



Successful heat treating requires all hands on deck – and a well-thought-out process that considers the needs of both production and quality.

The art of leading the heat-treat team

Leadership is about guiding the team toward the best opportunities and taking action toward getting the required task done. But success can come down to whether the process is appropriate for the team to even be able to succeed. Therefore, leaders in engineering, quality, and production must be aware of the relationship of the process and the operators.

For example, if a heat-treat oven is not calibrated, is it really reasonable to expect an acceptable outcome after using it? There is a reason why AMS2750 has guidelines for indicating frequencies of calibration. It is to ensure the quality is upheld such that whatever product runs through can meet the necessary requirements. But in the world of manufacturing, there are always the opposing forces of production and quality. Production wants to do things faster, sometimes at the expense of quality. And quality would prefer to take their time, but can't take forever and find ways to be efficient in meeting the requirements.

Abraham Lincoln once said, "Give me six hours to chop down a tree and I will spend the first four sharpening the ax." Leadership must view this similarly in the given process. Production wants to get product out the door to make the shipments to the customer — but if the "ax" is dull, it will take longer for the team to produce the results. Putting your best employee on the job with a "dull ax" (or unmaintained furnace) will just result in the process taking longer and potentially creating nonconformances. Instead, taking the time to do what is necessary to make all goals must be incorporated into the process.

Sharpening the ax in terms of metallurgical considerations involves reading up on literature papers and ASM handbooks on metallurgical phenomena to properly design heat-treat cycles. Sharpening the ax even for production scheduling comes down to value stream mapping and incorporating concepts such as lean manufacturing into the process. Sharpening the ax in the case of furnace performance is about doing the proper preventative maintenance programs on the furnaces and following through on the correct calibration, system accuracy tests (SATs), and temperature uniformity surveys (TUS).

Because AMS 2750 outlines these critical requirements as necessary, without these being performed the furnace has a potential to not run in accordance with customer requirements. Therefore, the view of "taking time out of the process" for speed must be changed to one of viewing this time as critical for making the process flow smoothly. Hence, the leader must know when to "sharpen the ax." This is not always that simple to convey in the manufacturing environment.

The first step is to clearly realize the goals or modify or even establish them. Without a goal, how does the person cutting the tree even know where to swing the ax? Get clear on AMS2750 and attend the PRI course. Read it multiple times and even attend the PRI conferences hosted around the world to talk to others in the industry about the requirements. ASM courses on heat treat are also great resources to

learn about the metallurgical considerations for the "goals" of why transforming the microstructure is favorable depending on the application.

The second step must be about educating and conveying the importance of "why." When the operators know that a sharp ax will result in a faster process of cutting the tree, they will begin to realize that a properly tuned and maintained furnace will produce more consistent results when heat treating. When the instructions are written in such a way that they are clear and meeting requirements, there is less room for error in interpretation. When the process is scheduled and managed to set a cadence of a steady drum beat, the effort can be more consistently maintained. Short bursts of the ax to cut the tree may get you further into the cutting, but might tire out the employee. Thus, having a steadier cadence of performance is better for overall longevity.

"Why" atoms go to their respective crystallographic structures based on equilibrium phase diagrams and time temperature transformation curves is important to understand when troubleshooting. If a furnace is out of calibration and goes to the wrong temperature and a different phase is produced, the phase diagram will tell you. It is "why" meeting requirements to AMS2750 to keep a furnace properly working and consistent with its performance is important — because if the instruments aren't reading correctly, there could be potential escapes of nonconforming product.

However, it has often been my experience over the years that convincing the production team of the importance of quality-related issues is much like convincing a race car driver that speed bumps for safety are a help and not a hindrance. But the racer wants to get to the finish line as quickly as possible, shaving off time anywhere they can. The regular driver wants to get there safely and within the speed limit. Production wants to hurry things along to satisfy the customer in a desire to provide great service. Quality can seem to hold things up in an attempt to maintain the necessary requirements — seemingly "slowing" the process down from meeting the customer demand for fast delivery. This isn't a new concept and happens anywhere in a manufacturing facility.

Instead of thinking of quality as the police and production as a speeding driver, ask when it's time to sharpen the ax and work smarter, not harder. It's a win-win for production and quality as the tree will get cut down more quickly and will still meet the requirements. For companies to stay sharp in the industry, the time to prepare is often more important than the actual time spent doing the work. ♣

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