

MBDA AT IDEX 2007

MBDA, a world-leading guided weapons manufacturer, stands alone as the only company in its sector with a range of products covering all three operational environments, land, sea and air. With the modern-day requirement for joint-service operations this capacity has proven to be highly relevant to many of the company's customers around the world. Bringing together the best European missile technologies, MBDA, the first truly European integrated group, offers a wide range of products and cutting-edge technologies. These represent the latest thinking and most advanced levels of

performance, and they are already being selected by customers to meet their defence needs for years to come.

Many of MBDA's missiles are highly versatile and adaptable to a wide range of different platforms. MBDA's Exocet anti-ship missile, one of the world's best known missiles, is also one of the most versatile, capable of being fired from surface ships, submarines, aircraft and even coastal batteries. MICA, like the Exocet already in service within the region, is a tried and operationally tested air-to-air missile that now features in both naval and land-based air defence.

At IDEX 2007 MBDA will be displaying its range of capabilities and focusing closely on some of the latest additions to its product range, particularly in the area of naval operations and ground-based air defence (GBAD).

To meet the needs of modern navy operations, which in recent years have seen more emphasis on littoral requirements, MBDA has two new products, Exocet MM40 Block 3 and Marte MK2, which reflect this shift. With regard to GBAD, the company also offers a range of solutions based on both existing and new products.

MBDA, A DEFENCE PARTNER FOR THE REGION

The company's products and capabilities have long been recognised in the Gulf region, where MBDA has established a very close working partnership with members of the GCC (Gulf Cooperation Council). Its weapon systems meet the vital defence requirements of many of the land, sea and air forces of this important region, protecting the autonomy and sovereignty of countries such as the U.A.E., Saudi Arabia, Oman, Qatar, Kuwait and Bahrain. At IDEX 2007, MBDA will be demonstrating how its product range is ideally suited to the future needs of the region, whether to arm its combat aircraft, provide its navies with the equipment necessary to ensure sovereignty of its national waters or to protect its territories from the dangers of potential air threats.

AIMING FURTHER WITH A NEW GENERATION OF EXOCET

Exocet can be considered the benchmark for anti-ship warfare. This highly versatile and reliable missile has already proven its effectiveness in combat, and 18 different navies around the world will attest to the capabilities of the MM40 variant. Anticipating the needs of navies in the years ahead, MBDA is aiming further with a new generation of Exocet MM40 Block 3.

In the battle for naval supremacy, MBDA is aiming far into the future of surface-to-surface missile technology. As the latest addition to the Exocet missile family, Exocet MM40 Block 3 features the kind of advantages in technology, efficiency, logistics and service that one expects from a company with years of experience in developing one of the world's most successful and effective missile systems. With its new propulsion

system and optimised airframe, the new weapon has a greatly extended range of around 180 km (more than double the current Block 2's range) and importantly, thanks to a totally new navigational guidance system, is now capable of carrying out coastal land attacks as well as conventional blue water anti-ship operations.

Test-fired for the first time in September 2006 and already ordered or selected by two GCC countries as well as the French Navy for its next generation FREMM frigates, MBDA's Exocet MM40 Block 3 is also compatible with existing Exocet MM40 launchers and logistic support infrastructure assets. So the new MM40 Block 3 missile can be easily retrofitted to in-service surface ships for existing Exocet customers.

Marte, a new family of anti-ship missiles

MBDA developed the Marte concept to enhance the Marte MK/2 that first entered service with the Italian Navy's SH3D helicopter fleet in the 1980s. As a result, MBDA now offers a helicopter- and ship-launched range of medium-range anti-ship missile weapon systems designed to meet operational requirements in complex littoral and blue water environments. Both weapons feature the new Marte Mk/2 missile, which incorporates several technological enhancements providing increased operational performance.

Marte MK2/S was developed for the new generation of naval anti-surface warfare helicopters and Marte MK2/N for warships ranging from 30 metres to more than 50 metres in length. As further evidence of the missile's versatility, it can also be mounted on vehicles for deployment as a coastal battery. In terms of logistics and optimised weapon inventories, MBDA sees clear advantages in a single missile offering a range of launch options. Navies operating medium naval helicopters such as the NH90 or the EH101 will therefore be able to maintain a common stock of missiles for deployment from both helicopters and ships as well as coastal batteries.

