EHLA exterior and interior coating

Machine and process solutions for high-speed laser material deposition of rotationally symmetrical components

EHLA CLASS

Wear protection
Corrosion protection
Additive manufacturing
Repair
Machine and process solutions for high-speed laser material deposition of rotationally symmetrical components.
ACUNITY is the market-leading technology company for extreme high-speed laser material deposition of rotationally symmetric components.

ACUNITY offers the world’s most powerful EHLA machine concept and process know-how, replacing hard chrome plating, thermal spraying and conventional cladding.

With our machines, the flexible coating, repairing or additive manufacturing for our customers becomes an in-house solution and part of our own value chain.

ACUNITY comes from the heart of research and is a strong partner to the industry. As a spin-off of the Fraunhofer ILT (Fraunhofer Institute for Laser Technology), the experts are responsible for the development and market maturity of EHLA technology.
EHLA.
Application.
Procedure.

Extreme high-speed laser material deposition.
Highly stressed machine components such as rollers, hydraulic cylinders or bearings have so far been protected against wear and corrosion by hard chrome plating, thermal spraying or laser material deposition.

Major deficiencies, such as low layer adhesion, the use of environmentally harmful chemicals or high post-processing costs make ACUNITY-EHLA a new system for a full-featured, efficient and environmentally friendly alternative for wear and corrosion protection.

With the machines of the ACUNITY-EHLA-class, particularly dimensionally stable layers with a thickness between 25 μm and 250 μm can be applied.

And this at very high process speeds in the range of several hundred metres per minute with surface rates in the range of a few square metres per hour.

By choosing the appropriate powder type, all steel, cast and aluminum alloys can be coated. The low heat input also makes it possible to coat heat-sensitive components. Also material pairings, such as titanium on steel, can be easily realised by melting metallurgy.

The ACUNITY-EHLA-class machines set new standards in terms of cost-effectiveness, productivity, surface design, environmental friendliness and resource efficiency.
Advantages over conventional laser material deposition

Complete abandonment of environmentally harmful chemicals (especially chromium VI) and avoidance of noise emissions

Increase in the quality of the layer (melting metallurgical bond, dense layers), thus lowering required layer thickness

No pretreatment of the surface required, thereby shortening the process chain

High material utilisation rate (up to 95%), thereby drastically reducing the use of resources

Suitability for coating, repair and additive manufacturing with system technology

Processability of innovative coating systems (such as Metal Matrix Composites) to increase the life of components

Possibility of manufacturing individualised products by additive manufacturing of special functional elements or modification of basic geometries/components (hybrid design concept) and high flexibility with regard to the manufacturable geometries

Reduction of production and delivery times compared to forging, casting and joining (welding, soldering, screwing or gluing)

Drastic increase in cost-effectiveness and significant reduction of coating times

Reduction of heat input into the component. Processing of hard-to-weld or non-weldable alloys possible

Increased accuracy due to reduced layer thicknesses and smaller molten baths

Significant reduction of (mechanical) rework, reduction of resource use

Reduction of surface roughness and thus reduction of reworking of the layers

Less downtimes
Fast revision processes
Part of own value creation
Also for large components
Also for heat-sensitive components
High grade surface material may be carried by lower core material (e.g. low cost, tough, workable)

General advantages when coating components with EHLA

Coating with EHLA has many advantages. It is particularly effective and efficient compared to conventional methods.

Advantages over thermal spraying and hard chrome plating

Complete abandonment of environmentally harmful chemicals (especially chromium VI) and avoidance of noise emissions

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Reduction of production and delivery times compared to forging, casting and joining (welding, soldering, screwing or gluing)
Exact build-up rate and an efficiency of over 95%. Designed for various powder materials.

Particularly smooth surfaces with a thickness of 25 μm to 250 μm with an area rate of more than 250 cm²/min.

Extremely high process speeds of up to 500 m/min.
The EHLA-machine-program.

External cladding “ECO-Series"
Internal cladding “ICO-Series”
ACUNITY offers the world’s most powerful EHLA machine concept and the most application-flexible process know-how.

As a spin-off of the Fraunhofer ILT (Fraunhofer Institute for Laser Technology), the experts are also crucial for the quality maturity of the process - right up to market maturity in industrial applications.

The machine concept uses largely industrially proven machine components.

This combines performance, ease of use and serviceability in the ACUNITY EHLA class machines, making them the ideal complement to in-house machinery and a reliable component in the company’s value chain.

