MARITIME SUPERIORITY

MBDA
MISSILE SYSTEMS

MARITIME SUPERIORITY

INSHORE INTEGRITY, OFFSHORE INFLUENCE

The evolving naval mission

Supporting almost 90% of global trade, the world's oceans, territorial seas, coastal areas and estuaries are the arterial lifeblood of today's trading system. They are also the source of valuable mineral and fish resources whose increasing scarcity is linked to ever growing competition over their ownership, access and control.

MBDA understands that sea power or command of the sea means different things to different nations. To some it is the ability to deny the use of the sea to an enemy and to project power far beyond one's own shores. To others it is the ability to protect merchant shipping and important coastal assets. Perhaps the need is for a visible display of force, acting as a deterrent in the face of potential aggression over disputed maritime boundaries. Whatever the specific viewpoint, recent developments have seen navies around the world adjusting to their new strategic environments and peacetime missions ranging from sovereignty operations and patrols to new challenges such as those posed by terrorism, piracy and even organised crime.

Increasingly navies are being called on to provide the right of innocent passage for friendly ships, to protect vital installations such as ports and offshore oil and gas production facilities as well as to provide support for armed forces during littoral amphibious operations. Certainly there has been a growing recognition of the role navies can play in taking control of the littoral environment, an area where the traditional open water battle space becomes tightly compressed, more complex to manage and where it is more difficult to obtain an accurate and timely Recognised Maritime Picture.

MBDA's long naval tradition

Nearly 50 years ago, MBDA introduced SEA SLUG, Europe's first naval anti-air guided missile system. Then in the 1970s, MBDA's EXOCET became available as the world's first sea-skimming, guided anti-ship missile. MBDA continues to set the standard in surface-to-air, air-to-surface, surface-to-surface and sub surface-to-surface operations. This technical mastery, combined with the experience gained from working with navies and shipyards around the globe, is available to MBDA customers, helping them to adapt to an ever evolving and increasingly challenging range of operational requirements.

WEAPON SYSTEM SOLUTIONS

SEA POWER TO DETER, PROTECT, INFLUENCE AND PROJECT

MBDA has developed a broad range of weapon systems covering the full spectrum of capabilities for blue water and littoral operations. This range is constantly being enhanced in line with the new concepts of operations where multi-platforms and Cooperative Engagement Capability are key drivers.

MBDA's weapon systems are modular, allowing the customer a high degree of flexibility and customisation in optimising a weapon system to achieve the desired level of operational capability. Significantly, MBDA has proven skills in integrating weapon systems into either federated or centralised combat system architectures as well as stand-alone configurations.

Total system expertise

- Sensor management and weapon (missiles and guns) coordination
- Missile command and control sub-systems
- Missile engagement and launching sub-systems
- Missiles

Defence architectures

Working with the customer and with the ship's combat system integrator, MBDA can define the most appropriate weapon system and a flexible architecture. The result is a systems package capable of firing a mix of missiles to provide a total solution.

For multi-platform engagement, MBDA offers:

- Optimised coordination and control of weapon systems at force level
- Optimum reactivity in order to counter increasingly complex threat scenarios

Comprehensive naval platform expertise

- Aircraft carriers, destroyers, frigates and corvettes
- Fast Patrol Boats, Offshore Patrol Vessels and auxiliaries
- Naval helicopters and combat jet aircraft, Maritime Patrol Aircraft
- Submarines
- Coastal missile batteries

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EUROPE'S INTEGRATED DEFENCE COMPANY

AT THE FOREFRONT OF TECHNOLOGY INNOVATION

MBDA has a long tradition as prime contractor or as the principal partner in a range of major international collaborative programmes in each of the operational theatres - sea, air and land. These include ASTER ground (ASTER SAMP/T) and naval air defence systems (ASTER PAAMS and ASTER SAAM), the METEOR beyond visual range air-to-air weapon and the STORM SHADOW / SCALP air-launched cruise missile system. The Company is also working on a joint Franco-British helicopter-launched anti-ship missile known as FASGW/ANL.

As the only integrated international missile systems company and with large industrial and technology bases in France, Germany, Italy, the UK and the USA, MBDA is ideally positioned to lead these cooperative programmes. In addition, MBDA has proven its ability to incorporate specific but different national requirements within a single European programme offering not only interoperability but also cost advantages to all concerned.

