Innovate UK

Results of Competition: Materials & Manufacturing Round 2 13-24 Months
Competition Code: 1611_MM_R2

Total available funding is up to £5m for this stream (£15m total competition budget)

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
Rawwater Engineering Company Limited	Advanced Bismuth Alloy Development for Downhole Casting & Plugging of Oil Wells	£342,170	£239,519
Astrimar Limited		£82,879	£58,015
Project description - provided by applicants			
This project addresses the need for high integrity offshore oil and gas well abandonment plugs, required for the North Sea in the upcoming wave of platform removals (decommissioning). Currently, wells are abandoned through plugging the well bore with two columns of cement up to 160 meters in length. The industry has concerns over the cost and long term seal integrity of cement plugs and has been seeking an alternative solution for years. This project aims to demonstrate the feasibility of a cost effective, high reliability plugging technology for oil & gas well applications. The project aims to develop a new bismuth based metal alloy to use as a plug, leveraging the unique property of bismuth (expansion upon freezing) to deliver high integrity seals. The project also aims to demonstrate a method of casting the molten alloy down hole to deliver a cost effective deployment method. The use of metal alloy plugs for well abandonment has already been demonstrated in shallow onshore wells in Canada. This project aims to develop superior performance alloys and deployment methods to demonstrate that metal alloy plugs are feasible as a solution for the more demanding, deeper offshore wells in the North Sea and elsewhere in the world.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Zeal Innovation Limited Swansea University	A new automatic process for composite strip conversion and end bonding for diverse high security applications.	£689,990 £232,265	£422,094 £232,265

Project description - provided by applicants

LITELOK is the lightest, flexible Gold standard bicycle lock on the market, which harnesses the unique security properties of multiple innovative materials contained in the composite strap called BoaFlexicoreÂ®. Each layer provides additional security, meaning it can withstand sustained attack from tools like cable cutters, bolt croppers and hacksaws. LITELOKs have been thoroughly tested by us, and independently tested by Sold Secure, the world-class certification house, achieving their highest security rating: Sold Secure Gold. We were the winner of the â€œBest cycling innovationâ€•at the London Cycling Awards 2016. We are proud that LITELOK is Made in Britain. This project is a collaboration with Swansea University and our UK manufacturer, to develop a new much improved automated manufacturing process, which will not only be applied to our bike lock range, but will enable the development of complementary innovative security products over the coming years. One of the driving forces of this work is to create efficiencies which will ensure that we can continue to manufacture in the UK, create highly skilled employment and further develop our position as a premium innovator in global markets.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Nano Products Limited	PrintAblate: Offset printed and Laser Ablated Flexible Circuits - Materials and Processes	£408,355	£285,849
Harman Technology Ltd		£150,297	£90,178
M-SOLV Limited		£402,722	£201,361
Nottingham Trent University		£228,861	£228,861
Synergy Devices Limited		£160,094	£112,065

Project description - provided by applicants

The project objective is to develop and inetgrate new and sophisticated materials and processing techniques for which there is a latent demand in the healthcare and industrial markets where new low cost digitally connected flexible electrical circuits can give improved performance characteristics for technical and commercial advantage. Ultimately a high productivity and high profitability integrated manufacturing process will convert 2D nanomaterials into components which enable a broad range of unique novel life changing digitally connected lighting and sensor based products. Nano Products Ltd [NANO] will work with Harman Technology [HARMAN], Synergy Devices[SYN] and Nottinghsam Trent University [NTU] to create advanced ink formulations. NANO will print multilayers of ink on thin plastic sheet. Deposited layers will be patterend by M-SOLV [MSOLV] to define small regions with microstructured detail.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Teer Coatings Limited	Novel microwave plasma sputter deposition process providing enhanced durability coatings (NMPLAS)	£169,493	£84,747
Qioptiq Ltd		£55,307	£27,654
Helia Photonics Limited		£175,696	£122,987
University of the West of Scotland		£161,408	£161,408

Project description - provided by applicants

The NMPLAS project is focused on an innovation in the Materials and Manufacturing high growth sector and will apply a cutting edge and innovative, high throughput coating process - Microwave Plasma Assisted Sputtering (MPAS), to produce infrared (IR) transparent and hard, wear/erosion resistant coatings, which are themselves an innovation in materials development. The coatings will be applied on an expanded range of thermally sensitive and strategic substrates, which will initially be exploited in the optical and automotive high value manufacturing sectors, thereby opening up new sustainable business for the partners and increasing the UK's competitiveness, in addition to the transfer of techology to the industrial partners in the project (enabling a step-change in capability for an SME) and opportunities for future growth in capital equipment sales. This business-led project brings together three industrial partners from these sectors, Teer Coatings Limited (TCL), Qioptiq Limited (QUK) and the SME Helia Photonics Ltd (HPL), with the University of the West of Scotland (UWS), who have pioneered the MPAS process.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Carnaud Metalbox Engineering Ltd	REFORMAT 2	£706,045	£241,820
Computer Controlled Solutions Ltd		£140,274	£98,192
Senseye Ltd		£144,803	£101,362
The Manufacturing Technology Centre Ltd		£300,075	£300,075
Crown Packaging PLC		£205,000	£0

