

Heat Treat Suppliers Focused on Gears

Auto Industry Driving Demand for Heat Treating Technology

Randy Stott, Managing Editor

“I’m bullish on the gear industry,” says Geoffrey Somary, president and CEO of Ipsen USA.

Gear Technology caught up with Somary at the recent Powdermet 2013 show in Chicago, where Somary described his company’s technology and how it fits well with the current trends in gear manufacturing.

“The trend from 6-speed to 8-speed and now even 9-speed transmissions requires more compact gears capable of higher torque loads,” Somary said in a follow-up e-mail. “In many cases, older heat treating equipment is no longer capable of delivering on such demanding specifications. Also, smaller, more compact gears enable the use of different improved technologies that were previously cost prohibitive. Therefore, advancement in automatic transmission technology has created new demand for heat treating equipment worldwide.”

Those trends in automobile transmissions have a number of heat treat suppliers looking forward to this year’s combined ASM heat treating show and Gear Expo. In particular, companies specializing in certain technologies — namely



The latest technology in vacuum furnaces allows for ergonomic design and easy integration into the workflow of a manufacturing operation, as seen here with the ModulTherm concept from ALD-Holcroft. (courtesy ALD-Holcroft).

Heat Treat 2013
27th ASM Heat Treating Society Conference and Exposition
September 16-18, 2013
Indiana Convention Center, Indianapolis
www.asminternational.org/content/Events/heattreat

The ASM Heat Treating Society Conference and Exposition is once again co-located with AGMA’s Gear Expo. This year’s show celebrates the 100th anniversary of the ASM Heat Treating Society, which began as the Steel Treaters Club in Detroit.

In addition to a comprehensive technical program, the conference will include three special “Heat Treating Master Series” sessions that will focus on heat treating pioneers whose research transformed heat treating technology. The sessions will include lectures by current experts in the heat treating field on the contributions and impact of past heat treating giants Walter Jominy, Marcus Grossmann and Edwin Northrup.

The technical program runs from September 16-18, but the exhibition hall is open only Tuesday, September 17 (9 a.m. until 6 p.m.) and Wednesday, September 18 (9 a.m. until 5 p.m.). Note that the Gear Expo portion of the exhibition hall is open one additional day— Thursday, September 19.

For more information, visit www.asminternational.org/content/Events/heattreat.

vacuum carburizing and induction hardening — seem especially interested in the possibilities opened up by these gear manufacturing trends.

“Vacuum carburizing, alternately called low pressure carburizing (LPC), will become more prevalent due to the smaller gear cross sections,” Somary says. “One of the drawbacks to LPC has been the difficulty of gas quenching larger gear cross sections. Now that cross sections are smaller, LPC and the gas quenching of gears has become more affordable.”

Bill Gornicki, VP sales and marketing for ALD-Holcroft, echoes the increased emphasis on vacuum carburizing for automotive transmissions. “ALD-Holcroft has benefited in the new automotive transmission trend toward vacuum carburizing. These 8+ speed transmissions with many more gears have benefited from more uniform case hardening in vacuum carbu-

rizing in conjunction with our distortion control capabilities in high pressure gas quenching.”

John Gottschalk, director of engineered products for Surface Combustion, agrees that the automobile industry is driving trends in heat treating equipment. “Due to the increase in global motor vehicle production, output from small part producers has ramped up significantly, leading to increased demand for our equipment designs.”

Smaller sized gears are also well suited to induction hardening, says Dr. Valery Rudnev, director of science and technology for Inductoheat, commenting that although most transmission gears are still carburized, virtually every manufacturer is using induction hardening for at least some of those gears.

“With the recent improvements, inventions and breakthroughs associated with induction heat treating—such as development of new medium- and high-frequency inverters with amazing capabilities—the range of induction for gear hardening applications is expand-

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Gear Grinding Technology

ing with a steadily increasing pace, and increasing numbers of gear manufacturers are turning to using induction gear hardening.”

