

The Missile Powerhouse



Rafale's with MICA AAMs.

Visiting MBDA in France

First and inevitably, the weather! While the temperatures in New Delhi, and most of northern India were a sizzling 45°C, Vayu stepped out of the Charles de Gaulle airport in Paris to a crisp and cold morning recording 8°C ! The invigorating air certainly dispelled any jet lag as the visitors were propelled almost immediately into a highly paced visit to MBDA facilities at various parts of France, in fact the first time doors were opened to specialist media – we were privileged indeed.

First a coach ride to Bourges, some three hours away to be briefed on MBDA's ongoing activities and industrial defence links with India. The next day we visited three factories: Bourges (aéroport), Bourges (Subdray) and Selle Saint Denis. While Bourges Aero produces all components of the missiles, spare parts, composites, launchers, tooling and electronic devices including actuators, Bourges Subdray is an integration and assembly line of certain types of missiles (we visited the Eryx assembly line), but also deals with R&D and testing (we visited the firing tunnel). Selle Saint Denis is an other integration and assembly line which produces larger missiles such as the Exocet, Mica, Aster, etc (we visited the Mica and Exocet production lines).

On Day 3 of the tour, we visited Plessis (just outside Paris) and were updated on MBDA's ground based air defence solutions such as the low level solutions (Mistral, VL Mica and MPCV), higher level solutions such as the Aster and discussed the short range surface to air (SR SAM) missile. The latter is an all new system that MBDA is planning to develop along with the DRDO and for which discussions are at an advanced stage (more on this later). We also had the opportunity to discuss one-on-one with MBDA CEO Antoine Bouvier various facets of the company and their long term

PARS 3LR weapons. Of particular interest was the Fire Shadow, a loitering munition weapon system which the company is actively promoting.

Day 4 concentrated on air platforms, challenges facing the modern pilot, modern missions, new platforms, 5th Generation developments and threats, equipping the Jaguar and Mirage 2000s (for the Indian Air Force) and all the European M-MRCA contenders such as the Eurofighter, Gripen and Rafale. Missiles covered in this section ranged from the Mica to the Meteor, ASRAAM and Strom Shadow/Scalp. At end of the tour, there were discussions on innovations and the company's export strategy as well as MBDA's proposals to the Indian defence forces.

In 2009, MBDA received orders valued at euros 2.6 billion, a steady increase over the total achieved in 2008 (euros 2.3 billion). The order book maintains its high level with a total of euros 12 billion as of 31st December 2009, representing approximately four years of activity for the business. Sales achieved a total of euros 2.6 billion, a slight drop compared to the previous year's figure of euros 2.7 billion. Domestic orders amounted to euros 1.27 billion, comparable with 2008. Export orders were at a total of euros 1.33 billion meeting the target set

“We are looking to consolidate our position and hope to upgrade more than 100 Jaguars with the latest short range air to air missile ASRAAM”

vision. Later the same day we were briefed on anti-ship missiles such as the Exocet family and the Marte ER.

Then the topic shifted to MBDA and their connection with the Indian Army (Milan and Milan 2T anti-armour missiles) and the advantages of the Mistral ATAM/

for this aspect of business, namely that export orders should exceed 50% of the total order intake. Commenting on these results, Antoine Bouvier, Chief Executive Officer of MBDA, stated: "Looking back on 2009, this was an important year with significant successes and good financial results albeit with some disappointments regarding certain programmes. Our level of order intake is progressing and our strategy of being both the European leader as well as a global player is being confirmed. Remarkable progress has been made in the UK with regard to the collaborative Team CW approach which is providing an example to be followed as far as partnering with our customers is concerned. In Italy and Germany, the MEADS programme has successfully completed Critical Design Reviews (CDR) for all Major End Items. In the export market, a major platform weapons

We also plan to upgrade more than 50 Mirage 2000 fighters with the IR and EM versions of the MICA air-to-air missile

package contract was won. In addition, important partnering agreements were signed in the U.A.E. and Poland. Key programmes such as Mistral, SCALP Naval, Marte, Dual Mode Brimstone and PARS 3 LR are progressing smoothly and to plan. In France, as well as continuing to be a major contributor to the strategic debate on anti-missile defence, MBDA is also intent on being a key player once again in the close combat sector".

