Project Overview

Stellar Project: Selective Tape-Laying for Cost-Effective Manufacturing of Optimised Multi-Material Components

The aim of the Stellar project is to develop the manufacturing process for high-speed placement of carbon, glass and polymer fibre reinforced matrices, in selected locations in a composite structure, to provide the optimum reinforcement, weight and cost profile within a part.

The concept of this project is to develop the design methodologies, manufacturing processes, equipment and control systems needed for localised placement of different fibre-reinforced thermoplastic composite tapes onto different substrates, creating locally reinforced components that are fully weight-optimised.

To achieve this, the project will focus on development of the Automated Tape Laying (ATL) process to selectively place reinforced thermoplastic tapes in 3 manufacturing routes:

• Selective reinforcement of existing components
• Direct additive manufacture of components
• Manufacture of selectively reinforced tailored blanks for compression moulding

The manufacturing process developed will have a significant effect on the weight of structures, as for the first time it will allow different reinforcement fibres (polymer, glass, carbon) to be used synergistically in the same thermoplastic polymer matrix, to produce hybrid multi-material structural components with optimised performance and weight.
You are invited to become a member of the Stellar project Industrial Stakeholder Group

Stellar is a collaborative three year project part-funded by the European Commission. It has partner organisations from six European countries and will develop manufacturing processes for high-speed placement of carbon, glass and polymer fibre reinforced matrices.

The Industrial Stakeholder Group will provide a forum for two-way discussion. Stakeholder Group members will receive advance information about the new technologies and the ability to steer the project outcomes, while consortium partners will receive external feedback and commercial perspectives on their developments.

Join and Influence Outcomes

The Stakeholder Group will have the opportunity to meet with the consortium partners at several workshops throughout the duration of the project as well as participating in active discussions on the project’s professional LinkedIn group.

Stakeholder Group Members will:

• Receive the latest updates on project progress, including development of new materials and technologies.

• Have the opportunity to steer the project outcomes to be industry-relevant.

• Provide feedback and commercial perspectives on the project.

To become a Stakeholder Group Member, please visit www.stellar-project.eu/isg
NetComposites Ltd was established in 2000 in Chesterfield, UK, initially as a news and information portal for the composites industry. Since then, the company has grown year-on-year, its activities broadening to include applied research and development, conferencing and training.

Today, NetComposites remains a privately-owned company with around 25 staff (including 8 PhDs) and a well-equipped development centre. Its online presence is now divided between “NetComposites Enterprise” or its commercial service offerings, and “NetComposites Now” for its news and information services.

NetComposites also has a sister company, Composites Evolution, which sells the materials developed by NetComposites. Composites Evolution’s current products include the Biotex range of natural fibre reinforcements, and Ecopreg bio-based prepregs.

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Toyota Motor Europe (TME) oversees the wholesale sales and marketing of Toyota and Lexus vehicles, parts and accessories, and Toyota’s European manufacturing and engineering operations. Toyota directly and indirectly employs around 80,000 people in Europe and has invested over €7 billion since 1990.

In 1987, Toyota Motor Europe established a Technical Centre in Zaventem (Belgium). The centre was expanded in 2006 and now has approximately 600 employees. The centre is the headquarters for Toyota Motor Europe’s Research and Development, Production Engineering, Evaluation and Certification, and Vehicle Prototyping activities.

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HBW is a medium sized full-service provider with several branches in the greater area of Nürnberg., Germany. Its know-how is in the design, development and manufacturing of plastic parts and assemblies for the automotive and consumer electronics industry, as well as technical parts for other consumer goods and optical fibres. It also covers the production of stationery, drawing instruments and plastic in medical technology.

HBW’s capacities in tool making, mould construction and injection moulding, including installation with its own designers and engineers, enable it to provide full service from the concept through to the product from one source.

HBW’s high flexibility makes it possible to reduce development times and cost. Combined with a broad problem oriented customer support, it provides the basis for high customer satisfaction. All of which is rewarded by the longtime faithfulness of our customers.

Its special excellence is providing knowledge and consequently coordinated proceedings throughout every stage of the development and manufacturing. Therefore it is possible for it to operate cost-efficiently in the market.

The task of the design department is to realise the customer’s ideas with CAD systems.

Using FDM- (Fused-Deposition-Modeling) as well as STL-procedures and milling technology, prototype parts are manufactured. If the prototype parts are needed in original material, HBW provides prototype moulds.

Generating series moulds and the production of series parts, plus product-related services complete its range of products.

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AFPT was founded to develop an automated, human and environmentally friendly process to produce reinforced composites as an alternative for traditional thermoset composites. Its Automated Fibre Placement (AFP) Technology is focused on processing thermoplastic composites. By using the laser as heat source, the in-situ consolidation technology enables a reliable and efficient process for industrial composite production.