The new rapid reaction "fire-and-forget" missile now features smaller dimensions, both in length and in width, lighter weight, an insensitive ammunition warhead and extended range. Terminal guidance has

been optimised with an advanced I-band active seeker with adaptive search patterns, excellent discrimination and resistance to countermeasures.

The first qualification test firing of MARTE MK2/S took place in March 2005 aboard an Italian Navy EH101 helicopter. Finally, in October 2006, following a successful test firing from an Italian Navy EH101 helicopter, MBDA completed the new missile's development programme for the Italian Navy, which will be receiving deliveries for installation aboard its EH101 and NH90 helicopters in 2007 and 2008.

Taking advantage of the new missile's versatility and considering changing naval requirements, MBDA also offers customers a new ship-launched weapon, the Marte MK2/N. This new weapon is available in several launcher options (single, twin and quad) with easy upgrades from a smaller to a larger configuration (usually without compromising the original launcher "footprint"). With its operational range in excess of 30 km, the system will provide navies with a complementary capability to deploy longer-range anti-ship missiles, such as MBDA's Exocet and Otomat for example. Optimised for operations within the Exclusive Economic Zone (EEZ), Marte MK/2N is the weapon of choice to deal with low-intensity naval warfare against a wide variety of low- and high-value targets.

Sailing a safe ship with MBDA

MBDA, with its understanding and mastery of the most effective means of attacking ships, has the skills and know-how to protect them as well. In fact, MBDA offers the most advanced technologies and capabilities in naval air defence. The company's product range includes air defence systems that have been developed with both current and future threats in mind, systems designed to counter the growing threat posed by new-generation combat aircraft as well as the latest range of highly manoeuvrable and complex anti-ship missiles.

Earlier mention has been made of MBDA's ability to extend the capabilities of existing systems and weapons, exploiting tried and tested technology when necessary to minimise development risk and

hence cost. MBDA's new vertically launched VL Mica naval air defence system (MBDA also offers a land-based VL Mica air defence system) is typical of this approach. Using the same air-to-air MICA missile operational on the Rafale and Mirage 2000, MBDA has developed a system that provides the capabilities of a point defence missile system (PDMS), an inner layer missile system (ILMS) and a close-in weapon system (CIWS) to counter a potential saturating anti-ship missile attack.

Serving as the storage and transportation unit as well as the vertical launcher, VL Mica's launch canisters are the key to the new system. These can be installed in machined and aligned slots in a silo structure, part or fully buried in the

ship's deck. Alternatively, the canisters can be installed alongside the ship's hangar or any suitable vertical bulkhead. Installation in a wide range of either new or retrofit warships, from fast patrol craft to major vessels, is therefore relatively easy.

The most recent test firing of naval VL Mica took place in France in April 2006 when VL MICA (Naval) registered a direct hit against a target simulating an incoming sea-skimming anti-ship missile. Given the effectiveness of the weapon and the success of its trials programme, several navies and shipyards around the world have already expressed a strong interest in VL Mica, including a GCC country that has selected VL Mica to equip its on-order corvettes.

Air defence: answering a growing and increasingly complex threat

Air defence represents a considerable and growing challenge for most countries around the world, which need to counter a wide variety of threats:

Fixed-wing aircraft and helicopters:

These feature increased performance, increased stealth, and carry a new generation of weapons. They are also very well protected by the latest counter measures such as warning systems and decoys.

A new generation of air-to-ground weapons:

Ranging from precision-guided bombs to cruise missiles, these are small, highly accurate and often low cost and can be deployed in a saturating attack to confuse defenders.

Theatre Ballistic Missiles (TBMs):

These have proliferated in recent years, particularly in the short- to very short-range category (most of these have ranges between 600 km and 1,000 km). Add the threat of chemical warheads to the equation and the picture becomes clear and worrying at the same time.

Other air threats:

UAVs (unmanned aerial vehicles) and UCAVs (unmanned combat aerial vehicles) are a new but definitely growing threat as their design and hence their capabilities improve. Some are very small, making them very difficult targets to hit.

The best of European collaboration, available to customers worldwide

MBDA's ability to head complex programmes, combined with its unmatched technology base, is the reason it was selected as the leader of the Franco-Italian FSAF (future surface-to-air family) programme. Under this programme, France and Italy agreed to develop and produce a family of naval platform (SAAM) and ground-based (SAMP/T) air defence systems for the armed forces of both countries. A subsequent trilateral agreement signed between France, Italy and the United Kingdom resulted in the development of a third naval air defence system using the Aster family of missiles known as PAAMS. All three systems are based on a new modular family of Aster vertically launched missiles, Aster 15 and Aster 30.

