

# Laser Powder Direct Energy Deposition (LP DED) Technology



## OEM Expertise

### ACCURATE CLAD GEOMETRY PREDICTION FOR CONSISTENT AND CONTROLLED LMD RESULTS

Our technology's core strength lies in the precise prediction of single-clad geometry (height, width, and overlap), enabling stable and defect-free processes without external control systems.

MATERIAL  
EFFICIENCY **+95%**

TECHNOLOGY  
TESTED IN **+20** DIFFERENT  
MATERIALS



MATERIAL AND PROCESS  
CHARACTERIZATION



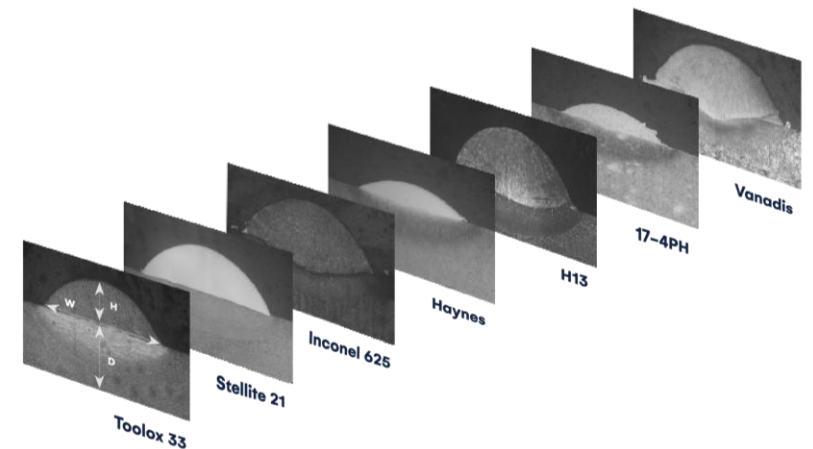
HARDWARE AND  
NOZZLE



QUALITY  
ASSURANCE



SOFTWARE FOR LASER  
PROCESSES



# Penn State University- Applied Research Laboratory (ARL)



Founded in 1945 at the request of the U.S. Navy, ARL is a Department of Defense (DoD) designated University Affiliated Research Center (UARC) that leverages cutting-edge research and innovation to pursue our mission.



Working with Director of Center for Innovative Materials Processing through Direct Digital Deposition (CIMP-3D) at The Applied Research Laboratory at Penn State University.

- Research Program with CIMP3D.
- Deploying proprietary technology in next 2 years.



Working with Director of the Center for Innovative Sintered Products

- Research program on laser powder behavior.



Working with Gear Research Institute.

- Research program on fatigue behavior of gear teeth manufactured by laser DED.

## Own Prototype Machines

### MACHINE EQUIPPED WITH:

NLIGHT 12KW & IPG 8KW LASER	+	Talens laser head
TRUMPF 12KW LASER	+	Trumpf laser head.
TRUMPF 24KW LASER	+	Trumpf laser head.
LASERLINE 24KW LASER	+	Talens & Trumpf laser heads



## Metallurgical Laboratories



Specific team for material research.



High quality microscopes.



Surface hardness and microhardness tester.



Full equipped laboratories for checking part quality.



Band saw, metallographic saws, mounting and polishing machines.



# Customized Machines

We craft machines optimized for high production, ensuring precision and durability in every additive-coating application.

From automotive, naval, aerospace, and advance technology Industries, our solutions transform and improve the efficiency and quality of products.



## BD Concept

High-production cladding solution (EHLA) for brake discs.



## Laser Cladding & Hardening Cell

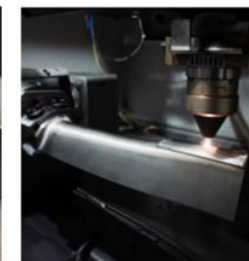
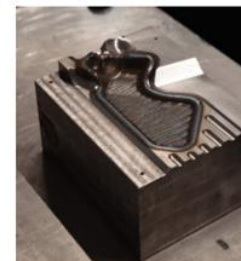
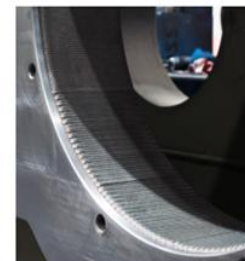
Turnkey solution for maintenance and repair of different workpieces.



## AXLES Concept

High-production cladding solution for axles.

