MCM ITP
Materials & Components for Missiles Innovation & Technology Partnership

PRESS INFORMATION

15-16 OCTOBER 2019 HILTON METROPOLE BIRMINGHAM, UK

The UK MOD and French DGA MCM ITP programme brings together the best in British-French Missile Research & Development

The Materials & Components for Missiles Innovation & Technology Partnership (MCM ITP) is a Dstl and DGA sponsored research fund open to all UK or French companies and academic institutions. Launched in 2008, the MCM ITP looks to identify and develop novel, exploitable technologies for next-generation missile systems in the 2030+ timeframe.

The MCM ITP aims to consolidate the UK-French Complex Weapons capability, strengthen the technological base and allow better understanding of common future needs. The Programme manages a portfolio of cutting-edge technologies that hold the promise of major advances, but are still at the laboratory stage today. The MCM ITP is structured into eight main technical domains (Systems and Navigation, RF Seekers, EO Sensors, Rocket Motors, Air Breathing Propulsions, Warheads, SAUs & Fuzes, Materials & Electronics), each of which is led by one of the MCM ITP industrial consortium partners (MBDA, Thales, Roxel, Leonardo, Safran Power Units, QinetiQ and Nexter).

Since its inception, the MCM ITP has conducted over 200 research projects involving over 150 different organisations, and in October 2019 a further 14 projects are being launched. The programme is funded equally by the governments and the industrial partners, and with an annual

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budget of up to 13M€ and 30% of the budget targeted towards SMEs and Academia, the MCM has become the cornerstone of future collaborative research and technology demonstration programmes for UK-French missile systems.

Looking forward, there is an intention to launch a follow-on programme to the MCM ITP. Called the Complex Weapons Innovation & Technology Partnership (CW ITP), it will build on the positives from the MCM ITP and ensure that UK/FR missile systems research and technology remains at the cutting edge in the years to come.

Over the 15 and 16 October 2019 the DGA, Dstl, MBDA and its partners will review the last two years of the MCM ITP programme, and present the technical advances that have been made possible thanks to this cooperative programme. During the two days in Birmingham, UK, more than 340 delegates attending the conference will have the opportunity to:

- View the novel, innovative technologies that have been researched within the programme
- Network with Academia, small and large businesses and meet decision makers from UK/French Government and industry
- Listen to noted guest speakers on key technological topics, and gain a particular military insight from our guest key note speaker, General Sir Richard Barrons KCB CBE

FUTURE TECHNOLOGIES FOR CRUISE MISSILE

ALM Penetrator Warhead

The ALM (Additive Layer Manufacturing) Penetrator Warhead uses metal 3D printing to create a complex internal structure that retains the required strength to penetrate hardened targets while reducing mass.

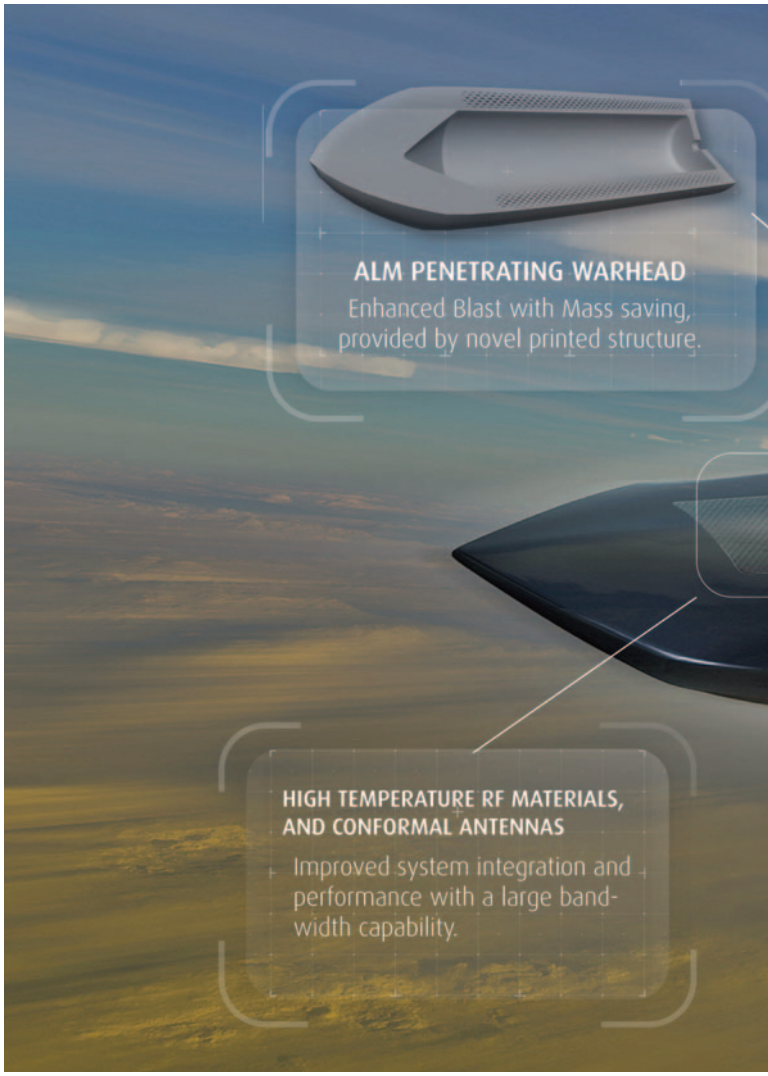
A penetrating warhead requires sufficient strength to pass through a masonry or concrete structure prior to detonation. Traditionally a thick metal casing provides this strength, however this casing also absorbs a significant amount of energy when the warhead detonates. Since the ALM Penetrator Warhead has a reduced-mass case, less energy is lost during detonation. Additionally, desired fragmentation can be achieved by incorporating an optimised pattern into the ALM printed structure.