SAAM system

SAAM (Surface-to-Air Anti-Missile) uses the Aster 15 (30-km range) missile. It is a high-performance and highly manoeuvrable medium-range anti-aircraft and anti-missile system for point and local defence against the new generation of threats, including combat aircraft, high speed, stealthy and highly manoeuvrable sea skimming anti-ship, cruise and anti-radar missiles. It is also designed to handle the most difficult of anti-ship threats, saturation attack in extreme countermeasures environments. The system, ideally suited for both open-water and littoral operations, comprises a fire control system with multifunction electronic scanning radar, Sylver vertical launchers each containing eight ready-to-fire missiles and the Aster 15 anti-missile missiles. The Aster 15 missile's active RF seeker and inertial mid-course guidance gives the system significant advantages over comparable systems in terms of target handling. Employing a unique combination of aerodynamic and thrust vector control, the Aster 15 missile has unrivalled agility and manoeuvrability, making the weapon highly effective in all operating conditions against highly agile and stealthy targets. The French SAAM/FR (the Italian system is referred to as SAAM/IT and features a different radar) system was qualified in December 2001. On 30 October 2002, the Aster 15 was successfully test fired using the complete system for the first time from aboard the French aircraft carrier Charles de Gaulle, destroying a target simulating an attacking anti-ship missile. Since then a series of operational firings have been carried out, proving how effective the system is under a wide range of operational conditions. The Royal Saudi Naval Force (RSNF) was one of the early customers for SAAM, ordering the system for its three Al Riyadh-class (F3000S Sawari II) multi-purpose frigates. Crew training with the new weapon was completed in 2004 following a series of successful test firings, with Marwan

Lahoud, MBDA's Chief Executive Officer, commenting at the time: "This is wonderful news for the RSFN customer and is further proof of the SAAM system's pre-eminence in the area of naval air defence. It also has implications for the wider ASTER missile-based FSAF programme which positions MBDA as a clear technology leader in the field of air defence systems for both naval and ground forces." A total of 200 Aster 15 naval missiles have already been ordered to equip 11 naval defence systems intended for the nuclear-powered French aircraft carrier Charles de Gaulle, the Italian aircraft carrier, Conte di Cavour, the three F3000S frigates for the RSFN and a further six foreign frigates. The SAAM air defence system will also provide anti-air warfare capability on the 27 new Franco-Italian FREMM multi-mission frigates.

PAAMS system

PAAMS (Principal Anti-Air Missile System), like SAAM, is a 360° omni-directional naval air defence system. However, employing a mix of Aster 15 and longer-range Aster 30 missiles, this system is designed to provide multi-layer air defence incorporating three separate mission capabilities in a single naval air defence system – ship self-defence; local area defence for nearby ship defence; and medium- and long-range air defence. Depending on the threat, the combination of the Aster 15 and Aster 30 missiles enables the PAAMS system to fire in any configuration from the PAAMS Sylver A50 launcher, providing an impenetrable defence envelope day or night, even in cases of extreme electronic countermeasures and in all weather conditions. The PAAMS programme was launched on 11 August 1999 with the awarding of a contract by the DGA in France on behalf of France, Italy and the U.K. The contract called for the development of two system variants, PAAMS (S) with a SAMPSON radar for the U.K.'s Royal Navy and PAAMS (E) with an EMPAR radar for the navies of France and Italy. Test firings have since shown the system's ability to counter the complex evasive manoeuvres of an anti-ship missile as well as its effectiveness to handle a simultaneous attack by more than one incoming threat. PAAMS is on course for a scheduled in-service date in 2008-2009 with the French Navy equipping the first of its Horizon class frigates. The Italian Navy will take delivery of PAAMS for its Orizzonte class frigates. The U.K. Royal Navy will deploy its initial PAAMS system on the first of its Daring class Type 45 destroyers.

MBDA, optimum solutions to counter air threats

The layered solution

The solution lies in ground-based air defence (GBAD), a mix of air defence weapons integrated within an adequate defence system architecture to create an impenetrable defensive "bubble" or umbrella. This defensive bubble is not one but three distinct layers comprising firstly SHORAD (Short Range Air Defence) and covering ranges up to around 5 km and altitudes of 3,000 metres. The next layer is medium-range area defence, to counter all kinds of aerial threats at ranges of between 5 km and 15 km and altitudes of around 5,000 metres. The final layer is long-range, which extends beyond 50 km and altitudes of more than 15,000 metres to handle the TBM or ATBM (Anti-Theatre Ballistic Missile) threat. This last layer is the keystone of a comprehensive GBAD system.