Experience from more than 30 years of applied research in laser material deposition:

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**Fraunhofer ILT**

With over 435 employees and more than 19,500 m² of net floor space, the Fraunhofer Institute for Laser Technology ILT is one of the world’s largest contract research and development institutes in the field of laser development and laser application.
02.01
Professional Line

External cladding, Internal cladding, Hybrid system

Payload up to 3,000 kg

3,000 kg can be coated with high precision and exactness at a process speed of up to 500 rpm.

Modular construction in 3 extension levels

On the system side there are 3 extension levels of the Professional Line available: ICS 3,000 mm / ECS 4,500 mm, 9,000 mm

External cladding (ECS) Internal cladding (ICS) Hybrid system (HCS)

Professional Line can coat components outside and inside. As a hybrid, both systems are combined in one machine.

Highly efficient powder nozzle

Construction allows an exact build-up rate and an efficiency of up to 95% for different powder materials.

Low-maintenance standard components

Use of low-maintenance or free and industrially proven standard components.

First-class CNC reliability

The user-friendly system stands for fast processing times and precise coating quality.

Powerful software tool

The powerful and user-friendly software guarantees the creation of arbitrary tool paths in one shift.

Highest material and energy efficiency

The system is highly efficient in terms of material and energy utilisation, thus protecting resources and the environment likewise.
02.01
Professional Line

External cladding, Internal cladding, Hybrid system

Cladding processes:

ECS-Series [External Cladding System]
ICS-Series [Internal Cladding System]
HCS-Series [Hybrid Cladding System]

Configuration:
Zoom processing optics and high-precision EHLA powder nozzle
Variation of the laser beam diameter
High-efficiency powder feed and powder utilisation (only a slight excess)
Repeatability: X ± 0.02 mm, Z < ± 0.05 mm per m
Crash sensor for active detection and emergency stop during collisions
External cooling unit for laser, optics and nozzle
CE declaration of conformity and type plate (according to Machinery Directive 2006/42/EG, Annex II, Part II)
Operation manual hardcopy and digital
Location and type of media and power supply interfaces according to customer requirements
Data editing: fast USB, LAN
Mass flow controller for inert gas (Ar)
Length compensation: thermal expansion compensation system

Machine drive
Z-axis: Rack drive and linear guides, hardened steel rail
X-axis: Linear unit (spindle drive) with 4 precision steel shafts, maintenance-free
Linear unit (spindle drive) with 4 precision steel shafts, maintenance-free
Linear axis: servo motor (B&R), maintenance-free
Repeatability: X ± 0.02 mm, Z ± 0.05 mm per m
Positioning accuracy: X ± 0.10 mm, Z ± 0.10 mm
Control: B&R, offline programming possible

External cladding
Internal cladding
High working speed
High quality surfaces
Flexible order rate
Different powder types

Machine performance

Working range
10.000 mm
15.000 mm
20.000 mm

Configuration:

External cladding, Internal cladding, Hybrid system

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15.000 mm
20.000 mm
02.01 Professional Line

External cladding [ECS]

<table>
<thead>
<tr>
<th>Machine types</th>
<th>Process</th>
<th>WLL</th>
<th>Ø max.</th>
<th>Working range</th>
<th>Laser</th>
<th>Rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-ECS-Series-3000/45</td>
<td>Außenbeschichtung</td>
<td>3000 kg</td>
<td>bis 1000 mm</td>
<td>0 - 4.500 mm</td>
<td>5 kw</td>
<td>500 U/min</td>
</tr>
<tr>
<td>P-ECS-Series-3000/90</td>
<td>Außenbeschichtung</td>
<td>3000 kg</td>
<td>bis 1000 mm</td>
<td>0 - 9.000 mm</td>
<td>5 kw</td>
<td>500 U/min</td>
</tr>
<tr>
<td>P-ICS-Series-3000/18</td>
<td>Innenbeschichtung</td>
<td>3000 kg</td>
<td>33 - 1000 mm</td>
<td>0 - 900 mm</td>
<td>5 kw</td>
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<td>P-HYBRID-Series-3000/18</td>
<td>Außen- + Innen</td>
<td>3000 kg</td>
<td>33 - 1000 mm</td>
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<td>5 kw</td>
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<td>P-HYBRID-Series-3000/30</td>
<td>Außen- + Innen</td>
<td>3000 kg</td>
<td>33 - 1000 mm</td>
<td>0 - 3.000 mm</td>
<td>5 kw</td>
<td>500 U/min</td>
</tr>
</tbody>
</table>

Cladding speed: 0.6-1.6 m²/h | Cladding thickness: 0-350 μm (Einzelschicht) | Alignment: 90° + 45° | Monitoring system: | Distance control: Optional

Internal cladding [ICS]

<table>
<thead>
<tr>
<th>Machine types</th>
<th>Process</th>
<th>WLL</th>
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<tr>
<td>P-ICS-Series-3000/18</td>
<td>Außenbeschichtung</td>
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</table>

Cladding speed: 0.6-1.6 m²/h | Cladding thickness: 0-350 μm (Einzelschicht) | Alignment: 90° + 45° | Monitoring system: | Distance control: Standard
02.02
Grand Line
External cladding, Internal cladding, Hybrid system

- **Payload up to 10,000 kg**
  3,000 kg can be coated with high precision and exactness at a process speed of up to 500 rpm.