With more than 90 armed forces as customers in the world, the company is an acknowledged world leader in missiles and missile systems. In total, the group offers a range of 45 missile systems and countermeasures products already in operational service with more than 15 others currently in development. MBDA is jointly held by BAE Systems (37,5%), EADS (37,5%) and Finmeccanica (25%).

MBDA Air Dominance systems feature the "range, speed, end-game agility and resistance to countermeasures to assure victory in the air". The company's product range of missiles has been designed to meet the potential challenges that the 21st Century conflict scenario might present, from close range combat to



From left-to-right: Loic Piedevache (Country Head India for MBDA), Antoine Bouvier (CEO MBDA) and Patrick de La Reveliere (VP Export Sales Directorate MBDA). "We have signed an agreement with BDL which transfers production of the Milan anti-tank missile to India. The deal allows BDL to meet Indian demand, but there are discussions on exports of the Indian Milan", the CEO said. "MBDA has worked with BDL for 30 years under a licensed production deal. And now they will produce the Milan 2T. We are also supporting the three European fighters - Eurofighter, Gripen and Rafale in the M-MRCA competition".

well beyond visual range interception. It continues to work closely with the world's leading aircraft manufacturers, gaining the level of platform understanding and familiarity that is crucial to meeting even the most demanding of customer operational requirements. They have over 50 years of experience in the design and development of air-launched weapon

systems. As a result, the Company has established a depth of technical expertise allied to an impressive product range of combat proven missile systems. This covers all the aspects of air-launched engagement, air-to-air missile from BVR to short range, air-to-surface, anti ship missile, deep strike cruise missile, precision guided munitions.



The vertically launched VL MICA is a further development of the MICA AAM.

In line with the Company's commitment to gain worldwide recognition as the "partner of choice" in offering cost-effective solutions to all future threats, MBDA's product range and technology base have been developed to correspond to the very specific needs of the modern air force. MBDA has already provided Europe with a high degree of autonomy in establishing its main weapon systems capabilities – "the pre requisite for guaranteeing superiority in the skies". The comprehensive portfolio of air-to-air products is represented by MICA, ASRAAM and Meteor, covering the air-battle space from short-range to beyond visual range.

MICA (Missile for Interception, Dogfight and Self Defence), with two missile versions (RF and IR), is able to engage in both BVR (Beyond Visual Range) and all short-range combat

“We are hopeful for joint development of a new SR-SAM with DRDO and BDL”

ASRAAM's (Advanced Short Range Air-to-Air Missile) "incredibly fast reaction time" from button press to end game performance gives the pilot the ability to engage the enemy without getting involved in a dogfight. The system is in service with the Royal Air Force (RAF) on its Tornado F3s and will be carried on the Eurofighter Typhoon as well. The RAF and the Royal Navy have also selected ASRAAM for the F-35 Joint Strike Fighter when it enters service.

combine to create a dramatically increased "no escape zone" compared to current MRAAMs. The result will be a weapon system to combat all the foreseen threats of the next 25 years and beyond.

MBDA's air-to-air missile system technology logically extends into the area of countermeasures. The result is a comprehensive portfolio of missile launch detector and decoy systems to counter the diverse range of threats that might be confronted by either fixed or rotary wing aircraft. The mastery of cutting-edge technologies is not only an advantage for MBDA in successfully developing and producing new products. It is also a means of guaranteeing customers that innovations can be made to existing products during their life span in order to meet constantly changing specifications arising from increasingly complex



ASRAAM fitted on the Jaguar: a contender for the IAF's Jaguar upgrade programme.



