

Phoenix Heat Treating (PHT) Adds Value-Added Services to Help Machining Operations Adjust to Economic Challenges

Shorter Cycles, Faster Delivery, Save Time and Money

Phoenix Heat Treating, one of the largest and leading full-service heat treating companies in the southwest recently added a trio of new services to support tool and die shops, fabricators, machining operations and many other metal manufacturing entities. The new services include the delivery of timely, value-added benefits to customers, and offer lower costs, faster turn-around, and lab-certified quality. They are based on a business model plan that includes the reduction of waste and lower energy usage, which supports the company's energy-saving and eco-friendly initiatives.

The new lines include gaseous nitrocarburizing (FNC), black oxide metal finishing, and tool steel hardening with overnight delivery. These key heat treating services are much in demand and cover a wide range of industries from fasteners and machined tools to stamped parts and hand tools. In order to meet the challenge of adding the new lines, Phoenix Heat Treating developed a lean business model that was designed to help customers benefit from the company's same high quality, increased productivity, skilled worker involvement, and a twenty-four-seven plant schedule.

With extensive testing and follow-up lab work, the company discovered that new processes required fewer cycles at lower temperatures with less energy consumption to meet the objectives of resource reduction and lower costs. The need for more effective tracking of the new services required the addition of a new customer service technician who could follow customer jobs through the plant in real time. The company's automated processing and job-scheduling system was also enhanced to handle two separate shifts working around-the-clock.

"Today it's all about time and efficiency," says Peter Hushek, a fourth-generation heat treater, company owner and trained metallurgist. "The industry is seeking greater process efficiencies based on shorter cycles without having to sacrifice product quality. Customers are demanding lower costs and quicker deliveries so they can turn their orders faster and keep cash flow moving," Peter explained.

Lower Temperatures Save Energy and are Eco-Friendly

Two important characteristics of PHT's new quick-turn services are based on reduced cycle times and improved temperature uniformity, Peter explained. He said that one of the primary objectives was to fill a void in the need for shorter cycle processing with greater product yield and lower costs. "Shorter cycles at lower temperatures result in less wasted labor and energy with less chance for part distortion. "We believe that these timely services are a win-win situation for our company and shops who are adjusting work schedules and budgets to meet more demanding times," Peter added.



Gaseous nitrocarburizing, or FNC, is handled at PHT with submerged fluid bed furnaces. The lower temperature, shorter cycle furnaces improve the surface hardness with a case that resists wear, fatigue and corrosion. There is no quenching required, no change to hot-work steels and the grinding step is eliminated.

According to industry information, processing with lower temperatures and shorter heating-rate cycles without sacrificing quality is not that easily defined and has been problematic in many processing operations. PHT was able to develop optimum time-temperature rates through much in-house testing and lab work. Hushek believes the four generations of family heat treating experience helped provide the catalyst to perfect the reduced-energy, short-cycle services that would eliminate the potential for distortion in the metal parts.

FNC, Gaseous Nitrocarburizing in One Quick Step

PHT's gaseous Nitrocarburizing is a one-step, non-distorting thermochemical treatment for diffusion of both nitrogen and carbon into the surface of ferrous metals performed at lower temperatures in the company's submerged fluid bed furnaces. FNC improves the surface hardness layer of carbon steels, low-alloy steels, cast-irons and sintered ferrous alloys to include a 0.0002 to 0.0015" case that resists wear, fatigue and corrosion.

The key advantages of PHT's FNC are reduced costs and quicker delivery times derived from shorter cycles, as well as improved temperature and heating rate uniformity which minimizes parts deformation. Only minor surface clean-up is needed and the extra step of grinding is eliminated. More importantly, there are no changes to hot-work steels. Quenching is not needed to produce the same, or higher quality as salt bath or plasma nitriding, in a much more environmentally friendly manner.

"You receive the same benefits of resistance to wear, fatigue and corrosion with less pollution potential, as well as lower energy usage," Peter said. FNC surface

treatment is used on parts found in the manufacturing of automobiles, construction equipment, airplanes, appliances, power tools, engines, motors, conveyor systems, manufacturing equipment, among many others.