- **Modular construction in 5 extension levels**
  On the system side there are 3 extension levels of the Professional Line available.

- **External cladding (ECS)**
  Internal cladding (ICS)
  Hybrid system (HCS)
  Professional Line can coat components outside and inside. As a hybrid, both systems are combined in one machine.

- **Highly efficient powder nozzle**
  Construction allows an exact build-up rate and an efficiency of up to 95% for different powder materials.

- **Low-maintenance standard components**
  Use of low-maintenance or -free and industrially proven standard components.

- **First-class CNC reliability**
  The user-friendly system stands for fast processing times and precise coating quality.

- **Powerful software tool**
  The powerful and user-friendly software guarantees the creation of arbitrary tool paths in one shift.

The system is highly efficient in terms of material and energy utilisation, thus protecting resources and the environment.
Cladding processes:

**ECS-Series**  [External Cladding System]

**ICS-Series**  [Internal Cladding System]

**HCS-Series**  [Hybrid Cladding System]

### Machine drive

- **Z-axis**: Rack drive and linear guides, hardened steel rail
- **X-axis**: Linear unit (spindle drive) with 4 precision steel shafts, maintenance-free
- Linear unit (spindle drive) with 4 precision steel shafts, maintenance-free
- Linear axis: servo motor (B&R), maintenance-free
- Repeatability: X ± 0.02 mm, Z ± 0.05 mm per m
- Positioning accuracy: X ± 0.10 mm, Z ± 0.10 mm
- Control B&R, offline programming possible

### Konfiguration:

- Zoom processing optics and high-precision EHLA powder nozzle
- Variation of the laser beam diameter
- High-efficiency powder feed and powder utilisation (only a slight excess)
- Repeatability: X ± 0.02 mm, Z ± 0.05 mm per m
- Crash sensor for active detection and emergency stop during collisions
- External cooling unit for laser, optics and nozzle
- CE declaration of conformity and type plate (according to Machinery Directive 2006/42/EG, Annex II, Part 1A)
- Operation manual hardcopy and digital
- Location and type of media and power supply interfaces according to customer requirements
- Data editing fast: USB, LAN
- Mass flow controller for inert gas (Ar)
- Length compensation: thermal expansion compensation system

### Machine performance

![Machine performance chart](chart.png)

- External cladding, Internal cladding, Hybrid system
02.02
Grand Line

External cladding [ECS]

G-ECS-Series-10000/90
- Außenbeschichtung
- 10.000 kg
- 9.000 mm

G-ECS-Series-10000/135
- Außenbeschichtung
- 10.000 kg
- 13.500 mm

G-ECS-Series-10000/180
- Außenbeschichtung
- 10.000 kg
- 18.500 mm

Internal cladding [ICS]

G-ICS-Series-10000/18
- Innenebeschichtung
- 10.000 kg
- 900 mm

G-ICS-Series-10000/30
- Innenebeschichtung
- 10.000 kg
- 1.500 mm

Machine types

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<td>Außenbes.</td>
<td>10.000 kg</td>
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<td>0 - 18.500 mm</td>
<td>5 kw</td>
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<td>10.000 kg</td>
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<td>0 - 1.800 mm</td>
<td>5 kw</td>
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<td>Innenebes.</td>
<td>10.000 kg</td>
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<td>0 - 3.000 mm</td>
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Cladding speed: 0.6-1.6 m²/h
Cladding thickness: 0-350 μm (Einzelschicht)
Alignment: 90°
Monitoring system:
Distance control: optional standard
Applications in the industry.

Cladding of rotationally symmetrical components
Railway
Repair and cladding of wheel axles
Long-lasting corrosion protection of hydraulic components for mining.
Steel production
Wear protection for highly stressed rollers in the steel industry.
Protection of hydraulic cylinders against wear and corrosion in maritime environments.
Petrochemistry
Corrosion protection of heat exchanger tubes in the chemical industry.