code-DISP-2026A

# Call for applications – M1/M2 level research internship

## Study of the digital continuity of production processes for a digital twin of manufactured parts

**Supervision:**
Valéry WOLFF / Sébastien HENRY

**Institution:** Lyon 1
**Laboratory:** DISP laboratory

**Required profile:**
Final-year engineering student or equivalent master's degree in industrial engineering or mechanical engineering

**Funding :** ~600€ / mois

**Internship period**: 2026 (2nd semester)

**Required skills:**
Digital tools in the fields of: AI, VR, AR, CAD, CAM, and Metrology

**Keywords:**
Digital Twin, Industrial Production, Metrology, Industry 4.0

**Subject**:

A new industrial concept, Digital Twin, now offers enterprises new approaches to optimize their performance. In the latest report from the Alliance for the Industry of the Future (AIF), a Digital Twin is defined as "an organized set of digital models, updated in real time, and equipped with advanced operating tools." Among all the use cases presented in this report, this subject focuses more specifically on real-time production monitoring through automatic, real-time correction of production equipment parameters based on inspection operations carried out in the production flow. Indeed, given the increasing complexity of the product/process combination in the context of the industry of the future, human expertise is no longer sufficient to interpret the results of complex shape controls in order to define/correct machine parameters. Therefore, the wealth of measurement information should no longer be used only to assess the conformity of parts, but the analysis of this information should lead to a better understanding and better control of machining processes.

The scope of application here will be the industrialization of products and, more specifically, the machining of manufactured parts. Metrological inspection of parts (and not just the monitoring of dimensional drift in production) will be integrated into the manufacturing process.

Preliminary research has been conducted, identifying numerous obstacles to effective communication between the various industrial tools used and between the different players involved in the production process. Examining the need for standardization via exchange formats such as STEP-NC is a key aspect of digital continuity, enabling the synchronization of the digital twin. Following this initial study, we were able to move forward with the development of a digital twin demonstrator applied to CAD, CAM, and CNC tools. This tool makes it possible to validate the consistency of information from different stages, different software programs, and different participants in the digital chain.

The aim of this internship is to further advance data modeling requirements and interfacing between professional tools in order to efficiently synchronize the digital twin and the real system. This will involve quantifying the qualitative benefits that could be obtained by removing the identified obstacles (in order to prioritize future developments).

One of the approaches being considered relates to the need for optimal synchronization (a step that can be cost-intensive in industrial terms). The objective will be to highlight concepts that can be used to improve the alignment and synchronization between the digital twin and the actual manufacturing process, and to develop a concrete application case.

The use and implementation of industrial tools such as HoloLens augmented reality systems is envisaged. As is the use of AI learning tools to identify the key parameters for synchronization timing.

**Working plan:**

(i) Bibliographic research on the use of digital twins in manufacturing
(ii) Mastering the available resources (manufacturing/control, virtualization, Unity, HoloLens, etc.)
(iii) Identifying the parameters needed to synchronize the twin with the actual process
Identifying the parameters that can be modified in real time or with rapid response to process control in order to improve the final quality of the part produced.
(iv) Proposing and implementing applications in specific cases using augmented reality equipment.

**Working environment:**

The DISP (Decision and Information Systems for Production system, UR4570) laboratory brings together researchers and teacher-researchers from the University of Lyon, with dual expertise in Industrial Engineering and Business Information Systems. In response to the scientific challenges posed by changes in the socio-economic world, it conducts research into the design and deployment of decision-support methods and information systems to improve the performance, agility and resilience of goods and services production systems and global supply chains. Its dual expertise, drawing on skills in Modeling, Operations Research, Simulation, Software Engineering, Artificial Intelligence, Planning, Scheduling and Decision Support, enables it to consider these complex systems in their technical, structural, organizational and human dimensions simultaneously. Its members are spread across 4 institutions of the University of Lyon: INSA Lyon, Université Lumière Lyon 2 and Université Claude Bernard Lyon , as the parent institutions, and Université Jean Monnet de Saint Etienne as a partner institution.

**Application:**

The application must include:

• A detailed CV
• A cover letter outlining your motivation for the master.
• Grades from master's program (M1, M2) or engineering school (L3, M1, M2) and any other documents deemed useful (letters of recommendation, for example)

After an initial selection process based on applications, the selected candidates will be interviewed by the master supervisors.

The master's program is scheduled to start during the 2nd semester (2026). The monthly gross income is 600 euros.

Applications should be sent by email to Sébastien HENRY, Valery WOLFF:
sebastien.henry@univ-lyon1.fr, valery.wolff@univ-lyon1.fr

**Bibliography:**

[LEGLISE, 2024] LEGLISE Timéo (2024), Étude de la continuité des chaînes de production pour un jumeau numérique de pièces manufacturées, Stage Master, DISP

[AIF, 2023] AIF (2023). Jumeau numérique levier majeur de la transformation digitale de l'industrie. Industrie du Futur.

[Bechtold, 2022] BECHTOLD, J. (2022). Développement d'un contrôleur natif step-nc de machine-outil à commande numérique interopérable et compact. PolyPublie.

[Zhao, 2011] ZHAO, Y. (2011). Dimensional metrology interoperability and standardization in manufacturing systems. Computer Standards Interfaces, 33:541–555.

[Laguionie, 2010] LAGUIONIE, R. (2010). Integration de la programmation basee entites pour la fabrication sur machines a commandes numeriques dans un contexte multiprocess. Ecole Centrale de Nantes.

[Lu, 2016] LU, Y. (2016). Current standards landscape for smart manufacturing systems. NISTIR 8107.