Localization:
Aix en Provence

Additional information:
Position available from: **April 2023**

Unit of assignment: The Mechanical, Surface, Materials, and Processes (MSMP) Laboratory

Project Name: MARS
Funding: Horizon Europe
Possible co-supervision: No

Type of contract: Doctoral contract

Our recruitments are based on skills, regardless of origin, age, or gender and all our positions are open to people with disabilities.

Title of the doctorate: Docteur Arts et Métiers HESAM- engineering sciences and professions
Teaching: No
Contract duration: 36 months
Work quota: Full-time

Attachment to a standard position: PhD student

Application:
to be sent by email to
jecandidate@ensam.eu

Dr. El Mansori (mohamed.elmansori@ensam.eu) or Dr. Knoblauch (ricardo.knoblauch@ensam.eu).

Date of publication: 01/03/2023

Reference Place of public employment:

Application deadline: 01/04/2023

PhD position: Proactive Quality Control of machining inside Horizon European Project MARS

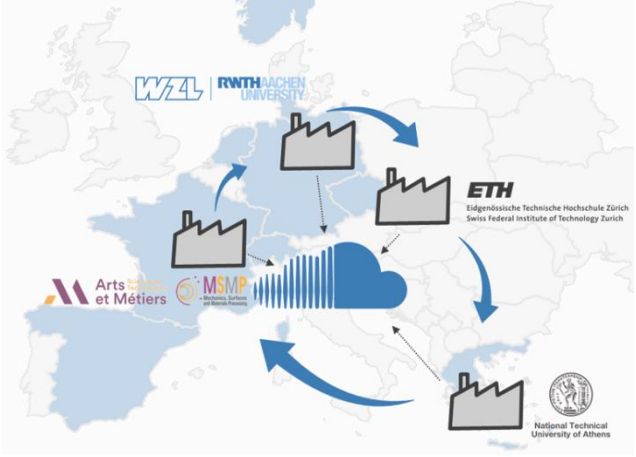
Main scientific field: Machine learning for machining process

About Arts et Métiers

ENSAM is a traditional engineering/research graduate school (Grande École), recognized for leading French higher education in the fields of mechanics and industrialization. Founded in 1780, it is among the oldest French institutions and is one of the most prestigious engineering schools in France. The school is a "Public Scientific, Cultural and Professional Institution" which has trained more than 85.000 engineers since its foundation.
The Mechanical, Surface, Materials, and Processes (MSMP) Laboratory is at the ENSAM campus located in Aix-en-Provence, France. The city is located in the region of Provence-Alpes-Côte d'Azur, close to the Mediterranean Sea in the south of France, a fact that gives it a warm climate with an average of 300 days of sunshine per year.

Workstation environnent:

Under the scope of the Horizon European project MARS: Manufacturing Architecture for Resilience and Sustainability, the MSMP Laboratory hosted by the École Nationale Supérieure d'Arts et Métiers (ENSAM) offers a PhD position. The PhD candidate will be part of a very ambitious project that offers the opportunity to work with 7 European high-tech companies (STIL/France, Ubitech/Greece, ARXUM/Germany, Konica Minolta/Czechia, Noosware/Netherlands, Simula/Norway, AIN/Spain) and 4 worldwide renowned Universities: Texas A&M, ETH Zurich, RWTH and NTUA.



Thesis/research topic :

The European manufacturing industry is majorly composed of SMEs, and they could take advantage of digitalization to join the world's competitive market. As economic, sanitary, and societal