## APPLICATIONS:





# Laser cladding head for low to high volume production

- Modular design.
- Interchangeable nozzle.
- Different nozzle types own EHLA included.  
Quick nozzle change.
- Improved cooling system.
- High volume laser metal deposition.
- HV LMD High efficiency of powder usage.
- Currently in production.
- Design and manufactured by Talens.

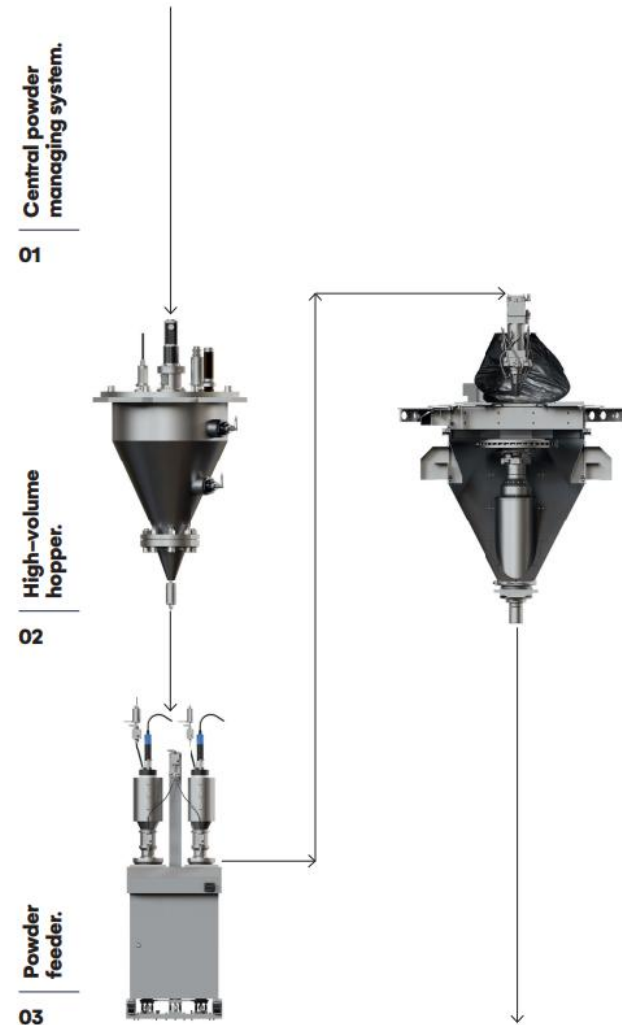
Configuration	IG 13	IG 20	IG 30	IG 6 EHLA
Powder flow volume	Low	Medium	High	High
Powder flow rate	5-15 g/min	20-50 g/min	75-200 g/min	80-200 g/min
Powder of lasers	< 3 kw	4-8 kw	10-15 kw	Up to 25 kw
Laser beam diameter	2-3 mm	4-6 mm	8-10 mm	1.5-3.5 mm
				



# Automated refilling hopper

24/7 production patented solution

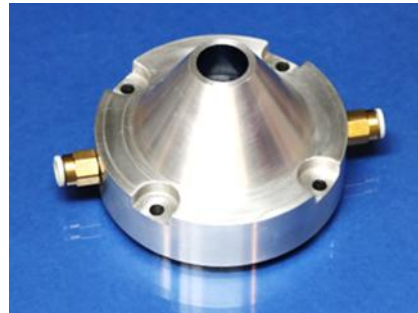
- High volume hopper for automatic powder loading.
- Connection with commercial hoppers.
- Commercial hopper.



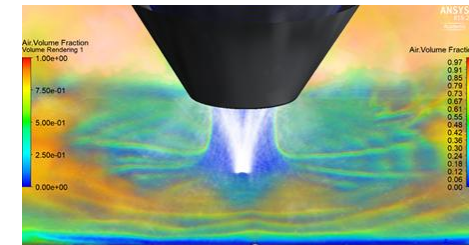


# Protective nozzle module for reactive alloys

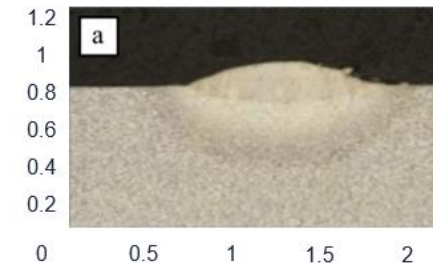
- Modular design.
- Interchangeable nozzle.
- Process modelling.
- Low oxygen content in the melt pool area.
- Design and manufactured by Talens.



