ICI Selects Best Investment Casting Designs

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Contest highlights achievements in lightweighting, injection, and other process capabilities.

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The Investment Casting Institute's presented the winners of its annual casting contest on October 20, as part of the 12th World Conference on Investment Casting, which it hosted in Dallas. The top honors went to products representing some of the leading markets for investment castings — aerospace engine components, aerospace electronics, and military equipment markets.

The contest was designed to recognize facilities that manufacture components that best illustrate and promote the benefits and flexibility of the investment casting process, or that demonstrate problem-solving techniques for the customer. The contest was open to members of the Investment Casting Institute, Cast Metals Federation, and the European Investment Casters Federation.

Aristo Cast's expertise in investment casting of magnesium proved advantageous as its aerial engine gearbox won the award for the aerospace engine component category. Frequently, weight reductions are critically important in castings designed for military application.

This Aristo-Cast magnesium aerial engine gearbox was the winner in the aerospace engine component category.

The customer's engineering staff originally designed the gearbox in aluminum, but weight constraints required the unit to be made of a lighter metal. Two prototype castings, which comprise the upper (5 x 6 x 5-in.) and lower (6 x 6 x 2-in.) gear box, contain bosses, cast-in holes, and thick-to-thin walls, which are all standard fare for investment castings.

Precision Castings of Tennessee chose a new alloy as part of the investment casting process for a redesigned quadrant mount.

Precision Castings of Tennessee chose a new stainless steel alloy for this redesigned gear worm wheel, used on the M777

A gear worm wheel – a vital component on the M171 telescope and quadrant mount used on the M777 lightweight 155 mm Howitzer – guides the movement of the telescope and quadrant mount for the leveling and error compensation process. The original part had been an investment casting of 304 stainless steel since the late 1970s, but the Howitzer has undergone drastic weight reduction since then. Precision Castings decided that changing the alloy, rather than the geometry of the part, was the best way to compensate for the weight change. The 17-4PH alloy was selected for its toughness, strength, and corrosion resistance. PCT provided dimensional stability, lower residual stress, improve toughness, and maximize the service life through cryogenic treatment of the casting during the heat treatment process.

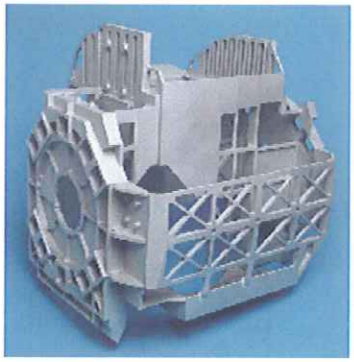
Uni-Cast submitted its 16.75 x 16 x 14-in. component for a sensor used in forward-looking infrared system (FLIR) in military aircraft.

Cast in beryllium-free aluminum (F357), the electro-optics component was designed as an investment casting. The customer wanted a casting that was lightweight and reasonable in price. The combination

of thin walls and complex geometry created manufacturing challenges in wax injection, straightening, and inspection. These resulted in adaptive and unique manufacturing techniques.

Other contest finalists included TPM Inc. and its housing for load sensing compression cell assembly; Kovatch Castings and its aerospace engine access door panel latch housing; Alcoa Laval Castings and its front frame casting for aircraft engine; and TITAl GmbH and its tail rotor gearbox housing.

lightweight 155 mm Howitzer.



This FLIR component designed by Uni-Cast combines thin walls and complex geometry,— overcoming challenges in wax injection, straightening, and inspection.