When discussing automotive gears, all of the suppliers agree that one of the most important demands made by manufacturers is better and better control of gear distortion.

“The biggest demand is to try to avoid post heat treat operations,” Rudnev says, adding that that’s an area where induction hardening shines. Because processes like contour hardening can take one second or less per part, there isn’t a lot of time for distortion to occur.

Rudnev adds that a number of technology improvements are significantly changing the applicability of induction hardening for an increasing range of part geometries. In particular, technologies such as simultaneous dual-frequency induction hardening allow for greater control over the hardening process.

But there is also substantial R&D work underway, Rudnev says. Most induction heat treating equipment providers are looking for ways to expand the versatility and capability of the inverters that provide the frequency control and power supply. In fact, Rudnev says, within 5-10 years, we may see induction heat treating equipment that will allow for processing a part with three or even four simultaneous frequencies, opening up even more part geometries for possible induction heat treating.



As power supplies continue to improve, induction heat treating is becoming applicable to a much wider range of gears. Shown here is Inductoheat's Statipower IFP inverter, which will be on display for the first time at Heat Treat 2013 (courtesy Inductoheat).

For now, Inductoheat will be displaying for the first time ever its Statipower IFP (independent frequency and power control) inverter at the show. This new technology allows process flexibility by allowing independently adjustable frequencies (5-40 kHz) and power (10-360 kW) via a CNC program. In the past, such a range of options would have required multiple power supplies, each with a very limited range of adjustment.

“This concept substantially expands heat treat equipment capabilities for processing parts by programming power and/or frequency changes on the fly, optimizing hardening of gears of different modules with various tooth geometries,” Rudnev says.

Controlling distortion is also one of the promises of vacuum carburizing.

“Most new automotive transmission programs are steering toward LPC (low pressure vacuum carburizing),” says Gornicki. “It is highly repeatable, extremely uniform, offers better fatigue resistance, and in conjunction with convection heating and high pressure gas quenching, post heat treat grind can often be eliminated.”

Ipsen's Somary agrees. “Manufacturers are demanding tighter tolerances and greater uniformity from part to part. This has led builders of heat treating equipment to bring new innovations, sensors and software to market that can deliver on these tighter specifications.”


Gornicki points out that the trend toward lower carbon emissions in manufacturing has steered the automotive transmission manufacturers toward vacuum processing. “With virtually no carbon emissions compared to atmosphere processing, vacuum is most certainly on the rise.”

Similarly, Inductoheat is touting the environmental friendliness of its heat treating processes, according to Rudnev. “In the last three to five years, there is an increasingly strong demand for environmentally friendly and energy-efficient technologies.” Rudnev counts induction heat treating among these technologies because it “puts the energy where it is needed, when it is needed.”

Another key emphasis of these heat treating suppliers seems to be helping to integrate heat treating into a leaner overall manufacturing environment. They’re doing so by creating technologies that can be more easily integrated on the manufacturing floor (as opposed to a separate heat treating department) and which help reduce work-in-process.

“Our ModulTherm concept enables heat treating to be placed directly into the manufacturing environment,” said ALD-Holcroft's Gornicki. “This eliminates the typically dark, smoke laden and hot heat treat facilities (often located in the back of the building). These modern vacuum facilities are ergonomically superior to the pushers and batch atmosphere furnaces of the past.”

The trend is also to increase automation of heat treating equipment. “As the present demand for gearing tends to be for automotive industry driven products, designs incorporating higher levels of automation are of increased value to our customers competing in that market,” says Surface Combustion's Gottschalk.

Clearly, heat treating equipment suppliers are listening to the demands of industry, and they’re working to develop technologies that improve the overall gear manufacturing process. Heat treating technology is far from stagnant. In fact, all of the sources we talked to indicated that there are significant new technologies on the horizon that will soon have a big effect on the way many gears are heat treated. 

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