

## Hey, Don't Blame Me!

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The product is coming out of the oven or dryer, and it's not right. What's going on? Is the burner gas-air ratio wrong? Has anyone checked the temperature controls lately? Are we sure the recirculating fan is turning at full speed? All legitimate questions which should be answered, but don't stop there. The problem may be rooted elsewhere in the process.

Heat makes things happen -- for better or worse. It causes water and solvents to evaporate, it triggers chemical reactions and it alters physical properties. But, because we can't stroll through the oven or dryer watching these things happen, the heating process often takes on an aura of mystery. Small wonder that when something goes wrong, we gravitate to the heating process and equipment.

I'm not saying that heating processes are trouble-free, but if you limit your troubleshooting to the oven, you may be doing yourself a great disservice. You have to look at the whole manufacturing process. Let me give you a few examples.

**Bad Finish Quality.** A company was heating metal parts in an oven. Surface appearance was important, but discoloration and staining occurred on the parts. All sorts of theories were proposed -- sulfur in the natural gas, some sort of unspecified mystery substances produced by the burner, fumes being drawn in by the oven fan. After going over the oven with a fine-toothed comb and finding nothing wrong, the company began looking farther upstream. The parts went through a stamping operation prior to heating, and they came out of this process carrying some lubricant from the dies. They were supposed to be washed before going to the oven, but some baskets missed the wash tank and went directly to the oven. The lubricant residue baked onto the parts, causing the discoloration.

**Ambient Effects.** After years of trouble-free operation, a dryer just couldn't do the job any longer. The product coming out of it was underdried, and worse, the moisture content was all over the map. The dryer was serviced -- burner tuneup, new fan belts, clean filters, temperature controls calibrated -- all to no avail. Then someone checked the moisture content of the product coming into the oven and found it was much higher than it should have been. The cause? After the previous processing step, the product had been stored in an unheated part of the plant, where it absorbed water from the damp air. The dryer never had a chance -- there was simply too much moisture to remove.

**A Bad Fit.** This example comes from a steel heat-treating operation -- not usually the realm of this column -- but it illustrates an important point: Stuff goes wrong downstream of the heating process, too. Steel is hardened by heating it to a temperature of about 1,500°F (816°C) and then quenching (rapid cooling) it in water, oil or air. A company was hardening a long tube, but differences in hardness occurred from one end of the tube to the other. The company suspected the furnace temperature wasn't uniform but hadn't been able to verify it. After investigating, it found the oil tank used for quenching wasn't quite wide enough to take the part. So, after removing the hot tube from the furnace, the operator had to turn and tilt it to get it into the tank. One end of the tube went into the oil a second or two later than the other, and that little delay was all it took to cause the hardness difference.

The point? If a product comes out of your oven or dryer all screwed up, don't automatically assume the heating process is at fault. It may simply be revealing a problem elsewhere. Before killing the messenger, look upstream and downstream:

- Have your raw material specifications changed, with or without your knowledge?
- Have any of the upstream or down- stream processing steps changed or been bypassed?
- Is the product being exposed to any sources of contamination elsewhere?
- Does the work in process get equal treatment at all processing steps?
- And finally -- I can't skip this -- are today's quality acceptance standards the same as they were back when there were no problems?

Until you have good answers to all those questions, it's too soon to beat up on the poor oven.