

# Innovate UK

**Results of Competition: Game-Changing Technologies for Aerospace - Feasibility**  
**Competition Code: 1506\_FS\_TRANS\_HITEA3**

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

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<b>Participant organisation names</b>	<b>Project title</b>	<b>Proposed project costs</b>	<b>Proposed project grant</b>
<b>Oliver Crispin Robotics Ltd</b> Cranfield University	Automated sealant deposition in confined aero-structures	£98,931	£82,896
<b>Project description - provided by applicants</b>			
<p>There is currently an industry-wide drive to reduce aircraft construction time, whilst increasing the quality of manufacture and lowering costs. Removing workers from confined spaces, such as wing-boxes, is also a target throughout the aerospace sector. This project addresses these key elements by considering the automation of sealant deposition. Previous development on this topic has focused on open structures and simple seal geometries. This project will investigate the challenging requirements for automating sealant in confined aero-structures, as well as targeting the automation of complex seal elements and geometries, such as filleting corners and initiating and terminating seals. Combining OC Robotics' world-leading expertise in snake-arm robots for confined environments and Cranfield University's extensive knowledge of sealant application techniques, this partnership has the potential to conduct innovative research, with game-changing results.</p>			

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Aqdot Ltd University of Manchester	AeroCURE - Improving aerospace composites with encapsulation technologies	£102,927	£77,532
<b>Project description - provided by applicants</b>			
Epoxy resins are robust, light-weight plastics that are used in the manufacture of composite materials used throughout commercial aircraft. Using epoxy composites to construct aircraft makes them lighter and more fuel efficient. Developing new kinds of epoxy resin could make manufacturing of composite materials simpler, more energy efficient and less expensive. Aqdot has developed epoxy curing catalysts that could simplify the manufacture of epoxy composites by making them stable at room temperature. In this feasibility study, Aqdot and the University of Manchester seek to investigate whether the new catalysts can be successfully applied to aerospace composites.			

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CT Aerocomp Engineering UK Ltd TWI Ltd NCC Operations Ltd	Enhanced Ultrasonic Welding of Thermoplastic Composites	£99,800	£84,875
<b>Project description - provided by applicants</b>			
<p>Aerospace industry is going through a phase where there is an evolution towards lightweighting the aircrafts by using light weight composite materials. This has huge financial and environmental implications for all stakeholders. There is an increasing need to develop techniques which can process these materials (joining, welding, etc.) at a similar rate to conventional metal components. A thorough feasibility study of ultrasonic welding, the process variables involved and its suitability for commercialization will be done in this project. The project will also compare parts processed by ultrasonic welding to established manufacturing techniques. The key outcomes and understanding from this project will be fed into a larger industrialisation project which will assess the suitability, repeatability and mechanical properties of composite parts processed by using ultrasonic welding techniques. The UK aerospace industry and the entire supply chain can benefit from the understanding of a clean, fast and reliable joining technique and this feasibility study is the first step towards achieving that goal.</p>			

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Artemis Intelligent Power Ltd Vitrex Manufacturing Ltd	Digital Displacement aerospace pump	£99,870	£49,935
<b>Project description - provided by applicants</b>			
<p>Artemis Intelligent Power has developed a new kind of energy saving and highly controllable technology called Digital Displacement® hydraulics. The company has demonstrated the advantages of Digital Displacement® pumps and motors in all sorts of applications including in the largest floating wind-turbine in the world, in energy saving buses and trains, and in industrial machines. Vitrex Manufacturing is a global leader in the development and supply of remarkable engineering plastics. Vitrex will help Artemis to find ways to adapt Digital Displacement® pumps to make them able to operate in the very demanding conditions encountered by aircraft hydraulics. The companies will also collaborate with hydraulic experts at Airbus, one of world's two leading aircraft manufacturers.</p>			

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N.D.T. Consultants Ltd University of Birmingham	Online and Real-Time Measurement of Magnetic Powder Dosage in Magnetic Particles Inspection (MPT) of Materials	£94,218	£72,503
<b>Project description - provided by applicants</b>			
<p>The feasibility of a method to provide assurance of the compliance of inspections of component quality to international standards will be assessed. The method applies to magnetic particle inspections which detect cracks in metallic components and involves the use of a high frequency electromagnetic sensor. The sensor resonates at a frequency in the microwave frequency band. The working fluid used in the inspection is a dilute suspension of ferromagnetic particles, in which each particle is coated with a fluorescent dye. Particles will collect in the magnetic fields around cracks in the component being inspected and can be found via their fluorescence. The sensor will measure the concentration of particles in the fluid during the inspection, a sample of the fluid being drawn from the testing apparatus and pumped through the sensor before being returned to the testing apparatus. The current method of measuring particle concentration is performed prior to inspections and takes several hours, the new method is a real-time solution which is also more appropriate to automatic data logging.</p>			

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Aircraft Research Association Ltd University of Manchester	MiniPSP - Miniaturisation of pressure sensitive paint apparatus for embedding within wind tunnel models	£100,000	£75,000
<b>Project description - provided by applicants</b>			
The miniaturisation of lighting and sensing apparatus for use with pressure sensitive paint systems, such that the apparatus can be embedded within wind tunnel models.			

