Haydale Graphene Industries plc
("Haydale" or the "Company")

Collaborative research project funded by the National Aerospace Technology Exploitation Programme

Haydale (AIM: HAYD), the group focused on the commercialisation of graphene and other nano particle products using their proprietary plasma process is pleased to announce its composites division, Haydale Composite Solutions Ltd ("HCS"), has entered into a collaborative 18 month research project awarded and managed by the National Aerospace Technology Exploitation Programme ("NATEP"). The project involves two end users; Airbus UK and BAE Systems Plc. Collaborating in the project are Cobham Plc (lightning strike advice and testing), SHD Composites Ltd (carbon fibre reinforced epoxy resin pre-impregnated fabric supplier) and HCS (supplier of functionalised graphene enhanced epoxy resins). NATEP are providing a grant of up to £150,000 towards the £300,000 cost of the research project, of which HCS will receive up to £100,000.

Carbon fibre composites are used extensively in aircraft applications such as fuselages, leading edges and wing surfaces. However, because the carbon fibre reinforced epoxy composite materials are poor conductors of electricity they are prone to damage from lightning strike. This has led to aircraft companies incorporating copper or aluminium meshes into the composite materials which add significant weight and cost.

The electrical conductivity of graphene enhanced composites has already been established. The aim of this project is therefore to develop highly electrically conductive epoxy resins through the addition of functionalised graphene which, when combined with conductive carbon fibre, is expected to result in a highly conductive carbon fibre reinforced epoxy composite material capable of withstanding lightning strike in its own right. The development of such a material would result in safer aircraft, weight and cost savings from the elimination of the expensive metallic meshes as well as eliminating time associated with integrating the meshes into the structure.

Gerry Boyce, Managing Director of HCS said:

"The ability to develop electrically conductive epoxy resins by incorporating alternate forms of graphene functionalised by our proprietary HDPlas® process is a great opportunity for us. We are very excited about developing highly conductive carbon fibre reinforced epoxy composite materials and structures which require no additional parasitic lightning strike protection. The ability to add graphene to change one of the fundamental characteristics of the base resin, in this case, electrical conductivity, is a most important development for composite engineers and could lead to a whole new generation of graphene enhanced composite materials."

Ray Gibbs, Haydale Chief Executive added:

"At the beginning of June we announced the appointment of Ebbi Shahidi and Quentin Fontana to develop our aerospace division within HCS and I am very pleased with this early, significant development. The support of NATEP is very welcome as it will accelerate our research in this area and enable us to collaborate with leading aerospace companies to develop new materials and structures at the forefront of emerging technology."

Bridget Day, NATEP Deputy Programme Director commented:

"We are delighted to welcome Haydale into the NATEP programme. It is particularly pleasing to assist them with a practical application that uses the exciting properties of graphene in the aerospace industry. We see this as having a high potential for jobs growth and exports. NATEP is a £40m programme helping UK supply chain companies develop 100 novel technologies. It will also enhance UK supply chain capabilities and networks and enable them to deliver high added value to future aerospace products and services and increase their ability to win new business with higher tier companies anywhere in the world.

NATEP is being implemented by the UK's national aerospace strategy body, the Aerospace Growth Partnership, and includes £23m from the government department responsible for business, through its Advanced Manufacturing Supply Chain Initiative fund, this fund is administered by Finance Birmingham. It is also sponsored by leading UK aerospace primes and Tier 1s: Airbus, Bombardier, GKN Aerospace, Rolls-Royce and Spirit.

NATEP builds on the successful regional Aerospace Technology Exploitation Programme (ATEP) run by the Midlands Aerospace Alliance, MAA, from 2006-12, by turning ATEP into a four-year national programme. MAA have supported Haydale with their project application and will continue to support them through the life of the project."

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About Haydale (www.haydale.com)

Haydale has developed a patent pending proprietary scalable plasma process to functionalise graphene and other nanomaterials. This enabling technology can provide Haydale with a rapid and highly cost efficient method of supplying tailored solutions to enhance applications for both raw material suppliers and product manufacturers.

Functionalisation is carried out through a low pressure plasma process that treats both organic mined fine powder and other synthetically produced nanomaterial powders producing high quality few layered graphenes and graphene nano platelets. The process can functionalise with a range of chemical groups, where the amount of chemicals can be tailored to the customer needs. Good dispersion improves the properties and performance of the host material and ensures it delivers as specified.

The Haydale plasma process does not use wet chemistry, neither does it damage the material being processed, rather it can clean up impurities inherent in the raw material. The technology is a low energy user and most importantly environmentally friendly. The Haydale method is an enabling technology where working with a raw material producer can add value to the base product and tailor the outputs to meet the target applications of the end user.

Haydale, based in South Wales, housed in a purpose built facility for processing and handling nanomaterials with a laboratory facility, is facilitating the application of graphenes and other nanomaterials in fields such as inks, sensors, energy storage, photovoltaics, composites, paints and coatings.

About Haydale Composite Solutions (HCS)

Haydale Composite Solutions is a recognised composite R&D and testing house, based in Loughborough. HCS customers include significant corporations such as National Grid, SSE, Eirgrid, Chevron, Anglian Water, Severn Trent Water, Yorkshire Water and 3M.

HCS has developed a reputation for delivering innovative solutions in the commercial applications of advanced polymer composite materials working with global companies over more than 20 years. EPL is focused on a range of market sectors including pipe lining for the oil, gas and water industries, infrastructure for electricity and energy sectors plus the marine and transportation markets.

HCS competence spans the entire development cycle from applied research, product design, process development, product testing and certification, to setting up manufacturing plants. EPL also works with OEMs and end-users to develop and provide composite solutions with demonstrable clear technical, economic and environmental benefits over existing structures currently manufactured in traditional materials such as steel, aluminium, wood or concrete.

About Midland Aerospace Alliance (http://www.midlandsaerospace.org.uk/atep)

New technology developed with the help of the MAA's Aerospace Technology Exploitation Programme (ATEP) is already entering the aerospace supply chain. The great success of the 11 ATEP technology projects for aerospace supply chain companies -- coupled with the unique way ATEP was designed as a programme to fit the aerospace industry's requirements -- led the UK government to launch a national version, NATEP, to support 100 new projects between 2013 and 2017.