LabAM24

No Chamber, Yes Inert.

Laser-wire DED in open air
with no oxidation



LabAM24

KEY MILESTONES 03

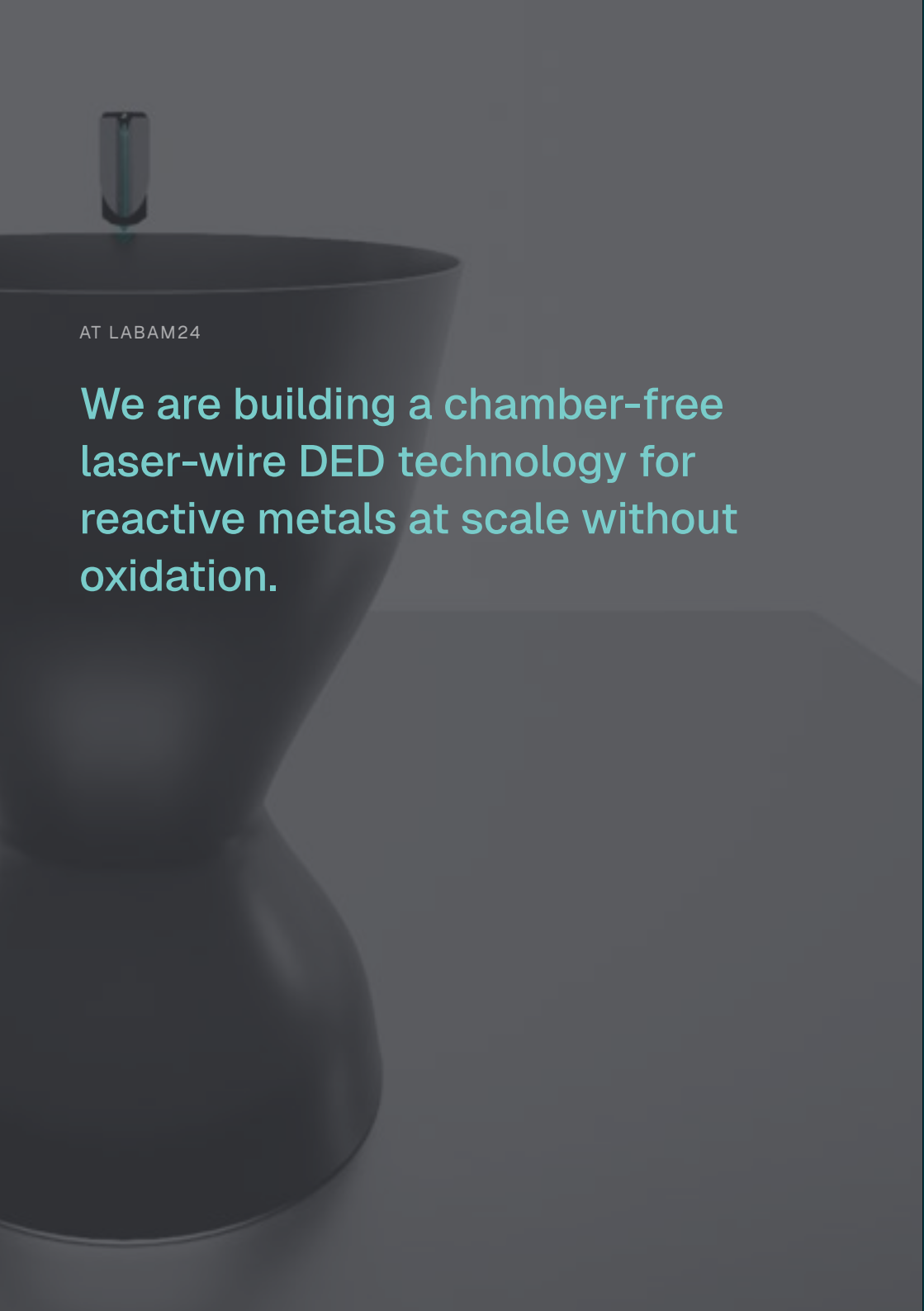
TECHNOLOGY 04

PRODUCT 07

MATERIALS 09

BUILT WITH MST 14

GLOBAL NETWORK 16



AT LABAM24

We are building a chamber-free laser-wire DED technology for reactive metals at scale without oxidation.