Close up of the ASRAAM overwing on the Jaguar.

situations. Already operational in the French Air Force and Navy Rafale and Mirage 2000-5, the system is also fielded by several other air forces around the world. The availability of two guidance systems, whatever the mission is, offers unique enhanced tactical flexibility and hampers enemy countermeasure selection. "MICA is able to offer a firing solution in any air-to-air scenario, especially providing undetectable BVR engagement capability with its IR guidance, and over the shoulder capability, to kill the enemy in rear sector before the enemy is able to enter dogfight".

ASRAAM is the first European air-to-air missile to equip an American-built fighter aircraft, the F/A-18 Hornets of the Royal Australian Air Force.

MBDA's cooperative programmes has been endorsed by the Company's selection as leader of the six-nation Meteor programme. Meteor is being developed to meet the requirement for an advanced BVR missile system for integration on Europe's major platforms; Eurofighter Typhoon, Gripen and Rafale. Featuring ramjet technology, the missile's speed throughout the total flight envelope, its agility and end-game kill capability all

engagement scenarios. It is precisely this combination which makes MBDA the "defence sector partner of choice" in many countries around the world!

On to India

The company plans to upgrade the IAF's Jaguar and Mirage 2000 fighters and also develop missiles with DRDO/BDL. "India is the biggest market for us globally," Loic Piedevache, India country head, MBDA, told us in France "We are looking to consolidate our position and hope to upgrade more than 100 Jaguars with the latest short range air to air missile



The Milan anti-armour missile which the Indian Army deploys in numbers.

ASRAAM, to replace the older Magic missiles. We also plan to upgrade more than 50 Mirage 2000 fighters with the infrared and electromagnetic versions of the MICA air-to-air missile”.

“We are hopeful that talks with the Indian authorities will yield a contract for joint development of a new short range surface-to-air missile (SRSAM) with the DRDO and MBDA’s local industrial partner, Bharat Dynamics Ltd”, CEO Antoine Bouvier said. “Our discussions are making good progress to maturity and are still expecting a final decision from the customer soon. It’s very important to have the French government’s blessing because there is very significant technology transfer in this programme,” Bouvier said. If the deal goes ahead, MBDA would co-develop the new missile and launcher, using technology and capabilities of the European company and DRDO. BDL would be prime contractor and produce and integrate the weapon system. The

missile will have range of beyond 15 kilometres and development of the Indian missile could help further increase MBDA’s technology base in Europe.

The name of the new series of co-produced missile has been proposed as ‘Maitri’ which aims to fulfill the demand of the Army, Navy and Air Force in India for procuring thousands of such missiles

BDL will supply the new Milan 2T missiles to the Indian Army

to cover the massive gap in the air defence network. India is currently in the process of replacing its entire range of surface-to-air missile defence system (from the Soviet Union era).

MBDA has also signed a contract with Bharat Dynamics Ltd (BDL) for the supply of Milan 2T missiles to the Indian

Army. The contract will ensure continuing production of the Milan missile at BDL, under licence agreement with MBDA for at least another four years. BDL has already manufactured well over 30,000 variants of the Milan missile in an unbroken business partnership that dates back to the 1970s. For the latest contracts, most of the components will be locally sourced and produced in India with BDL also responsible for final assembly. MBDA will contribute part of the missile systems.

On the deal, Antoine Bouvier, CEO of MBDA, said: “I am doubly delighted by this contract. As well as confirming that Milan continues to be the weapon of choice for many of today’s modern ground forces, this contract also further



The Meteor BVRAAM has been offered as part of the M-MRCA requirement.

cements the close partnership MBDA has developed with BDL over the years”. It has been locally reported that the army may have ordered as many as 4,100 2T versions of the anti-tank guided missiles. Milan is a man-portable, easy to use, medium-range, anti-tank weapon and features reliable wire-guided SACLOS (Semi-Automatic Command to Line Of Sight) technology. It has a range of between 25 and 2,000 metres for anti-tank warfare and multi-role strikes against ground targets. The Milan 3 system has been in production since 1996 and with its 2T (tandem) military warhead

Commitment to gain worldwide recognition as the partner of choice in offering cost-effective solutions to all future threats

can destroy modern reactive armour. With an upgraded kill potential and even better resistance to jamming and decoying, Milan 3 is offered as a new system or as an upgrade to existing equipment for customers already equipped with the Milan 1, 2 or 2T.