NEW  
PROTECTIV  
E MODULE



Protective gas flow of 10 [l·min<sup>-1</sup>]



NEW  
PROTECTIV  
E MODULE



NEW  
PROTECTIV  
E MODULE



NEW  
PROTECTIV  
E MODULE

# Materials research and development

- Specific team for material research
- Researched Powders with different substrates
- More powders under R&D and codevelopment with powder designers
- Custom powders designed & manufactured: energy, aerospace engines, naval & hypersonics

## Stainless Steels

AISI 316L  
17-4PH  
AISI 430L  
AISI 420S  
Ferro 742

## Maraging Steels

CORRAX  
M300

## Cobalt Base

STELLITE 6  
STELLITE 21

## Nickel Base

INCONEL 625  
INCONEL 718  
INCONEL 282

## Tool Steels

DIEVAR  
AISI H13  
AISI 4140

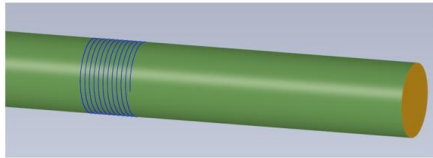
## Bimaterials

AISI 316L+TUNGSTEN CARBIDES  
AISI 430L+TITANIUM CARBIDES  
AISI 430L+TITANIUM CARBIDES FECP

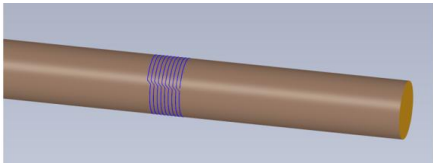
## Other Materials (powders)

SSAB TS1  
SSAB TS2  
Fe-7336  
Other powders under NDA

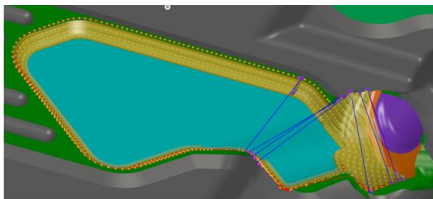
# Automatic toolpath generation based on geometry with integrated



