POROSITY PREDICTION IN COLD SPRAYED PARTS

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STUDENT PROFILE

We are looking for a hard-working mechanical engineering student with a proactive attitude. Creative approaches and new ideas are encouraged throughout the project.

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CORE SKILLS

Additive Manufacturing knowledge

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Programming (Matlab/Python)

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Machine learning methods

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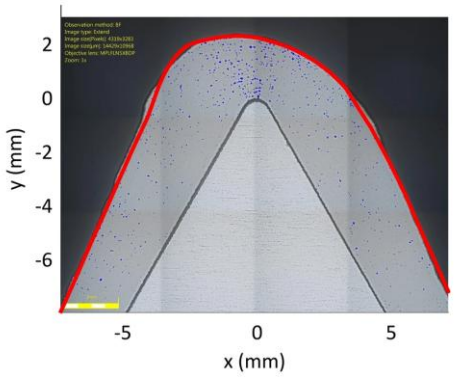
PROBLEM PRESENTATION

Porosity can be a major drawback in Cold Spray (CS) deposition, weakening the mechanical performance of sprayed parts. Its formation is influenced by powder properties—such as morphology and size—as well as key process parameters like gas temperature, pressure, and stand-off distance. Despite its significance, research on porosity formation remains limited. Unlocking the ability to accurately predict porosity would be a game-changer, enabling the fabrication of deposits with customized mechanical properties.

THESIS DESCRIPTION

Your work will focus on analysing CS samples fabricated with different process parameters to understand their influence on porosity. You will learn how to test the mechanical properties of a sample and apply computational image elaboration methods to identify pore distribution. You will then select the best methods to integrate your results into a predictive model, using traditional or machine learning-based techniques. A demonstrator can be designed and fabricated to test the accuracy of the methodology.

APPLICATIONS



Pore formation (blue) in the CS repair of a leading edge

Defect prediction and mitigation are a major subject in the field of Additive Manufacturing (AM). CS, as a meltless AM technique, results in the absence of solidification defects in the material's microstructure. This characteristic makes it attractive for AM and repair purposed in several highly demanding aerospace and automotive applications.

BASIC INFORMATION

- Duration: 6-9 months
- Immediate start
- Experimental and numerical methods