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<b>Intercal (UK) Ltd</b> CIA Technology Global Ltd	Lithium Battery Management and Monitoring System for Civil Aviation	£85,998	£60,199
<b>Project description - provided by applicants</b>			
To develop a laboratory prototype system for managing and monitoring lithium-ion batteries in civil aircraft and other applications. If successful it will have potential for early and world-wide exploitation. The use of Lithium-ion for auxiliary power allows considerable cost and energy savings owing to the very high energy and power densities compared to alternatives. The technology is, however, inherently unstable and several major incidents including two fires led to the grounding of the entire Boeing Dreamliner fleet in 2013. Subsequent regulatory scrutiny has delayed adoption of the technology for the Airbus A350 and elsewhere. Central to the project is a patented method of battery management and monitoring which has been shown in extensive laboratory tests to have the capacity to detect signs of battery failure at a very early stage. Establishing the feasibility of the technology through prototyping would be a key step forwards for regulators and the industry. The system has spin-off potential in all market sectors which use larger lithium-ion batteries.			

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<b>Applied Materials Technology Ltd</b> Fibre Photonics Ltd Cranfield University	Flexible Thermographic Borescope with Pyroelectric detection	£100,197	£85,132
<b>Project description - provided by applicants</b>			
Flexible Thermographic Borescope with Pyroelectric Detection to allow inspection of components in difficult to reach or hazardous areas. The Flexible Thermographic Borescope with Pyroelectric Detection project will undertake the miniaturisation of the non-destructive evaluation (NDE) technique 'active thermography' with the development of a pyroelectric detector using nanomanufacturing techniques that interfaces directly with a bundle of around 300 polycrystalline optical fibres. The optical fibres are optimised for mid IR in the 5-14µm range, ideal for thermography inspection techniques. The thermographic borescope will be flexible and steerable allowing inspection of components in difficult to reach or hazardous areas, potentially increasing the service life of equipment and ensuring testing personnel's safety.			

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Formax (UK) Ltd Loughborough University	Novel Fibre Treatments for the Improvement of Composites	£99,667	£74,752
<b>Project description - provided by applicants</b>			
Formax UK Ltd and Loughborough University are collaborating to develop a novel fibre treatment process, for the purposes of improving the performance of existing composites used throughout the aerospace sector, with a view to reduction in vehicle mass and emissions. This has formed as an outcome of prior research conducted between the two organisations. The aim of the project is to conduct a feasibility study into potential applications and identify suitable route to market.			

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SalusUAV Ltd University of Bath	UK Beyond Visual Line of Sight UAV Operations	£99,315	£84,508
<b>Project description - provided by applicants</b>			
A joint project lasting 13 months between commercial drone company SalusUAV and the University of Bath, with input from the Civil Aviation Authority. The aim of the project is to develop sensors and operating procedures that would allow a UAS (drone) to operate beyond the visual range of its remote pilot. To explore this progression, the project will engage in developing systems that enable the drone to detect and avoid obstacles and other aircraft without any input from the pilot. These systems would also make ATC and other aircraft aware of the drone's position at all times. If successful the project will result in the first small drone to be certified by the CAA to operate a part of its flight plan beyond the direct line of sight of its operating pilot.			

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Ferrodax Ltd Axis Composites Ltd Glyndwr University	Consolidation of property data for the life cycle of a composite product (COMP-LIFE)	£71,201	£55,211
<b>Project description - provided by applicants</b>			
<p>The life cycle of composite material products can include the manufacture and testing of starter products, the design and testing of the main product, the testing of the structural integrity of the product in the operational phase and the management of the disposal stage of the product at the end of life. Digital data at each stage of this life-cycle is generated by different processes, by different actors using different software and recording methods. Data can be lost at each stage, which presents difficulties from a shortage of relevant information if problems arise in the later stages. The study will investigate the feasibility of using new information models in the ISO Standards for digital product data representation and exchange to consolidate property data from different sources and different stages in the life of a composite product into one verifiable source and provide an audit trail for the origins of all of this data over its life cycle. The ISO standards provide open information models for the digital representation of engineering data independent from proprietary software. They support interoperability between different software systems and quality control and assurance for the information.</p>			

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<b>Copper Clothing Ltd</b> University of Bath	Composite dual functional filter for cabin air clean-up	£84,984	£71,484
<b>Project description - provided by applicants</b>			
Health effects associated with microbial aerosols and contaminants are well known. Due to the largenumber of passengers in the aircraft cabin, there may be high concentrations of CO2, dust, fibres, bacteria andother micro-organisms.In the complex cabin air environment, passengers and crew may be more susceptible to infection than undernormal circumstances. The collaborative project between Copper Clothing Ltd and the University of Bath aim todevelop a novel dual functional cabin air filter for the eradication of microbial aerosols, and the removal ofvolatile contaminants, providing improved, cleaner air for passenger use. The active copper ions and nano-carbon/novel metal organic frameworks (MOF) encapsulated microbial/adsorbent filters will be designed toachieve optimal filtration performance while providing health benefits to passengers and crew, maximumservice life, minimum weight, smallest size and energy savings.			

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