% increase compared to the previous year. We maintained our firm backlog at a high level; at the end of the year the backlog stood at 817 helicopters with a value in excess of RUB 350 billion".

## Eurocopter's Ecureuil in Bangladesh

In end-March 2013, Eurocopter has made a breakthrough into the Bangladesh civil helicopter market with the arrival of the country's first Eurocopter rotorcraft. An EC130 B4 was delivered to R&R Aviation while an AS350 B3e was showcased for civilian and governmental prospects in a two-day flight demonstration.

Eurocopter delivered its first civil helicopter to R&R Aviation Limited (a concern of Sikder Group) in early March, the first of



two EC130 B4s that were acquired by the Bangladesh helicopter operator during the Singapore Airshow 2012. To be used primarily for providing emergency medical services (EMS) and humanitarian support, the EC130 B4 can also be reconfigured for air charters, sightseeing tours and aerial observation with a cabin that seats up to eight passengers.

## Boeing delivers 7,500th B-737

Boeing has delivered the 7,500th 737 to come off the production line to Malaysia-based Malindo Air. Malindo Air is a joint venture by Jakarta, Indonesia-based Lion Air and Malaysia's National Aerospace and Defence Industries. Malindo Air is using the Next-Generation 737-900ER to launch its low-fares service. Malindo Air's 737-900ER (Extended Range) with the passenger-pleasing Boeing Sky Interior features new modern sculpted sidewalls and window reveals, LED lighting that enhances the sense of spaciousness and larger pivoting overhead stowage bins.

## Selex ES selected to provide VigilX in Australia

Selex ES has had its VigilX enhanced vision system formally selected by the Australian Defence Science & Technology Organisation (DSTO) as part of a contract for evaluation of an integrated solution for the Australian Defence Force (ADF) for operation of helicopters in Degraded Visual Environment (DVE). The contract, which will be primed by Rheinmetall Simulation Australia Pvt Ltd, is a consequence of a grant awarded under the DSTO Capability and Technology Demonstrator programme with a view to trialling and potentially acquiring the system for the ADF's Army and Navy's helicopter fleets.



VigilX brings together feeds from multiple cameras situated around an aircraft to create a single integrated panoramic image that is displayed on the crew's helmet-mounted displays. It provides the aircrew with an all-direction view of the outside environment, allowing them to 'see through the hull' of the aircraft. The system improves flight safety and, via a combination of camera types supplemented by 3D conformal symbology, allows platforms to operate at any time 24/7, even in degraded visual environments caused by darkness, sand, dust, heavy rain and sea spray.

## LAN selects Recaro BL3520 seat

At the Aircraft Interiors Expo 2013, held between 9-11 April 2013, at Hamburg, LAN Airlines announced their order for the innovative Recaro BL3520 economy class seat. About 10,000 pax will be installed in LAN's A320 and A321 fleet and the first shipsets will be delivered starting early 2014. The BL3520, which was honoured with prestigious prizes such as the *Red Dot Award 2012* and the *Crystal Cabin Award 2011* has been chosen by many leading airlines worldwide. With more than 150,000 seats in service and on order, the BL3520 has been confirmed as one of Recaro's most successful launch products so far. LAN has ordered the BL3520 including the comfort kit with headrest

and reinforced foam thickness in the backrest and seat cushion. The padding contour and seat cover materials are also designed for added comfort.

## 30 Bombardier CS100s for Porter Airlines

Porter Airlines has signed a purchase agreement for 12 CS100 airliners, with options for an additional 18 CS100 aircraft. The agreement also includes purchase rights on six Q400 NextGen aircraft. Based on the list price of the CS100 airliner, a firm-order contract would be valued at approximately \$870 million and could increase to \$2.08 billion, should the 18 options also be converted to firm orders.



## LM PAC-3 missile 'intercepts and destroys' TBM test

Lockheed Martin's PAC-3 Missile successfully detected, tracked and intercepted a tactical ballistic missile (TBM) in a Lower Tier Project Office flight test at White Sands Missile Range, NM. Two PAC-3 Missiles were ripple-fired in the test as per current doctrine. The first interceptor destroyed the target and the second PAC-3 Missile self-destructed as planned. Mission objectives were focused on reducing risk for a flight test of the PAC-3 Missile Segment Enhancement (MSE) scheduled later in 2013.

The PAC-3 and MSE Missiles are two of the world's "most advanced, capable and reliable theatre air defence missiles. They defeat tactical ballistic and air breathing targets." As the most technologically advanced missile for the Patriot air defence system, PAC-3 significantly increases the Patriot system's firepower, allowing 16 PAC-3 Missiles to be loaded in place of just four legacy Patriot PAC-2 missiles on the launcher.



## Eurocopter UK continues private/VIP market leadership

With a series of deliveries, Eurocopter has further extended its lead in Britain's private/VIP market and once more confirmed the company's role as Britain's civil helicopter hub. Two of the rotorcraft are the AS350 B3e evolved members of Eurocopter's Ecureuil family, while the third is an EC120 B. A fleet of 314 turbine helicopters is operated by private and business aviation customers across the UK, which represents the largest market of its kind in Europe, and is ranked third worldwide. With close to 40% of this fleet in Britain, Eurocopter provides more than any other helicopter manufacturer.



The EC 120B

## Eurocopter Japan delivers to the FDMA

The capabilities of Japan's Fire and Disaster Management Agency (FDMA) in crisis response and coordination will be significantly augmented following introduction of a Eurocopter AS365 N3 helicopter equipped with a high-speed, real-time transmission system using Earth-orbiting relay satellites, a world's first. The AS365 N3 on which Eurocopter Japan installed the HSA is a highly popular helicopter type with fire fighting services, disaster relief organisations and police agencies, as well as the news media. Currently, 55 AS365s are operated in Japan and Eurocopter has a 60 percent market share in the Japanese fire-fighting segment, which includes operations of the BK117 helicopter, developed jointly with Japan's Kawasaki Heavy Industries.



## E-2D Advanced Hawkeye approved by US Navy

The E-2D Advanced Hawkeye, designed and manufactured by Northrop Grumman, has been approved to enter full-rate production by the Office of the Secretary of Defence (OSD). This decision follows a report where the E-2D was declared operationally suitable and effective, following a successful 10-month initial operational test and evaluation (IOT&E) conducted by the US Navy.



Conducted by the US Navy's Air Test and Evaluation Squadron One, IOT&E is a rigorous phase of testing that every new system undergoes to determine that it is operationally effective and suitable for fleet introduction. A successful IOT&E is a key factor leading to a successful full-rate production decision and a necessary step leading to multiyear procurement. So far, Northrop Grumman has delivered nine E-2Ds to the US Navy on or ahead of schedule, with another 11 aircraft in various stages of manufacturing and pre-delivery flight testing. Initial operational capability with the US Navy remains on track for 2015.

## Thales Sonar for Royal Navy's 'Astute'-Class boats

Thales UK has been awarded contracts to supply the Sonar 2076 fully-integrated search and attack submarine sonar system for the UK Royal Navy's sixth and seventh *Astute*-Class submarines. Thales will supply the sonar system to BAE Systems Maritime - Submarines, the prime contractor for the *Astute*-Class build, to be fitted to the submarines at its shipyard in Barrow-in-Furness. The complete sonar system supplied by Thales will comprise both inboard and outboard of the bow, fin, intercept and flank arrays, and the associated inboard processing. Thales has now been contracted to supply Sonar 2076 for all seven *Astute*-Class boats.

The *Astute*-Class platform is also fitted with a significant number of other Thales sensors and systems, including two non-hull penetrating CM010 optronic masts that, together with Sonar 2076, effectively provide the submarine with its 'eyes and ears'. Thales also supplies the electronic support measures (ESM) system, which has two multifunction antenna arrays mounted on the masts.