Drawing on a wide European skills base to develop the best weapon systems in the world

WORKING IN PARTNERSHIP WITH THE NAVIES OF THE WORLD

UNDERSTANDING THE INDIVIDUAL NEEDS OF THE GLOBAL CUSTOMER COMMUNITY

MBDA provides the world's navies with access to the latest generation of weapons systems. As a systems prime contractor, MBDA can also provide incremental, through life support to ensure that these systems benefit from future technology developments to better meet requirements as they evolve. Importantly, the Company is able to draw on and transfer technologies between systems across the product range as they are developed, resulting in obvious advantages both with regard to de-risking and cost. MBDA's experience has been gained from working with navies and shipyards around the world. It is this first hand experience that has formulated MBDA's approach and offer to its customers:

- Effective working partnerships to fully understand, interpret and optimise capability requirements, both current and projected
- Cost-effective solutions to meet specific demands
- Comprehensive system architectures
- Total programme management, on cost and on time
- System Through Life Support
- Incremental capability growth

As a system prime contractor, MBDA is experienced in managing turnkey projects with shipbuilders around the world

NAVAL AIR DEFENCE

FROM SELF-DEFENCE TO THE WIDER DEFENCE OF THE FLEET AND LAND FORCES

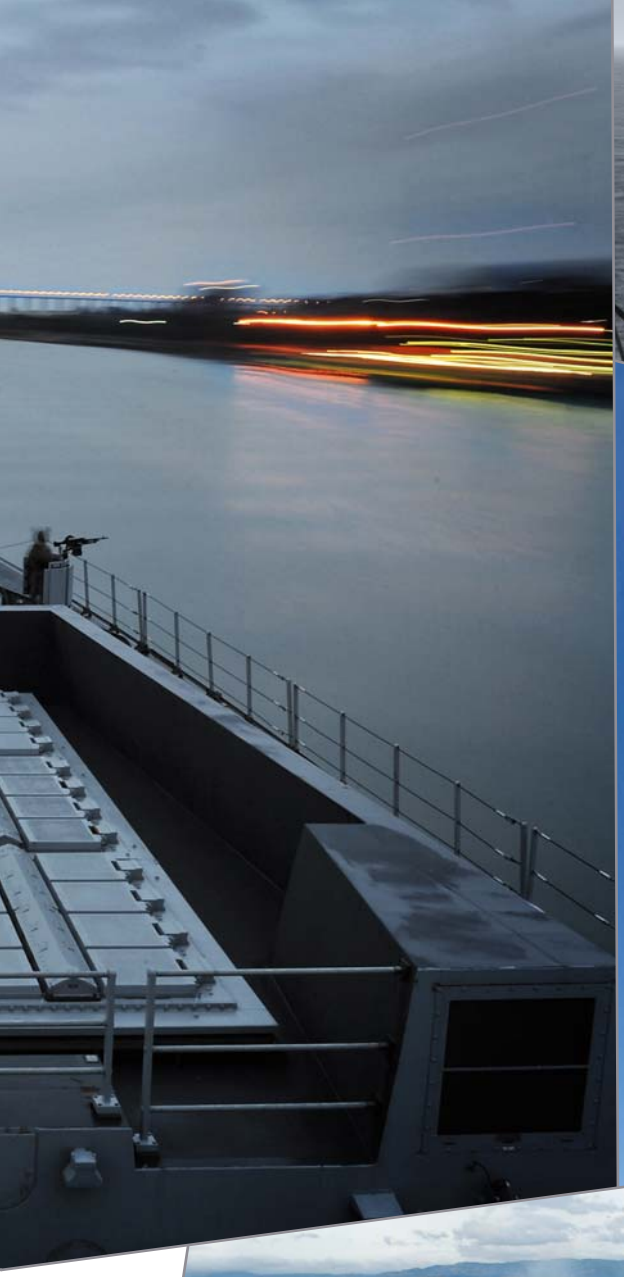
The most serious threat to deployed maritime forces is that posed by the anti-ship missile, particularly when deployed in line with modern naval tactics, namely as part of a saturating attack. Adding to the danger is the emergence of sea-skimming missiles now capable of supersonic speeds. Ideally the attacking platform or platforms should be destroyed before their missiles can be launched but this is not always possible, AAW (anti-air warfare) resources need, therefore, to be balanced between inner/point and outer/area layers of defence. To counter the full spectrum of threats, MBDA is able to propose the most comprehensive range of naval defence systems. These are based on five families of missiles: ASPIDE, ASTER, CAMM, MICA and MISTRAL.