Only those GBAD weapons equipped with the most effective of missiles will be able to create these three defence bubbles.

MBDA is a world leader in GBAD technology and understanding, able to provide not only anti-air weapons ranging from a single GBAD defence unit to a range of interconnected units, but also a fully integrated defence architecture linked as required to legacy weapons and to existing higher level command and control and ATM (air traffic management) systems. In support of this, the company has invested heavily in a range of existing and latest-generation weapon systems to provide optimum levels of defence in each of the aforementioned layers.

For the first layer, or "bubble," MBDA has Spada, Rapier/Jernas and the Mistral 2 family of short-range air defence systems. For the mid- or medium-range layer there is VL Mica, one of MBDA's latest products, which provides 360° coverage and an interception range of up to 20 km. MBDA also offers systems based on Aster 30 missiles. These are long-range (more than 100 km), high-level (more than 22,000 metres) area defence systems to counter the whole range of threats from combat aircraft and high altitude UAVs to stealthy cruise missiles and ATBMs.

MBDA has developed a range of highly mobile, short-range air defence systems based on the MISTRAL 2 missile, which has demonstrated its capabilities against fixed-wing aircraft, nap-of-the-earth helicopters, UAVs as well as cruise missiles. ALBI and ATLAS are highly mobile, lightweight fire-and-forget weapons capable of intercepting a wide variety of aerial targets, even those with a low infrared signature.

Fielded by the U.K. and Omani armed forces and, more recently, the Malaysian Army, Rapier / JERNAS, with its unique dual-target engagement capability, is a mobile system capable of countering threats such as UAVs, cruise missiles, fixed- or rotary-wing aircraft to protect assets and military infrastructures. The ease of deployment of this all-weather system that is also highly resistant to countermeasures makes it ideal for rapid reaction forces.

SPADA 2000 can operate in dense ECM environments to provide all-weather, day and night area defence against combat aircraft and incoming missiles. The system is integrated within a shelter, allowing for both tactical and strategic mobility, including air-transportability.

Vertical Launch MICA (VL MICA) has been developed to provide troops and installations with all-weather self-defence against high speed, manoeuvring targets such as fast aircraft and cruise missiles. It is exceptionally easy to deploy and integrate within a wider air defence architecture. The system, using MBDA's proven MICA air-to-air missile, comprises a tactical operation centre (TOC) and several (three to six) launchers (each housing four missiles) mounted on vehicles and interconnected via optical fibre (TOC – radar) and VHF (TOC – launchers).

VL Mica, which can be mounted on standard high mobility vehicles, has a very short reaction time and a high firing rate (less than two seconds between firings) to simultaneously engage multiple targets and provide 360° defence coverage. The first system test of VL MICA (Land) took place in February 2005 with a successful hit being registered on the target. MBDA is

now developing a static silo launcher for permanent defence of fixed sites.

The Franco-Italian SAMP-T programme incorporates the ASTER 30 Block 1 missile (120-km range) to protect land forces and sensitive sites and zones from the emerging threats posed by aircraft, UAVs, and in particular the new generation of stand-off missiles characterised by high speed, increased stealth and manoeuvrability. Capable of firing eight missiles in rapid sequence and with its vertical launch and high rate of fire, the system is capable of providing 360° defence against even the most demanding of saturating threats. SAMP-T will also provide optimised area defence against Theatre Ballistic Missiles of the 600-km class.

On 26 July 2005, a first qualification firing, using all SAMP/T's system elements (the engagement module, the ARABEL multifunction-radar, the vertical launcher and the Aster 30 munition), was carried out at DGA Landes Test Centre (Centre d'Essai de Lancement des Missiles CELM) in southwestern France. The firing was a success, with a direct hit registered against a target simulating a fast combat jet. A second qualification firing was carried out at the same range on 20 December 2005, this time against a target simulating the threat presented by a combat aircraft undertaking evasive manoeuvres. Again, the Aster 30 missile successfully registered a direct hit, once again confirming the missile's extreme precision. All the sub-systems of SAMP/T are now qualified, and complete system qualification firings are about to be completed. Deliveries to the French and Italian armed forces will commence in 2007 in readiness for full operational capability in 2008.