

3D Printed Ceramic Cores and Shells for Investment Casting Through Large Area Maskless Photopolymerization (LAMP) Technology

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Abstract:

LAMP is a breakthrough additive manufacturing technology enabling the 3D printing of ceramic cores and shells for investment casting. Originally developed for the direct digital manufacturing of turbine airfoils, the technology is applicable across all of investment casting. In LAMP, thin layers of a ceramic-loaded photocurable resin are sequentially cured using high resolution images in ultraviolet light using a scanning projection device. Macroscale green parts can be built with microscale features and excellent surface finish. Thermal post-processing involves binder burnout and sintering to achieve the final ceramic parts ready for casting. LAMP eliminates up to 7 of 12 process steps in investment casting, thereby dramatically reducing the cost and lead time for new castings. LAMP also enables advanced designs that are prohibitively expensive or impossible to make through traditional tooling. This presentation will cover the state-of-the-art of LAMP technology and an outlook towards future developments.