## Atlas Elektronik and Thales to modernise F124 frigates

Atlas Elektronik and Thales Deutschland have been commissioned to jointly modernise the combat system of German Class F124 frigates, the CEOs of both enterprises signing the contract at the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) in Koblenz. The activities include replacement of the outdated console processors, the data recording modules, and various network modules using components of the latest generation. Supportability of CDS components that are not regenerated, yet critical for the system's real time response will, however, be ensured. An intentional side-effect is that, following the hardware regeneration, the computer systems will offer sufficient capacity for the integration of new subsystems and future CDS functionalities.



## DCNS sea trials with FREMM for Royal Moroccan Navy

The FREMM frigate built for the Royal Moroccan Navy was launched at sea on 17 April 2013, marking start of sea trials, which will be conducted off the Brittany coast. The ship will be delivered to the Royal Moroccan Navy at the end of 2013, in accordance with the contract schedule. During this first period at sea, the crew made up of French Navy personnel, customer representatives and DCNS employees will focus primarily on performance of the ship's propulsion and navigation systems. The exceptional seakeeping qualities of the FREMM frigates have already been demonstrated by the first-of-class *Aquitaine*, delivered to the French Navy in November 2012.



The FREMM programme includes 12 ships, 11 for the French Navy and one for the Royal Moroccan Navy. In November 2012, DCNS successfully delivered the FREMM frigate *Aquitaine*, the first-in-class of the new FREMM multi-mission frigates. The second vessel of the programme will be delivered to the Royal Moroccan Navy before the end of 2013, in line with contractual agreements, and will be named *Mohammed VI*.

## Selex ES ATOS for Beechcraft MPA

Selex ES (a Finmeccanica company) have handed over to Corporate Aircraft SA a Beechcraft King Air 350ER equipped with the company's Airborne Tactical Observation and Surveillance (ATOS) system. "The end user has expressed satisfaction with the system performance demonstrated during flight tests." Under the programme, Selex ES has been responsible for the design and integration of a complete surveillance solution for the customer's maritime patrol aircraft. The solution provided had a Beechcraft SKA 350ER equipped with a retractable electro-optical system and ventral radome, all integrated together under the ATOS system.

The ATOS, which includes electro-optics, a laser illuminator and the T200 Gabbiano radar to provide 360 degree coverage, has been integrated into the King Air aircraft by drawing on Selex ES's more than 10 years of experience with the system across a number of existing customers.

## Cassidian Optronics for Colombian Navy submarines

Cassidian Optronics are to improve mission effectiveness of the 209-class submarines of the Colombian Navy by installing state-of-the-art sighting systems. After refurbishment of an attack periscope, the Colombian Navy has now ordered a SERO 250 search periscope from Cassidian Optronics for a 209 Class submarine. Cassidian Optronics' SERO 250 owed to its modern and cost effective plug-in solution replacing older periscopes without having to make major modifications to the boat. (Cassidian Optronics is the well-known producer of optronic mast systems and periscopes for submarines, formerly known as Carl Zeiss Optronics).

This contract is the first in a series of contracts aimed at the final replacement of all current optical systems on board the existing Class-209 submarines of the Colombian Navy, which were commissioned in 1975 and are now in an overhaul and upgrade phase. The current programme is under contract to the German shipbuilding company HDW in Kiel.





### Alenia Aeronautica's Centenary



*Alenia Aermacchi Eurofighter, SF-260, C-27J, M-346.*

On 1 May 2013, Alenia Aermacchi celebrated their centenary, arguably the sole aeronautical company in the world to achieve this honour under the same shared brand! Alenia was incorporated in 1913 by Giulio Macchi as the Società Anonima Nieuport-Macchi. 100 years later, Alenia Aermacchi oversees the aviation sector of Finmeccanica, which is Italy's main industrial group that ranks in the top ten groups of the aerospace, defence, and security sectors.

Alenia Aermacchi is the final step of a long integration process, which was launched in the mid-sixties aimed at streamlining operations to better compete in international markets, which demanded companies that offered integrated product portfolios. Its workforce now comprises 12,000 personnel

a distinct contrast from the 10 workers who built the first Nieuport-Macchi monoplane in 1913. With its activities balanced equally between the military and the civilian sectors, it is a global major player in the aviation industry.

During its century of activities, the 'Alenia' companies which progressively merged with under today's brand have designed, developed, built, delivered and supported nearly 30,000 aircraft in both the civilian and military sectors, which are operated by air forces, airlines and private operators around the world.

As Giuseppe Giordo, Alenia Aermacchi's CEO, stated: "Our first 100 years mean a century of records, of technological achievements and of development of an industrial system which has been generating a significant economic and social impact in our country. Today Italy boasts one of the few aviation industries in the world able to offer a new generation fighter, a tactical transport aircraft, an outstanding advanced jet trainer and several industrial collaboration programmes ranging from the modern Boeing 787 to the A380, the world's largest passenger airliner."



*Nieuport-Macchi, aircraft number 1.*



*Fiat CR.32 in formazione.*

## CFM LEAP-1B achieves major milestone

On 2 May 2013, CFM International announced completion of design freeze for the advanced LEAP-1B engine, which is exclusive powerplant for the Boeing 737 MAX, paving way for the first full engine for test in mid-2014. Such a milestone is effectively the point at which the engine configuration is set, or frozen and it allows CFM to finalise and release detailed engine design drawings, which it will do over the next six months. Parts manufacturing for the LEAP-1B engine will then accelerate through to the year end, leading to build-up of the first engine in early 2014. The LEAP-1B is on schedule for CFM flight testing in 2015 and engine certification in 2016. The 737 MAX is scheduled to enter service in 2017.

Design freeze for the LEAP-1A / LEAP-1C variants was achieved in June 2012. The first full LEAP engine, the LEAP-1A, is currently being built and is on schedule to begin ground testing later in 2013. "Achieving design freeze is a significant step in the programme. All of our testing and design work leading to this moment demonstrates that we are on track to meet all of our programme commitments," said Gareth Richards, LEAP programme manager for CFM parent company GE Aviation.

Francois Bastin, LEAP programme manager for Snecma added: "The extensive component tests we have completed so far, including both the core engine and full fan module testing currently underway, indicate that we are on track to deliver world-class fuel efficiency for the 737 MAX, along with the world-class reliability and durability that we have established with the CFM56 engine family."

CFM has been conducting component and rig tests on LEAP hardware for more than five years and the programme is now moving into an exhaustive engine ground test phase with twelve LEAP-1B certification engine builds scheduled over the next three years. Overall, CFM will have a total of 28 certification engine builds and 30 flight test engines across the three LEAP engine models. The LEAP-1B engine is result of an exhaustive six-year

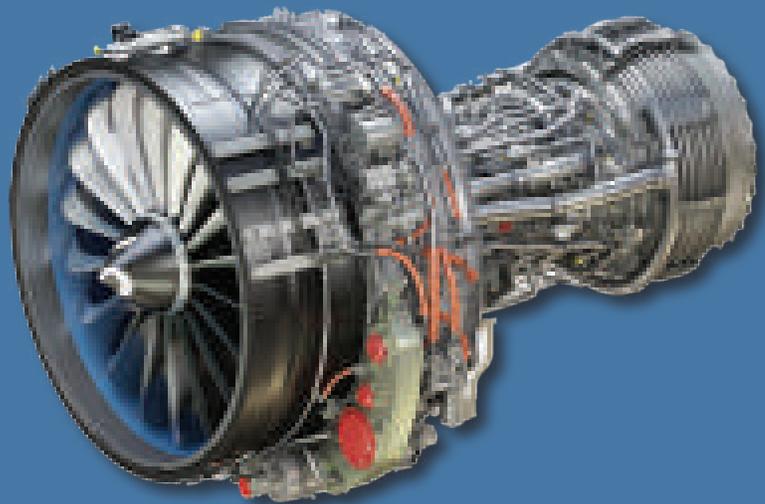
collaboration effort with Boeing and the entire turbo machinery and installation are customised to meet the unique requirements of the 737MAX.

