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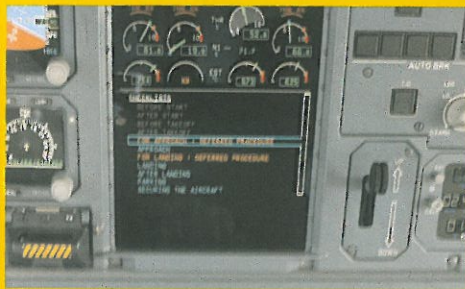
International

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Missile masterclass

Anglo-French research co-operation



Exclusive From the flight deck

**Qantas A380 QF32
interview and photos**

Missile masterclass

British and French researchers have formed a joint international partnership to investigate and develop new future missile technologies. **BILL READ** reports from the second annual meeting of the MCM-ITP in Manchester on the latest developments.

The Materials & Components for Missiles Innovation & Technology Partnership (MCM-ITP) was launched at the end of 2007 between the UK MoD and its French equivalent, the Direction Générale de l'Armement (DGA). The five-year programme is managed by missile manufacturer MBDA, in partnership with other French and UK companies in the same sector, including Thales, Selex-Galileo, Roxel, Microturbo, QinetiQ and Nexter. There is also a strong participation from smaller companies as well as universities.

With an annual research budget of around €14m, funded equally by the governments and the industrial partners, the aim of MCM-ITP is to

develop a portfolio of new missile technologies currently in early stages of development. British and French researchers collaborate their research efforts to develop technology demonstration programmes for new complex guided weapons systems. This will enable the UK and France to consolidate their capability in guided weapons by strengthening the technological base and allowing a better understanding of common future needs.

MCM-ITP is divided into eight 'technical domains', each led by an consortium partner. Around 60 research projects are currently in progress involving around 100 participants — of which 30% are from small to medium enterprises (SMEs) and academia. Additional projects are to be started over the next two years.

Conference report

To report on progress, MCM-ITP held its first annual conference in Lille in 2009. In 2010, the second MCM-ITP conference was held on 19 and 20 October at the Manchester Central Conference Centre. The two-day conference consisted of a series of 58 presentations on different areas of missile technology. There was also a small exhibition area in which companies and research institutions showcased their latest programmes.

The conference was introduced by keynote speakers from the UK Ministry of Defence (MoD), French DGA and pan European missile company MBDA who highlighted the



MBDA

MICA multi-mission air-to-air missile system developed by MBDA for the French Air Force. Other missiles for aircraft produced by MBDA include ASRAAM (Advanced Short Range Air-to-Air Missiles); Brimstone and Dual Mode Brimstone (DMB) air-to-ground anti-armour missiles which were developed for the RAF; Storm Shadow/SCALP long-range deep strike cruise missiles used by both the British and French military; Meteor beyond visual range air-to-air missiles; and Taurus KEPD 350 long-range stand-off missiles in service with the German Air Force.

drivers and benefits of Anglo-French collaboration, as well as discussing the main objective, principles and key achievements of the MCM-ITP programme.

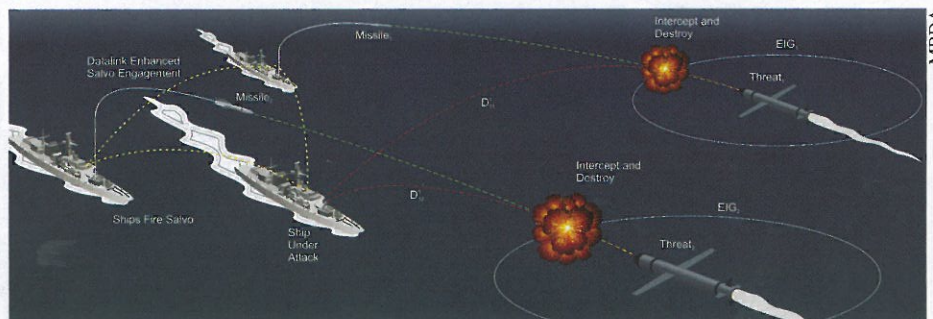
Following the introductions, delegates were able to attend sessions covering the eight technical domains currently being investigated as part of the MCM-ITP programme. These comprise the systems which guide and navigate missiles; radio frequency (RF) and electro-optic sensors which recognise and identify targets; construction materials, air-breathing and rocket propulsion systems; fuses and safety and arming units (SAUs); warheads; and the materials and electronics used for missile construction.

Tomorrow's missiles

In the systems domain, researchers are looking at such ideas as micromunitions which can be fired from small UAVs, as well as using a UAV to guide a missile to a beyond line of sight target. Other projects are working on new ways to improve missile performance and target recognition, including adapting commercial video compression techniques for missile applications as well as research into micro fluidic control. Several projects looked at landmark and features recognition to aid navigation while another involved providing a missile with a library of different vehicle types taken from different angles to aid target recognition while another looked at the potential of co-operative missile guidance in which a salvo of missiles communicated with each other to best allocate targets.

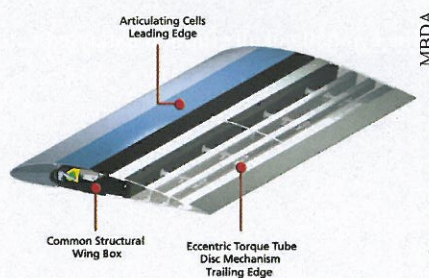
In the two missile sensor domains, researchers are investigating new technologies to make more accurate and lower cost sensors, the use of ultraviolet (UV) fluorescence imaging systems to detect camouflaged targets and new target acquisition algorithms which can better detect targets in 'cluttered' environments on the ground and avoid collateral damage.

Turning to propulsion systems, MCM-ITP



A co-operative missile guidance system to allocate multiple targets.

researchers have been working on ways to reduce missile weight, size and vulnerability while enhancing thrust-vector control to increase manoeuvrability, so that they can be used in new applications, such as urban warfare. Attention has also been focused on methods to modulate the thrust from both solid fuel and air-breathing rocket motors to enable missiles to 'loiter and dash'. Several projects are also looking at ways to improve the performance of turbojet-powered missiles.



Design for a morphing wing.

Materials research has examined new applications for high-temperature resistant ceramics, as well as coatings and sealants resistant to extreme temperatures, speeds, pressures and corrosion. Reducing the cost of missile systems through the use of commercially available systems is also being investigated, as

are new types of 'smart materials' — to enable morphing wing and other novel missile structures. The use of nanotechnology to develop 'self-healing' and low-friction versions of conventional missiles, or even swarms of miniature missiles, is also under analysis.

The latest research on fuses and SAUs concentrated on three main categories: detect, decide and detonate which look at target detection devices, systems that decide the optimal time to set off a warhead after penetration and different types of detonators. Work has also been carried out into improved safety devices which prevent warheads from being detonated accidentally. Finally, work on future warheads has not only been looking at ways to better penetrate hard surface and composite targets but also into 'tunable effects' warheads which could vary their effect depending on the type of target.

Not all these projects may progress beyond the research stage but those that do may be developed into technology demonstrators which can then be used as a basis for new missiles. By working together through the MCM-ITP partnership, both the UK and France can benefit from new technology which can benefit both their national defence industries and armed forces.

See also p34 for Keith Hayward's commentary on recent joint Anglo-French defence agreements.



The conference was opened by key speakers from the MoD and DGA (left); stands at the exhibition showcased different aspects of missile research (centre); a demonstration of MBDA's new 'concept vision' Sniper hand-held missile system (right).