Gear Nitriding 2019

A Conversation with Sabine Kreuzmayr of Rübig

Randy Stott, Managing Editor

Both gas nitriding and ion/plasma nitriding are important heat treating technologies for gear manufacturing, so we sat down with Sabine Kreuzmayr, Sales Manager for industrial furnaces at Rübig GmbH & Co.

Q: What types of gear parts are best suited for ion/plasma nitriding?

A: Here are just a few examples from all kinds of gears and industries which are currently nitrided in our furnaces in series (either in our heat treat shops or at our customers in-house):

- Disc carriers of dual-clutch transmissions
- Ring gears for wind industry (up to 2 m/6.5 feet in diameter!)
- Crankshafts for automotive, racing as well as aerospace, as well as their forging dies
- Main shafts for automotive
- and many more...

Q: What are the main reasons for nitriding (either conventional or ion/plasma)?

A: For either conventional nitriding or ion/plasma nitriding, manufacturers can expect to require fewer production steps after hardening. Case hardening/carburizing processes generally take place at a much higher temperature than nitriding, which requires only 850–1,200°F. Consequently, nitriding causes less distortion, which means fewer machining steps after hardening.

With ion/plasma nitriding, you have the additional benefits of easier masking and environmental friendliness. During other heat treating processes (such as carburizing or even gas nitriding), masking requires time consuming applying of pastes (mostly copper pastes),

Rübig's Mircopuls Everest system is designed for plasma nitriding gears, shafts, bearings and similar parts (image courtesy of Rübig)

which need to be removed afterwards again, mostly mechanically and again time consuming. Masking in ion/plasma can be done by a mechanically made sleeve/cover. In addition, ion/plasma nitriding does not require the use of ammonia, nor does it involve the use of open flames in the production environment, which increases work safety. In addition it provides for a better ecological footprint, as well as easier compliance with local regulations concerning toxic gases.

Q: How widespread is nitriding?

A: Conventional gas nitriding or ferritic nitrocarburizing is already very popular and used in many industries. Ion/plasma nitriding is the latest nitriding technology and not nearly as prominent.

What we experience is that the trend further moves into the direction of ion/plasma nitriding. The combination of lower tolerances, new materials and more severe regulations in terms of environmental friendliness will force manufacturers to find alternatives to carburizing and gas nitriding.

Q: What are the latest trends?

A: Talking about 4.0, everybody is talking about something different. For us as a machine builder we see a network of smart data: Learning out of data, simulations, joined-up machines, usage of augmented reality in daily business (one answer for skills shortage).

Robotic loading, remote maintenance, or conformity to all kinds of aerospace or automotive norms are standard for us.

Q: What should gear DESIGNERS be thinking about with regard to heat treatment?

A: People as creatures of habit tend to stick to long-standing technologies—also designers. What we experience is that the latest heat treat technologies are most of the times not known to designers. To avoid mistakes, they stay with processes they know.

Heat treaters (not only commercial, but also captive) are under highest pressure, as all unplanned changes, mistakes and stresses, which could not be determined before heat treatment, will be visible AFTER heat treatment! Knowledge about less-distorting processes would help!

By the way, this is one reason why we also offer heat treatment training for designers. It's an urgent need.

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