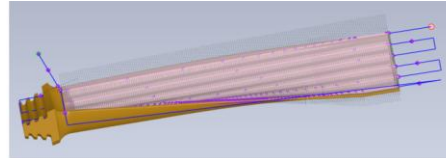
HELICAL  
TRACKS



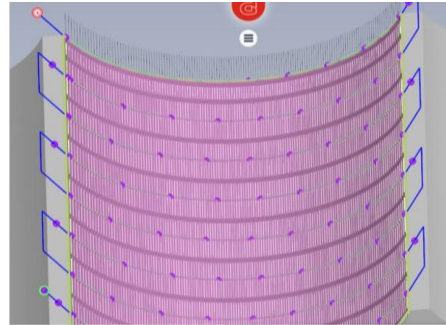
RINGED  
TRACKS



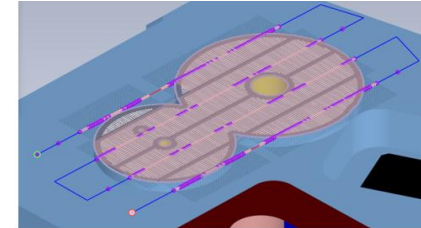
WALL CLADDING  
ON AIRREGULAR  
DIE



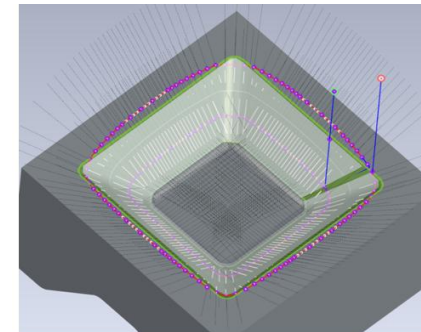
HARDENING  
ON A TWISTED  
SURFACE



HARDENING  
ON A CURVED  
SURFACE



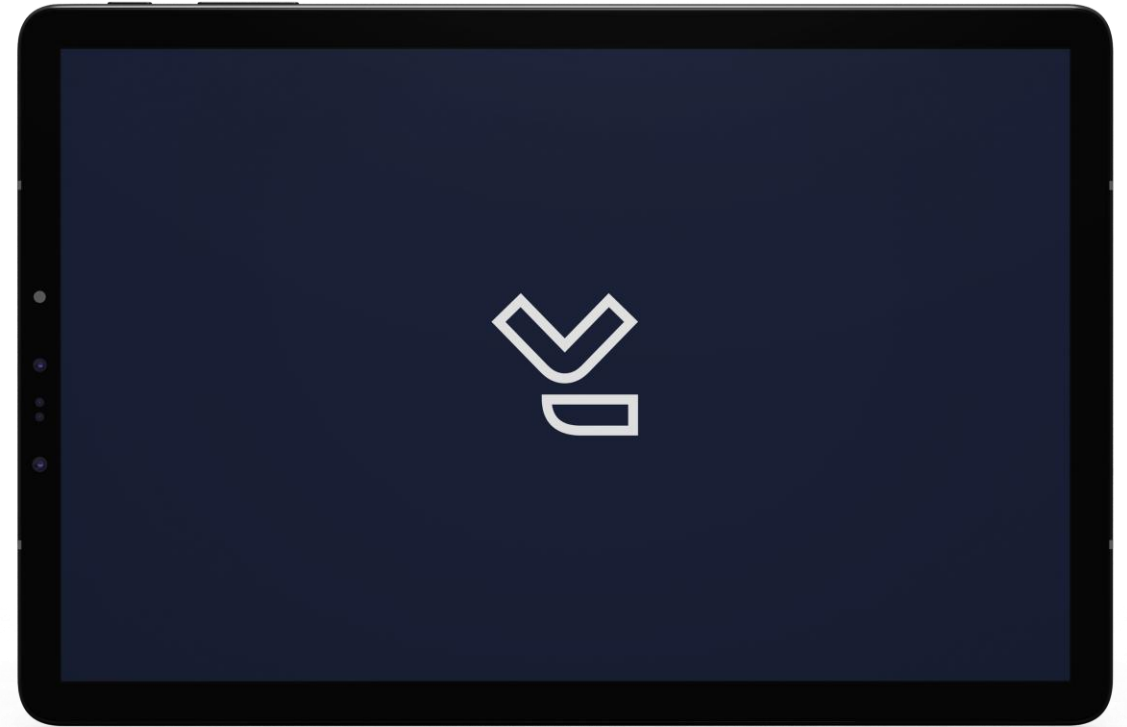
VARIABLE-WIDTH  
HARDENING  
SURFACE WITH  
HOLES



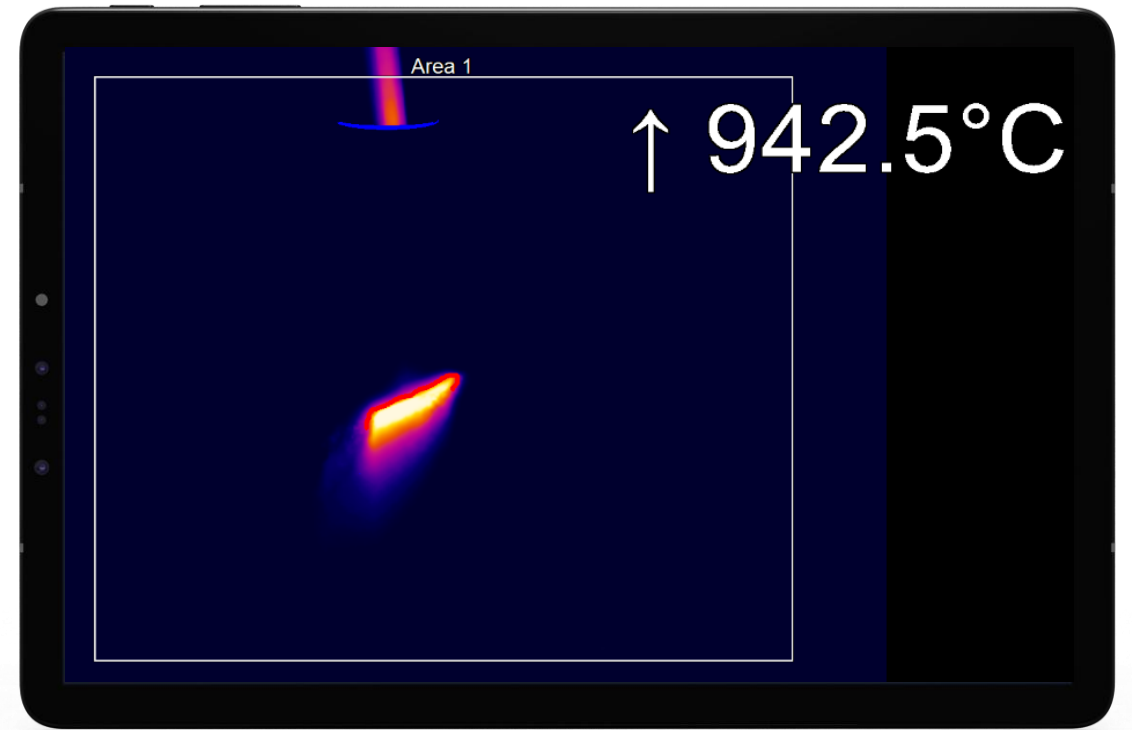
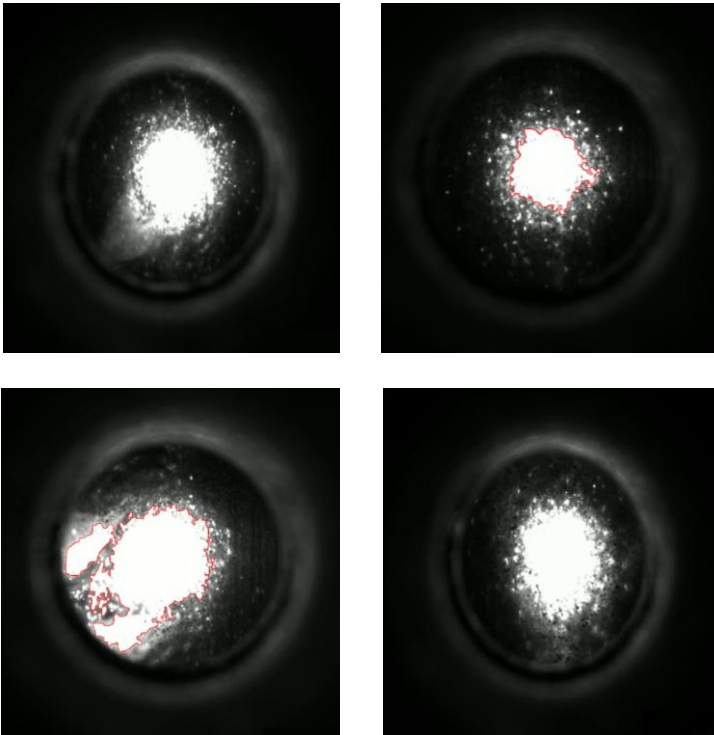
ADAPTIVE  
HARDENING ON  
A SLOPED  
(AND CURVED  
WALL)

