

Streamlining adoption of high-speed and high-resolution surface texturing delivered with the Prometheus project

This three-year program brings together leading research and industrial organizations to allow the broad manufacturing of materials with low-friction, oleophobic and hydrophobic properties

Porto Salvo, April 3rd, 2019 – Prometheus' project will bridge the existing gap between niche and mainstream applications for high power ultra-short pulse laser surface processing. This advanced technology enables the production of materials with advanced properties such as non-stick, low wear/friction, oleophobic or hydrophobic, but through this unique project will deliver a broad range of surface functionalities onto metals, polymers and ceramics by way of high throughput, high spatial resolution Direct Laser Interference Patterning (DLIP) surface processing. It is expected to deliver unprecedented surface texturing speeds of up to 5 m²/min and enable high resolution features down to 1 µm to be produced with minimal heat impact on work pieces. This ambitious project represents a pan-European EU consortium of world leading organizations, from industrial and research partners to four manufacturers – Maier, Johnson and Johnson, Fiat Chrysler Automobile group and Arcelik – that will be able to assess the project's outputs against current industrial processes. Wrapping up the three-year project, and through breakthrough developments in laser sources, optics, process setup, control and monitoring, the consortium will deliver an integrated laser processing demonstrator system to showcase its capabilities according to the established goals.

Beyond the expected improvement on accuracy, the Prometheus project qualitative objectives include better resources utilization from raw materials to energy and waste. It is also expected a quantum leap on the speed of materials' processing, as mentioned, by reaching 2-5 m²/min, while also minimizing heat impact on sensitive materials. The project aims to achieve improved flexibility and allow for a simpler product customization – all of this at a fraction of existing solutions' cost. The case studies being developed include a dishwasher, a tumble dryer, a cylinder piston liner, and high strength aluminium pressing for automotive.

The unique ability of this technology to deliver precise periodic arrays of surface features at an unprecedented processing rate will contribute to its entrance into mainstream manufacturing processes, from its current usage in niche ultra-high value applications. The DLIP (Direct Laser Interference Patterning) technology enables the full utilisation of the high-power laser systems delivering profound productivity gains versus current technologies. Also, by being digital by default, the system enables rapid reconfiguration to deliver customised surface functionalities and patterns on a component by component basis.

Keeping Europe at the core of innovation and environmental leadership

This unique project will bring to light a high potential high power ultra-short pulse laser processing system. Prometheus will address some of the key European 2020 societal challenges, both by ensuring that European companies and research organizations stay at the leading edge of the new

manufacturing technologies and by creating new jobs opportunities. At the same time, the project will minimize environmental impacts.

Prometheus will also contribute to support the goal of increasing investment in innovation up to 3% of the EU's GDP. The new approaches to surface engineering made possible by this technology will have an impact on the increase in R&D spending, both in photonic component development necessary to control the increased power densities and in widespread application development.

The exceptionally high processing rate enables cost-effective processing to price-sensitive industrial sectors such as the consortium partners, spanning automotive, fast-moving consumer goods (FMCG), white goods and consumer durables. The effect will also be felt on the overall value chain, given the expected technology transfer and training across manufacturing sectors, as it becomes mainstream.

Project partners

EWF	Managing the International System for Training, Qualification and Certification of both welding personnel and companies using welding, in Quality, Environment, Health and Safety for more than 25 years
APL	ANDRITZ Powerlase is an innovative, independent, high power laser design and manufacturing company, focused on powerful picosecond and nanosecond high energy Diode Pumped Solid State lasers.
HOLO-OR	"Holo/Or- design and manufacture of Diffractive High Power Beam Shaping optics"
VISUM	IRIS is an advanced engineering company that brings process optimisation solutions to manufacturing
PHOT	Photonics Innovation Hub composed of a Research and Technology Organisation expert in the production of specialty optical fibres, components and biophotonics and a business cluster gathering more than 100 members in the field of Photonics.
PRIMA	Prima Power is a leading specialist in machines and systems for sheet metal working. Offering in this field is one of the widest and covers all applications: laser processing, punching, shearing, bending, automation.
JJVC	Johnson & Johnson, incorporated on November 10, 1887, is a holding company. The Company and its subsidiaries are engaged in the research and development, manufacture and sale of a range of products in the healthcare field. The Company operates through three segments: Consumer, Pharmaceutical and Medical Devices, and its primary focus is on products related to human health and well-being. The Company has over 230 operating companies, operating in 175 countries.
ARÇELİK	Having operations in durable consumer goods industry with production, marketing and after-sales services, Arçelik offers products and services around the world with its 30,000 employees, 18 different production facilities in 7 countries, its 34 sales and marketing companies in 32 countries all over the world and its 11 brands (Arçelik, Beko, Grundig, Blomberg, ElektraBregenz, Arctic, Leisure, Flavel, Defy , Dawlance and Altus) serving products and services in more than 145 countries.
MAIER	MAIER is one of the leading decorated plastic component supplier for the automotive industry, with up to 3,000 employees in 8 countries with global sales around 360 M€, being part of the biggest co-operative group in the world (global sales above 13,200 M€ and a workforce above 82,000

	employees)
CRF	Centro Ricerche Fiat is one of the main private research centres in Italy, with the mission to develop and transfer innovative products, processes and methodologies in order to improve the competitiveness of the products of the Fiat Group.
MTC	Delivering ground-breaking solutions from core manufacturing techniques, through to embedding and implementing the future technologies that will be integral elements of the fourth industrial revolution.
IWS	The Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Dresden stands for innovations in laser and surface technology by offering one stop solutions ranging from the development of new processes to implementation into production up to application-oriented support
AIMEN	AIMEN is an Innovation and Technology Centre highly specialized in materials and in advanced manufacturing technologies, especially joining technologies and laser technologies applied to materials processing, robotics and automation.
TWI	TWI Ltd (TWI) is one of Europe's largest independent RTOs, specialising in all aspects of materials joining and associated technologies.



PROMETHEUS project has received funding from the European Union's H2020 program: Photonics-based manufacturing, access to photonics, datacom photonics and connected lighting.