Inner Layer Missile Systems (ILMS)

With close-in threats, time is of the essence particularly if faced with two or more incoming dangers (aircraft or missiles) at the same time. The only effective response is the deployment of missiles with autonomous guidance. Therefore, MBDA ILMS systems are based on the MISTRAL missile currently in service with 39 armed forces in 27 different countries. Capable of engaging rapidly manoeuvring airborne targets, MISTRAL has also been successfully tested as an anti-FIAC weapon to provide ships with defence against asymmetric threats, particularly in littoral waters where a ship's low speed and inability to manoeuvre (and where there are constraints on using the main armament) can potentially render it highly vulnerable.

TETRAL (housing four MISTRAL missiles) and SIMBAD (two MISTRAL missiles) systems are in service with several of the world's navies with the latter now being available as SIMBAD-RC with a new remote-controlled turret.

For a complex multi-dimensional problem, MBDA can offer multiple solutions



Self and local defence systems

In selecting an air defence system, operational requirements, the type of platform and shipyard design criteria are just some of the variables that customers need to consider. The type of CMS (Combat Management System) as well as the availability of above and below deck space will also have a bearing on the final decision. MBDA can offer a choice of flexible air defence solutions be they conventional or vertical, soft or hot launch.

For optimised defence against saturating attack, vertical launch is the preferred option providing as it does 360° coverage. A high rate of fire is also crucial as is autonomous guidance. MBDA can offer customers the choice between two latest generation systems deploying all weather, fully active radar-guided missiles, namely VL MICA and the recently introduced SEA CEPTOR to defend ships ranging from Offshore Patrol Vessels (OPV) to much larger craft.

Navies are already being equipped with VL MICA whose compact launch canister facilitates simple and modular installation either on new ships or as a retrofit. There is currently no other in-service naval air defence system in this category that provides the necessary 360°, all-round, fully automatic engagement capability against the full threat spectrum that is offered by VL MICA.

SEA CEPTOR has been designed to replace the UK Royal Navy's VL SEAWOLF systems as part of its Type 23 upgrade programme and to provide the air defence system for its future Type 26 frigates. The system is the perfect complement to the latter's Global Combat Ship design concept which the UK is actively promoting around the world. With its very small footprint, SEA CEPTOR is similarly ideal for refits and its launch canisters can be easily integrated within various existing VLS launchers.

ALBATROS, deploying the ASPIDE or ASPIDE 2000 missile which also features in MBDA's SPADA ground based air defence system, is designed to counter a wide range of threats. The system is in service with several navies on ships ranging from aircraft carriers to OPVs.

Self/local/area defence system

Based on the ASTER family of surface-to-air anti-missile missiles (ASTER 15 and ASTER 30), MBDA has developed PAAMS (known as SEA VIPER by the UK Royal Navy) as the ultimate in self, local and long range fleet area defence capability. Its remarkable effectiveness has been proven over a number of demanding test firings, establishing a naval benchmark for anti-air protection which others in the industry aspire to. ASTER-missile based systems have been selected to equip major naval platforms around the world. These include aircraft carriers (the Italian Navy's Conte di Cavour and the French Navy's Charles de Gaulle), anti-air surface ships (the UK Royal Navy's new Daring class destroyers, the French Horizon and the Italian Orizzonte frigates), multi-role warships (the Franco-Italian FREMM and the French air defence variant known as FREDA), the multi-purpose Al Riyadh class anti-air frigates of the Royal Saudi Naval Forces and other frigates for export customers.

Armed with ASTER 30, a ship's captain can intercept a launch aircraft well before its anti-ship missiles are in range. However, should an enemy aircraft actually succeed in launching its attack, in 2012 the French Navy successfully proved the PAAMS system's ability to defend the fleet against the most demanding of anti-ship threats, namely that posed by a sea-skimming supersonic missile.

