Dr. Die Cast

What's the news from the die casting/manufacturing floor?

"My people are destroyed for lack of Knowledge", Hosea 4:6. Popular culture talks about us being in an "Information age". While it seems all types of businesses are experiencing a personal shortage. From the lumber yard to the tire shop to die cast companies. Each business has its own special knowledge and high pressure die casting has some of the most complex integrations of industrial technical disciplines of them all. The difference between information and knowledge is application. Anyone can access information as easily as taking their phone out of their pocket and asking Alexa, Google, Siri or YouTube a question. But is that enough? A field service engineer, from a die casting machine builder described it this way. When relays, limit switches, push buttons and timers controlled manually operated machines, trouble-shooting was much simpler. Process control was a matter of moving "Fast Shot Limit Switches", and turning knobs to change speeds. Pressure gages and a volt/ohm meter was enough to trouble-shoot. One die casting machine builder even bragged about using less than 4 relays to control his entire machine. When this was the case, tribal knowledge was sufficient for lots of companies. And then along came PLC's, proportional and servo controls and life on the die casting floor just got a lot more complicated. At this point the job description for a machine mechanic includes becoming an electronic technician and hopefully a programmer. Add to that an HMI (Human Machine Interface) that uses terminology that made sense to the designer. Unfortunately, the HMI programmer probably never actually made a casting or knows the popular terminology, or at least the local terminology. (See a previous article on the various words used for the same component or attribute within the industry).

The key controls on a modern die casting machines consists of electrical, electronic, electro-hydraulic, pneumatic and mechanical.

Schematics, electrical, hydraulic and pneumatic cross language barriers and allow the troubleshooter to carefully and logically determine cause and effects by a series of yes/no steps.

Add automation such as robots that operate with a whole different programming language as well as servo driven ladles and sprayers and the complexity goes up exponentially.

Where does one get the type of training essential in a modern die casting plant? It is typically not available from a single source but several entities.

For example, hydraulics servo and proportional controls are provided by the companies that produce the valves. Companies such as Parker, Bosch, Rexroth, Vickers, etc. They know the components and how they should perform and how to test them. They will not know what a well-functioning machine looks like. Knowing the proper function of a hydraulic or proportional component is extremely valuable. Is that enough?

PLC producers such as Allen-Bradley. Omron and Siemens can tell you if the processor is working and how to connect the laptop computer and search for specific inputs and outputs such as limit switches, push buttons, selector switches and solenoids, pilot lights and relays. (E-Stop buttons are notorious for stopping a machine for hours while the troubleshooter looks for broken wires). It will tell you if the output to a solenoid is enabled but it won't tell you if the fuse is blown or if and why a solenoid is burned out.

The electrical ladder diagram on a modern machine is relatively simple in that it includes the Start and Stop buttons for the pump motor and enables power to the PLC. Beyond that, you are back to the PLC program. It will list physical components such as limit switches, push buttons and solenoids and identify the I/O location and wire number. In a few cases the drawings will show you where the switches and valves are located if you are really fortunate. Hopefully, the hydraulic schematic and electri-

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cal schematic will cross reference each other. I have seen cases where the two schematics used entirely different identification systems for components.

Robotics suppliers and integrators can provide training specific to their robot but not how to make a casting.

In my observation, few companies have been successful hiring the above skills off the street. When the do exist, they are in companies where their key technical staff were schooled, one discipline at a time over a number of years. Yes, that's right, years. I used to say that it took 3 years to train a person to a technician level. That presumes that he or she is working in an environment where at least half of the employees were already skilled and could mentor someone in between their class work and their work experience. If most of the work force is relatively new, then the only way to get up to speed is to train large groups at a time. The commitment to train at this level requires understanding of the cost of ignorance. The cost of down time, poor quality and damaged tooling and equipment from improper operation and/or diagnosis is easily documented. What is your up-time, utilization and PPM target? A skilled team reduces costs, improves up-time and utilization and produces better quality.

What are your training goals? Are you ready to make a commitment to training?