The primary benefit offered by the ALM Penetrator Warhead is enhanced lethality from a reduced-mass weapon – or the potential to sustain current levels of lethality but with a smaller weapon. With the ability to also control fragmentation, reduced collateral effects can be achieved.

The ALM Penetrator project has involved MBDA as project lead, IMPETUS Afea and Fluid Gravity Engineering for modelling expertise, with the gas gun and live firing trials undertaken by Thiot Ingenierie and Blastech respectively. The structure developed through modelling was produced by MBDA in France and testing has proven the survivability of the penetrator against targets previously requiring a heavier metal casing, while detonation trials have shown the anticipated enhanced blast effects.

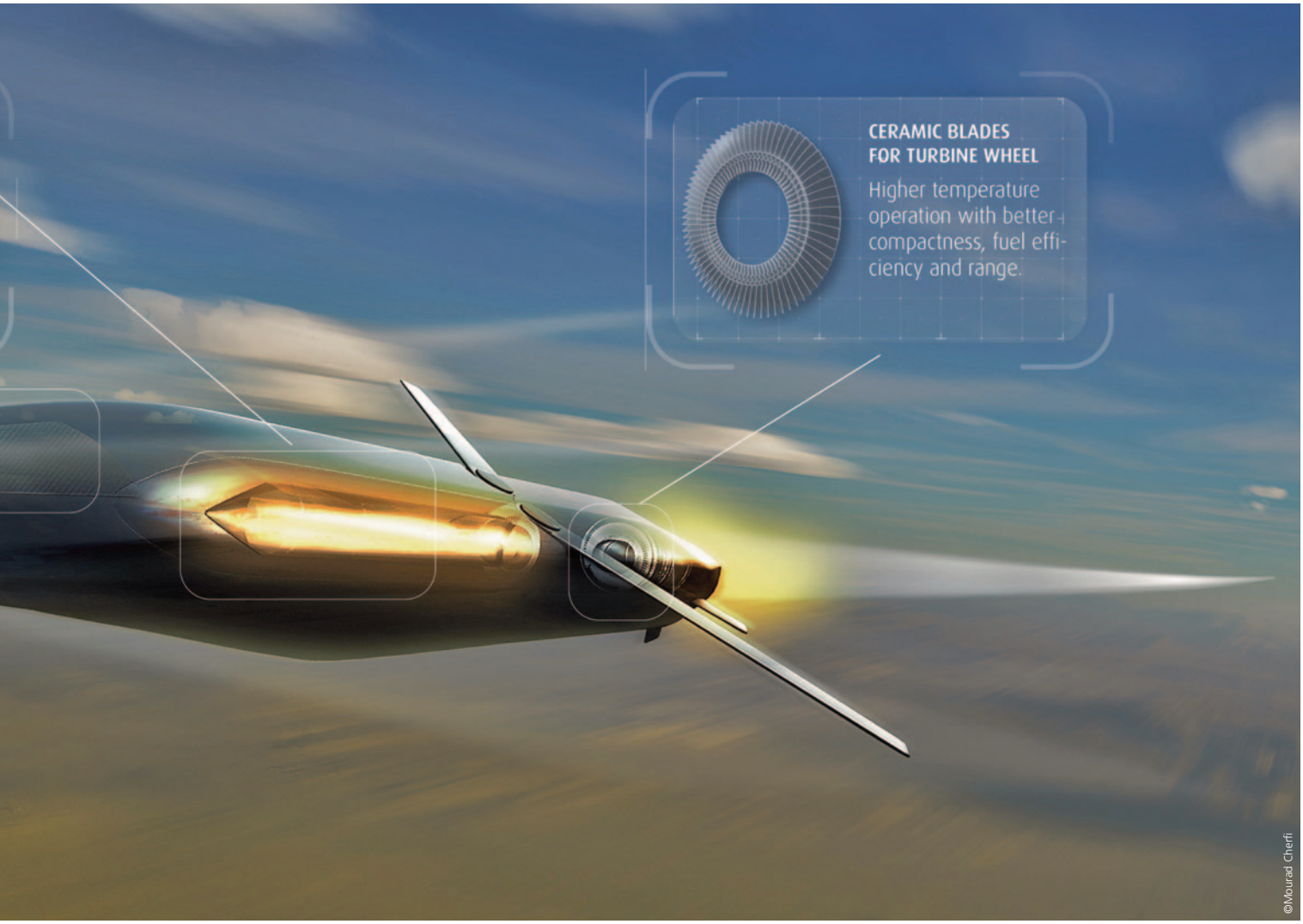
Ceramic blades

Safran Power Units (SPU) is specialised in the design and manufacturing of turbojets and other power systems (auxiliary power units, fuel cells, etc). SPU has investigated the use of ceramic turbine blades with several partners (University of Birmingham,



Syalon, Imperial College) in order to introduce ceramic parts into turbojets. Such parts can sustain higher operating temperatures and be more compact, thus increasing fuel efficiency and range.

Thanks to the research and work performed within the MCM ITP framework, this technology has reached the step of manufacturing ceramic blades that will be attached to a disc and spin tested. This very promising research could lead to use ceramic blades on turbine wheels instead of very expensive metal alloys. Improvement of the manufacturing process is now being continued with the University of Birmingham.

