Innovate UK

Results of Competition: Game-Changing Technologies for Aerospace - CRD
Competition Code: 1506_CRD2_TRANS_HITEA3

Total available funding for this competition was £8,730,000 from Innovate UK (across CR&D and Feasibility

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
Reliance Precision Ltd University of Huddersfield The Manufacturing Technology Centre Ltd Delcam Ltd	Reliable Additive Manufacturing technology offering higher ProdUctivity Performance (RAMP-UP)	£1,467,579	£1,138,958
Project description - provided by applicants			
Additive Manufacturing (AM) offers unrivalled flexibility in terms of part geometry, material composition andproduction volumes. It could revolutionise the high value manufacturing sector and in particular the aerospaceindustry, enabling complex, lightweight, high performance parts to be produced with less material waste.Unfortunately, despite the clear potential, until recently AM has been largely restricted to the production ofprototypes and components for rig testing.In the RAMP-UP project a comprehensive programme of experimental work will be conducted to addressthe critical challenges which must be overcome for widespread adoption of AM for the production of 'flying'production parts within the civil aerospace sector.			

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Weston Aerospace Ltd University of Cambridge	Accurate Life Prediction for High temperature Engine Thermocouples (ALPHET)	£373,932	£274,524
Project description - provided by applicants			
The turbine of a jet engine provides one of the most challenging environments in engineering today, whereextreme temperatures are combined with a corrosive atmosphere. These temperatures are measured withthermocouples that are a critical part of gas turbine engines used in aircraft and in power generation. Theyensure operation at the most efficient temperature and protect the structure from excessive heat. This projectapplies novel technology developed in Cambridge University to determine the useful life of the structuralcomponents of the turbine. This, combined with Weston Aerospace's expertise and pedigree in thermocoupledesign and condition information from service run parts, provided with the assistance of Rolls-Royce, willimprove the accuracy of prediction of the effective life of thermocouples. Methods to test existing and newthermocouple materials will subsequently be developed, leading to more reliable monitoring of temperature,the use of the right material in each specific engine application and potentially raising the maximumtemperatures that can be reliably measured. This will raise efficiency and extend economic life.			

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Meggitt Aerospace Ltd Ten Cate Advanced Composites Ltd Victrex Manufacturing Ltd Oxford Advanced Surfaces Ltd AgustaWestland Ltd University of Exeter	DAEDALUS	£846,171	£569,292
Project description - provided by applicants			
The aim is to develop a new lightweight wheel technology for aircraft. The new wheels will utilise some of thelatest advances in materials engineering. The programme will utilise latest advances made in the automotivesector and apply them in the aviation market. Key requirements include very high toughness demonstratingexcellent impact strength at low temperatures, high mechanical fatigue strength, and a very low tendency tocreep. Requirements in this sector are formidable, where wheels must survive a series of industry-specific testsincluding extended roll life, roll-on-rim, combined load & burst tests in order to be viable. If achieved, the 25+%potential weight savings would put UK tier 1 suppliers in a world leading position. Project DAEDALUS is a 6partner 2yr initiative.			

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Microsemi Semiconductor Ltd Moog Controls Ltd University of Bristol University of Southampton	NEMICA Nanoelectromechanical Relay-Based Ics for Avionics	£1,058,332	£793,574
Project description - provided by applicants			
NEMICA is a UK collaborative research and development project between Microsemi, Moog and theUniversities of Bristol and Southampton. The project aims to develop reprogrammable memories and gatearrays based on Nano-Relay technology that are capable of withstanding long term exposure to 225oC and/or100Mrads.The primarily target application will be avionic actuator systems but the technology has markets in space,transportation and down hole drilling.			

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Toolroom Technology Ltd Sandwell UK Ltd Meggitt Aerospace Ltd JRI Orthopaedics Ltd The Manufacturing Technology Centre Ltd Alstom Power Ltd	Flexible and automated finishing and post-processing cell for high value AM components – FlexiFinish	£870,323	£666,764
Project description - provided by applicants			
The FlexiFinish project addresses the significant challenges faced by industry surrounding the ability to finishsurfaces on complex parts, in a controlled and cost effective manner. This is also becoming a significant barrierto the wider uptake of additive parts within the Aerospace industry and beyond. In order to address this, theFlexiFinish project will create a fully automated cell which includes a number of finishing (laser polishing andadaptive linishing) and post processing technologies (shot peening). The cell will be enclosed, and will useadaptive toolpath software alongside inspection technologies (roughness and dimensional) to allow automatedfinishing of multiple parts' geometris. A database of finishing strategies and approaches will also be created,and constantly updated to improve quality. This will not only improve current capability, but will reduce costsand timescales from existing approaches			