Indian media and MBDA executives at the company production plant.

Enhanced Eryx registers 100% success rate



During its first export demonstration carried out in the Gulf, the enhanced Eryx anti-armour system registered a 100% hit rate during a test firing campaign which comprised a total of eight shots. Of these four were carried out at night with the aid of the latest generation thermal sight designed for adaptation on the Eryx firing post.

As well as proving the new enhanced night capabilities, the firing campaign also enabled well known Eryx features to be confirmed: suitable for firing within confined spaces, exceptional penetration capability against reinforced concrete and ease of operation.

MPCV readiness for production



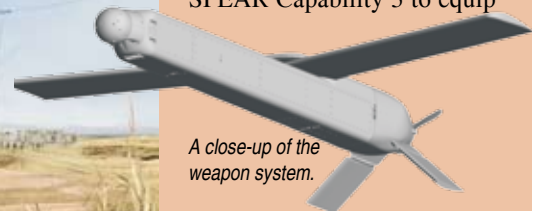
MBDA is in the process of freezing the final definition of the MPCV (Multi Purpose Combat Vehicle) in readiness for its series production. Two Mistral missile firings carried out at the end of 2009 which served to validate this automatic system in its air defence configuration. MBDA launched the development of MPCV in 2006. MPCV features a multi purpose missile turret, which in its first version, is the anti-air configuration with a launcher deploying four, ready-to-fire, Mistral missiles with four other missiles stored within the vehicle. The turret is equipped with an EOSS (Electro-Optic Surveillance Sensor) enabling the passive surveillance, detection and tracking of the target even when the vehicle is in motion.

MBDA and UK MoD in long term partnership agreement for complex weapons



MBDA's Fire Shadow loitering munition in a battlefield scenario.

respective Demonstration and Manufacturing Phases. The contract also requires MBDA to carry out further Assessment Phase work on SPEAR Capability 3 to equip



A close-up of the weapon system.

MBDA has entered into a long term partnering arrangement with the UK MoD for the development and supply of new Complex Weapons (CW) to the UK Armed Forces to counter current and future threats. The initial contract will see MBDA deliver unique weapons capabilities that are directly relevant to today's war fighting environment: Fire Shadow Loitering Munition (LM) for the British Army and Selective Precision Effects At Range (SPEAR) Capability 2, Block 1, for the Royal Air Force with both projects now moving into their

the Joint Strike Fighter and Future Local Area Air Defence System (FLAADS) to equip the Royal Navy's Future Surface Combatants. This is in addition to the ongoing Assessment Phase on Future Anti-Surface Guided Weapon/Anti-Navire Léger (FASGW/ANL), in cooperation with the DGA, to equip UK and French naval helicopters.

DDM NG: Protection for the Rafale

The DGA has ordered the DDM NG for the 60 Rafales ordered in December 2009 for delivery commencing in 2012. The concept behind DDM NG is the ability to detect incoming attacking missiles from any direction and angle of attack with regard to the host aircraft. It will supplant the current DDM system on the Rafale as a “form, fit and function” replacement. DDM NG incorporates a new infrared array detector which enhances performance with regard to the range at which a missile firing will be detected, offers improved rejection of false alarms and gives an angular localisation capability which will be compatible with the future use of Directional Infra Red Counter Measures (DIRCM). With two sensors, each equipped with a fish-eye lens, DDM NG provides a spherical field of view around the aircraft.



