

Dr. Die Cast



I Love the Smell of Die Lube in the Morning!

Die lubes are a necessity. We need to create a protective coating between the molten metal and the die steel. How we apply them has a direct impact on our efficiency and quality.

Die lubes can sometimes be described as “You can’t live with them and you can’t live without them”. We’re in a constant battle to strike a balance between too much and not enough. We don’t want to waste resources on excess lube and runoff and yet, a lack of or too little lubrication can cause stuck castings. That stuck casting is not only an interruption but can often result in damaged dies, broken cores and compound lost production (machine downtime). There is also the interruption of solder build up that requires frequent removal.

(Please note that many of the comments below are unique to water-based fluids.)

What, when, where and how much? What are some keys to successful application of die lubes?

- Have a clean reservoir or mixing tank.
- If you have a central system, make sure the distribution lines are cleaned regularly. (Hot water is very effective in removing old die lube build up inside reservoirs, distribution lines and spray valves.) Bleach if needed to kill bacteria build up.
- Filter the die lube at the point of use if using a central system.
- Maintain good shutoff on your directional valves (lube and compressed air) to avoid waste.
- When using a spray manifold, only open the mixing valves to spray heads needed for your specific die.

- Ensure that you maintain the required air and lube pressure needed for your spray heads.
 - Typically, the air pressure should be about 10 to 30% greater than the die lube in order to get good atomization.
 - Check the pressure while the spray manifold is in use in order to verify that you have a sufficient air and lube supply.
 - Excessive pressure drops are an indication that your supply lines are undersized.
 - “Closed loop” supply lines for both air and die lube will help reduce pressure variations.
- Adjust your spray and blow off times for your specific die. This is one place you must avoid the “one size fits all” approach. If you try to use a program and nozzle adjustment used for a heavy walled casting on a thin walled casting you will create cold flow defects.
- Most die lubes are formulated to be effective within a certain die temperature range. Understand your die temperature and the requirement that high temperatures place on your die lube. If your ambient die temperatures vary widely from one machine to another, you may have to develop the ability to mix at the machine or have dedicated spray systems for specific machines and/or specific casting features.
 - Too often, die lube is being used to compensate for a lack of water cooling on specific features. Look at ways to reduce the temperature of hot spots with improved internal cooling such as “Jet cooling” or “conformal cooling” or by using “High thermal coefficient” materials in order to achieve more uniform die temperatures.
- Die coatings or treatments can often reduce dependence on die lube. A harder, slicker surface can often reduce the amount of lube necessary for reliable ejection.
- Don’t forget to spray the vents. One thing I have noticed is that vents and chill blocks frequently get ignored when it comes to die spray. It is no surprise when the vents and chill blocks start to stick and plug up as they heat up and dry off. A light spray is often enough to keep them open and effective.
- Quick die setup and spray nozzle alignment: With the ability to recall process parameters from the controllers of a known good process, spray nozzle alignment is often the most time-consuming part of a setup. Following are some tips on reducing setup time.
 - Spray nozzle alignment: Mount a small pin that fits into the tip of a spray nozzle to a laser pointer. You can easily see exactly what the nozzle is aimed at.

Who’s Dr. Die Cast?

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- Develop dedicated spray manifolds. Once the ideal alignment and spray settings are achieved, swap out the manifold with the settings intact. Be sure to purge the die lube out or better yet, have a separate cleaning purge station.
- Build a "Spray manifold test station" where you can clean/purge, test, repair and align spray manifolds. This would be an enclosure with plexiglass sides so you can watch the function of each spray head. Build a spray manifold alignment template. Fabricate a plexiglass spray pattern template for each die with key hot spots identified. Use this to align the spray nozzles outside of the machine.

Doing a trial on a new die lube?

When trying out a new die lube be sure to have a good base line. Don't stack the deck in favor of one or the other. Start with a clean die just like it started fresh when you initially set the die. I learned this lesson the hard way when I ran several successive die lube trials, simply changing the die lube and resuming production. After nearly 12 hours of tests I thought I had found the "Silver bullet". The parts were the cleanest castings the die ever produced and we continued until we used up all the sample. However, when we removed the residue left over from the previous samples, we soon learned to our disappointment that the "base" created by the earlier samples was the reason for the supposed success of

die lube X. By itself it did not have the required lubricity.

I hope to see you at the Die Casting Congress & Tabletop in Grand Rapids, October 20-22. I believe you'll enjoy our city.