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Safran Landing Systems UK Limited Metalysis Ltd University of Sheffield University of Strathclyde	FASTForge-From rutile sand to novel titanium alloy aerospace component in 3 steps	£1,442,135	£1,078,472
Project description - provided by applicants			
A consortium lead by Messier-Bugatti-Dowty, Metalysis, University of Sheffield and the Advanced FormingResearch Centre is working on the FASTForge project: From rutile sand to novel titanium alloy aerospacecomponent in 3 steps. The aim of FASTForge is to develop a novel low cost titanium forging production process,unique to the UK. The production of this aerospace grade titanium at affordable price, will be an enabler for theintroduction of more titanium on aerospace components but also introduction of titanium, a light and noncorrosive material, to other industries such as the rail, automotive, heavy duty construction, defence.The project will develop the raw material process, establish how it can be embodied in a new UK supply chain,develop cost effective manufacturing techniques and prove the capability in a landing gear application			

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Rolls-Royce PLC TRT Ltd Toolroom Technology Ltd University of Bristol	Advanced Repair of Turbine Engine Materials In-Service (ARTEMIS)	£1,480,069	£930,028
Project description - provided by applicants			
Development of advanced repair technologies is a key business enabler for the aero engine market. Rolls-Royce, a world-leading provider of power systems and services for use on land, at sea and in the air, generatesmore than half of its revenues from aftermarket services supported by novel repair technologies. Turbinecomponents have been identified as the single biggest cost driver at engine overhaul; this project is directed atreducing the cost and environmental impact of turbine component repair via the development of cutting edgenon-destructive sulphidation inspection techniques and nozzle guide vane repair technology in a multi-partyconsortium.			

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Hutchinson Aerotech Ltd IPG Photonics (UK) Ltd AgustaWestland Ltd TISICS Ltd Queen's University Belfast The Manufacturing Technology Centre Ltd TWI Ltd	OLIVER - Optimised laser welding implementation via enabling research	£1,496,568	£1,199,387
Project description - provided by applicants			
Current socio-economic pressures on the global civil aerospace industry are increasing the utilisation oftitanium in aero-structures. Production of parts by existing methods leads to inefficient buy-to-fly ratios (ashigh as 20:1), which is becoming increasingly uneconomical (high material cost & labour intensive; leading tohigh repeat costs, long lead times & design constraints) and driving the need for structures to be fabricated bynear-net-shape welding processes. Laser welding is emerging as the process of choice since it can produce lowdistortion welds of good quality and properties at significantly faster speeds than other welding processes. TheOLIVER project will further develop knowledge in laser welding titanium and its application to structuralaerospace assemblies, and at the same time exploit this knowledge by developing UK manufacturing capabilityboth within the UK supply chain and OEMs. Project OLIVER includes 2 OEM case studies which represent first-to-market opportunities for the technologies to be developed. A further case study is included which willdemonstrate the capability of laser welding a strut component in a revolutionary titanium-composite.			

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Rolls-Royce PLC Ashton and Moore Ltd Short Brothers PLC GE Aviation Systems Ltd Indestructible Paint Ltd Meggitt Aerospace Ltd Monitor Coatings Ltd Poeton Industries Ltd Loughborough University University of Manchester	Advanced Hex Chrome-free Surface Technologies for Corrosion Protection	£1,428,625	£1,001,589

Project description - provided by applicants
Hexavalent chromates set the benchmark for corrosion protection for a number of industries and they areessential for the safety of current Aerospace products. However, EU REACH legislation has tightly restricted thesale and use of these chemical substances which creates a business continuity threat to the UK and EEA supplychains. One key technology is chromate conversion coatings (CCC) that are essential for the protection ofaluminium components. While there are a number of proposed alternatives on the market, previous work hasidentified these to be unsuitable.A consortium has been brought together in order to develop and industrialise CCC alternatives to ensure thatthey meet stringent requirements set by the Aerospace industry. The lifetimes of these hex-chrometechnologies will be measured using advanced methodology so that they can be safely introduced intoAerospace products. Furthermore, the new technologies will be available for the entire UK supply chain to use,including for other industries such as medical, automotive, oil and gas.

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