PROMETHEUS
RAPID ULTRA-SHORT PULSE LASER SURFACE TEXTURING TECHNOLOGY

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PROMETHEUS Events

The **PROMETHEUS project** has reached **month 48 of its life!** During the last semester of 2022, PROMETHEUS **consortium** met on 2 dates.

First on the **29th and 30th of June** in Coventry, at the Manufacturing Technology Centre (MTC), where the installation, shipment and final validation of the machine were discussed! The **training guideline** on surface texturing was reviewed and learning outcomes were discussed among the partners.

On the **29th and 30th of November**, the consortium met again in Cambridge, at The Welding Institute (TWI) facilities.

The **results of the case studies** were shared and it is proving the impact of laser surface texturing in products such as **combustion engine pistons, dishwashers or stamping tools**. The other focus was to define how these results can be made public for the last **6 months** of the project.

The PROMETHEUS project was also presented at the **75th IIW Annual Assembly and International Conference,** between the 17th to 22nd of July 2022, held in Tokyo, Japan.

The article **"Impact of Laser Surface Texturing in the increase of energy efficiency in the white goods sector"** was presented in Commission IV dedicated to Power Beam Processes.

This was a **great opportunity** to present the project at an international level.

Training Activities

During 2022, partners have conducted **training activities** focused on different topics. **Fraunhofer IWS** went to PRIMA to **integrate** the optical path from the EW laser to the DLIP module and optimize the DLIP pattern by adjustment of the **optical telescope** and **DOE**. This enables the operation of the DLIP setup in the PRIMA machine and allows **some testing** to be performed.

The **training focused** on optical adjustment to improve the quality of the pattern and on optical adjustment and **DLIP software** to change the structure period. A **second training** activity was also conducted for the MTC partner delivered by **Fraunhofer IWS** and **PRIMA**.

It also took place at **PRIMA's facilities** focusing the training on:

- Laser system hardware components and DLIP module (mechanical and electrical);
- System safety;
- System control software;
- Optics adjustment to improve pattern quality;
- DLIP software to change structure period;
- Fault finding and diagnosis.

PROMETHEUS Machine

The **activities** of the **final integration** consisted of:

- Installation of the prototype and Verification of functionality;
- Ground installation of the Edgewave laser source integrated with Thermotek heat exchanger and chiller;
- Installation of the laser source, optical chain and shelters on the machine;
- Machine laser interface and safety loop;
- Remote and manual control signals with pulse time control and remote button for "Single Pulse Emission";
- Installation of new interior lighting with selector;
- Installation of DLIP head and its alignment and preliminary tests with Fraunhofer and Prima personnel.

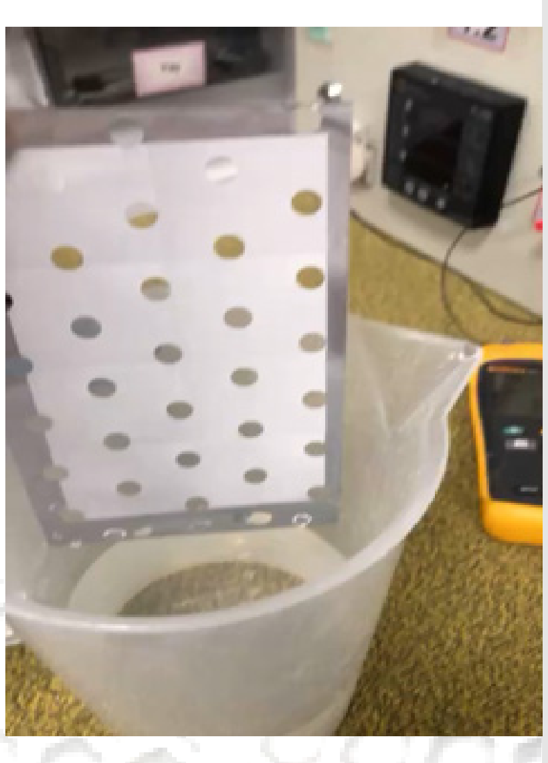
The **Head Alignment** has been achieved with **success** nevertheless more tests **were conducted** to test the power **distribution**.