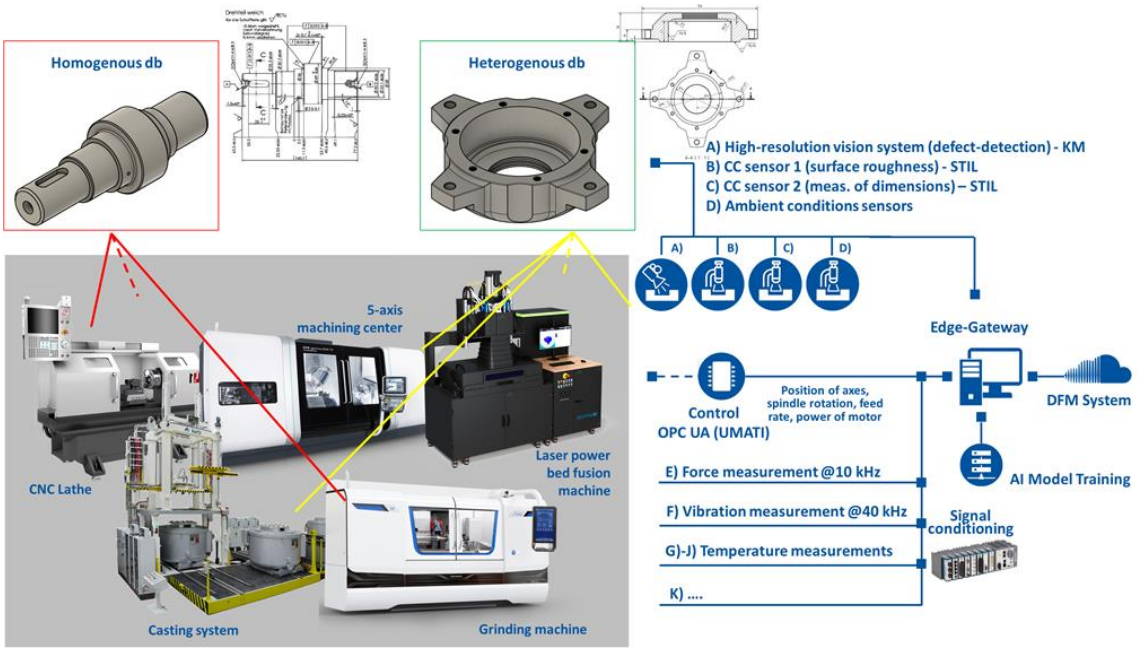
crises take place more often than usual, supply chain disruptions are experienced creating a shortage of products in many sectors of the economy. The MARS project aims to enable SMEs to access advanced innovations in the field of AI-driven digital manufacturing processes and enter into process chains that are geographically distributed, making the manufacturing industry more resilient to crises. For that, the MARS project will create a Distributed Fractal Manufacturing System (DFMS), which is composed of manufacturing platforms that are interconnected. The DFMS will work as a coordinator hub connecting different manufacturing platforms (nodes). Each node of the DFMS will work as a local convergent manufacturing platform with the following databased decision-making/support tools: i) CAPP (Computer Aided Process Planning), ii) multi-agent distribution and scheduling of manufacturing tasks, iii) digital and data-hashed (blockchain) certification of measurements, iv) Proactive Quality Control (PQC). Each manufacturing platform will have its own local data management and will share only AI models and quality data with the system through the use of Federated Learning.
As a result, the project aims to introduce radical flexibility into manufacturing by redefining the process route, raw material, resources, technology, throughput, manufacturing site, delivery date, proven product quality, and sustainability.

Activities

The PhD project will encompass:

- development of a Proactive Quality Control system for manufacturing;
- development of a multi-agent system for manufacturing scheduling and planning.

The first axis concerns the use of AI approaches to predict the quality of manufactured parts based on the manufacturing process input parameters. Then, an AI model shall be capable of correcting the manufacturing process in such a way that the so-called Zero-Defect-Manufacturing can be achieved. The quality of manufactured parts will be measured by non-contact sensors that will be provided by the industrial partner STIL/Marposs. The generation of data from the manufacturing process will be performed with help of the Smart Manufacturing R&D team of the MSMP Laboratory. The resulting AI-based PQC model will be later on enhanced by a Federated Learning approach that will be implemented by concerned partners of the MARS project. The second axis of this work aims to develop a multiagent system for manufacturing scheduling and planning. For that, you will be in contact with leading experts from Texas A&M, which will provide support on the development of such system.



*D*ata acquisition during part manufacturing in MARS project.

Keywords:

machine learning, manufacturing, artificial intelligence, multi-agent systems, metrology

Your Profile:

We are looking for a proactive and highly motivated candidate, with an MSc degree in a quantitative discipline (such as mechanical/industrial engineering, data science, or mathematics) from a recognized University.

You have a background in modeling methods (AI, optimization methods), manufacturing, and metrology. Professional command of English (both written and spoken) is mandatory. Furthermore, you will need to enjoy working in a dynamic and international environment with other doctoral students and postdocs.

Equal opportunities

ENSAM employs a large number of people with very different backgrounds and qualities, who inspire and motivate each other. We want every talent to feel at home in our organization and to be offered the same career opportunities. We therefore especially welcome applications from people who are underrepresented at ENSAM.

Curious? So are we.

We look forward to receiving your online application with the following documents:

- Curriculum Vitae, max. 2 pages
- Motivational Letter, max. 1 page
- Academic Portfolio (summary of research works, practical work, AI modeling, etc.)
- Transcript of records (including detail of grades, where available)
- Contact details of 2 referees

The contract will be for 3 years, starting at your earliest convenience.

Further information about the MSMP can be found on the website : https://www.msmp.eu/. Questions regarding the position should be directed to Dr. El Mansori (mohamed.elmansori@ensam.eu) or Dr. Knoblauch (ricardo.knoblauch@ensam.eu).

Your personal data

ENSAM processes your personal data in accordance with the GDPR and the Data Protection Act. This processing is carried out for the purpose of managing your application and assessing your skills in relation to the position/internship for which you are applying.
For any exercise of rights on your personal data, you can contact ENSAM's Data Protection Officer at **the address dpo@ensam.eu**
To find out exhaustively about the data collected by ENSAM and how your data is processed, you can consult ENSAM's related personal data protection policy **HERE.**