Dr. Die Cast

What is Advanced Technology in Die Casting?

What's possible, where are you now and where are you heading?

I met a die casting company owner once who said "we just got our first computer". Since I had a few moments before been presenting the benefits of shot process monitoring I assumed he meant they got their first "Visi-Trak" or similar. After asking what brand he purchased, he clarified, "No we just got our first computer….for the office!" While he may be in the minority today, his statement should certainly should make us question what we consider "advanced". Do we even aspire to adopt and implement advanced technologies in our plants and offices? Does technology stop at the door to the shop, the shipping office, production control, etc.?

Why adopt "Advanced Technology" in your business? I can think of two reasons, reduce scrap and increase profit. PPM levels of quality can never be achieved by 100% visual inspection (waste) or occasional process or quality spot checks (crossing your fingers and hoping for the best). The system must do what is humanly impossible. It must monitor and control 24/7.

Is the tail wagging the dog? Sometimes customers have coerced suppliers in to using certain technologies such as computer simulation, shot process monitoring, vacuum etc. However, if the die caster is not committed or trained in its implementation it simply becomes an added expense.

Take for example computer flow and solidification simulation. When used properly, simulation will demonstrate if the gate and overflow designs are inadequate or poorly designed or placed. Similarly, solidification simulation will show where additional cooling is needed or heavy cross sectional areas where the casting design could benefit from lighteners/metal savers. Each of these can provide valuable direction toward improved quality and a more robust process when the die cast tool reaches production. Simulation used properly is a step by step process of identifying problems and correcting them in the design stage. If you stop at one iteration of a simulation without making any changes in your design you have wasted your money. The greatest benefits are experienced by people who optimize their process and design before building the tooling.

What about computer process monitoring? When first introduced process monitoring equipment cost as much as a new 3 bedroom home. It was also a manual operation, that is, someone had to physically be present to push the button in order to take a shot trace. The process engineer then had to analyze the data and determine if it was within tolerance. If not, then he made machine adjustments and took another trace. This trial and error process continued until he was satisfied with the results. His productivity as a process engineer was limited by the number of machines he could connect to and monitor within the available time. Today, process monitoring equipment costs about as much as a Canadian "Walleye" fishing trip. It can monitor automatically, archive results, and calculate statistics on selected parameters, store trend charts and alarm when the shot process is "out of control" or beyond control limits. When integrated into the machine controls it can become "closed loop" and manage the shot process. Used in conjunction with simulation it is an essential and integral to a successful start-up.

Cell management: It is possible to integrate the entire die casting cell. At this level, a computer monitors not only the die casting process but the ancillary equipment as well. It can monitor furnace temperatures, die heaters, process water temperatures, die temperatures, vacuum performance, die lube usage, vision systems, robotic inspection, trimming and palletizing. Supervisor can be notified by text when a cell alarms.

Smart machines/Big Data: David Blondheim, Jr PE of Mercury Castings gave a very inspiring presentation at the Atlanta NADCA Congress on "Machine Learning Algorithms to Predict Casting Defects in High Pressure Die Casting". His objective was to use collected data to identify defects before they reached the customer. Along with other presentations Mr. Blondheim's paper demonstrated that random unscheduled breakdowns affect the downstream quality results. The interruptions also tend to "muddy the data" (my words, not David's) creating flyers that somehow have to be recognized and addressed for what they are.

Implementing shop floor technology: I have found that adding automation equipment to a poorly maintained die or tool only makes things worse. It has been my experience that poor machine and/or tool conditions create interruptions that inevitably create defective castings. Used properly a monitor system will help identify machine and tooling problems. Then we can at least cull out castings produced in an out of control process before they leave the die casting cell. That doesn't give us license to continue to run without addressing the poor conditions. But it should help us set priorities for our investment strategy to repair or replace machinery and tooling and start us on the road to a healthier plant in the future.

How or where do we start? Hopefully this hasn't intimidated you and has at least made you curious enough to develop a plan for implementing more technology in your plant. I've found there are lots of people with lots of experience in our industry who are willing to help. Give them a call, it's not as frightening as you might think.

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

Bob McClintic & Associates
4411 W. Grand Blvd. NW
Walker, MI 49534

rmcclintic@ameritech.net
www.drdiecast.com
616.292.0454