Key Milestones

2024

- MAR **LabAM24 Founded**
  Our journey began with the question: "Can we overcome the constraints of inert 3D printing with portability?"
- SEP **Technology Patent I**
  Morphing Shield Technology
- OCT **U.S. Air Force Funding**
  Morphing Shield Technology received research funding from the U.S. Air Force Research Lab (AOARD)

2025

- MAR **Industrial R&D & Venture Enterprise Certification**
- MAY **KASA SBIR Program**
  Selected to participate in the Korea AeroSpace Administration Small Business Innovation Research Program Phase 1

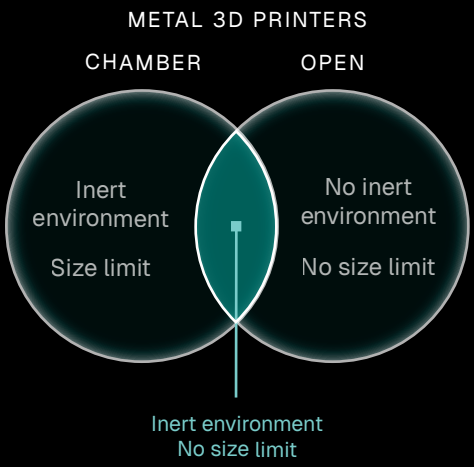
2026

- MAR **KARI Supply Contract**
  Supply contract to produce Niobium C103 rocket nozzle extensions awarded by Korea Aerospace Research Institute
- JUL **Technology Patent II**
  Real-time Power Ratio Control of Hybrid Laser System

Technology

Overcoming the constraints of inert 3D printing with portability

As metal additive manufacturing scales, the industry has been constrained by a tradeoff between sealed-chamber systems and open-type platforms.



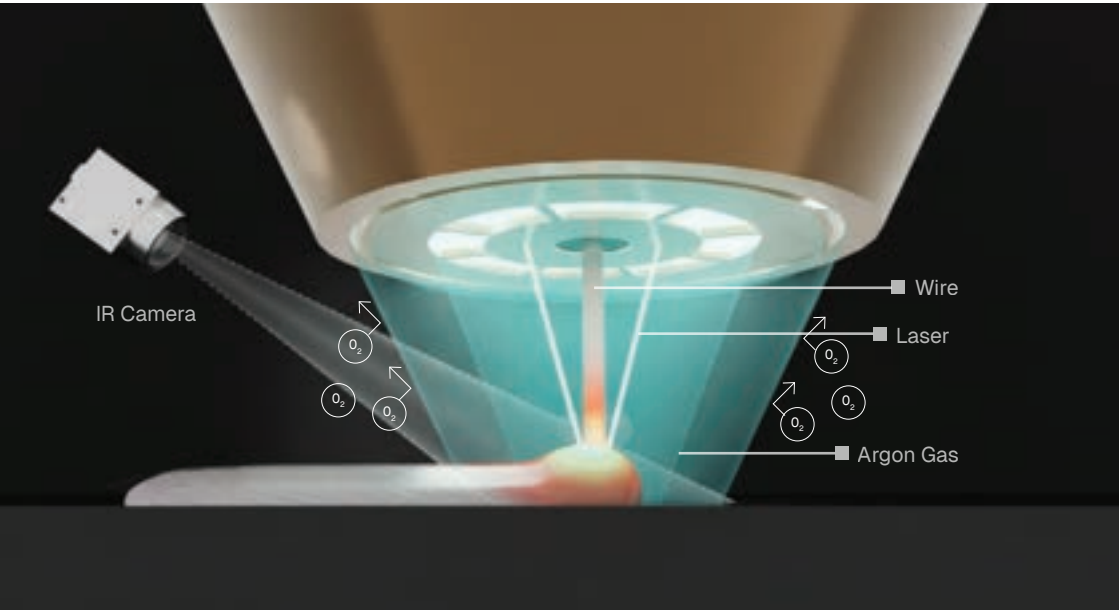
Our technology resolves this by generating a portable inert environment without a sealed chamber, enabling scalable, cost-efficient processing of oxidation-sensitive alloys. MST and RT-MCT form the core of this capability, implementing real-time monitoring and control of process parameters to minimize oxidation throughout the build.

