Nagel Technologies GmbH

www.nagel.com

Nagel is the leading specialist for machines and tools for honing and superfinishing. The company, headquartered in Nürtingen and with seven international subsidiaries, produces primarily for the automotive industry and its suppliers. Large parts of the business were previously linked to components for combustion engines. With the machine for brake disk coating, Nagel is now deliberately offering a product that is independent of the drive.

INDUSTRY
Mechanical engineering

NUMBER OF EMPLOYEES
1,800 worldwide

SITE
Nürtingen (Germany)

TRUMPF PRODUCTS

- TruDisk Laser
- HS-LMD

APPLICATIONS

- High speed laser metal deposition (HS-LMD)

Challenges

The new Euro 7 standard requires a significant reduction in the formation of particulate matter - for the first time not only in the exhaust gases from combustion engine cars, but also in the abrasion of tires and brakes. All manufacturers who want to sell cars in the European Union after 2026 need a solution for both components quickly. Dr. Claus-Ulrich Lott is the CEO of Nagel Technologies GmbH in Nürtingen. As he walks through the older, well-lit part of the main factory, he asks: “What should the solution look like? First of all, it must comply with the standard. No abrasion, of course. Secondly, it must be affordable. Brakes are a mass-produced product, so the unit price is a matter of cents. And thirdly, it has to fit into the established production process as smoothly as possible.” Lott arrives to the front of the testing facility for brake disk production and comes to a halt That's why we decided to buy a machine to build a machine that coats brake disks with an ultra-hard coating.”

"How economically efficient coating is depends on completing the process with as little powder as possible."

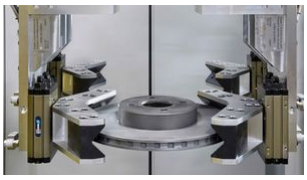
CLAUS-ULRICH LOTT
CEO OF NAGEL TECHNOLOGIES GMBH

Solution: High speed laser metal deposition

Three coating processes were quickly crossed off the list: electrochemical coating - too dirty. Thermal coating - too slow. Cold spraying - too expensive. Lott opted for the high-speed variant of laser metal deposition (HS-LMD) due to the clean process and short processing time. In this process, nozzles blow a metal powder onto the top layer and a laser beam melts it, creating a coating. In this particular case, a cast-iron car brake disk rotates under laser optics and seven powder feed nozzles. The high-speed laser cladding cell, called NaCoat, applies two layers. First a 0.1 millimeter thick adhesive layer of stainless steel. And then on top of that a 0.2 millimeter thick functional layer studded with ultra-hard carbide particles. "But cast iron is a not a good carrier for coatings." It has difficulty sticking, so a lot of powder is needed. "However, the powder ultimately accounts for 60 to 70 percent of the manufacturing costs in the brake disk production process. Our machine must therefore achieve a high level of powder efficiency, i.e. utilize as much of the supplied powder as possible."

Implementation: Beam shaping for greater powder efficiency

Lott explains: "We worked closely with TRUMPF's development department. And they use a double trick in beam shaping to maximize powder efficiency." The BrightLine Weld beam shaping technology divides the laser power into a core and ring zone that can be controlled independently of each other. A bit like a shower head with a core jet and a ring jet. The energy and heat inputs can thus be optimally adjusted. On the one hand, this means that the brake disk hardly warps at all. On the other hand, the coating is much thinner and therefore requires less powder. The second decisive step for powder consumption is TRUMPF's bifocal technology: part of the laser beam heats the casting slightly just before the powder shower falls on it. As a result, the powder adheres immediately without any problems instead of bouncing off and becoming waste. During the coating process, the machine uses up to 94 percent of the powder during the coating process. As a result, Nagel now has an economical production method for Euro 7-compliant, low-abrasion brake disks.



Outlook: Business success and a good earner

Lott took over the management of Nagel two and a half years ago and focused fully on transformation and brake disks. "Our previous business was heavily dependent on the combustion engine and is noticeably declining. With our solution for Euro 7-compliant brake disks, we want to offer a drive-

independent product while remaining in the industry we know best." And the orders prove him right: in the first six months, Nagel has delivered a double-digit number of brake disk systems for series production. Lott is proud of the success, but only gushes for a moment before turning serious again: "There's something else that's important: our systems will mean people are exposed to less particulate matter and therefore stay healthy. For me, that's a very satisfying prospect."

Find out more about our products

TruDisk

The TruDisk is a high-power solid-state laser for the welding, cutting, and surface processing of metals. It is suitable for tasks that require high performance combined with the highest beam quality.

Zum Produkt

High speed laser metal deposition (HS-LMD)

High-speed laser metal deposition is suitable for coating large areas of rotationally symmetrical components with thin layers.

Zum Produkt

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