Special Issue

Additive Manufacturing of Metal Components: Mechanical Behavior, Process Parameter Optimization and Control

Message from the Guest Editors

Metal additive manufacturing enables the rapid, low-volume production of highly complex metallic components. Numerous industries are highly interested in directly manufacturing metallic components, but there remains great uncertainty in terms of the processes and controls slowing widespread industrialization. This is complicated due to the tremendous flexibility in materials and processes, with each having their own strengths and weaknesses. Approaches vary from direct energy deposition, powder bed fusion, extrusion, and thermal and cold spray, to name just a few. Each of these processes, while simple in principle, exhibits its own complexity in terms of material properties that are a function of processing parameters, toolpaths, and systems and controls. In many cases, there seems to be more art than science when it comes to reliably being able to manufacture components using these advanced manufacturing processes. This uncertainty can lead to the slow adoption of the technologies in industrial settings.

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