Extended air defence and BMD

MBDA specialises in evolving the capabilities of its weapon systems, drawing on experience from across its range of products. This is especially true with ASTER which at the end of 2010 became the first European missile to have ever successfully carried out a ballistic intercept. This ASTER 30 Block 1 variant of the missile is totally compatible with PAAMS and its addition would serve to create a highly effective ATBM defensive umbrella provided from a ship.

Lethality delivered with precision to deter or neutralise threats of all sizes

ANTI-SHIP OPERATIONS

A LEADING RANGE OF ANTI-SURFACE AND ANTI-SUBMARINE WEAPONS FOR BOTH BLUE WATER AND LITTORAL OPERATIONS

Protecting and enforcing the battle space, both in the open ocean and in the close confines of the littoral, is a major aspect of naval operations. Similar principles apply as for naval air defence, namely the ability to warn off the enemy or, if necessary, to neutralise the enemy's vessels before their weapons can pose a threat. Against frigates and corvettes, to torpedo-carrying FPBs as well as against the more recent and very significant asymmetric threat posed by swarming Fast Inshore Attack Craft (FIAC) and Fast Attack Craft (FAC), MBDA has a number of solutions.

Heavyweight anti-ship missile systems

MBDA is synonymous with EXOCET, the West's first long-range anti-ship missile with "fire and forget" and low sea-skimming flight capabilities. EXOCET, the mainstay of the French Navy's anti-ship warfare capability, has developed into a unique family of missiles (AM39, MM40 and SM39 variants) with the flexibility to be fired from all maritime platforms – surface ships, submarines, fixed wing aircraft, helicopters as well as from fixed or mobile coastal batteries. Since its entry into service in 1972, around 4,000 EXOCET missiles, in all configurations, have been delivered to over 30 countries around the world.

The latest addition to the family is EXOCET MM40 Block 3 which now features open-ocean, littoral warfare and coastal land attack capabilities in order to meet the changing needs of navies worldwide. EXOCET AM 39, fully digitised to optimise performance from the latest generation aircraft, can be launched at an appropriate stand-off range from a number of different platforms: combat aircraft, maritime patrol aircraft and naval helicopters. Its devastating effect, already proven in combat, can be brought to bear against even the largest of enemy ships including aircraft carriers.

OTOMAT Mk2 Block IV (known as TESEO by the Italian Navy) is a long-range anti-ship missile system for use from ships and coastal batteries. Currently arming about 100 ships operated by 11 different navies around the world, the system has been advanced to better meet the challenges posed by the complex target scenario in the often cluttered littoral environment.