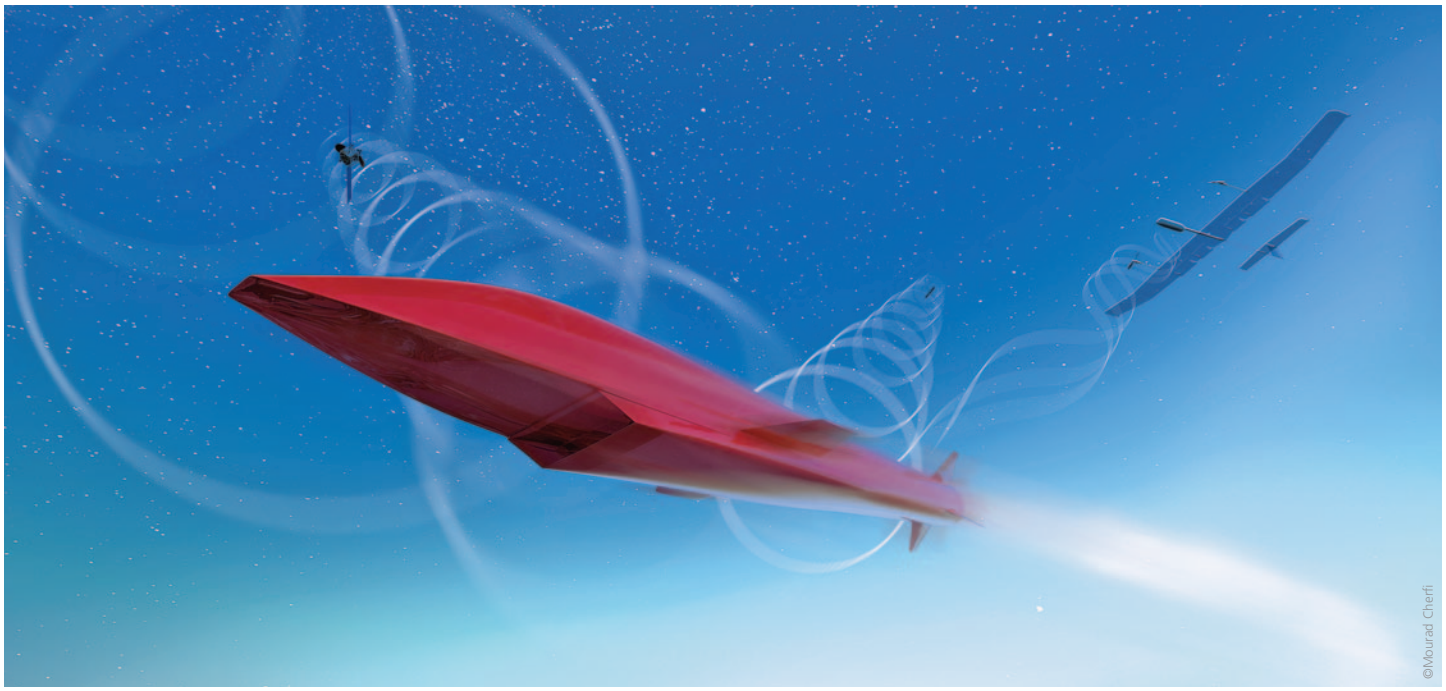


High temperature RF materials & Conformal Antenna

High-speed flights cause extreme aerodynamic heating of missile structures. The high temperature RF materials project looks to identify radio frequency (RF) transparent materials that can withstand these effects to protect satellite and data link antennae. MBDA has been working in partnership with International Syalons Ltd and Pyromeral Systems to select and engineer RF transparent ceramics and ceramic composites that can perform in this challenging environment, operating across the range of military communication frequencies.

The novel Conformal Antenna concept takes existing antenna technologies and aims to integrate the antenna into the surface of the missile to reduce the volume of the data link and seeker; the freed volume may then be used to increase range and lethality. Conformal Antennae enable greater transmission and receiving angles to be achieved without the need for moving parts, reducing complexity and cost. This project is conducted with the University of Loughborough.

RESILIENT & AUTONOMOUS SATCOM NAVIGATION (REASON)



The objective of this project is to assess the technical and system-level feasibility and benefits of using specialist satellite signals as an aid to navigation. Cruise missiles have to travel several hundreds of miles before delivering the effect with an ever-increasing precision. In that context, robust navigation is a mission critical capability for a missile. In order to achieve accurate and reliable navigation performance for medium to long duration flight, a combination of multiple sensors are used to support the inertial sensor.

The REASON project addresses the major issue of navigating in highly contested environments, where core navigation means like GPS/GNSS (Global Positioning System/Global Navigation Satellite System) are very likely to be denied. This is achieved by fusing range measurements from opportunity signals with an inertial sensor, and additional sensors such as altimeters, to navigate effectively.