The advanced LEAP engine provides a 15 percent improvement in specific fuel consumption (SFC) compared to current CFM56 engines, along with an equivalent reduction in carbon emissions; nitrogen oxides (NOx) emissions that are approximately 50 percent below the International Civil Aviation Organisation's (ICAO) Committee on Aviation Environmental Protection (CAEP)/6 limits and an engine noise signature well below anticipated regulatory limits.

"Experience has taught us that the more testing we do before the first engine goes into service, that smoother that entry will be," said Richards. "That is why, we are going to log more than 40,000 engine cycles - the equivalent of approximately 10 years of airline service - over the next three years to ensure that we deliver service-ready engines from day one."

LEAP engines incorporate technologies never before seen in the single-aisle aircraft segment. The new engine combines advanced aerodynamic design techniques, lighter, more durable materials and leading-edge environmental technologies, making it a major breakthrough in engine technology. The 737 MAX continues a 32-year relationship between CFM and Boeing; CFM engines have been the sole powerplant for all 737 aircraft sold since 1981, and till present, there have been firm orders for a total of 1,185 LEAP-1B-powered 737MAX airplanes.

CFM is the world's largest commercial aircraft engine supplier, and the company has delivered nearly 25,000 engines to more than 530 operators around the globe. The CFM56 fleet has logged more than 625 million flight hours in the past 30 years as the "most reliable engines" in the air.



LEAP-1B

## A successful 2012 for Irkut

Irkut Corporation delivered 15 Yak-130 new generation combat trainers and 2 Su-30SM multirole fighters to the Russian Air Force in 2012. 55 Yak-130 combat trainers delivery to the Russian Air Force is part of the contract signed in December 2011 between the Russian Ministry of Defence and Irkut Corporation. The contract for 30 Su-30SM fighters was signed between the Russian Ministry of Defence and Irkut Corporation in March 2012. President of Irkut Corporation (part of United Aircraft Corporation) Oleg Demchenko said “Our company fulfilled all the obligations concerning the state defence order of 2012”.

On 19 December 2012 the contract on delivery of the second batch of 30 Su-30SM fighters to the Russian Ministry of Defence was signed. Oleg Demchenko continued “High professionalism of our employees, well organised mass production, effective cooperation with the leading enterprises of UAC, collaboration with suppliers on long-term contracts – all of these allow us to execute state and export contracts on schedule and of high quality”.

“Our company has been working on exports for a long time. But we’ve been preparing for new aircraft deliveries to the Russian Air Force successfully, as to build aircraft for the Motherland is the main aim for an aircraft manufacturer”, stated Head of the Irkut Corporation.



*Fine depiction of a pair of Yak-130s.*

## MBDA and Lockheed Martin to MoU on naval weapon systems

MBDA and Lockheed Martin, manufacturer of the MK 41 Vertical Launch System (VLS), have entered into a Memorandum of Understanding (MoU). Under terms of this MoU both companies agree to jointly explore the market for the integration of MBDA naval missile systems into Lockheed Martin launching systems, plan for all necessary common developments and, more broadly, “pursue mutually beneficial opportunities.”

Specifically, the two companies intend to work together to assess potential business opportunities with respect to potential sales of Lockheed Martin’s MK 41 Vertical Launch System (VLS) and Extensible Launching System (ExLS) and MBDA’s Air Defence and Anti-Ship missiles systems, starting with MBDA’s Sea Ceptor, using the CAMM missile. Lockheed Martin and MBDA plan to jointly demonstrate the launch of a CAMM missile from a Lockheed Martin MK 41 Vertical Launch System later in 2013.

Commenting on that event, the CEO of MBDA Antoine Bouvier said “possessing the broadest range of naval missiles available on the market, there is a strong logic for MBDA to join forces with Lockheed Martin whose vertical launch systems have a strong presence in the naval market. Working in concert, we will be able to offer greater choice to naval customers around the globe providing them with solutions optimised to their exact needs, which has always been MBDA’s priority.”

## MBDA and Thales extend their cooperation on CAMM

The core Team Complex Weapons (Team CW) air defence missile development programme – the Common Anti-air Modular Missile (CAMM) for the Future Local Anti-Air Defence System (FLAADS) – has been the catalyst for creation of a new business relationship between MBDA and Thales UK’s Belfast site.

MBDA is developing a common missile that will meet the future anti-air target requirements of Navies, Armies and Air Forces. Given that the target set, ranging from fast jets and helicopters to cruise missiles and UAVs, is similar across the sea, land and air domains, a weapon solution maximising modularity and commonality has obvious cost and logistics benefits. MBDA’s common missile is called CAMM (Common Anti-air Modular Missile) and is currently in MoD funded development as part of the Royal Navy’s Sea Ceptor weapon system.

FLAADS is the far-reaching MoD programme aimed at delivering a new air defence system not only for the Royal Navy but also for the British Army to replace its Rapier deployable air defence system. At the heart of both systems (SEA CEPTOR for the Royal Navy and the future CEPTOR-based land system for the British Army) is MBDA’s Common Anti-air Modular Missile (CAMM).



The proximity fuze contract followed almost 5 years of Thales research and development and collaborative working with MBDA on the FLAADS/CAMM Concept and Assessment phase. The proximity fuze solution improves performance whilst significantly reducing price, through the use of modularity, generic signal processing and COTS components.

## C-130J worldwide fleet in 1 million flight hours

The worldwide community of Lockheed Martin C-130J Super Hercules operators recently surpassed a landmark one million flight hours milestone, logging this time through numerous combat, special operations and humanitarian missions. Thirteen countries operating C-130Js, and members of Lockheed Martin's Flight Operations and the U.S. Government's Defence Contract Management Agency (DCMA) teams contributed to this achievement. Hours were tracked beginning with the C-130J's first flight on 5 April 1996, through the end of April 2013.

Countries with C-130Js contributing to these flight hours include (in order of delivery) the United Kingdom, United States, Australia, Italy, Denmark, Norway, Canada, India, Qatar, Oman, Iraq, Tunisia and Israel (now in flight test for a summer

2013 delivery). In the USA, C-130Js are flown by the Air Force, Air Force Reserve Command, Air National Guard, Marine Corps and Coast Guard units. Fifteen countries have chosen the C-130J as an airlifter of choice, including Kuwait and the Republic of Korea, which will join the fleet with C-130J deliveries in 2014.

## Sagem GFCS fire-control systems for Singapore Navy

Sagem has signed a contract with the Defence Science and Technology Agency (DSTA) of Singapore to develop and produce a new Gun Fire-Control System (GFCS) for eight Littoral Mission Vessels ordered by the Republic of Singapore Navy. Sagem's new GFCS is a centralised system located at the ship's operations centre that integrates several functions: main and secondary guns, radar, optronics and navigation systems. Capable of operating from several multifunction consoles concurrently, Sagem's GFCS will also be interfaced with the combat management system. Its open architecture not only allows for easy integration but also ensures flexibility and scalability for future upgrades and enhancement.

A long-standing partner of the Singapore Navy, Sagem has also supplied the GFCS for the six *Formidable*-class frigates, and four *Endurance*-class LSTs.



