



CSM Lube Free Diecastings

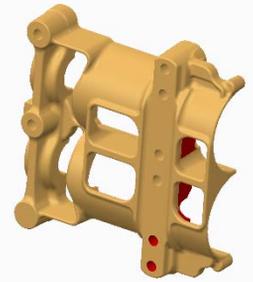
Die casting, a low-cost, near-net shape manufacturing process, requires that a liquid organic-based lubricant be applied to the reusable steel dies before each shot to prevent the liquid metal from sticking to the dies. However, the application of the lubricant can reduce the quality of castings, increase processing time and costs, reduce die life, and create environmental issues.

Under the AMC Casting Solutions for Readiness program, Colorado Schools of Mines (CSM) has been evaluating permanent and semi-permanent coatings for die casting dies so they do not require lubrication.

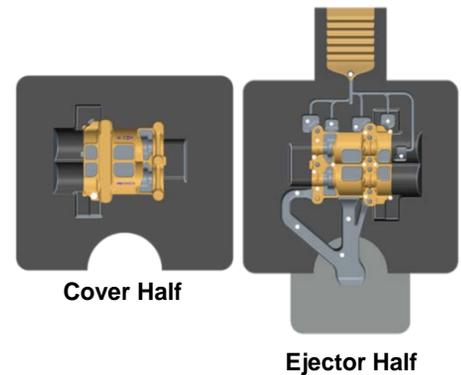
CSM conducted an in-plant trial at Mercury Marine, a manufacturer of outboard and inboard engines located in Fond-du-Lac, WI, to evaluate the potential of using an AlCrN coating for lube-free die casting. This AlCrN PVD coating was identified as being the best candidate via laboratory testing performed at CSM. The casting produced during the plant trial was a balance shaft housing, weighing about 1.75 lbs, and the entire surface of the die was treated with the AlCrN coating. An uncoated version of this die required the die be sprayed for 12 seconds per shot. Since the goal of this trial was to evaluate the use of reduced or zero lubrication, much shorter spray times were investigated. This trial was an initial Production Part Approval Process (PPAP) run for the die, and involved producing sufficient castings so that Mercury could prove to their customer that castings met dimensional and performance requirements.

In the initial trial, seventy cast parts were successfully produced using only 2 seconds of spraying instead of 12. This equates to a decrease of 83% in the spray. No evidence of alloy sticking was observed for these 70 shots. The spray time was further decreased to 1 second per shot, or a 92% reduction in spray, and another 30 castings were produced with no evidence of sticking. This dramatic reduction in the amount of lubrication required to produce quality castings is of great interest to Mercury Marine.

Further work is underway and Mercury Marine plans to make more castings in the near future using these coated dies and pins. Once the parts have been approved for production, Mercury plans to produce large quantities (thousands) of castings at this reduced lubrication level.



Balance Shaft Housing



Cover Half

Ejector Half

AMC Represented at 2016 Defense Manufacturing Conference

AMC was well represented as part of the Defense Logistics Agency (DLA) exhibit at the Defense Manufacturing Conference 2017 held at the Denver Convention Center, Denver, CO, November 28 - December 1, 2017. The conference was attended by government and industry representatives, displaying and presenting the latest in manufacturing processes in support of military weapons systems. DMC is of great benefit to AMC as it provides a forum for technology exchange among customers and partners.