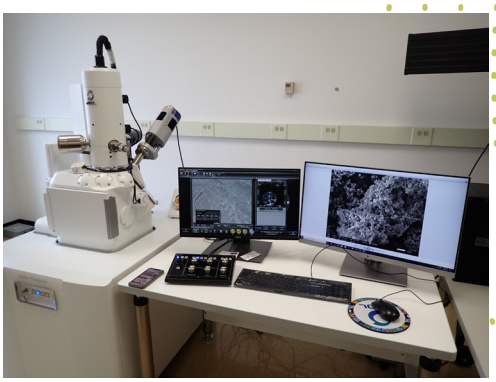
STAM

The LightMe project is funded by the European Commission, with 13 partners across Europe. LightMe aims to set up a self-sustainable open innovation ecosystem for the upscaling of industrial processes concerning lightweight metal alloys (aluminum, magnesium and titanium) composites from TRL 4 or 5 to TRL 7.

Monitoring and control are essential in any process to make sure the expected quality is reached. A number of monitoring techniques exist when it comes to characterizing structures in the nano and micro-metre ranges including **SEM** (scanning electron microscopy) and **AFM** (atomic force microscopy). Fourier transform analysis of the SEM images has been used to quantify the periodicity of the structures. This approach enables a global value of spatial period to be quickly calculated, rather than estimating line thickness and spacings line by line, and generating a mean value, which is a more laborious process.



SEM (scanning electron microscopy)

However, most commonly used techniques at this dimensional scale are in fact implemented off line and require sample preparation. Optical techniques offer the best opportunity for inline process monitoring, as they are non-contact, non-destructive and can be applied to samples as they are, without pre-treatment.

In pilot lines, the selection of optimal input parameters for a given output is usually done manually through a trial error method. We plan to work on automation of the production parameters.

We implemented a **Machine Learning (ML)** in LightMe to make calibration of production parameters more automatic, faster and easier than the existing practices (manual, empirical).

The goal of developing machine learning techniques in the **LightMe project** is to optimise the parameters and settings during production processes thus identifying the control requirements to automatize corrections in real time.

The contribution of STAM in the LightMe project aims to validated processes and tools for on-line quality monitoring and control. In particular, during LightMe project, quality control and process verification systems have been coupled with innovative automated tools to increase the process control and ensure the required productivity as well as monitoring the quality of materials and products in the pilot lines.

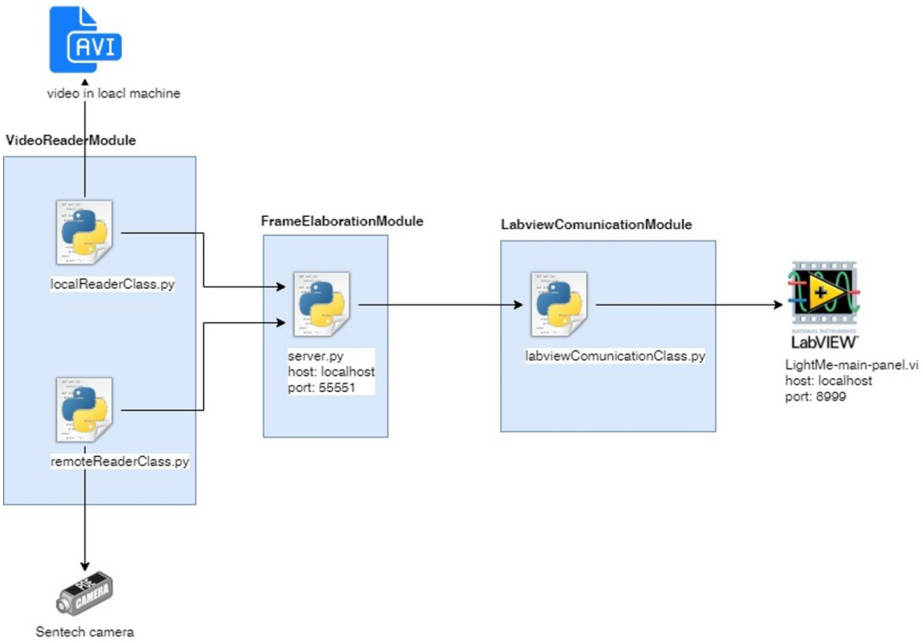
STAM followed particularly the **IRIS pilot**.

Process monitoring, and control have been upgraded in all the Pilot Lines, using user-friendly control systems, assuring the remotely monitored control and the continuous and safe operation of the processes.

Co-funded by the Horizon 2020 programme of the European Union. This project has received funding from European Union's H2020 innovation programme under the grand agreement number 814552.

STAM work was to optimize the melted pot of the IRIS pilot trough an Artificial intelligence model trough Size Analysis, Temperature analysis and Laser power analysis and control.

The system architecture is visible on the image below.



Monitoring and control systems promoted the ability to suppress external disturbances and assess the status of the processes with the use of sensor measurements and artificial intelligence systems. This led to reliable results with low variability, consistent cycles that will provide predictable material structures and therefore higher repeatability and quality standards in other contests.

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