# Dr. Die Cast

## Plant Engineering Continued: Sizing Central Die Lube Systems:

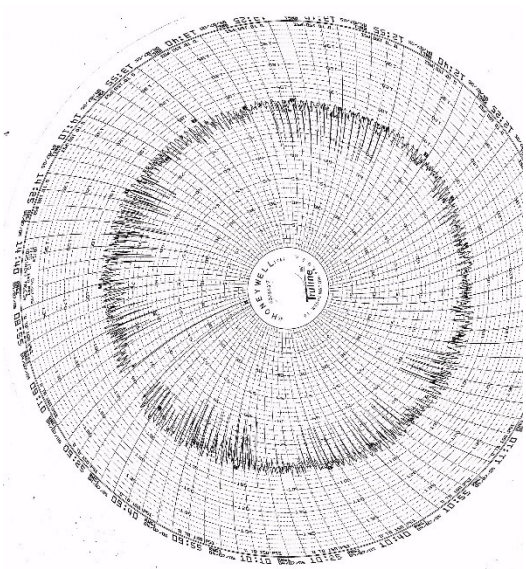

***Figure 1*** *- During initial compressed air study. Excess variation (When enough machines go down the process stabilizes.)*

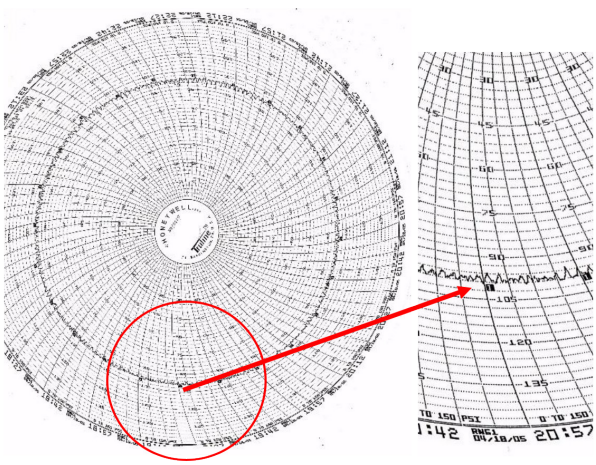

***Figure 2*** *- One week later variation is acceptable after eliminating system bottlenecks. (The system can support the demand no matter how many machines are running.)*

The above relates to compressed air distribution systems that are essential to a stable and repeatable die casting process. In order to apply die lubricant in a repeatable manner, both the compressed air and central lubrication systems must be reliable and repeatable. Compressed air and fluids must be available at the desired pressure, volume and ratio/mixture. The two go hand in hand. As stated previously, the ratio of air pressure to lube pressure must be maintained in order to achieve atomization. Inadequate volume will result in a loss of pressure at the spray head and inadequate delivery. The results are random stuck castings, solder build up and in some cases die damage such as broken cores. So how do you verify the proper supply?

As before, you will need to get the specifications on the spray heads (GPM at a given pressure) from the supplier. Then count the number of spray heads and nozzles. For example at 60 PSI lube pressure, lube output ranges from 0.45 to 2.10 GPM depending on the nozzle size. For aluminum die casting the range is more like 1.5 to 2.1 GPM. Let's just take a nominal 1.5 GPM for 8 spray heads in an 8 machine shop. 1.5 X 8 X 8 = 96 GPM Peak demand or (12 GPM/machine).

The recommended minimum line size to each machine would be ¾" NPT. This is based on keeping the flow rate at less than 20 feet per minute. Lower flow rates = less pressure drop. At 12 GPM with a ½" NPT line, the flow rate would be 12.7 feet/second and the pressure drop would be 11 PSI. With a ¾" NPT line the flow rate drops to 7.2 feet/second and the pressure drop is reduced to 4 PSI.

The recommendation for the above examples is a main line size 2" NPT if there is a single in-line pipe run, or a 1 ½" closed loop. Schedule 40 or heavier PVC or stainless lines are recommended for die lube lines. As stated above, larger line size = lower pressure drop. At 96 GPM with a 2" line, the flow velocity is 9.2 Feet/second with a pressure drop of 6 PSI. It is recommended that the die lube is circulated continuously while in use. Bladder type accumulators such as "Well-X" tm at the extreme end of the system is recommended to support the demand and reduce pressure and flow variations.

**Who's Dr. Die Cast?**
**Robert P. McClintic**
*Die Casting Consultant*

**Bob McClintic & Associates**
2544 Almar Street
Jenison, MI 49428-9108

rmcclintic@ameritech.net
www.drdiecast.com
616.669.2932

Since the spray system only operates a percentage of the total cycle, it is necessary to calculate the actual demand to size the lube pump. When doing this calculation one should be careful to anticipate future growth or jobs that are significantly faster than current production. A good approach is to use the highest demand jobs as your template. Typical spray times for aluminum jobs ranges from 16 to 38% of the total cycle time. Therefore, if your cycle rate is 90 shots per hour, you are spraying 9.6 to 22.8 minutes per hour per machine. Let's say we are at the 33% rate or 20 minutes per hour. Using the above example, that would equate to a consumption of 1,920 gallons of die lube solution. (At 90:1 that means 21 gallons of concentrate.)

It would take a 29.7 GPM pump to keep the accumulator(s) charged for the above plant.

Hopefully the above and previous article led you to thinking about improving, or at least reviewing, your current systems. There is hidden treasure in most plants and it is hidden in "plain sight"! Enjoy the treasure hunt!

## About the Author

Bob McClintic founded "Bob McClintic & Associates" in 1998 to provide engineering and management consulting to producers and users of die castings. He has experience in all facets of the die casting industry, including project management, tooling engineering, product design and evaluation, manufacturing management, plant layout, process and plant engineering. He is experienced with aluminum and magnesium cold chamber as well as magnesium and zinc hot chamber. His clientele includes companies throughout North America and on every continent. McClintic has been an active member of NADCA since 1981. For more information, visit www.DrDieCast.com or contact him at rmcclintic@drdiecast.com or (616) 292-0454.

Keep Your Casters Running with Blasch DuraLadle™ Auto Ladles

Blasch manufactures some of the highest performing materials available for use in the containment, control and refinement of molten aluminum.

Our new DuraLadle ceramic auto ladle, available in a variety of sizes, is completely non-wetting, requiring no coating – EVER.

- Months of maintenance free service life
- Adapters available for all major auto ladle machines
- Available in 5, 8, 10, 12, 15, 17 and 45 pound capacity

Learn more about our Ceramics for Molten Metal Transfer
800.550.5768
blaschceramics.com

BLASCH PRECISION CERAMICS