# Thrills at LIMA 2013



**F**or the first time in the history of the Langkawi International Maritime and Aerospace (LIMA) Exhibition, four aerobatic display teams performed over the skies of Langkawi from 26-30 March. The Russian Air Force's 'Russian Knights', Indonesian Air Force's 'Jupiter Aerobatic Team', Royal Malaysian Air Force's 'Smokey Bandits' and the Malaysian Aerobatics Team 'Krisakti' were in action daily!

At the Mashuri Exhibition Centre a total of 48 aircraft were on display, with

the Royal Air Force Typhoon and the Royal Thai Air Force Gripen attracting the most interest: these two aircraft are in the running to be the next multi-role combat aircraft for the Royal Malaysian Air Force, replacing the MiG-29s.

Also on display was the Apache attack helicopter from the Republic of Singapore Air Force while the Royal Australian Air Force brought their E-7A Wedgetail AEW&C aircraft. Malindo Air, the latest commercial airline set to take to Malaysian skies, displayed

its B737-900 ER which will be used for flights between Kuala Lumpur and Kuching and Kota Kinabalu.

Meanwhile, the Awana Porto Malai maritime exhibition centre showcased 63 ships, from state-of-the-art warships to the latest leisure ships. Warships from eight different nations were anchored at the area, with the Russian Navy destroyer *Marshal Shaposhnikov* being one of the biggest attractions at the naval display site. The Indonesian Navy brought two of their warships, *KRI Today* and *Beladau*,





*An Airbus A380 from Malaysia Airlines' fleet conducts a flyover in formation with Royal Malaysian Air Force Sukhoi Su-30MKM fighters during opening day of the country's 2013 Langkawi International Maritime & Aerospace Exhibition*

while the Bangladesh Navy had its warship *BDNS Dhaleshwari* on show. The Myanmar Navy displayed their warship *UMS Mahar Bandoola* for the first time. The popular Search and Rescue Maritime Demonstration Programme, which has been a feature of the show in the past, also ran daily at the Awana Porto Malai; it involved the participation of the Royal Malaysian Navy and the combined Malaysian Maritime Security Agencies.

VSC



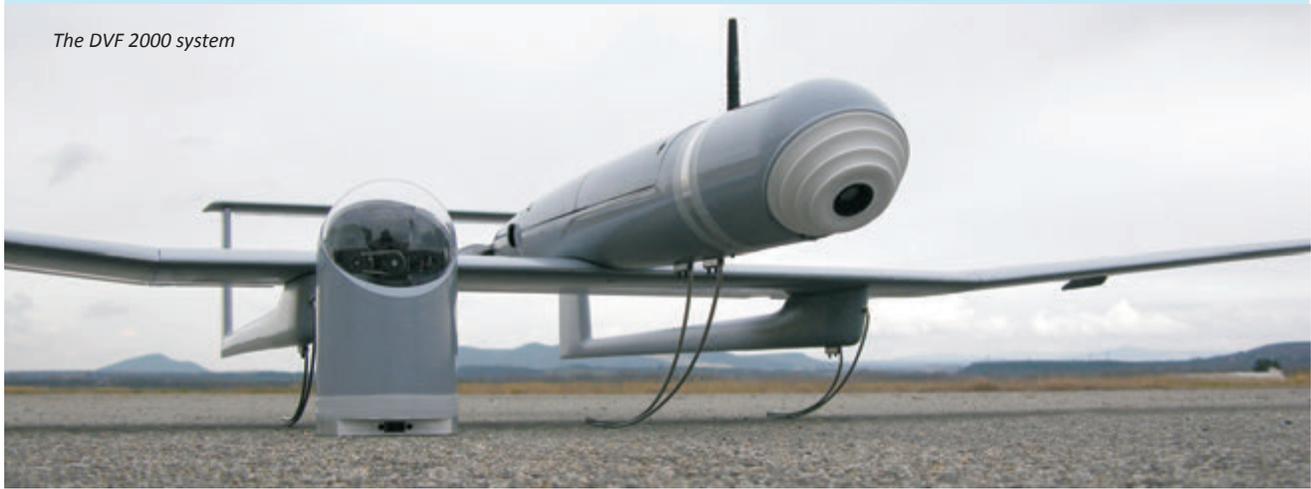
# Highlights at Langkawi 2013

## Cassidian offers advanced defence and security solutions

Cassidian presented its portfolio of defence and security products. “Looking forward to expanding Cassidian’s operations into a springboard for strong and sustained growth in Asia-Pacific, our presence at LIMA ‘13 is a major opportunity to present our latest solutions in avionics, mission- and radar systems,” stated Peter Gutsmedl, Cassidian’s Head of Operations in Asia Pacific.

Several Cassidian products were showcased: SPEXER 2000 is the worldwide first security radar using the newest radar technology of Active Electronically Scanning Array (AESA); the Airborne Observation Systems (AOS) are fitted to rotary and fixed wing aircraft to provide the observer with capability to, from an airborne vantage point and at considerable distance, day and night, detect, recognise and eventually identify objects of interest; the LEO-III-HD is the latest generation AOS launched in 2010 and offers full High Definition (HD) technology. It incorporates the latest technologies in response to demands from the para-public market; Unmanned Aerial Systems (UAS) like the DVF 2000 system, which is destined for land and naval operations of forces with the aim of multiplying their intelligence and reconnaissance capabilities.

*The DVF 2000 system*



## Russian Helicopters showcase new models

Russian Helicopters brought some of their latest helicopters to Langkawi and showcased models that included the multi-role Mi-171A1, the updated Mi-171A2, the coaxial-rotor Ka-32A11BC, the new multi-role Ka-62 and the light Ansat. At business meetings during the exhibition, Russian Helicopters set out a roadmap on how the Mi-171A2 and Ka-62 could be used for search-and-rescue missions by ASEAN nations as well as Japan, Canada and China.



*The Ansat from Russia*

## Two EC225 helicopters for Malaysia's Weststar Aviation

Following major orders of the EC225 signed at the Heli-Expo in Las Vegas, the sales momentum for this 11-ton class helicopter from Eurocopter's Super Puma family continued at the Langkawi Show with an order for two units from Weststar Aviation Services. A Memorandum of Understanding for the EC225s was signed during the exhibition by company officials, witnessed by Malaysian Minister of Defence, YB Dato' Seri Dr. Ahmad Zahid Hamidi. The acquisition is part of Weststar's strategy to build up an extensive helicopter fleet to be deployed around the world.



## Eltronica presents its VIRGILIUS EW system

Eltronica's Virgilius family of integrated EW systems is an innovative architecture that leverages the natural evolution of EW passive sensors (ESM/ELINT) and actuators (ECM) to achieve a fully integrated, compact, optimised but still scalable solution, where each resource is shared between different functions. In today's operational scenario, the electromagnetic environment can be very dense and complex in terms of number of emitters, number and repetition frequency of pulsed waveforms (typical of digital communications or radar signals), number of CW waveforms (typically employed in telecommunications), dynamic range of the received signals (especially for airborne platforms missions, conducted at low altitudes),

presence of complex coded waveforms. Thus the key to a modern EW asset is flexibility, which very much depends on its mission systems, software, communication and growth potential.

Virgilius encompasses all these requirements with features such as fully digital processing, by means of RF conversion, full integration of the three main EW functions (threat awareness, surveillance and jamming), ease of installation, low reaction time, and sensitivity, since it provides an installed sensitivity adequate for the detection of Low Probability of Intercept (LPI) emitters, irrespective of the LPI signal characteristics, by means of state-of-the-art processing

For instance, the presence of multiple strong signals (like broadcast

and communications) needs to be correctly addressed in an EW sensor, by means of a protected digital Ultra Wide Band (UWB) receiver (i.e. the digital version of the WO receiver) with the capability of excluding the spectrum portions affected by strong interferences, together with multiple Digital SH receivers (WB DRx) that can correctly treat and analyse the signals discarded by the UWB DRx protection mechanism. Furthermore, a very powerful set of algorithms is the core of a completely automatic Emitter Sorter, that enables the system to de-interleave and sort both known as well as unknown emitters. This capability is aimed to produce an accurate reaction, tailored to the threat and to the operational context.