The **PROMETHEUS Machine** has arrived at **MTC facilities**! Now the final tests will be conducted to **finalise** the ultimate details.

Case studies

Arçelik case study:

The **latest results** from the Arçelik **case study** are:



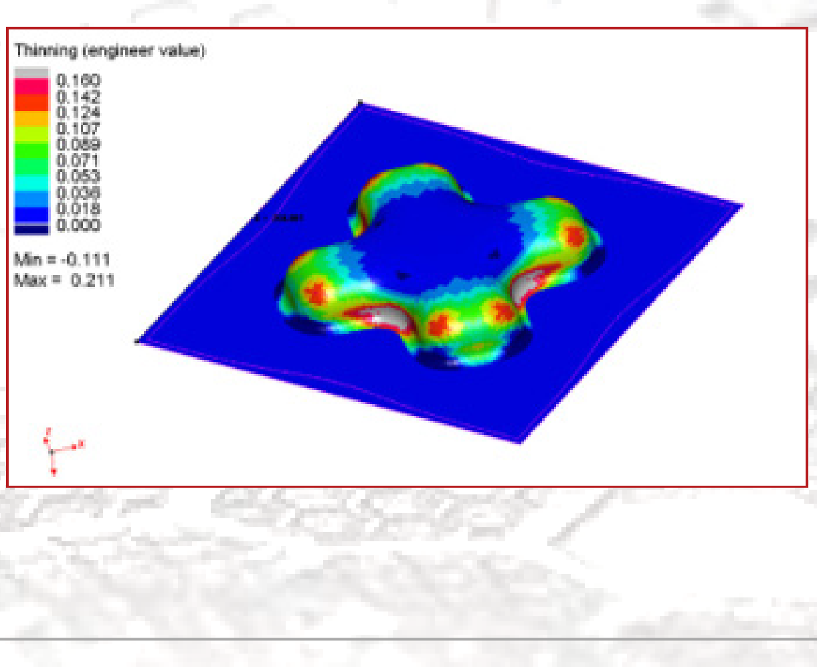
- Reduction of energy consumption considered the hydrophobic surfaces made by the laser surface texturing;
- On the Dryer case study, the evaporator tests are being conducted: 12 samples drilled and not textured and 12 samples drilled and textured to compare performances;
- During the next months, more corrosion tests will be conducted.

Maier case study:

- Maier case focus on laser texture to apply on exterior chrome trim;
- The part used is a conceptual prototype, similar to a real part, to have the possibility to present the technology to different customers.

CRF case study:

- The aim of the cylinder liners case study was to reduce friction & reduce oil consumption. From the tests, it was observed that for higher pressures, the coefficient of friction is highly reduced (for dynamic loads);
- The 2nd case study for CRF is related to the stamping tool, where the aim is to avoid the use of lubricant (or reduce its usage); in this case, cross dies were produced at CRF and textured in MTC, finally the tests conducted at CRF (hydraulic press). There is also an ongoing investigation regarding new materials for the tool. A comparison between a conventional blank holder and two textured ones using the PROMETHEUS approach will be conducted. To assess the tool wear, destructive tests will be conducted as well as direct observation of the surface of the blank holder and formability of Al alloy sheets.



Coming Soon

The **PROMETHEUS project** has 6 more months ahead! It is time to prepare everything to **finalize the project** and deliver the **machine** to the market!

During these **final months**, the final tests will be conducted as well as the discussions between all partners to **define the strategy** to deliver the PROMETHEUS machine to the market. The impact of the technology is a high asset of the project and **everything** will be set for the **final conference** in June!

There is no date yet defined but **sooner or later** it will be announced! **Don't miss the opportunity!**

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