MST

MORPHING SHIELD TECHNOLOGY

RT-MCT

REAL-TIME TEMPERATURE MEASUREMENT & CONTROL TECHNOLOGY



Morphing Shield Technology builds a portable argon inert gas environment surrounding the melting zone for laser-wire DED processes to effectively prevent oxidation at a local level.

MST Algorithm

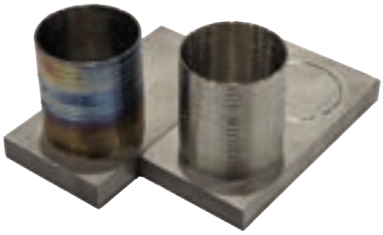
Process optimization with section-based gas flow adjusting to the printing geometry.



Melt Pool Monitoring

Real-time monitoring of the melt pool temperature to ensure it doesn't exceed the material's oxidation threshold temperature.

Ti-6Al-4V Cylinder Sample



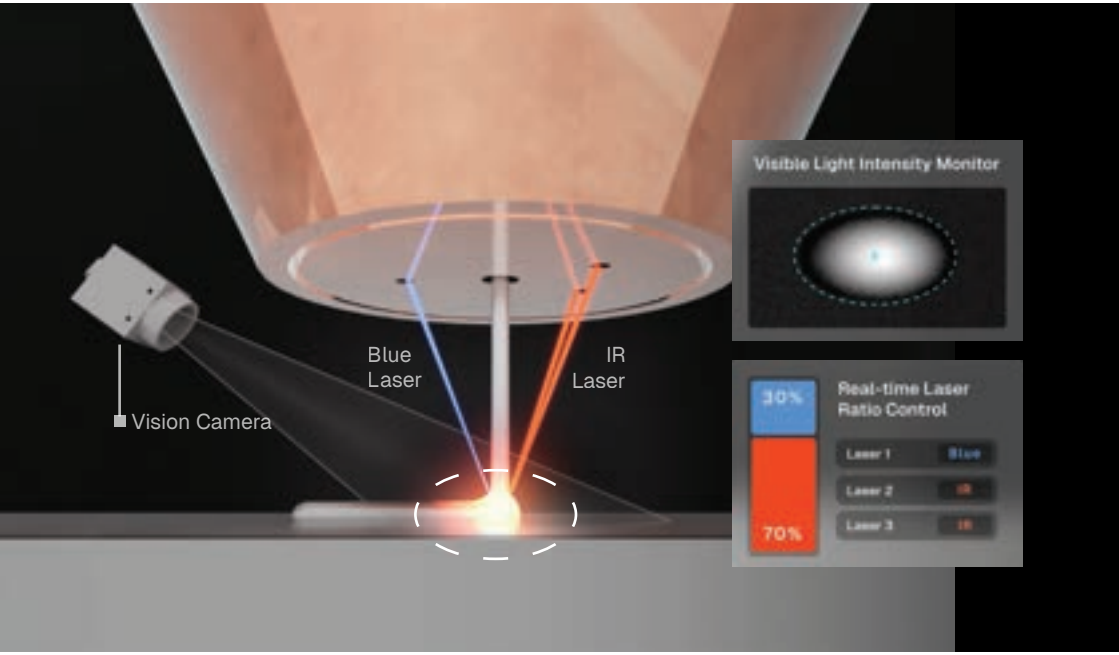
MST Off MST On

New Technology

Hybrid Laser System

Launching End of 2027

REAL-TIME POWER RATIO CONTROL OF
BLUE AND IR LASER SYSTEM



LabAM24's hybrid laser system is designed to adjust the power ratio between the IR and blue lasers in real time. This closed-loop balancing aims to maintain a stable melt pool across a range of metals, from aluminum to titanium, for consistent deposition quality from the first layer to the last.

Benefits of a Hybrid Laser System

Stabilized Melt Pool Control

The high absorptivity of the blue laser enables rapid initial melting, while the IR laser provides deep penetration.

Real-time Power Ratio Adjustment

The blue-to-IR power ratio can be adjusted to optimize the process for each material and geometry.

Broad Material Compatibility

Materials, from highly reflective copper to reactive titanium, can all be deposited reliably.