## Saab and DRB-HICOM sign MoU “to broaden relationships”



Saab signed a Memorandum of Understanding (MoU) with Malaysian company DRB-HICOM to broaden and deepen the relationship between the companies which began in 2011. The agreement between Saab and DRB-HICOM outlines industrial cooperation which will look into areas of technology transfer and bringing expertise to Malaysia among others. “For Saab, the agreement with DRB-HICOM is an important step in order to do further business in Malaysia and surrounding countries”, stated Dan-Åke Enstedt, President and CEO of Saab Asia Pacific.

In 2011, DRB-HICOM and Saab signed an industrial cooperation teaming agreement to collaborate on an Airborne Early Warning and Control system (AEW&C). The MoU signed at the exhibition is an added effort to broaden and deepen the existing relationship between both companies. Both parties have agreed to explore the various areas of cooperation that include the design and manufacturing of advanced composite system and components for military and commercial aerospace applications, composite repair technology. In addition to this the agreement also covers UAV systems and technology, system integration of electronic warfare, avionics and other airborne systems.

## Alenia Aermacchi promotes its ATR 72MP

“For Malaysia, patrolling and protecting its 200 nautical miles of the Economic Exclusive Zone, the Spratly Islands, the Malacca Straits and the waters between Sabah and the Philippines is a significant security task. The Alenia Aermacchi ATR 72MP is the perfect solution for this requirement”, said company officials at the event. The ATR 72MP is a maritime patrol aircraft developed by Alenia Aermacchi and based on the new ATR 72-600 series. Its maximum endurance (at 5000 ft) of about 10 hours, the ATR 72MP is capable of patrolling Malaysia’s EEZ at extremely low operational costs. The ATR 72MP can perform search and identification of surface ships, SAR missions, anti-narcotic, piracy, and smuggling operations and provide environmental protection and EEZ patrol. The ATR 72MP can also implement crew and paratroopers transport.

“The ATR 72MP offers significant benefits to Malaysia in terms of training and maintenance. Additionally, 44 ATR are already operational in Malaysia with three airlines and 38 more are on order”, stated the officials.



## NGC Highlight E-2D Advanced Hawkeye

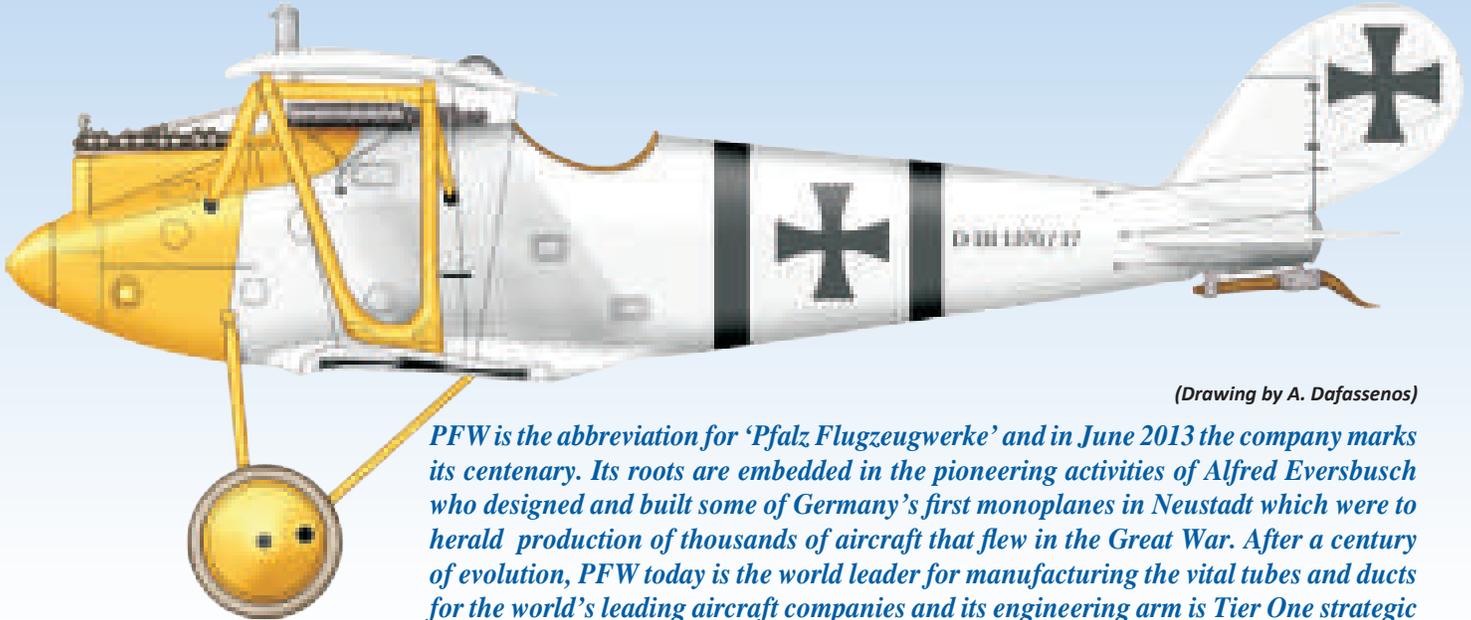
Northrop Grumman highlighted its global capabilities in intelligence, surveillance and reconnaissance (ISR), in introducing the E-2D Advanced Hawkeye to the Malaysian market at the Langkawi Exhibition. “ISR capability is critical to maintaining national sovereignty,” said Mary Petryszyn, vice president, international, Northrop Grumman Aerospace Systems. “Northrop Grumman’s leadership in multiple-domain ISR strongly positions us to provide effective solutions for Malaysia’s defence modernisation.”

The E-2D Advanced Hawkeye programme couples a newly designed electronically scanned radar with a matching suite of sensors, avionics, processors, software and displays to provide advanced AEW command and control capability available worldwide. The AN/APY-9 radar, with a two-generation leap in capability, is the backbone of this aircraft and provides greater flexibility and significantly improved detection and tracking over all terrain.



# Avi-Oil

# PFW : the alphabets that denote 100 years of success



*(Drawing by A. Dafassenos)*

*PFW is the abbreviation for 'Pfalz Flugzeugwerke' and in June 2013 the company marks its centenary. Its roots are embedded in the pioneering activities of Alfred Eversbusch who designed and built some of Germany's first monoplanes in Neustadt which were to herald production of thousands of aircraft that flew in the Great War. After a century of evolution, PFW today is the world leader for manufacturing the vital tubes and ducts for the world's leading aircraft companies and its engineering arm is Tier One strategic engineering partner for Airbus, Lufthansa Technik, XAC and other key global players.*

*From the Pfalz D III ...*

While PFW supports leading OEMs with the conceptual layout of hydraulic, fuel and air systems and takes over the responsibility for entire design & manufacturing, other major areas of activities include cargo loading systems, auxiliary fuel tanks and structural elements including flaps. In the short term, a range of innovations are being introduced in all established domains. In parallel, PFW are looking at a midterm strategy, working towards becoming a system house for dedicated systems which are offered as complete packages to various aircraft manufacturers.