## Advanced In-Situ monitoring for cladding operations

- Real-time monitoring with various sensors.
- Multisensor measures key parameters like gas flow, temperature, and pressure.
- Monitors powder feeder pressure, motor RPM, and powder flow rate.
- Provides comprehensive control and issue identification for cladding operation.

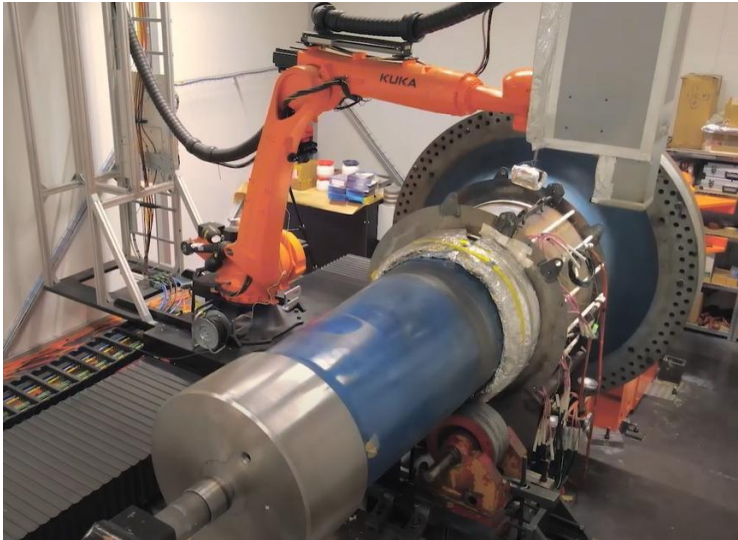


## Melt pool monitoring



## Prototype and industrialization capabilities

### ➤ Heavy duty repair and new coatings



⏪ WIND POWER MAIN  
SHAFT REPAIR

STEELWORKS PRESS  
TOOL REPAIR ⏩





## Prototype and Industrialization capabilities

### ➤ Near net shape and freeform manufacturing



**Aerospace frame test**

- ✓ Dimensions: length 1,5meters with 700mm height 47mm
- ✓ 5 hours nonstop process. Previously researched track height and width



**Honeycomb structure concept for satellites**

- ✓ 495x470mm2
  - 12,5m of perimeter/layer.
  - 55mm height.
- ✓ 16 hours nonstop process. Previously researched track height and width



Enabling  
Next-Generation  
Manufacturing

[talenstech.com](https://talenstech.com)