Black Oxide is the Lowest Cost of all Surface Preservatives

Black oxide applied properly produces a beautiful, deep satin black finish with no rub off or dimensional changes in the parts. The blackened surface of metal, when combined with the FNC process, is abrasion resistant, corrosion protected and reflects less light. Black oxide can meet certifications such as, MIL-DTL-13924, AMS 2485, ASTM D769 and ISO 11408, by heat treating companies that have been approved for application of black oxide to meet certification. The black magnetite finish is caused by a chemical reaction when parts are immersed in an oxide solution that is about 285-degrees-F. The reaction between the iron of the ferrous alloy and the hot oxide solution results in a Fe₃O₄ magnetite on the metal surface. For corrosion resistance, a rust preventative oil or wax is applied to the black oxide coating. The metal treatment adds about 5 to 10-millionths-in. to the surface of parts. The treatment will not crack or fracture if the part is bent or twisted.

PHT's black oxide treatment requires only about 45-minutes of processing time, thus energy costs are minimal due to low solution temperatures and short cycle times. A huge benefit to the environment is that the process doesn't produce CO₂ emissions or green house gases. Peter explained that black oxide is immensely popular in a multitude of industries. Applications include the manufacturing of appliances, autos, camping equipment, fastener, hardware, stamping, military components, power tools, tool and die and fabrication. PHT can turn out a large volume of black oxide and delivery is much quicker because the company is running two shifts, twenty-four-seven.

"We realized that black oxide was a perfect match for adding a new process that could be run in less time at lower temperatures, and would be more environmentally friendly," Peter described. He mentioned that their experience showed that no other metal finishing process can produce the same protective surface with similar metal preservation properties at a lower cost.



PHT's black oxide can be produced at lower temperatures and the metal finishing process produces a low cost, protective surface that is corrosion protected and abrasion resistant.



PHT ramped up the salt line to support a higher volume of tool steel hardening with overnight delivery. Lab results showed that improved heating rate uniformity reduced cycle times, improved quality and product yield. Most common tool steels are now processed in one cycle with greater efficiency at a lower cost, and without sacrificing quality.

One-Day Processing on Tool and Alloy Steels

PHT's new business plan showed that the company could handle a much higher volume of tool steel with only minor changes in the work flow matrix. With everything already in place, including five large capacity vacuum furnaces, endothermic batch furnaces, fluid beds and a complete salt line to support the volume, PHT ramped up the quick-turn tool steel processing to meet overnight delivery service and kept the high quality standards required by metal working shops.

Computer modeling and lab testing were used to determine mixed load capacities, cycle times, and heating rate uniformity. Peter said computer simulations were tested and adapted to suit higher-volume production. Lab results showed that improved heating rate uniformity not only reduced cycle times, but improved quality and throughput yield. The findings confirm that greater processing efficiency can be delivered at a lower cost without sacrificing product quality, Peter stated.

"For most common tool steels, a single temper will produce the desired hardness and the job can be turned around in one day, Peter said. "A machine shop can drop off their metal in the afternoon and pick it up the next day," he added. The quality is guaranteed and repeatable through automated processing, and the time savings is huge when a customer is on a very tight schedule, Peter added. "One of the purposes in adding the new quick-turn services was to help metal working shops get their metal processed with a minimum amount of inconvenience, and by our holding the line on costs," Peter said.

As an industry leader, Phoenix Heat Treating provides a wide range of heat treating services to a multitude of industries throughout the southwest. Because of its size and processing capacity, the company can offer pricing advantages to meet the needs of small tool and die shops to large aerospace manufacturers. "We have always been reinventing ourselves, to stay ahead of the industry and to be able to offer customers more value in heat treating," Peter said.

Phoenix Heat Treating is located in Phoenix, AZ at 2405 W. Mohave Ave., and has been continuously operating for 46 years. Contact Peter Hushek, company owner, or John Levensky, at 602-258-7751, for answers to your most difficult heat treating challenges.