Resulting from a short term liquidity crunch, 74.9% of PFW's equity is currently with Airbus, but the company continues to

serve the global aerospace market, which includes Boeing as a 1<sup>st</sup>-tier customer. PFW Engineering have their headquarters in the historical site of Oberpfaffenhofen near Munich, which special mission airport is forever linked with the legendary Dornier company GmbH which designed and built some of Germany's most revolutionary aircraft including seaplanes, bombers and reconnaissance aircraft and, towards the end of World War II, the fastest piston-engined fighter extant, the Dornier Do 335.

But back to 1913 : with the initiative of Alfred Eversbusch, who was 28 years old at the time, Pfalz Flugzeugwerke was founded. His father had an iron foundry in *Neustadt an der Weinstraße* and the company was founded thanks to the technical education and



*... to the Airbus A350.*



*Pilot's eye view of the airfield and facilities at Oberpfaffenhofen, south west of Munich in Germany.*

talent of Alfred Eversbush. The Eversbush family realised that the future lay in the nascent but exciting and futuristic industry involving aeroplanes, especially as the Bavarian Rheinpfalz did not have any aircraft companies. The transition from one-man-engineering operations to larger factories was evolving and thus for the Eversbusch family, the risk seemed low, even though an increasing number of aircraft factories were springing up in the Prussian-dominated part of the erstwhile German Empire. However, founding of more factories was practical only when they were of large-scale and having resources. Since the financial resources of any individual were not big enough for business on that scale, three shareholders joined the company, not only the entire Eversbush family (Alfred Eversbush, his brother Ernst and his brother-in-law Willy Sabersky-Müssigbrodt), but also the Kahn Brothers, Richard and Eugen, as well as August Kahn.

After 'Pfalz-Flugzeugwerke GmbH' was established on 3 June 1913 in Neustadt an der Weinstraße, a month later on 12 July 1913 the company was included in the register of companies at the district court in Ludwigshafen, with the following notation:

*The object of the company is the production of aircraft and the training of pilots as well as undertaking of any activities suited to the company's requirements.*

For practical reasons PFW first decided to produce aircraft under license as in 1914 their only aeronautical engineer designer, Willy Sabersky-Müssigbrodt, had moved to a different company Alfred Eversbush consulted the Albatroswerke in Berlin-Johannisthal on getting a license and shortly, a contract was signed creating a new company: 'Pfalz-Flugzeugwerke Lizenz Albatros GmbH'. After some legal skirmishing, the dissolution was accepted and the company again was registered as Pfalz-Flugzeugwerke GmbH.

After cooperation with Albatros ceased, PFW investigated different solutions and the Bavarian company 'Gustav Otto Flugmaschinenwerke' in Munich was eventually granted licence to produce the Otto-Biplane with a pusher engine. The first aircraft was ordered by the internationally well-known Rudolf Hertzog Company in Berlin. With the completion of their first aircraft, PFW started an intensive promotion campaign, which brought to Tübingen on 25 October 1913, the first aircraft to ever land at the little town. On 18 May 1914 Bruno Büchner flew to Usakos with two intermediate landings, carrying some post which were stamped

'Erster Flugpostversuch in DSWA' ('The first air mail trial in DSWA'). Seventy-five years later, a 50 cent stamp and a pre-paid mailing has commemorated this event.

On 6 February 1914 the city council of Speyer decided to accept PFW's request and sold an area of 7,000 m<sup>2</sup> on the corner of the old Lussheimer Strasse for construction of an aircraft factory.

A little later their production hall was built with the inscription 'Pfalz-Flugzeugwerke Speyer am Rhein', which could be seen from far away. One month before the Great War began, the factory was completed and production of parasol monoplanes began. During the 1914-1918 War, Pfalz-Flugzeugwerke produced different aircraft under license as well as their successive models.

By 1917, PFW had developed into the most competitive aircraft company in the Kingdom of Bavaria and in the German Empire they were regarded as important and reliable an aircraft company as were Fokker and Albatros.

Fast forward to 2013 : known for its excellence in design engineering, the company *Garner CAD Technic (GCT)* has recently been integrated with PFW and are now renamed as *PFW Engineering*. GCT's participation in high technology programmes in India began a decade back, one of the first western engineering companies working in this specialist field in India, having had opportunities to work with NAL, HAL and TAAL amongst others. During the recent past, they provided support to NAL on their Saras small passenger aircraft programme and have also contributed analyses on the 70-110 seater futuristic Indian airliner project.

*CADES* of Bangalore has been engineering partner chosen by *PFW Engineering* as Engineering partner in India with a joint office in New Delhi and Bangalore. While the office in Bangalore is dedicated to design and engineering activities, the office in New Delhi is engaged with technical publications and work packages exclusively for Airbus.

However, owing to new opportunities and environmental considerations, *PFW Engineering* have broadened their links with India and are teaming up with other leading players in aircraft engineering.

Many leading aircraft manufactures of the world including Airbus, Boeing and Bombardier trust in their capabilities, products and services *Made in Germany*. Although PFW's activity remain concentrated in Germany there are increasing operations in Izmir (Turkey) while the prospects for major engineering and manufacturing activity in India is strongly forecast for the times ahead.



*Representative tubing made by PFW.*

# Sand, Sea and Wind:



*A 462 Esc. Hornet departing for a training mission.*

**T**he Spanish archipelago Canary Islands lies more than 1000 kilometers from the southwestern part of mainland Spain just off the coast of Morocco. In order to defend this valuable but remote piece of territory, the Spanish Air Force has an important presence on one of the islands. On the southern side of the runways of the Gran Canaria-Las Palmas airport, which hosts ten million civilian passengers annually is the fifth largest airport of Spain, one can find fighters, transport aircraft and helicopters operating together to fulfill their tasks.

Gando Air Base was erected in the late thirties when a military (Army) installation was upgraded to an airfield used by both civil as military aircraft. At that point, a small civilian community took residence on the northern side of the runway while the Spanish Air Force found shelter on the southern side. The current Ala 46 (46th Wing) arose from those early military units in the thirties. Under the command of Ala 46 is 462 Escuadrón operating the F/A-18A. The other military unit operating out of Gando air base is 802 Escuadrón and flies the aging Fokker 27-200 Maritime and AS332B Super Pumas.

462 Escuadrón (Esdrón) is one of the early military units of the 1930s, officially getting its name in 1956. In the fifties, 462 Esdrón flew the Heinkel 111, nicknamed 'Pedro', but today the unit has second hand F/A-18As. These F/A-18As were ordered from surplus inventory of the United States Navy in 1995 and delivered to 462 Esdrón in 1999 after an initial transfer from the USA to Moron air base.

The war in the Ifni-Sahara desert during the seventies is when the squadron wrote its most glorious pages of history. Nowadays the main responsibility of the squadron is air defence of the Canary

# Gando Air Base, Spain



Islands, maintaining a 24/7 Quick Reaction Alert (QRA). The nickname of the squadron *Halcones*, or Falcons in English, was given to the squadron with arrival of the Mirage F.1 in 1981. Recently, in November 2012, the squadron reached a milestone by recording 30,000 flight hours on the F/A-18A.

Owed to its position far from mainland Spain, 462 Esdrón has become self reliant with regard to maintenance, as explained by 462 Esdrón commander Major Saez: "Our F/A-18As get inspections in a cycle of 100-200-100 flight hours. On base we have all the resources to do this. For

example, we have a fuel shop, avionics team, painters and an engine test bay. Our personnel are certified for first, second and third level engine maintenance." A large supply warehouse is present at the base, necessary to provide all the parts and tools needed for this job. Self supporting maintenance takes a lot of effort and also explains why the maintenance department has a staff of around 400 persons on base, far more than on an average Spanish Air Force base.