Technologies associated with satellite communications (SATCOM) have significantly increased in proliferation across the battlefield and are likely to be integrated into many complex weapons in the near to medium future. In this respect, the complementary use of SATCOM as a navigation aid provides significant benefits at system level.

The research team around the REASON project is composed of Airbus Defence and Space, ONERA and MBDA.

NOVEL HUMAN MACHINE TEAMING (HUMAT)

The main objective of the HUMAT project is to achieve better decision making through Human Machine Teaming.

Theatres of operations are getting more complex with multiple layers of systems for communications or ISTAR (Intelligence, Surveillance, Target Acquisition, & Reconnaissance). With the amount of information to be analysed and prioritised, and the time-critical nature of combat engagement, automation or autonomy must be implemented in the engagement chain. However, authority needs to remain in the hands of the human at the heart of the system, who must be able to make informed decisions or recognise when interventions are needed.

The research team is comprised of the University of Birmingham, ProbaYes and MBDA who approached the topic from multiple angles: defining and assessing the role of the operator in future missile systems; exploring ethical, legal and technological constraints to robust engagement decision making; exploring the opportunities and potential of new technologies and techniques to address this problem space.

The primary application is within weapon command and control systems for surface attack and air defence. The study scope addressed the engagement chain as defined by the following functions: Plan, prepare, detect objects, evaluate threat, determine engageability, assign weapon, control launch, control engagement and assess engagement.

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