

## Euro-7-compliant low-emission brake discs using high-speed laser metal deposition

Find out why high-speed laser metal deposition is the optimal choice for manufacturing Euro 7-compliant brake disks.

### › Euro 7 standard sets a new framework for brake disc emissions

Laser metal deposition offers optimum requirements for meeting the Euro 7 fine dust standard and the associated compliance with the prescribed brake wear.

### › High-speed laser metal deposition as a tried and tested process is ready for series production

High-speed laser metal deposition (HS-LMD) makes it possible to reliably produce low-emission brake disks in large series.

## Transforming production processes with high-speed laser metal deposition

Brake disks are usually cast and machined in vehicle construction. Untreated cast brake disks cause heavy brake abrasion and high particulate emissions during vehicle use. For the first time, the new EU standard Euro 7 also sets binding limits for non-exhaust-related particulate matter from tire and brake abrasion. This new legal standard presents brake disk manufacturers with major challenges: they not only have to manufacture an optimized product, but also test **new, suitable production technologies** and integrate them into their production processes before the deadline.

The good news is that there is already a **tried-and-tested process** that can be used in large-scale production to manufacture Euro 7-compliant brake disks – **high-speed laser metal deposition (HS-LMD)**. With this process, an extremely thin coating of a high-tensile and abrasion-resistant metal-carbide mixture is applied to the conventional brake disk, which significantly increases the **wear and corrosion resistance**.

## What advantages does high-speed laser metal deposition offer for the Euro 7-compliant brake disk production?

High-speed laser metal deposition allows you to produce brake disks which are compliant with the **Euro 7 standard**. The process also offers **numerous advantages in the manufacture and use of brake disks**:

### High cost efficiency

The application of up to 96% of the valuable powder optimizes the use of resources. In addition, costs for complex pre- and post-processing can be reduced. Saving time and money!

### Ready for highly productive series production

The high application rates of over 1,000 cm<sup>2</sup>/min enable the technology to be used economically in series production, even with volumes of several million brake disks per year.

### Uncomplicated integration

High-speed laser metal deposition can be integrated into any production process and used for different brake disk and coating types.

### High process reliability for uncompromising brake disk quality

Our beam forming technology ensures an optimally welded connection between the brake disk and the coating, and enables safe use in all vehicle types.

# 2,000 t

**CO<sub>2</sub> reduction** per year

Lower material consumption can save up to 2,000 t of CO<sub>2</sub> in brake disk production.

# 43 t

**Material savings** per year

High-speed laser metal deposition from TRUMPF reduces filler material by up to 43 t. Beam shaping enables maximum connection quality with minimum energy input.\*

# 10%

**Cost savings** per year

The production of coated brake disks using high-speed laser metal deposition technology enables high cost savings.\*

\* Example calculation for a typical brake disk coating of approx. 1 million disks per year, by saving 50 µm of coating material.

## Another plus: Corrosion and wear resistance

The high-speed laser metal deposition process allows **very thin layers** of typically 100 to 300 µm per layer to be applied with high precision. A special feature of the process is that the combination of metal and hard particle powders makes it possible to weld on coatings that are metallurgically bonded, crack-free and resistant to corrosion and wear – this also benefits electric cars, whose brakes are susceptible to rust. This ensures a **longer service life** and **longer maintenance intervals**.



## Everything from a single source: With these products and services, you are guaranteed to coat Euro-7-compliant

Sophisticated technique with **unique features** and **services** for laser coating of wear-resistant brake discs.

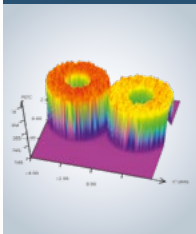
### Technology and hardware

#### High-power laser



**TruDisk:**  
**A robust beam source**  
Highest robustness and reliability, proven and tested by more than 20,000 lasers in serial production worldwide.

#### Beam forming technology



**BrightLine Weld + Bifocus:**  
**Precise beam shaping for process reliability**  
Precise adjustability of the beam profile enables better coating processes.

#### Beam and powder guidance



**Heavy-duty optics and nozzle**  
High-performance 3D-printed LMD powder nozzle. Replaceable and monitored optical parts allow highest robustness and convenient maintenance.

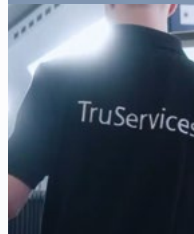
### Service and support

#### Application know-how



**Consulting tailored to your needs**  
A global team of highly trained HS-LMD application experts offers specific advice, application knowledge and customized solutions for your brake disc production.

#### On-site support



**Worldwide technical service**  
With service engineers worldwide, you can count on the very best – 24/7.

#### Patent rights included



**Includes all relevant patent licenses**  
Our components and beam sources are free of patents and license fees for HS-LMD applications. So you can concentrate on the essentials.

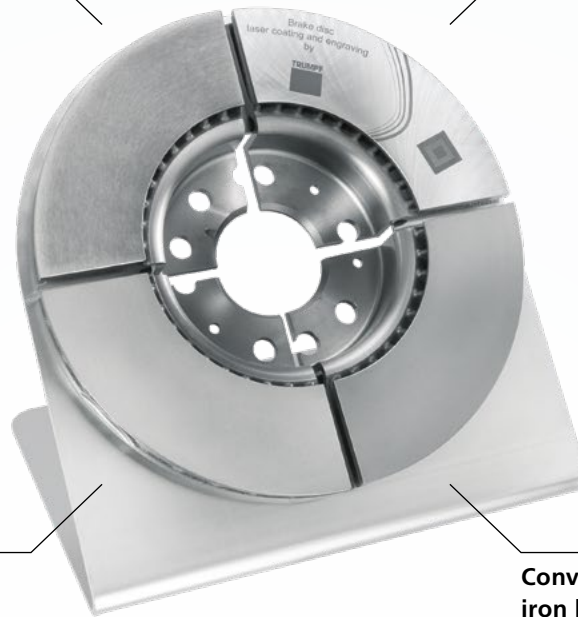
## Further TRUMPF laser applications for brake disc manufacturing

### HS-LMD of brake discs

Two-layer coating: adhesive layer and friction layer

### Finished brake disc with wear marks

Simple but smart wear detection



### Laser cleaning

Removal of oil, rust, etc.

### Conventional cast iron brake disc

Condition before any processing, usually milled

## ➤ Contact our brake coating experts now



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