## STAGE OFFER

Title: Refurbishment of aluminum parts by the cold spray process

Supervisors: Francesco Delloro, Mehand Tebib

Description:

Cold spray is an additive process for coating by successive stacking of particles impacting at high speed (300-1000 ms<sup>-1</sup>) on a substrate. Particles undergo large deformations in the solid state, in a rapid dynamic regime. This spraying process has undergone significant development in the last two decades because the properties of the coating were very satisfying in terms of density and because the low temperatures of the process prevent any chemical/thermal alteration of the powders and of the substrate. It is increasingly attracting the interest of manufacturers for its versatility both in applications (additive manufacturing, repair, surface functionalization, etc.) and in sprayable materials (metal powders, polymers, ceramics or mixtures). In the actual societal context, to answer to the need of lowering the environmental impact of manufacturing and of developing circular economy, there is an increasing interest towards repair and refurbishment of damaged parts, which can be interesting solutions to increase the lifetime of parts.

The project has two main objectives: first, optimize the process parameters (cold spray pressure and temperature, and the robot path) to obtain a satisfying material deposition onto a substrate; second, characterize the mechanical response of the substrate – deposit assembly to evaluate the quality of the repair. If the mechanical properties of the assembly are not satisfying, a post-spraying thermal treatment can be envisaged to improve its behavior.

Duration: 3 to 5 months (negotiable)

Profile: A motivated M1 or M2 student, with a special taste for experimental work, eager to discover the potential uses of an innovative process and to be trained in the science of mechanical testing.