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Super-efficient – High-performance laser coated hydraulic cylinder rods

Fraunhofer IWS Dresden optimized cladding process at Dutch Bosch Rexroth factory location

(Dresden, October 10, 2017) A higher laser beam cladding performance benefits Bosch Rexroth at the Dutch location Boxtel. The Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Dresden mutually optimized an industrial manufacturing process with the producer of drive and control engineering. For this purpose the IWS scientists upgraded an existing plasma powder welding machine. This way, large hydraulic cylinder rods can be coated considerably faster. Prof. Dr. Eckhard Beyer, managing director of Fraunhofer IWS, and Bernd Bodenstedt, Technical Plant Manager, Bosch Rexroth Boxtel, officially inaugurated the process.

In close collaboration with Bosch Rexroth, the Fraunhofer IWS Dresden developed a process for efficient high-performance laser coating. In Dutch Boxtel the IWS team upgraded a system for coating of hydraulic cylinder rods up to a size of 19 meters and a diameter of 600 millimeters. The new process increases the system productivity many times over by facilitating order data of up to 15 kilogram per hour. The researchers optimized the systems technology for laser power rates of up to 20 kilowatt and prepared it for industry 4.0 applications. Both partners will work out potential further developments in the forthcoming months. Thus, they plan on building closed digital control loops, process management simulation as well as connecting self-monitoring in order to automatically supervise and minimize errors for the purpose of quality control.

Metallurgically adhesive-secure joints and highest coating quality

In comparison to the earlier configuration, the new hydraulic cylinder rod coating procedure allows for handling higher powder quantities in shorter periods. The development aimed at fusing weld metal in such way that a wear and corrosion reducing coating emerges. While alternative thermal spraying methods merely yield metallic clamping between the applied powder and the to-be-coated basis material, the new solution creates a metallurgically clad joint on the cylinder rod surface – while concurrently stirring up low-alloy irons into the top layer. As distinguished from plasma powder cladding the laser powder cladding process realizes mixing degrees of below three percent already for single-pass coatings.

Presse and Public Relations

Dr. Ralf Jäckel | Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS | Phone +49 351 83391-3444 | Winterbergstraße 28 | 01277 Dresden | www.iws.fraunhofer.de | ralf.jaeckel@iws.fraunhofer.de

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In order to process the coating the hydraulic rods are fixed into the installation. While turning, a laser is guided along the processed rod with an even forward feed. In this way, a spiral coating bead forms with low porosity and steady layer height. Not only accelerates the laser power the welding process, but it also induces less heat into the base element. Thus, it remains intact with regard to structure and form. Depending on the intended purpose and conditions concerning the hydraulic rod, various types of powder materials with particularly customized characteristics like wear resistance, hardness, corrosion resistance or specific frictional properties may be applied.

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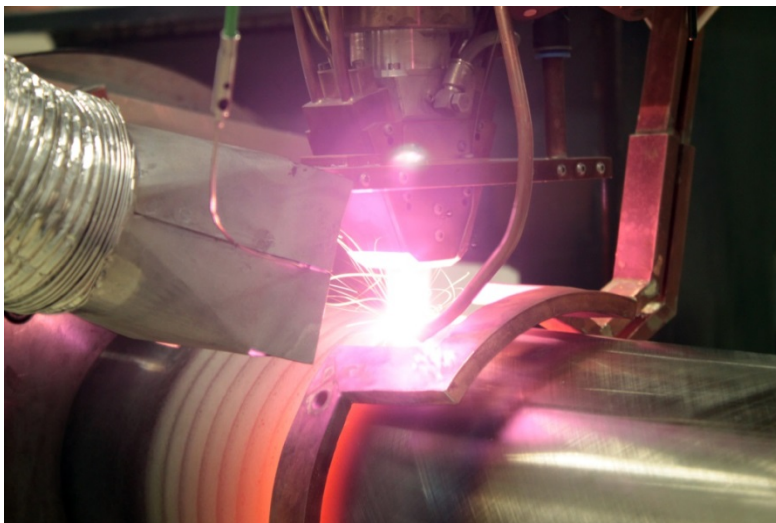
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Induction enables nickel-chromium alternative

In addition, the Fraunhofer IWS team equipped the Bosch Rexroth installation with an especially developed, inductive heating process. This facilitates an aimed process heat conduction whereby crack-prone and hard-to-weld coatings can be cladded faultlessly. This way Bosch Rexroth succeeded in expanding the coating range by specifically adjusted solutions ("Enduroq" family). Those offer protection against corrosion and constitute affordable as well as eco-friendly alternatives to conventional nickel-chromium coatings. "We may speak of a unique development," Bernd Bodenstedt emphasizes. "Optimizing the installation and technology did not only aim at widening our technical potentials and the coating range, but also at the whole process with regard to its efficiency. Thanks to Fraunhofer IWS we were able to extend the laser beam cladding process introduced in 2016. Now we dispose of a less critical, but considerably more stable process – with an enormous increase in quality."

Visit us at the "Formnext" in Frankfurt from November 14 until November 17, 2017: hall 3, booth F50.



While turning a Laser is guided along the processed cylinder rod with an even forward feed.

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Contact

Business Unit Manager Thermal Surface Technology: Dr.-Ing. Denise Beitelschmidt | Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS | Phone +49 351 83391-3444 | Winterbergstraße 28 | 01277 Dresden | www.iws.fraunhofer.de | denise.beitelschmidt@iws.fraunhofer.de

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Inaugurated the modified system: Dipl.-Ing. Bernd Bodenstedt (1.) and Prof. Dr. Eckhard Beyer (3. f. I.) with Holger Hillig (2. f. I.), Jan Hannweber (4. f. I., both Fraunhofer IWS), Rene Weidauer (LSA, 5. f. I.) as well as Uvar Broug, Arthur Brussaard and Roy Orbon (Bosch Rexroth, f. I.).
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The **Fraunhofer-Institut Werkstoff- und Strahltechnik IWS Dresden** embodies innovations in the area of laser and surface technology. According to customers' requests, we offer solutions for joining, cutting, ablation processes, surface treatment, and laser coatings as well as for CVD and PVD procedures. Research and development work is based on comprehensive materials and nanotechnology know-how. Systems engineering and process simulations complete the substantial competencies in the fields of laser materials processing and plasma coating procedures. We offer one stop solutions, starting with the research and development of new technologies, transferring them into industrial applications and supporting the customers on-site.