



## EXTREME HIGH-SPEED LASER MATERIAL DEPOSITION FOR MASS PRODUCTION IN THE OIL AND GAS INDUSTRY

### Task

Components in the oil and gas industry are used under extreme conditions, which cause high wear and corrosion. The use of wear- and/or corrosion-resistant coatings can improve the service life of these components, thereby reducing the risk of time-consuming and costly production downtime. Typically needed for quantities of more than 100,000 per year, the coating processes used must be fast, robust and resource-efficient.

### Method

In cooperation with Tenaris S.A., an international company in the oil and gas industry, Fraunhofer ILT developed a tailor-made process for the production of wear-resistant coatings by means of extreme high-speed laser material deposition (German acronym: EHLA). EHLA is a novel variant of laser material deposition (LMD), which is widely used for repair applications and for the production of wear protection layers with layer thicknesses in the millimeter range. With a process speed 10 to 100 times faster than LMD, EHLA can produce thin layers with layer thicknesses in the range of 25 to 350  $\mu\text{m}$ .

Compared to other coating processes, EHLA does not use chemicals nor does it require complex surface preparation. In addition, the EHLA process is resource-efficient: Approx. 80 to 90 percent of the additive metal powder applied is used to form the coating.

### Results

Different coatings were produced at Fraunhofer ILT and tested by Tenaris S.A. The coatings produced are dense, crack-free and metallurgically bonded to the substrate; furthermore, they can withstand the high stresses found in the industry. At the same time, the process is economical so that the aforementioned quantities can be readily made for mass production.

### Applications

To develop tailor-made EHLA processes, Fraunhofer ILT has several EHLA systems for component lengths of up to 1.5 m and revolutions of up to 2,000 rpm. In close cooperation with various laser beam source and machine tool manufacturers, Fraunhofer ILT offers support in the form of consulting, commissioning and on-site training in setting up production processes.

### Contact

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3 Cross-section of an approx. 350  $\mu\text{m}$  thick wear protection layer.

4 Photograph of the EHLA process.