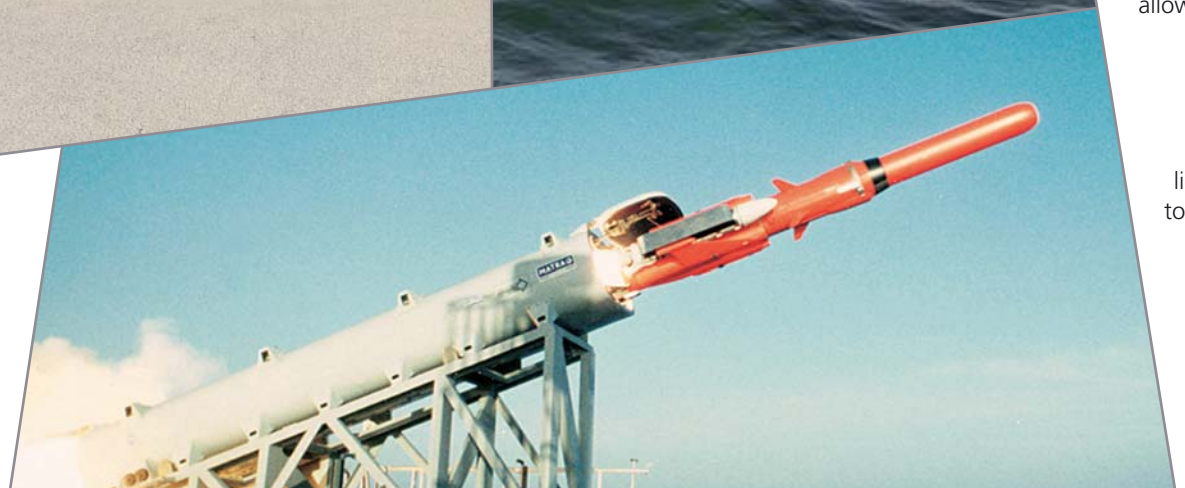
Lightweight anti-ship missile systems

MARTE is a clear example of MBDA's ability to draw on extensive experience to broaden and enhance a family of missiles, providing both commonality and operational flexibility. MARTE Mk2/S is the lightweight anti-ship missile selected for the NH90 and AW101 naval helicopters of the Italian navy. This medium-range missile has been designed to provide the new generation of naval anti-surface warfare helicopters with a potent anti-ship capability in both blue water and littoral environments.

MARTE Mk2/N uses the same missile but deployed from a launch system architecture that has been conceived for compatibility with vessels as small as 25m. Mounted on vehicles, the system can also form the basis of a coastal battery. Being prepared for the new generation of fixed wing light combat aircraft currently entering service worldwide is MARTE Mk2/S-A. Drawing on elements of its predecessor, the MARTE MK1/A as well as other MARTE iterations, the new weapon features optimised operational capabilities for use against planned or opportunist targets. With MARTE ER, MBDA is again re-using many existing MARTE technologies to develop a new extended range missile capable of engaging enemy vessels well beyond the radar horizon.

The UK and France have expressed a strong desire to work more closely together in defence, a desire that is being manifested in the replacement of two formerly competing missiles, by one new co-developed weapon. This new 110kg missile will meet the joint requirement (one that is also shared by many navies around the world) for a new helicopter-launched weapon to sink or disable small-to-medium craft or to severely damage larger ships of around 4,000 tonnes, particularly in complex operational conditions where the enemy might be found amongst friendly vessels or assets. In the UK this requirement is referred to as the Future Anti-Surface Guided Weapon (Heavy) (FASGW (H)) which will replace its currently in-service SEA SKUA missile. In France this requirement is known as the Anti Navire Léger (ANL), needed to replace the AS15 TT weapon.

MBDA's solution will see the UK's AW159 Lynx Wildcat and France's NH90 Caïman and Panther helicopters equipped with a new-generation weapon that provides not only range enhancements but also added features such as selectable man-in-the-loop control and eventual third party targeting for non-direct-line-of-sight operations.



Countering the FIAC threat

A recent phenomenon, particularly around in-shore waters, is the asymmetric threat posed by a new generation of craft referred to as FIAC. These small boats can appear very suddenly and are therefore often difficult to detect. Armed with machine guns, RPGs or even small missiles, FIACs can present a significant threat, especially if operating in large numbers, carrying out a swarming attack against larger but much less manoeuvrable vessels. In large formations they can hinder operations or even damage vital ship equipment thus totally disrupting a planned mission. Ideally they need to be dealt with at a suitable stand off range before they can close in to harass or attack vessels.

MISTRAL missiles have proven their effectiveness against such a threat. In addition, and when rapid fast jet intervention is called for, MBDA is able to offer BRIMSTONE (combat proven during recent operations). Featuring a dual, mmW radar and SAL seeker, the 50kg BRIMSTONE is capable of single or salvo strikes against small, rapidly moving targets at any time of night or day, even in very foggy coastal conditions.

BRIMSTONE is also being proposed as a surface-to-surface missile for deployment within the SEA SPEAR self-defence system against FIACs and other small surface threats. With a range of deck-mounted launcher options, from single to six-pack configurations, the system's very small footprint gives it a high level of deck positioning flexibility making it suitable for small vessels such as FACs as well as much larger vessels such as auxiliary ships.

This threat is also very much part of the target set catered to by FASGW(H)/ANL, allowing a ship's helicopter to keep FIACs well away from where they might begin to pose a serious threat.

