

PRESS RELEASE

PRESS RELEASE

No. 06 | 2021

March 22, 2021 || Page 1 | 3

Brake disc coating: HICLAD maximizes protection against corrosion and wear

(Dresden, March 22, 2021) Brake discs are moving into focus as part of the current green-energy discussion. Fraunhofer IWS scientists have developed the HICLAD process to maximize protection against corrosion and wear by tailored surface functionalization. A further focus includes the reduction of particulate emissions. An additional advantage of this technology is the cost-effective series production.

Due to its coating properties and the diverse material spectrum, laser powder cladding is one of the well-established industrial coating processes for protecting high-quality components against corrosion and wear. However, for mass production in large quantities, such as brake discs, conventional laser cladding so far only partially meets industrial cost targets. As a result, Fraunhofer IWS has now developed high performance and high-speed laser cladding HICLAD. This new process uses customized powder nozzles and optics configurations to design a stable and reproducible high power coating method with up to 20 kilowatts of laser power. Efficiency and coating performance increase accordingly, both indispensable for series production.

Optimum friction pairing in terms of braking properties and minimum particulate emissions

The brake discs are coated in two steps with two layers: Firstly, an approximately 125-micrometer-thick stainless steel anti-corrosion coating is deposited. The HICLAD process is set up in such a way that a defect-free coating is generated on the difficult-to-weld cast iron with lamellar graphite of the brake disc blanks, with minimum values for dilution, stresses and distortion. Secondly, the coating with the tailored tribological functions is applied on top. It receives its wear resistance from hard metals such as tungsten carbide, titanium carbide or chromium carbide, which are embedded in an iron-based alloy. The coating system and the mixing ratios are adjusted in such a way that, when combined with the brake pads, an optimum friction pairing in terms of braking properties and minimum particulate emissions can be achieved. Thanks to process control and melt pool monitoring, the process is extremely robust, so that, for example, low-cost powders with a broader particle size distribution can also be used. As a result, the overall material costs are significantly reduced. The quality of the coating system can be monitored non-destructively using LAwave® technology. Finally,

Head of Corporate Communications

Markus Forytta | Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS | Phone +49 351 83391-3614 | Winterbergstraße 28 | 01277 Dresden | www.iws.fraunhofer.de | markus.forytta@iws.fraunhofer.de

Group manager Laser cladding/System technology

Dipl.-Ing. (FH) Holger Hillig | Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS | Phone +49 351 83391-3358 | Winterbergstraße 28 | 01277 Dresden | www.iws.fraunhofer.de | holger.hillig@iws.fraunhofer.de

FRAUNHOFER-INSTITUT FÜR WERKSTOFF- UND STRAHLTECHNIK IWS

the coating solution significantly reduces particulate emissions during braking and avoids corrosion damage usually caused by sporadic use – such as in electric vehicles. The service life of HICLAD-coated brake discs is significantly extended.

PRESS RELEASE

No. 06 | 2021

March 22, 2021 || Page 2 | 3

Visit us on this topic at the digital Hannover Messe 2021, from April 12 to 16, 2021.

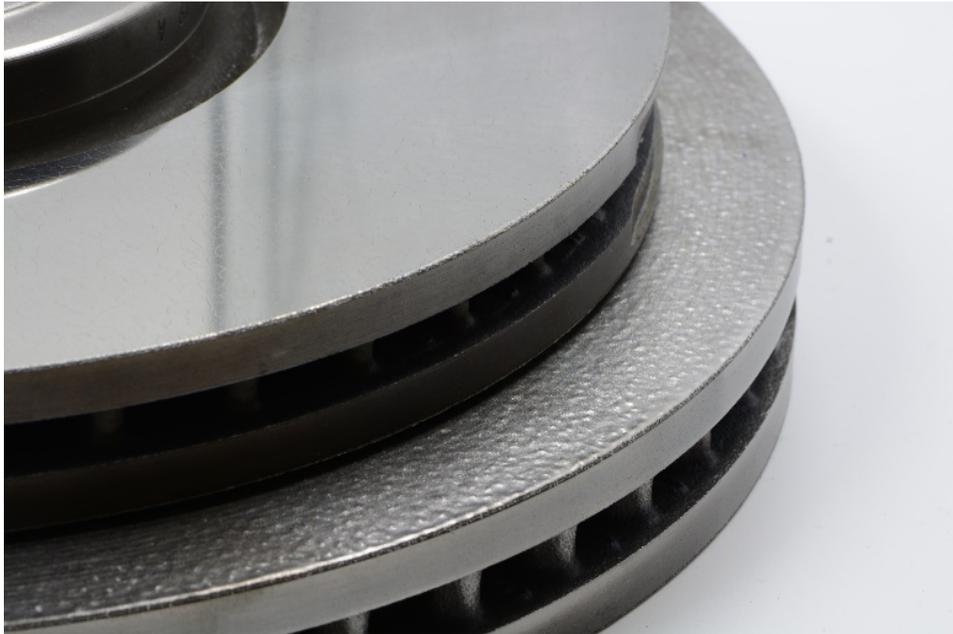


HICLAD enables high-quality corrosion coatings in an efficient process.

© Fraunhofer IWS Dresden

The **Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Dresden** stands for innovations in laser and surface technology. As an institute of the Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V., IWS offers one stop solutions ranging from the development of new processes to implementation into production up to application-oriented support. The fields of systems technology and process simulation complement the core competencies. The technology fields of Fraunhofer IWS include PVD and nanotechnology, chemical surface technology, thermal surface technology, generation and printing, joining, laser ablation and separation as well as microtechnology. The competence field of material characterization and testing supports the research activities.

At Westsächsische Hochschule Zwickau, IWS runs the Fraunhofer Application Center for Optical Metrology and Surface Technologies AZOM. The Fraunhofer project group at the Dortmunder OberflächenCentrum DOC® is also integrated into the Dresden Institute. The main cooperation partners in the USA include the Center for Coatings and Diamond Technologies (CCD) at Michigan State University in East Lansing and the Center for Laser Applications (CLA) in Plymouth, Michigan. Fraunhofer IWS employs around 450 people at its headquarters in Dresden.



PRESS RELEASE

No. 06 | 2021

March 22, 2021 || Page 3 | 3

HICLAD is a cost-effective coating solution for the tailoring of brake disc's corrosion resistance, friction behavior and reduced particulate emissions (bottom: as-clad condition; top: finish grinded condition).

© Fraunhofer IWS Dresden

The **Fraunhofer-Institut für Werkstoff- und Strahltechnik IWS Dresden** stands for innovations in laser and surface technology. As an institute of the Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e. V., IWS offers one stop solutions ranging from the development of new processes to implementation into production up to application-oriented support. The fields of systems technology and process simulation complement the core competencies. The technology fields of Fraunhofer IWS include PVD and nanotechnology, chemical surface technology, thermal surface technology, generation and printing, joining, laser ablation and separation as well as microtechnology. The competence field of material characterization and testing supports the research activities.

At Westsächsische Hochschule Zwickau, IWS runs the Fraunhofer Application Center for Optical Metrology and Surface Technologies AZOM. The Fraunhofer project group at the Dortmunder OberflächenCentrum DOC® is also integrated into the Dresden Institute. The main cooperation partners in the USA include the Center for Coatings and Diamond Technologies (CCD) at Michigan State University in East Lansing and the Center for Laser Applications (CLA) in Plymouth, Michigan. Fraunhofer IWS employs around 450 people at its headquarters in Dresden.