Project description - provided by applicants

As part of its drive to stay at the forefront of innovation as a leading Original Equipment Manufacturer in the can-making industry and to build upon work already done coupled with its recent innovative successes leading to awards for export, Carnaud Metalbox Engineering Ltd are seeking to test and demonstrate new equipment to make them more efficient and flexible, in order to meet the changing demands of their global customer base and consumers. By working with their partners in this project, CMB will also seek to accelerate their speed to market for new and innovative equipment.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Interface Polymers Ltd	Manufacturing process to produce additives with enhanced functional performance- Polarfin-Green	£483,560	£338,492
Loughborough University		£69,597	£69,597
University of Warwick		£103,431	£103,431

Project description - provided by applicants

Many high value crops around the world are grown in protective polytunnels made of polythene sheet (greenhouse film, GF), allowing control of temperature, humidity, ventilation and pests. This leads to dramatically increased crop yields, quality and efficiency while reducing the use of agrochemicals. Two key problems are condensation of water on the inside of the tunnel and precipitation collecting on the outside of the GF, both causing the formation of droplets. This â€œfoggingâ€• reduces the sunlight getting to the plants and also creates tiny magnifying glasses that cause burning. As a result, polythene sheet manufacturers use anti-fog additives in the polymer. These prevent the formation of droplets by dissipating the water. Interface Polymers Ltd will develop and manufacture a new range of anti-fog additives with improved longevity and performance leading to a new generation of better quality GF products and a commensurate increase in global agricultural productivity. Beyond this application, the new technology will also create impact in food packaging and construction industries; indeed, wherever we want to improve the surface properties or compatibility of a plastic material. Success will help us to realise our ambition of becoming a substantial UK based enterprise with global reach.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Toolroom Technology Limited	DIGI-TOOL	£258,488	£129,244
Mills Forgings Limited		£64,845	£45,391
ATS Applied Tech Systems Ltd		£208,845	£104,423
Hexagon AB		£144,169	£72,085
University of Strathclyde		£328,801	£328,801
Hybrid Manufacturing Technologies Ltd		£124,321	£87,025

Project description - provided by applicants

There is a large emphasis across the tool and die (T&D) sector to develop new methods which reduce cost, improve life and functional performance. The European T&D market is estimated at 11 billion USD per year and the UK spends Â£130m on closed die forging and sheet metal dies alone. These industries are made up of a large number of SMEs and adopting new methods require significant investment. The approach will develop an additive manufacturing digital framework which has cross sector applicability in all re/manufacturing applications and can be integrated with existing legacy machine tools, providing an affordable solution. The potential benefits are; rapid T&D re/manufacture (hybrid single platform); circular economy approach; gain on material utilization; saving on machine time; saving on consumable costs; lead time reduction; reduced energy consumption; improved performance. TTL (lead), Advanced Forming Research Centre, Hybrid Manufacturing Technologies, Hexagon and ATS Global will collaborate to achieve this. Mills Forging will provide an end user demonstrator case that will provide them with opportunities to be more competitive and diversify into different markets (automotive and aerospace) and employ staff in highly skilled areas.

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Branscan Limited	Manufacturing techniques based on intelligent control systems and sensors	£411,378	£287,965
Aston University		£196,936	£196,936
Warburtons Ltd		£49,305	£24,650

Project description - provided by applicants

Control of the quality and safety of the food during manufacturing processes is one of the key technical and commercial challenges in food manufacturing, directly related to productivity and competitiveness. The project aims to introduce innovative new manufacturing solutions in the food industry. Key for high consistency, high quality, high speed and large yield automation, multiple node, multi-mode quality sensing and controlling is the novel technique for safe-guarding the efficiency and quality of manufacturing processes, two facets of the process. We will use new photonic sensing technologies to develop flexible and fast quality control, making the manufacturing processes more efficient. The proposed novel photonic manufacturing control techniques require digital signal processing and data analysis, which is important part of the project. The proposed approach is applicable to manufacturing processes for foodstuffs, such as flour, bread and dairy and to industrial sectors handling powdered products, such as polymers. There is a promising business opportunity and the project leader â€“ Branscan Ltd is well positioned to take this opportunity and enable a step change in productivity and com-petitiveness of food industry with a clear public impact due to improved food quality and safety.