Anti-Submarine Warfare (ASW)

To counter the submarine threat, especially when adverse weather conditions prevent the operational use of helicopters, MBDA has developed MILAS. This lightweight torpedo-carrying missile is capable of accurately delivering an MU90 torpedo at stand-off ranges. Based on MBDA's in-service TESEO anti-ship weapon system, MILAS has been selected by the Italian navy for its Durand de la Penne class destroyers.

NAVAL LAND ATTACK

AN UNEQUIVOCAL MESSAGE OF INTENT BACKED BY THE UNEQUIVOCAL CAPABILITY TO STRIKE

A developing role for naval forces is the support of special forces that may be called upon to operate at considerable distances inland. To assist in this role, MBDA is able to offer highly accurate, quick response weapon solutions to neutralise fixed, re-locatable and even moving land targets.

Deep strike

International waters offer the advantage of permanence and proximity to several areas of potential crisis at the same time. Strategically positioned naval forces, suitably equipped with a naval deep strike capability offering a level of surgical precision totally unmatched by any comparable weapon in this class, are able to deliver a strong deterrent message to a potential foe.

MBDA has already proven its ability to deliver exceptional precision at long stand-off ranges with the air-launched STORM SHADOW / SCALP and TAURUS KEPD cruise missile systems. The former has been combat-proven in recent conflicts and is in production for five countries (including France, Italy and the UK), MBDA is bringing the same, world-leading skills to the development of MdCN, a very long range naval cruise missile to provide surface ships (FREMM) and submarines (the French Barracuda class of nuclear-powered submarines) with an unrivalled deep strike capability.

Taking the battle to the enemy in the littoral or deep within their own territory

Air-launched strike

The aircraft carrier represents the ultimate in maritime force projection. MBDA weapon systems play a significant role here and include the whole suite of modern combat jet armaments from short and medium range air-to-air and air-to-surface to long-range cruise missiles. To deal with a wide array of fixed and fast moving surface targets ranging from ships to main battle tanks and ground structures, the Company is currently working on SPEAR for the F-35 Joint Strike Fighter. This high precision, network enabled multi-target weapon could also offer other platforms a major capability enhancement.

Naval fire support

MBDA can offer solutions aimed at supporting amphibious and land force operations, both in the littoral and deeper inland. The recently developed FIRE SHADOW is capable of carrying out precision strikes against static or moving surface targets at ranges out to 100km. What makes it ideal as a ship-launched support to landing forces is its ability to loiter above the target area for several hours. With man-in-the-loop control and the ability to receive target information from a number of sources, FIRE SHADOW can protect disembarked forces from a range of potential threats coming from the sea, along the shoreline or even from well inland.

With its range in excess of 180km and its outstanding penetration capabilities against enemy air defences, EXOCET MM40 Block 3 is also ideally suited for the fire support role. As well as being able to discriminate and select targets at sea and along the shoreline, with its GPS accuracy this latest EXOCET weapon can be programmed to neutralise inland fixed targets that could pose a potential threat to operations.

