

Fuel Delivery Casting Succeeds With Attention to Gating

Jiten Shah, Product Development & Analysis, Naperville, Illinois

CASTING PROFILE

Casting Process: *Investment casting.*

Material: *Stainless steel 316.*

Application: *Automotive.*

Dimensions: *9.8 x 7.2 x 6.3 in.*

Aristo-Cast Inc., Almont, Mich., produced this prototype head casting for a fuel delivery system designed to reduce fossil fuel usage. The casting was converted from a 12-piece weldment and solution annealed (a heat treatment method involving heating the metal followed by cooling for a uniform microstructure free of carbides). The casting supplier used solidification software to find the gating and casting parameters that would produce the best results. Once the first samples were cast, minor gating and casting parameter changes were made. The parts were delivered to the customer in less than four weeks.



Cored holes eliminate complex 3D drilling.

- A carefully designed casting configuration allows cored features for the oil passages, which in the weldment had to be drilled and machined.
- However, as-cast cored holes are limited in size, depending on the section thickness, orientation, alloy and investment pattern type being used. So, some passages may be cast solid and drilled in later.



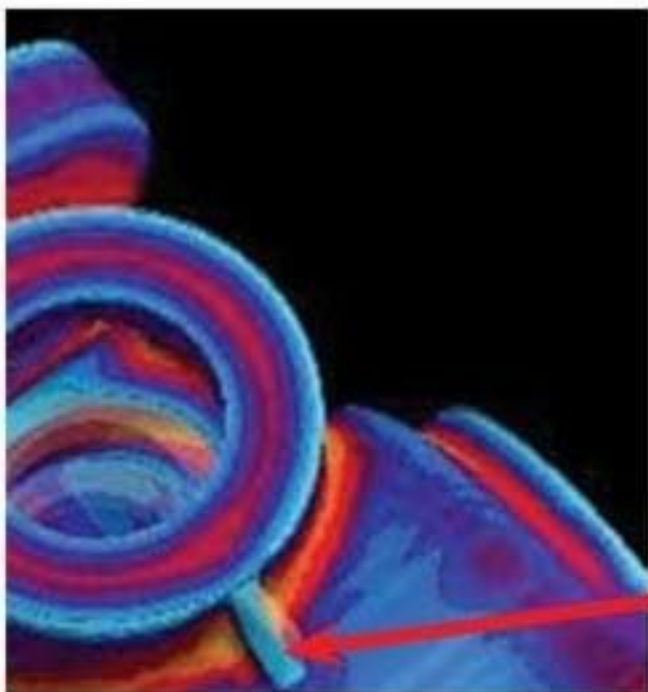
Gating attachments ease investment pattern handling during the dipping and drying process.

- All the gating attachments were designed in the casting for ease in handling the wax pattern during slurry dipping and drying, as well as pouring the molten steel into the pre-heated shell.

Thick to thin section transition aids directional solidification.

- The steel casting was designed such that the heavy sections fed the lighter sections, achieving directional solidification for better soundness. Computer simulation is useful for such complex casting design and development.
- Solidification simulation showed that the first areas to solidify were the thin sections, while the last areas to solidify were the thick sections.

METAL



Jiten Shah is president of Product Development & Analysis (PDA) LLC, Naperville, Ill., and a 25-year casting design and manufacturing veteran.