AFPT’s tape placement systems are offered in several configurations, optimised according to customer specification. Whether it is for R&D or industrial applications, the online process parameter control and data acquisition allows a complete traceable manufacturing process, which is essential for a precise quality control.

Typical tape placement applications are aerospace parts or locally reinforced flat or curved panels. Typical winding applications are pipes, tubes, seals, bearings and pressure vessels (CNG, H2).

AFPT operates from its well equipped technical centre near Koblenz, Germany, where it is able to support its customer’s product development with prototype and small scale manufacturing.

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CGTech is the developer of VERICUT CNC simulation, verification and optimisation software.

VERICUT simulates all types of CNC machining, including multi-axis milling, drilling and trimming of composite parts, water jet cutting, robotic and mill/turn machining. VERICUT runs standalone, but can also be integrated with leading CAD/CAM/PLM systems including Dassault Systemes CATIA, Siemens PLM NX CAM, Delcam PowerMill, Vero EdgeCAM, Open Mind hyperMILL, DP Esprit and Missler TopSolidCAM.

CGTech also offers programming and simulation software for Automated Fibre Placement (AFP) composites layup machines including robots. VERICUT Composite Applications suite includes VERICUT Composite Paths for Engineering (VCPe), VERICUT composite Programming (VCP) and VERICUT Composite Simulation (VCS).

VCPe gives a composite part designer, mechanical engineer or process engineer access to the same software tools NC programmers use to create NC program paths that are subsequently used in the workshop to lay-up a composite part.

VCP reads CAD models of the layup tool and ply boundary information that defines the laminate or ply stack and creates motion paths that add material and fill each ply boundary according to the user’s engineering requirements and manufacturing standards.

VCS reads CAD models and NC programs, either from VCP or other composite layup path-generation applications, and simulates the sequence of NC programs on a virtual machine. Material is applied to the layup form via NC program instructions in a virtual CNC simulation environment.

As part of the Stellar project, CGTech is configuring its Composites Applications Suite to provide a virtual environment for programming and simulation of the Automated Fibre Placement head in a multi robot cell.

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ESI is a world-leading provider of Virtual Prototyping software and services with a strong foundation in the physics of materials and Virtual Manufacturing.

ESI has developed a unique proficiency in helping industrial manufacturers replace physical prototypes by virtually replicating the fabrication, assembly and testing of products in different environments.

Virtual Prototyping enables ESI’s clients to evaluate the performance of their product and the consequences of its manufacturing history, under normal or accidental conditions. By benefiting from this information early in the process, enterprises know whether a product can be built, and whether it will meet its performance and certification objectives, before any physical prototype is built.

To enable customer innovation, ESI’s solutions integrate the latest technologies in high performance computing and immersive Virtual Reality, allowing companies to bring products to life before they even exist. Today, ESI’s customer base spans nearly every industry sector.

ESI Virtual Composites Manufacturing solution is a unique Finite Element (FE) simulation chain for the manufacturing of parts made of continuous fibres (Carbon or Glass fabric, Unidirectional or Non-Crimp-Fabric) and a thermoset or thermoplastic matrix. The solution is composed of three main applications that are PAM-FORM, PAM-RTM and PAM-DISTORTION.

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The Montanuniversität Leoben is well-known as one of the best Universities in Austria and undertakes high-quality research in a wide range of technological areas. This means that the different research areas are mainly focused along the “added value chain”, from the extraction of raw materials and their preparation, material & product development, production processes, manufacturing, building components/plants up to recycling and deposition.

Services of Montanuniversität Leoben embraces R&D for SMEs, industry and public institutions. Additionally it participates in setting-up of national competence centres, research studios as well as taking part in a high number of national, European and international research projects.

LVV’s mission is the development of manufacturing technologies for the production of fibre reinforced polymeric materials.

More than 25 people are employed at LVV. 580 m² of laboratory space offers full size processing techniques and specially developed test rigs for experimental research delivering application near results.

Within the Stellar project, MUL-LVV is mainly working on studying the effects of multi-material interfaces gained during selective tape-placement.

Furthermore, together with ESI-Group, MUL-LVV is working on modelling and simulating the consolidation process.

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The Fraunhofer Institute for Production Technology develops system solutions for production. IPT focuses on process technology, production machines, mechatronics, production quality and metrology as well as technology management.

Clients and partners of Fraunhofer IPT represent all fields of industry: from aerospace technology to the automotive industry and its suppliers, as well as tool and die making companies and the precision mechanics, optics and machine tool industries in particular.

The Department of “Fibre-reinforced plastics and laser system technology” aims to meet the increasing industrial demand for fibre-reinforced lightweight components by developing production processes and systems for the automated manufacturing of lightweight fibre-reinforced thermoset and thermoplastic components.

Its research, development and service activities include design of fibre-reinforced plastic (FRP) components and manufacturing of prototypes.

IPT also develops customised production machines/systems for tape placement, winding, thermo-forming and pultrusion processes as well as innovative gripper systems for handling semi-finished FRP parts.

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