The slogan of Gando air base is "Sand, Sea and Wind" and obviously these have negative consequences for Gando's

aircraft and facilities because of corrosion and erosion. Major Saez: "Being the second place in the world after Hawaii, with the highest corrosion index makes it necessary to make costly investments to mitigate these effects. In December of 2000, a system of environmental management was implemented according to the principles of ISO 14001, with the goal of achieving environmental performance based on the concept of "sustainable development". Among the measures taken to improve such sustainable development was expansion of the forest (from 25 to 65 hectares) on



*A Hornet of 462 Esc taxis back to its shelter.*

northern side of the base. Together with the reconstruction of extensive vegetation in the central area of the base, this had very positive results. A sewage treatment and two sea water purification plants contribute to achievement of the environmental objectives of the Base.

The second flying unit at Gando air base is 802 Escuadrón, without a nickname but callsign *Azor* which means Hawk in English. The unit flies three Fokker 27-200 Maritime and four Aerospatiale AS332B Super Pumas. The area of responsibility of the unit is roughly 1.5 million square kilometers with the Canary Islands as centre. A call for an actual incident can be received by local units or by the Spanish national Rescue Coordination Centre (RCC) in Madrid. Primarily the unit is on standby for ditched aircraft but also ships in distress and assistance in national disasters are missions of the Squadron. In 2012 seven actual rescue missions were flown by the squadron and eight people (all from boats) were rescued.

As Lt Hernandez, a Fokker 27 pilot explained, “The Fokker 27s and AS332Bs work closely together. When a distress call comes in,





AS332B Super Puma



preparation by both types are made for the mission. The Fokker 27 will fly out first for the search part of the mission. It has an endurance of eleven flight hours and flies out to the designated distress area to pin point exact location of the incident. If the incident location lies within the reach of the AS332B Super Puma, these helicopters step in for the rescue part of the mission". Lt Lopez, a young AS332B pilot, continues, "The reach of the Super Puma is 350 nautical miles each way. After the Fokker 27 establishes the exact location of the incident and if it lies within our reach, we immediately react by sending a helicopter towards the incident. A typical helicopter crew comprises two pilots, a mechanical crane operator, two swimmers and a physician. In total the helicopter has the capacity of 15 persons (including the crew)."

The Fokker 27 will continue to circle over the incident area to coordinate the rescue mission as well as relay information to the mainland or base. Lt Hernandez added, "We also act a reference point for the Super Puma or when the incident is out or reach for the helicopter for (Navy) vessels. When no support can be expected at short notice we also drop automatic inflated rafts, survival kits and colour torches to illuminate the area."

The aging Fokker 27 is scheduled to cease flying in August 2013. Its replacement, the CN235 MPA, should arrive mid-2013. The AS332B Super Pumas are also in the twilight of their career but still have to linger on for a few more years to come.

*Text and photos by Remco Stalenhoef*

*The venerable Fokker 27s of 802 Esc will be replaced this year.*



*Return of the Hornets.*

## Ancient aviator anecdote

# Airborne in Africa

Just wanted to share a wonderful little anecdote with *Vayu* readers!

Fifteen years ago, in my mid-60s and a decade after I had retired from the Indian Air Force, my wife and I were in Harare visiting our daughter and family. At a lunch party, a Zimbabwean lady had many questions about India and, also being the daughter of a pilot, was keen to know about life in our air force. In answering her questions, I expressed my own pleasure, nostalgia and envy at the sight of a tiny little light aircraft that overflew our residence quite frequently at the same time and height and in the same direction. Early next morning my daughter called out to me that she was holding the line from the lady secretary of the local aero club who had extended an invitation to the “Indian air marshal pilot to come and fly in a micro light aircraft with Jacques at 3.30 pm.” I accepted the invitation immediately and was most cordially welcomed by an expatriate French aeronautical engineer, private pilot licence holder, aviation enthusiast and owner of this self-assembled micro light plane.

On a small landing ground bereft of any manpower, I helped the friendly Jacques open a mini hangar and wheel out what looked to me at first sight like a powered glider with swept

I had done my basic flying training way back in 1951. One very soon sheds the ‘fighter pilot’ persona and returns to the basics of pure manual flying to enjoy the sheer pleasure of being in the air described so beautifully by the well known writer Richard Bach in his delightful novella ‘Jonathan Livingston Seagull’.

Like cycling and swimming, flying skills are never quite forgotten and soon Jacques left the aircraft in my hands just guiding and advising me verbally. We flew low over our bungalow and waved to my two little grandchildren on the tennis court who were thrilled to see Grandpa actually flying an aircraft! Approach and landing presented no major difficulty though ground control was a bit shaky as the plane had no brakes. After we had stabled the aircraft in the hangar I asked Jacques as to how I could repay his kindness. He replied that I already had as he longed for aviator company sometimes and was pleased to have met and taken up his very first Indian fighter pilot!

Over drinks at the club bar subsequently we talked ‘flying’ and he was keen to know of our experience with French aircraft. I informed him of our long and happy experience with the French Ouragan (our *Toofani*), Alouette helicopter (our *Chetak*), Mystere and Mirage. I shared with him my



wings. Out on the tarmac however, it resembled a tiny bird with a large wing span poised to lift off into the sky. A closer examination revealed the same basic controls and instrumentation of a conventional aircraft. The airframe and attachments were of light weight material and designed to offer minimum resistance in the air. The rear-fitted engine drove a propeller which pushed the aircraft forward. Flight within the local airfield zone (on the periphery of which our bungalow lay) and up to 1000 feet in good weather, was free and uncontrolled from the ground. Jacques briefed me on the simple procedure before we strapped on our seat belts and he started up the engine.

The aircraft required a very short run to get airborne and climb steeply away: the joy of being airborne again in an open cockpit took me back to the fabric-covered Tiger Moth on which

single experience of a French air base back in 1969. Ferrying a Hunter from the UK to India I had landed at their airfield in Istres where their refueling operator spoke only French and I was uncertain as to the grade of fuel he had as the markings were all in French. The problem was finally solved by a French-speaking RAF pilot in transit who ensured our two aircraft received the correct grade of aviation fuel. Regretfully Jacques and I did not keep up our communication over the years, but when he comes to know that our air force has opted for the induction of the French Rafale, I am certain he will remember this (now octogenarian) Indian air veteran whom he complimented as being a ‘*pilote naturel*’ (natural pilot) which a tribute to the training standards of the IAF.

*Air Marshal (retd) Cecil Parker*

# 25 Years Back

## Tu-142Ms join Indian Navy

The Tupolev Tu-142M (Bear-F) strategic maritime reconnaissance and anti-submarine warfare (MR/ASW) aircraft was formally inducted into the Indian Navy on 16 April 1988 at a ceremony held at INAS *Hansa* at Goa. Defence Minister KC Pant commissioned the re-activated Indian Naval Air Squadron 312 equipped with the Tu-142M, five numbers of which were ferried non stop from Sevastapol, in the Soviet Crimea, to Goa on India's western coast, a distance of some 7000 km. INAS 312 was formerly equipped with ex-Air India/Indian Air Force Super Constellations, the last of which was phased out in 1982 and the squadron number-plated till it was re-activated and re-equipped with the Tupolev Tu-142M.

## Surface-to-surface missile tested

First test-firing of the Prithvi, India's tactical surface-to-surface missile, took place at 1123 hours at Sriharikota space station in Andhra Pradesh on 25 February 1988. The Prithvi is based totally on indigenous design and development efforts of the Defence Research and Development Organisation. "I would like to stress again that no foreign knowhow or collaboration was involved", said Prime Minister Rajiv Gandhi. Giving details of the missile, the PM said that the Prithvi had a range of 250 km with different types of payload warheads. "Compared to other missiles of this class, it has the best warhead-to-weight ratio. Very advanced inertial navigation and guidance systems incorporating on-board computers operating with real-time software are used in the system".