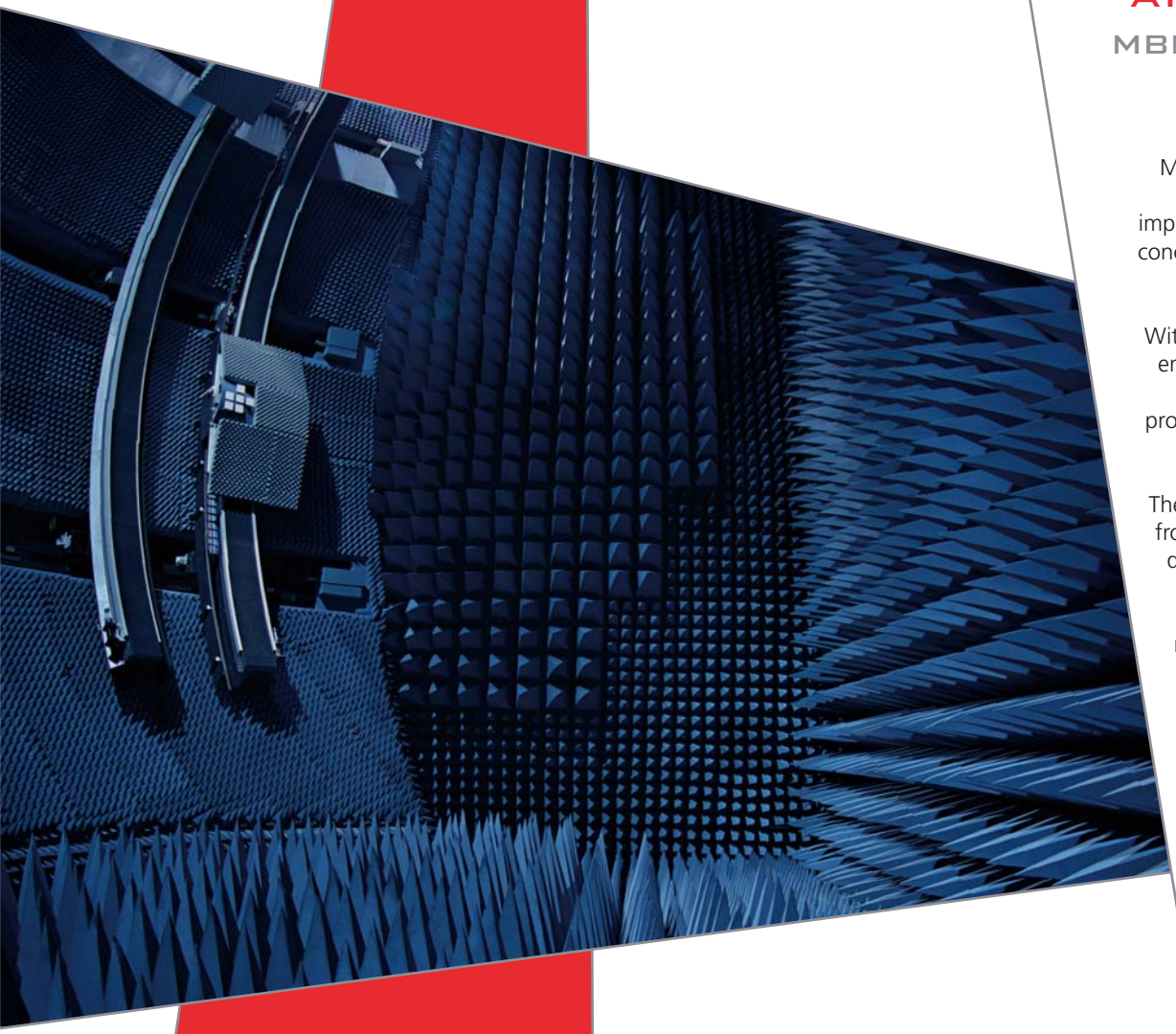
INTEGRATED SOLUTIONS

A FLEXIBLE APPROACH TO CUSTOMER REQUIREMENTS

Working hand in hand with local industry and local shipyards to meet local requirements

MBDA has more than 40 years' experience in C2 Command and Control systems for both anti-air and anti-ship missile systems. This experience is now being brought to bear in providing integrated combat system solutions for ships operating in sensitive coastal zones. Significantly, and in recognition of the fact that a growing number of countries in the world want greater control of their naval construction projects, MBDA is offering navies and shipyards a turnkey solution for the complete combat system integration on vessels such as patrol boats and logistics vessels.

This comprehensive solution, known as CWSP (Compact Warfare System Package), is available in two main variants. These are a self defence variant for logistics ships deploying the SIMBAD-RC air defence system based on the MISTRAL missile and, for an added anti-ship capability for fast patrol boats, a package that also incorporates MARTE Mk2/N launchers into the overall system. In both cases, MBDA's combat system solution would integrate radar, electro-optical systems and ship's guns, all easily controlled from internal consoles requiring minimal manning.



Advanced technology backed by operational excellence

AT THE FOREFRONT OF TECHNOLGY

MBDA VIEWS INVESTMENT IN TECHNOLOGY AS AN ONGOING INVESTMENT IN ITS CUSTOMERS

MBDA has invested in leading edge technologies throughout its plants in France, Germany, Italy, the UK and the USA that are focused on the development and improvement of the current product range and the creation and evolution of future concepts that will be needed to meet constantly evolving threats and therefore new military requirements.