Qatari Emiri Navy selects MM40 Block 3 variant



The Qatari Emiri Navy will procure a batch of Exocet MM40 Block 3 missiles to equip its fleet of four *Vita*-class Patrol Boats. This latest generation of naval superiority missile has a significantly extended range thanks to its turbojet propulsion. Guided by GPS navigation, the new Exocet MM40 Block 3 is able to strike a target designated by its geographical coordinates, while remaining compatible with existing MM40 launchers.

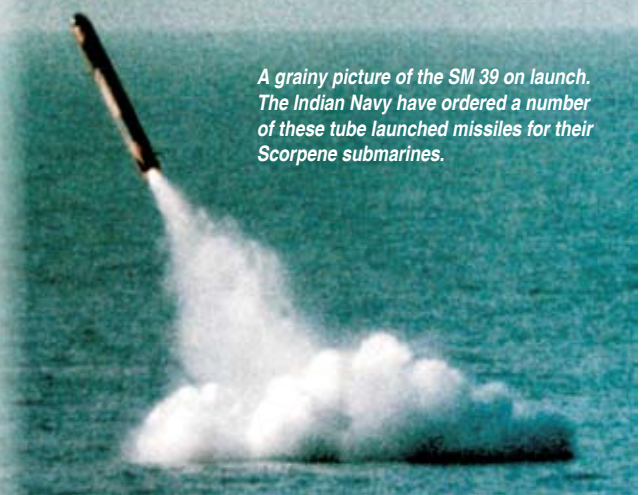
MM40 Block3 has been ordered by the French Navy and will equip its variant of the Franco-Italian FREMM frigate and has also been ordered by several other export customers. In March 2010, the French Navy carried out an operational firing of an Exocet MM40 Block3 from its *Horizon*-class *Chevalier Paul* frigate.

The Exocet Family of anti-ship missiles

MBDA's family of Exocet missiles comprises a range of “easy to use,” stand-off “fire and forget” stealth missiles with skimming flight for engaging high value naval targets with the flexibility to be fired from all maritime platforms – surface ships, submarines, fixed wing aircraft, helicopters and coastal batteries. In production since 1972, it was the West's first long range anti-ship missile with “fire and forget” and skimming flight capabilities. The missile is a family of all-weather heavy anti-ship missiles suitable for all types of carriers, and it is available in several versions that include surface-to-surface (MM) for ships, air-to-sea (AM 39) for aircraft and helicopters, submarine-surface (SM 39) for submerged submarines and land-sea (BC) for coastal batteries.

MBDA is currently developing the Exocet MM40 Block3 which is compatible with existing MM40 launchers. MM40 Block3 has a significantly extended range out to 180km and will feature open ocean, littoral and coastal land attack capabilities and available for surface ships and coastal batteries.

The Exocet AM39 can be launched from a range of platforms: fighter aircraft, maritime patrol aircraft and medium or heavy helicopters at stand-off ranges, and it is in service with the French armed forces and the navies of 11 other countries. In January 2004, the French DGA (*Délégation Générale pour l'Armement*) awarded MBDA with the contract covering the development of both the Exocet AM39 Block 2 Mod 2 and Exocet MM40 Block3. In June 2007, the latest Mod 2 development of the Exocet AM39 Block 2 completed its final validation firing from a Naval Rafale F3 combat aircraft.



A grainy picture of the SM 39 on launch. The Indian Navy have ordered a number of these tube launched missiles for their Scorpene submarines.

The Exocet SM39 is in service with the French Navy and abroad. It has also been ordered by several export customers (including India) to equip Scorpène class killer submarines. The missile is launched from a submarine's torpedo tubes enclosed in a VSM (*Véhicule Sous Marin*). The VSM, a self-propelled and guided container, manoeuvres before surfacing so as not to reveal the position of the submarine. Once in the air, the missile leaves the VSM and proceeds to the target like a normal surface variant of the missile