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EIGHT19 Limited	FIG - Flux Increasing Glass to enhance photovoltaic efficiency	£480,294	£336,206
Pilkington Technology Management Limited		£77,156	£38,578
University of Cambridge		£226,886	£226,886
Project description - provided by applicants			
The cost of silicon photovoltaics has fallen dramatically over the last 10 years to around 0.5$ per peak Watt of generating capacity and needs to fall further if grid parity is to be achieved but the efficiency of the best laboratory silicon cells has hardly increased during that period because, at 26% efficient, they are already well optimised and close to the theoretical efficiency limit of 29%. This project aims to develop a coating for solar module cover glass that is able to split photons of high-energy blue and green light into two infra-red photons. This increase in photon flux increases the amount of electricity generated, adding up to 4% to the efficiency of a silicon module of average efficiency and reducing the cost of the solar energy produced. The new materials technology that makes this possible has just been demonstrated to be feasible in a single-layer coating. In this project, the consortium aims to significantly improve the efficiency of the technology, to develop a process for coating it on glass and to show that it can remain operational after lamination to silicon solar cells.			

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Participant organisation names	Project title	Proposed project costs	Proposed project grant
Indestructible Paint Limited	Chrome Free Bond Primer System	£137,345	£96,142
Short Brothers PLC		£120,000	£60,000
Loughborough University		£125,981	£125,981
Poeton Industries Ltd		£37,769	£22,661

Project description - provided by applicants

Industrial sectors including aerospace, automotive & defence rely heavily on adhesive bonding for structural strength & lightweighting, reducing the need for riveting & welding. Bonding systems for aluminium alloys comprise surface pretreatment, bond primers & structural adhesives. The state-of-the-art surface treatment & bond primers used in the aerospace industry incorporate chromium as a corrosion inhibitor. However, the chromium used is toxic, carcinogenic and mutagenic and will be banned from use from January 2019 under REACH legislation. Chrome-free alternatives need to meet the very high demands of the aerospace industry for adhesive strength or corrosion resistance. The consortium of Indestructible Paint (specialist coatings manufacturer), Loughborough University (Materials Department, Surface Technology), Bombardier Aerospace & Poeton Limited (Tier 1 supplier of surface treatment to industry) will collaborate to develop and test bond primer formulation & process innovation with the objective to develop an optimised bond primer system meeting aerospace industry specification requirements.

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Oxford Space Systems Limited	Development of Novel Antenna Reflector Surface Material and Manufacturing Processes	£368,108	£257,676
In-Space Missions Limited		£32,218	£22,553
Nottingham Trent University		£111,511	£111,511
Project description - provided by applicants			
Oxford Space Systems (OSS) is a multi-award winning early-stage technology business which is commercialisation a new generation of deployable structures for the global space industry. Although an essential part of many geostationary telecomms satellites - and predicted to form a critical part of a large number of low earth orbit microsat satellite contellations - Europe currently does not have a flight-proven and commercially available deployable reflector antenna. The EU relies upon the USA for all flight hardware and suffers cost penalties and technical restrictictions as a result. OSS will develop and characterise a highly innovative reflector surface material, together with new manufacturing processes, intended to provide a disruptive and cost-competitive UK alternative for the space sector. This novel antenna surface material will permit OSS to offer a cutting-edge UK product to the global space market: an antenna that is lighter, less complex and lower cost than those in current commercial demand.			

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Biome Technologies plc	Scale-up and commercial evaluation of the manufacture of bio-based FDCA from HMF	£621,887	£435,321
University of Liverpool		£163,251	£163,251
University of Leeds		£51,917	£51,917
Project description - provided by applicants			
The environmental and social concerns surrounding the use of fossil fuels and food crops make lignocellulose a challenging but compelling target source of high value chemicals. Previous and ongoing IB Catalyst studies undertaken by Biome, the Centre for Process Innovation (CPI) and the Universities of Leeds, Liverpool and Warwick have demonstrated the feasibility of bioprocesses from lignocellulose to polyester pre-cursors. This project will seek to develop a continuous, pilot-scale enzymic process to produce a high purity polyester pre-cursor and convert it into a suite of highly functional polyesters. The work will be undertaken by a consortium of Biome Technologies Ltd and the Universities of Liverpool and Leeds. We believe that the project has the potential to advance the UKâ€™s knowledge and commercial position in the field of advanced bio-based materials.			

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Antich & Sons (Huddersfield) Ltd	FABFORM - Novel technology to transform fabric into net shape carbon fibre preforms	£486,441	£291,865
University of Sheffield		£202,089	£202,089
Project description - provided by applicants			
3D weaving of carbon fibre has been proven as a cost-effective method for producing high quality, large scale, high thickness laminates for use with liquid resin injection processes to produce light-weight composite materials for a variety of industries. However, to create composite preforms for use in the automotive and aerospace industries, a number of additional processes are key to enabling wide spread adoption of the technology. This project therefore focuses on the development of additional processes to create variable thickness, stabilised near net shape preforms and allow a UK SME, Antich & Sons, to move beyond the current state of the art. These preforms will allow efficient use of material within the component, be more easily handled and transported and be the correct size and shape to drop into the moulds used for injection of the composite matrix resin. The developments allow a significant step up the value chain by moving from a weaver of fabric to a manufacturer of advanced composite preforms which are ready for the next step in the manufacturing process.			

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