MpoMcc28-001

Additive Manufacturing use for polyamide-12 Compliant Mechanism fabrication

Shigueoka, M.O.(1); Beal, V.E.(1); De Carvalho, L.L.(1); Soares, L.F.(2);
(1) CIMATEC; (2) Senai-Cimatec;

The main objective of this study was to assess the application of additive manufacturing (AM) binder jetting powder bed fusion (BJ-PBF) technology for creating compliant mechanisms using thermoplastic materials. The research progressed through distinct stages: three-dimensional (3D) modeling, computational simulation, fabrication, and testing. Initially, a literature review was conducted to identify designs capable of withstanding substantial elastic deformations. The study's development process centered on selecting and modifying a spring geometry found in the references. The chosen spring geometry underwent numerical simulations, was printed in polyamide-12 using BJ-PBF, and was physically tested to evaluate its performance as a compliant mechanism. The results indicate that the choice of thickness to be printed significantly influences the final thickness obtained, along with the execution of post-processing for the unfused powder. Accumulation of non-fused powder in hardly accessible regions adversely impacted the mechanical properties of the part. Concerning computer simulations, further investigation is required, as the obtained values differed from the experimental results.