

Rapid & Affordable Castings from 3D-Printed Ceramic Molds

Abstract for 67th Technical Conference and Expo

PERFECT-3D and HTC Castings

With the emerging challenge of 3D-printed metals, it is essential for the investment casting industry to become more agile and responsive for small quantity orders. To remain competitive and further reduce the lead time from concept to finished casting, one opportunity area for investment casters is the use of 3D-printed ceramic molds. This approach enables the foundry to bypass the efforts involved in the front-end patterns and dipping processes and go straight to pouring metal. In addition, 3D-printed ceramics also allows for the creation of more complex molds and customized metal flow & gating systems.

In an example case, HTC Castings was approached by an after-market automotive parts manufacturer in need of a small quantity of aluminum throttle body castings for Jaguar automobiles. To be responsive to the short timeframe, HTC elected to work with PERFECT-3D to leverage 3D-printed ceramic tooling. The HTC/PERFECT-3D project team arrived at a design using a complete 3D-printed ceramic mold assembly, including pour cup, cup-filter, sprue manifold, and shell. This approach resulted in successful castings in a fraction of the normal design-to-production time.

This case study presentation from the Renaissance Services PERFECT-3D Division along with HTC Castings will provide an overview of the overall process used as well as the castings that resulted from the effort. In addition to the advantages of additively manufactured tooling, this presentation will discuss some of the current limitations involved as well as casting features that offer the best opportunities to leverage 3D-printed ceramic molds.