Dr. Die Cast

Die Cast Lubricants and Plunger Life

In HPDC, lubrication takes many forms. The machine bushings require continuous lubrication similar to an engine. The moving components of a die, such as slide cores, ejector pins and leader pins require lubrication as well. For some components such as ejector plate guide pins and bushings, lubrication during die assembly between production runs is sufficient. Other components need some type of ongoing lubrication. In HPDC aluminum, the cavity faces and core pins require lubrication each and every cycle. In addition, on cold chamber aluminum, the plunger tip requires lubrication every cycle.

Die lube and die release are terms used interchangeably. Die lube is applied to create a barrier between the molten material and the die steel. Applying and drying off/blowing-off excess die lube is a significant part of the die cast cycle time. In studying aluminum die casting cycle times, the spray and blow-off process consumes nearly 35 to 55% of the entire die casting cycle. Custom spray manifolds that can focus the spray more accurately have demonstrated significant cycle time savings.

Die lubricants are a major day-to-day expense in a die casting operation. Not only the purchase, distribution and application of the die lube but in most cases, dealing with the "overspray" and mist is a major expense. The waste stream must be collected and disposed of with respect for the environment in the shop, during transportation and at disposal sites. In the 60's, water-based die lubricants were not as common. Oil based lubes create a shiny carbon skin on the cavities that help with release. Slowly water-based lubes were adopted and have become the accepted standard. People had to adapt to a different behavior as the water-based lubes don't leave a carbon trace on the cavity the same way the old oil-based lubes did. Another characteristic of water based versus oil is that oil-based sprays would "wick" around behind slide cores where water-based lubes tend to "bead up" and behave more "line of sight" making it more difficult to reach the back side of slide cores. The short-term solution is spraying longer in order to force lubricant around to the back side of the slide core. Installing multiple focused spray nozzles greatly improves effectiveness of the spray. On larger slides, I have found it reduces the need to overspray and increases the effectiveness to install a spray nozzle in the holder block in order to spray directly at slide core surfaces that are otherwise hidden or blind. Ideally the sprayer would be on a separate timer to avoid over-spraying and wasting lube.

Plunger tips, cold chambers and lubrication. How good is good life?

Due to high metal temperatures, tips and cold chambers also require lubrication to reduce the chance for soldering. While most plunger tips have some form of internal cooling, cold chamber cooling is not as common. When operating with 390 alloy or some of the newer high ductility low iron alloys, cold chamber cooling is especially beneficial. Cold chamber and tip wear with the above alloys is many times greater than with typical 380/383 alloys.

For the best possible life, make sure you have the recommended water flow to your plunger tip. Five gallons per minute (GPM) for a 3 ½" tip is typical. Another way to look at it would be 0.5 gallons per minute per square inch.

Who's Dr. Die Cast?
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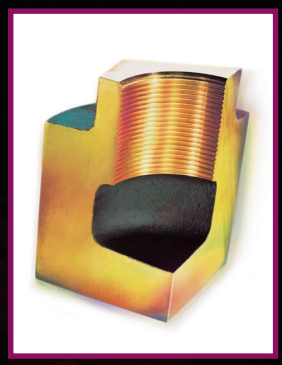

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