Virtual Part Qualification with Thermomechanical Modeling of Additive Manufacturing

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A primary challenge for Additive Manufacturing (AM) to become an economically feasible method of component production is the warping of parts during production. Finite Element Modeling can predict and mitigate build failure prior to manufacture. This study shows through simulation-experimental comparisons that simulation can be used to make timely and useful predictions of distortion for common AM metals. It will also document the successful modeling of the secondary failure mechanisms of support structure delamination, recoater blade interference, and hot spot detection. Large industrial use cases will be demonstrated for both LPBF and DED.