PRODUCT 7

Product

- INERTON
  LASER-WIRE DED HEAD
- INERTON + GANTRY OR ROBOT
  FULL LASER-WIRE DED SYSTEM



Product Specifications

InertOn is a laser-wire directed energy deposition (LW-DED) head module that enables chamber-free metal 3D printing of reactive metals by implementing LabAM24's MST.



Laser System	**Type**	Triple Laser (IR or Hybrid)
	Power	IR: 3 kW / Hybrid: 2.5 kW
	Chiller	Water Cooling System
	Sensor	Real-time Feedback #1
Morphing Shield System	**Gas Consumption**	30–50 L/min
	Setup Time	< 1 minute
	Oxygen Level	< 20 ppm
	Sensor	Real-time Feedback #2
Wire Feeding System	**Feeding**	Coaxial
	Straightener	Included
Software	**CAM**	1 Year License
	Operating Software	Included
Product Info	**Dimensions**	≈ 400 x 350 x 500 mm
	Weight	≈ 15 kg

Integration Options

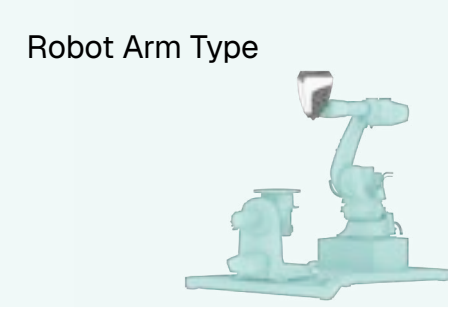
InertOn is available as a standalone head module with full integration support onto existing motion systems, or as a fully configured solution in gantry or robot-type configurations.

Gantry Type



Motion System	5-Axis Simultaneous: Linear XYZ & Rotary AC
Size	Custom Configurations
Capacity	Custom Configurations

Robot Arm Type



Motion System	6-Axis Robot Arm & 2-Axis Rotary Table
Size	Custom Configurations
Capacity	Custom Configurations



Materials

We are developing dedicated MST process parameters for a growing range of reactive alloys. Current materials include Titanium, Nickel, Iron, and Niobium alloys, with ongoing development across additional alloy families.

