

Captive Vs. Commercial Heat Treaters?

A Split Decision.

Jack McGuinn, Senior Editor



Upon completion, a heat treated wheel is pulled from the furnace at Xtek.

Heat treating is a vital step in the gear making process—that's a given. But how that step is taken can happen in a number of ways. For one, there is a goodly number of gear manufacturers that invest in keeping the heat treat process in-house, along with the not insignificant attendant overhead—i.e., equipment, trained personnel, quality control, R&D, metallurgy, environmental clean-up, etc. Then, too, there are well-respected gear makers with no heat treat capabilities that outsource the work to commercial shops.

Let's take a look at three companies—a gear manufacturer and two commercial heat treaters—that are useful examples

of both captive and commercial heat treating. We'll examine the pros and cons of each scenario, as well as how our gear maker came to heat treat in-house, and what commercial heat treaters have to offer. All of which leads to the question: Who does it better?

The Short Answer: It Depends.

Captives. Cincinnati-based Xtek, Inc., since 1909 a maker of heavy equipment gears, has a long history of heat treating in-house.

"Xtek was originally founded as the Tool Steel Gear and Pinion Company back in 1909, and has roots that go back even

further,” says Kevin Biggers, Xtek manager for metallurgical engineering. “Heat treating was the process that the company was founded on. One of the company founders had developed a pack carburizing process prior to 1905 in Chicago in an effort to make better bicycle bearings. Carburizing process has been part of the company’s core technologies ever since.”

And as Biggers points out, “At that point in time, there was no commercial heat treat industry. We had no choice but to do it ourselves.”

Xtek is one of many gear makers that feel keeping the process in-house is the only way to maintain strict quality control. For them, keeping the process at home is the only recourse. And given the markets served by a gear manufacturer such as Xtek, sometimes it is a matter of having little choice.

“Our decision to heat treat components is due in part to the nature of our products,” says Biggers. “We tend to make very large components compared to the general industry. It is not uncommon for us to be processing a 25,000-lb., double-helical pinion. There are not many commercial heat treat shops capable of heat treating a part like that.

“We also have products where the heat treatment is vital to the performance of the part, and the heat process and equipment is very specialized just for that product. To use a commercial heat treater in such a case, we would be giving up the competitive advantage that our product has in the market.” Biggers does say, however, that Xtek uses commercial heat treaters for many of their “non-critical” parts.

Larger captives such as Xtek are also in a better position



An in-process rope drum quenching at Xtek.

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A tray of spiral bevel gears after vacuum carburization at Solar Atmospheres.

to possess and maintain latest-technology capabilities and processes. Xtek maintains a complete metallurgical lab to complement their heat treat operation. Add to that their inherent, collective gear knowledge and you have a combination that is very competitive in the heat treat universe.

“In the industry that Xtek supplies, it is very important to them to know that Xtek people are doing the heat treatment of their components,” says Biggers. “This is one area that

Xtek has proved time and again that the quality of the heat treatment is critical to the performance of a product. We view ourselves as our customers’ problem solvers. Many times the solution to a customer’s problem is the correct application of material and heat treatment.”

Commercials. But let’s say you are a gear manufacturer who has chosen not to pursue in-house heat treating. In a perfect gear world, every shop would be able to do its own heat treating. But the typical reality is that often a company’s bottom line just won’t justify the capital expenditure required for personnel, training, equipment, quality control, etc.

For many, the best alternative is to identify a top-flight commercial treater that will work closely with you and your manufacturing process. Also, look for a commercial house that insists that customers invest in to-the-print tooling before they’ll agree to take on a job.

Bodycote, an international heat treating provider, is one of them.

“We require (dedicated) tooling for each job, and we’re not going to use something that’s ‘close enough,’” says Don Giessel, general manager at Bodycote’s New Berlin, WI plant.

“We take the stance that (the customer) must use the proper tooling for the proper job. Otherwise, they may come back to us and say ‘This isn’t flat enough,’ etc., because of improper tooling.”

Of course, there are other considerations at play when

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seeking out a good commercial heat treater. Bob Lacock, marketing manager for commercial heat treater Solar Atmospheres in Souderton, PA, addresses some of the more important ones.

“The primary goal of successful outsourcing is to decrease costs (purchasing, overhead, personnel, maintenance and processing),” he says. “Complementary to reducing costs is to give management more time and resources to focus on core activities. Outsourcing also allows for production flexibility; that is, expanding without investing in capital equipment and other associated costs. Conversely, savings occur when there is no idle equipment or people during slower production times.”

As mentioned, capabilities can be a huge difference maker, particularly with gear manufacture. Vacuum carburizing, for instance, is one of the newer technologies to come along. It is a much cleaner and cost-effective process in that the part comes out of the furnace in a much cleaner and finished state than with older heat treat processes. Thus with less handling and processing—less cost.

“Solar offers vacuum carburizing for optimum case-hardening results,” says Lacock. “This includes a more uniform case depth, no intergranular oxidation due to the controlled vacuum environment, and minimized distortion.” Bodycote is another commercial house providing this service.

That said, what should a gear maker look for if outsourcing is the process of choice?



Xtek specializes in carburizing heavy equipment gears for its customers.

“No. 1, a heat treater that’s going to work with them in the gear manufacturing process,” says Bodycote’s Giessel. “It’s very important that (the treater) ask a lot of questions; if a gear manufacturer calls up and asks someone about their heat treating their gears and all he gets is pricing, that should be a red flag. A lot of questions need to be asked upfront. No. 2, with press quenching, be adamant that proper tooling be used for that job, and don’t settle for the existing tooling of another

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treater's customer whose tooling is just close."

As for Solar, Lacock says it's all about "Honesty, plus unique capabilities, responsive service and consistent quality. And having staff metallurgists and an R&D department as we do at Solar."

And the winner is... So who to call—captive or commercial? The fairest answer is that there is no clear-cut winner in this debate.

Commercial houses may have more equipment capabilities, metallurgical and heat treat expertise, and, depending on the project, faster turnaround.

And yet gear makers—especially those with advanced heat treat facilities—possess an understanding of gears that most, although as this article certainly demonstrates, not all, commercials can't begin to match.

But one contention can be held that is impossible to argue against: If you are a maker of highest-precision gears, you must have a trusted and experienced provider—in-house or commercial—for heat treating for gears.

Anything short of that is playing with fire. 

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