

## Enabling Cost-based Support Structure Optimization in Laser Powder Bed Fusion of Metals

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### **Abstract**

Support structures are essential to laser powder bed fusion (PBF-LB/M). They sustain overhangs, prevent distortion, and dissipate process-induced heat. Their removal after manufacturing is required, though, increasing the overall costs. Therefore, optimization is important to increase the economic efficiency of PBF-LB/M. To enable optimization focused on the support structures' costs, a cost model is developed. The whole production process, including the design, manufacturing, and post-processing of a part is considered by deriving formulas for the individual costs. The cost model is applied to a benchmark procedure previously developed. Additionally, a case study investigating different support layout strategies is conducted.

The full paper may be found in a special issue of the TMS publication *JOM*, March 2022.