With the industry's most modern facilities, and utilising equipment such as synthetic environment laboratories, hardware-in-the-loop and anechoic chambers for stealth testing, the Company is able to simulate key aspects of missile system design, providing low risk solutions through the product life cycle, with clear cost benefits to the customer.

The wide portfolio of products delivered by MBDA, together with customer feedback from systems in service throughout the world, allows MBDA to develop technologies delivering continued advances in the performance and operational capabilities of its products. In addition, as a systems prime contractor, the Company is also able to transfer cost-effective and de-risked technology enhancements from one product range to another, as it develops new solutions in line with evolving customer needs.

For the next generation of operational requirements, MBDA is advancing new levels of modularity within its systems, and developing a range of new technologies including new seekers, improved guidance and control algorithms and new launch techniques. The Company is also completing the development of a single generic computer core for use across different missile types representing cost and risk reduction advantages to its customers.

Our customers have very specific requirements...

CUSTOMER SUPPORT AND SERVICES

THROUGH LIFE SERVICE, THROUGH LIFE PERFORMANCE

In today's competitive market, customers expect support solutions that offer greater value for money and deliver lower cost of ownership throughout the service life of their equipment. These support solutions must not only be tailored to the customer's specific requirements, they must also be flexible and interoperable to sustain an increasing number of rapid global military deployments.

As a result, and in addition to standard support services such as training, spares and technical documentation that come with ordering an MBDA product, customers can select from a package of additional services such as turnkey maintenance facilities and Stockpile Management consultancy. MBDA is there to provide support from initial purchase and delivery right through to demilitarisation.

MBDA aims to provide not only the highest level of through life product reliability but also to help the customer to drive down maintenance costs by becoming increasingly involved in overall support supply chain management.

MBDA's Customer Support and Services team strives to establish a very close and personalised customer relationship. This allows MBDA equipment users around the world to become familiar with their individual company interfaces who in turn become familiar with the customer's individual issues and developing requirements.

...we know that our approach has to be tailored accordingly

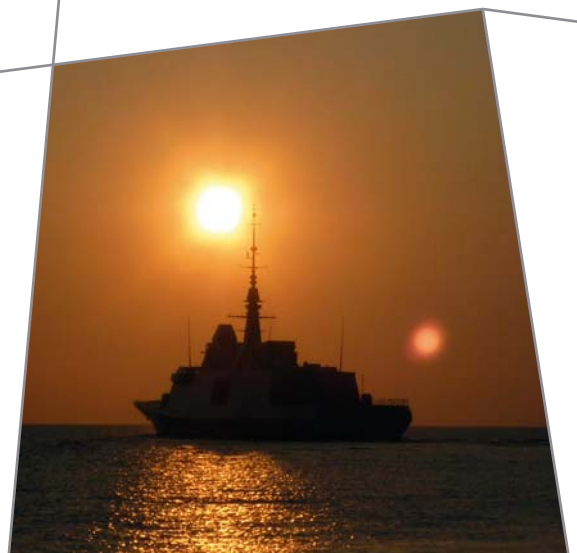
LOOKING TO THE FUTURE

NEW DANGERS, NEW REQUIREMENTS, NEW SOLUTIONS

MBDA's customer focused approach involves the Company in regular dialogue with end-users regarding short, mid and potential long term future requirements. In this way, MBDA is ideally positioned to bring different client needs together and to advance cooperation when possible in the development of new products or in the evolution of existing products.

Products in the MBDA range undergo continual evolution, but sometimes a quantum leap into the future is possible. To consider what might be needed and how current technology would probably evolve by around the 2030+ timeframe, MBDA's young engineers are working on a number of forward looking, guided weapon systems concepts grouped together under the Concept Visions title. In the naval domain, a Concept Visions team has envisaged a possible future weapon known as PERSEUS, a supersonic precision missile, featuring a number of effectors and a capability to carry out simultaneous anti-ship and land-attack missions using various trajectory modes against static and moving time-sensitive targets at very long ranges.

In an ever changing world, MBDA's excellence in technology remains a constant, providing navies around the world with the highest levels of equipment and support in readiness for the challenges that lie ahead.



Finding new ways and new technologies in readiness for new threats before they arise

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MISSILE SYSTEMS

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