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Realistic Performance Prediction for Additively Manufactured Cellular Structures: Synergy of Simulation and Experimental Analysis

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Reliable structural performance for tailored lightweight additive manufacturing (AM) design solutions drives current fundamental research efforts in a wide range of industry sectors. Manufacturers are continuously seeking to optimize the structural efficiency of AM structures; one such solution is the design and printing of lightweight cellular structures. As wall thicknesses and strut radii of these open-pore structures start to approach printing resolution, inherent imperfections and deviations from the as-designed geometry become increasingly important and can result in significant property variations, which need to be understood and accounted for during the design stage. This presentation will outline the value of synergistic simulation and experimental data analysis to accurately predict the mechanical behavior of cellular structures. Validated numerical modelling methodologies ensuring realistic performance assessment of cellular structures will be introduced, and the improved outcome will be highlighted for a range of case studies.