## IN's third carrier

Negotiations have been initiated for foreign expertise and collaboration for building India's third aircraft carrier. Collaboration would be limited to "advice on specific areas of design", because the Indian capability is not "totally familiar" with design and execution. Chief of the Naval Staff Admiral JG Nadkarni has said in Bombay that the design would be "Indian with limited foreign consultancy". The third carrier would be "a replacement ship" to be built at the Cochin Shipyard because it has the largest capability to handle a vessel of 28,000 to 30,000 tonnes. The carrier would be available by the turn of the century. The intent is to give the new carrier surface-strike as well as anti-submarine capability. The Admiral said the two existing aircraft carriers would complete about 40 years service by the end of the century and it was necessary to start on a new carrier now since it would take at least 10 years to build it.

## Dakotas phased out

The Douglas C-47 Dakota was formally phased out of IAF service on 30 March 1988 after over 40 years active service flying. The Dakota was backbone of the IAF's transport fleet for many decades, first serving with No.12 in 1946 and later with Nos. 11, 43, and 49

## From Vayu Aerospace Review Issue III/1988

Squadrons, as also a number of Target Towing and Communication Flights. Performing its last service as part of No.19 Squadron's 'afforestation programme', the Dakotas dropped 5,22,000 kg of seeds over 51,000 hectares in several states from 1985 to 1988.

## Additional Jaguars ?

HAL could build more than 30 additional Jaguar strike aircraft, according to the Minister of State for Defence who thus informed Parliament in March 1988. HAL are currently planned to build 76 Jaguars and this agreement, which dates from 1979, provides for 40 aircraft supplied from the UK, 45 for assembly in India, and 31 manufactured from raw material by HAL. Manufacture is said to be running at a rate of 1.5 per month, and HAL is scheduled to complete Jaguar production by 1989-90, if the contract is not extended.

## First F-16s for RSAF

The first General Dynamics F-16 for the Republic of Singapore Air Force, was accepted at Fort Worth in January 1988 and is to be followed by three more two-seaters and four single-seat F-16As, with the RSAF currently holding options on 12 more F-16s, all with F100-PW-220 engines. The RSAF F-16s are not expected to be operated from Singapore until 1989, and Singaporean pilots and ground personnel will be rotated to the US for training on the aircraft, which will participate in USAF 'Red Flag' exercises when pilots have been fully trained.

## F-16s for Israel

The Pentagon intends to sell Israel 75 General Dynamics F-16C/D fighters plus associated equipment and training worth an estimated \$ 2,000 million. These aircraft will be in lieu of the Israeli-developed Lavi which was "abandoned" in September 1987. The F-16 deal also includes provision of targeting pods, GBU-15 glide bombs and various spare/repair parts. The Pentagon states that Israel will co-produce the aircraft, but details on the co-production arrangement were not immediately available. The Tel-Aviv Government previously purchased 150 F-16s (75 F-16A/Bs and 75 F-16C/Ds).

## More F-16s for PAF

The Pentagon has notified US Congress that it intends to sell Pakistan an additional 11 General Dynamics F-16C/D fighters plus support equipment worth an estimated \$ 256 million. The DoD also said that Pakistan intends to buy 200 Raytheon AIM-7F Sparrow air-to-air missiles plus related equipment worth \$ 53 million and 360 AIM-9L Sidewinder heat-seeking missiles plus associated equipment valued at \$ 34 million. The Sidewinder missiles will be provided by both Raytheon and Ford Aerospace.

## First Airbus A320 delivered to Air France

The first European Airbus A 320 airliner was delivered to Air France on 28 March 1988. In February it became the first aircraft to be certificated for passenger service jointly by the Civil Aviation Authorities of Britain, France and West Germany under the new European Joint Airworthiness Requirement. Air France was Airbus Industrie's first customer, selecting the original A300 Airbus in June 1981. The French national carrier has ordered 25 A320s and has options on a further 25. It will have received all the aircraft on order by 1992, and by the mid-1990s Airbus variants will represent about half its fleet.

## The Bison Saga

Readers of the *Vayu* have followed the saga of the MiG-21bis upgrade (*From Fishbed to Bison*) recorded in great detail in the Issue II/2013. Metamorphosis of the original Type 74 (Fishbed) into becoming the Type 75 (Bison) is enshrined in aviation history but not the origins of that sobriquet. Delving into the recent past it appears that there was a dilemma, with the Russians suggesting this be labeled as the *bis upgrade project* (BUP), an alternative being *bis upgrade technology* (BUT), till a bright (Indian) spark suggested ‘son of bis’ which soon enough became bis-on, and now the hyphen has gone. Bison it is !



With MiG-21Bisons frequently flying over the Kaziranga National Park in Assam, did this precipitate the sighting of bisons (the four legged variety) in these grasslands ? It has long been believed by authorities that the great Indian bison was extinct in these parts, but then bisons were spotted during a routine exercise monitoring Royal Bengal Tigers in Kaziranga.

A case of nature inspired by aeroplanes ?



## Shocking behaviour

A plucky lass from the Punjab has worked out a self defence system to literally shock would-be eve teasers from getting too close. Agonising over increasing incidents where women are stalked (or worse) by rogues, this young lady discussed the plan with friends doing instrumentation and electronic engineering. Soon they invented

a device, ‘Society Harnessing Equipment’ (SHE) which comprises pressure sensors, an electric circuit, a Global Positioning System (GPS) and Global System for Mobile Communications modules. The circuit is placed on the bosom and when pressure is applied, the sensor-enabled device will trigger a 3,800 KV surge of current that can incapacitate the assailant long enough for the woman to escape. The innerwear would be bilayered : the layer touching the skin made of a material that would insulate her from the shock. Sensors would be placed between the two layers. The sensor is calibrated to distinguish between a normal touch, like a hug, and a violent one, like a squeeze, grab and pinch. The GPS and GSM work in tandem to send location details of the woman.

Definitely a case for the Nobel prize for technology – and chastity !



## Low flying Witches

“Witches flying broomsticks in Swaziland above 150 metres will be arrested and fined,” according to a newspaper report. A civil aviation official in this southern Africa country said “a witch on a broomstick should not fly above the (150-metre) limit.” It was hard to say how serious the official was, but witchcraft is a serious issue in Swaziland, with many people being believers.



## Balle balle !!

President Obama and the Canadian PM are shown a time machine which can see 50 years into the future. They both decide to test it by asking a question each.

President Obama goes first: "What will the USA be like in 50 years' time?"

The machine whirls and beeps and goes into action and gives him a printout,



he reads it out: "The country is in good hands under the new president, José Fernandez.... crime is non-existent, there is no conflict, the economy is healthy. Vice President Jin Tao has declared Chinese language mandatory in all USA schools. There are no worries."

The Canadian PM thinks, "It's not bad, this time machine, I'll have a bit of that" so he asks:

"What will Canada be like in 50 years' time?" The machine whirls and beeps and goes into action, and he gets a printout. But he just stares at it. "Come on, Mr. Harper," says Obama, "Tell us what it says."

"I can't! It's all in Punjabi!"

*Contributed by Lt Gen Kamal Davar*

## The great Indian Waterkloof wedding

The South African Air Force Base at Waterkloof, situated on the outskirts of Pretoria, means ‘Water Ravine’ in Afrikaans but this meant little to an Indian-origin tycoon who flew in hundreds of guests by chartered jet to this, the SAAF's busiest airbase. The occasion was the wedding of his niece and he wanted to make this a memorable occasion.



Memorable indeed it will be for the eleven South African Police and Air Force officers including the Chief of State protocol who have been suspended for allowing this unauthorised use of the SAAF base which houses seven air squadrons plus other units.

## Afterburner

Irkut

Shinmaywa