10:40 *Mohammed Farag* (IMMC, Université catholique de Louvain, Louvain-la-Neuve, Belgium, Belgium)
Nicolas Nothomb (IMMC, Université catholique de Louvain, Louvain-la-Neuve, Belgium, Belgium)
Grzegorz Pyka (IMMC, Université catholique de Louvain, Louvain-la-Neuve, Belgium, Belgium)
Jean-François Remacle (IMMC, Université catholique de Louvain, Louvain-la-Neuve, Belgium, Belgium)
Aude Simar (IMMC, Université catholique de Louvain, Louvain-la-Neuve, Belgium, Belgium)

ID:369-Characterization of High-Strength Aluminum Alloys Lattice Structures produced using Laser Powder Bed Fusion

ABSTRACT. The manufacturing of lattice structures using laser powder bed fusion (L-PBF) technology has not yet been explored for high-strength aluminum alloy 7075. The present study is part of a project aiming at additive manufacturing components combining high strength with reduced weight and exploring the possibility to combine with self-healing capabilities.

The possibility to build lattice structures has been demonstrated for two distinct design categories: triple periodic minimal surfaces (TPMS) and strut-based lattices. The strut size is varied. These intricate geometries, manufactured in aluminum 7075, represent a significant advancement in the additive manufacturing domain, particularly for applications requiring a balance of strength and lightness.

The specific process parameters and powder composition are optimized for L-PBF to produce these high strength lattice structures. The porosity level, mechanical properties of the new lattices are characterized microstructurally and mechanically. In particular, in-situ X-ray tomography compression testing with Digital Volume Correlation to track local strains is performed on the manufactured lattice structures.

The initial outcomes indicate a promising potential for the use of these lattice structures in high-performance applications. The novelty of the work lies not only in the material used but also in the potential for these structures to exhibit self-healing properties, a feature that could redefine durability and longevity in critical applications.