- TI-6AL-4V
- C103
- INCONEL 625
- SS 316L

Materials Data

Ti-6Al-4V Ti Alloy

Research Paper

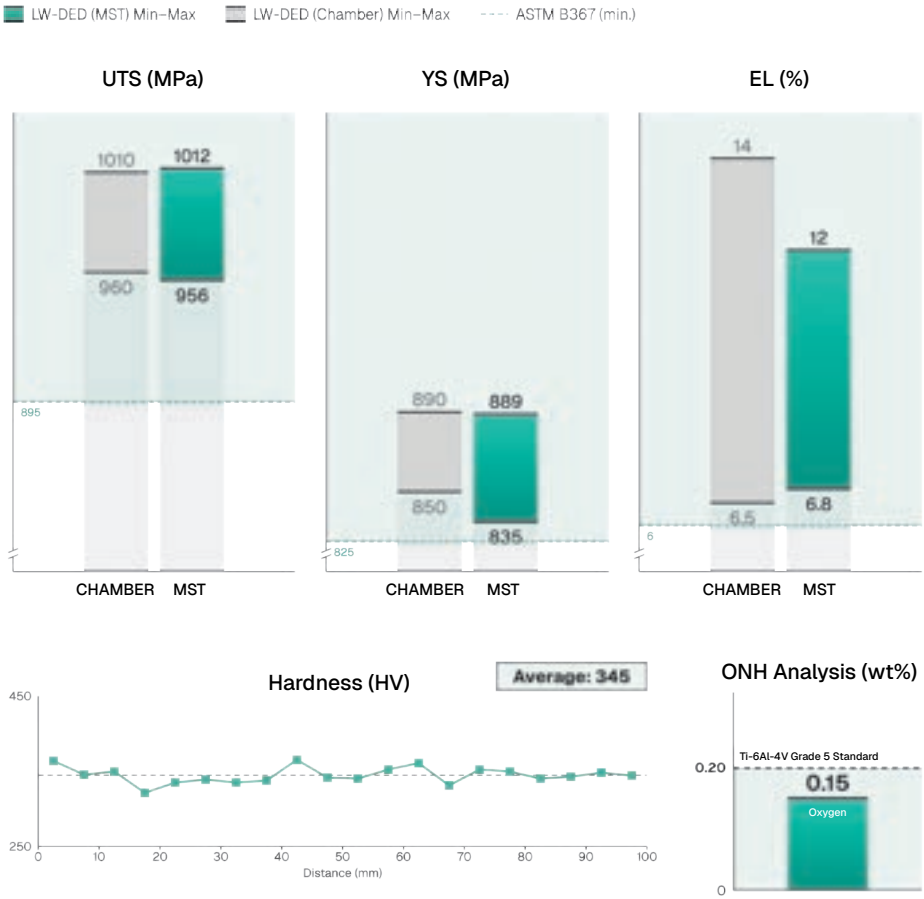
Characteristics

- High strength-to-weight ratio
- High fatigue strength
- High corrosion resistance

Applications

- Aerospace: airframe structures, brackets and fittings, engine mounts, pressure vessels
- Defense & Maritime: lightweight armor and structural parts, propellers and impellers, seawater fittings

Mechanical Properties & Oxygen Analysis



[References]
1. Procedia CIRP Volume 124, 2024, Pages 254-256 "Additive Manufacturing of Ti-6Al-4V with laser-wire DED and local shielding gas protection"
2. Physics Procedia 39 (2012) 416 – 424 "Material properties of Ti6Al4V parts produced by laser metal deposition" VITO (Flemish Institute for Technological Research), Materials Technology, Boeretang 200, 2400 Mol, Belgium
3. Degree Project in Materials Design and Engineering, Second cycle, 30 Credits Stockholm, Sweden 2018 "Effect of oxygen concentration in build chamber during laser metal deposition of Ti-64 wire"
4. LabAM24 conducted tensile strength testing through a third-party accredited analysis institution.

Materials Data

C103 Nb Alloy

Characteristics

- High-temperature strength
- High ductility and formability
- Good weldability
- Fast oxidation > 400–500°C

Applications

- Aerospace: rocket nozzles and nozzle extensions, thruster chambers, combustion chambers
- Defense: hypersonic leading edges, missile propulsion components, heat shields

Mechanical Properties



[References]
1. ASTM International, ASTM B655/B655M-25, Standard Specification for Niobium-Hafnium Alloy Bar and Wire, ASTM International, West Conshohocken, PA, USA, 2025. [ASTM]
2. LabAM24 conducted testing through a third-party accredited analysis institution

Materials Data

Inconel 625 Ni Alloy

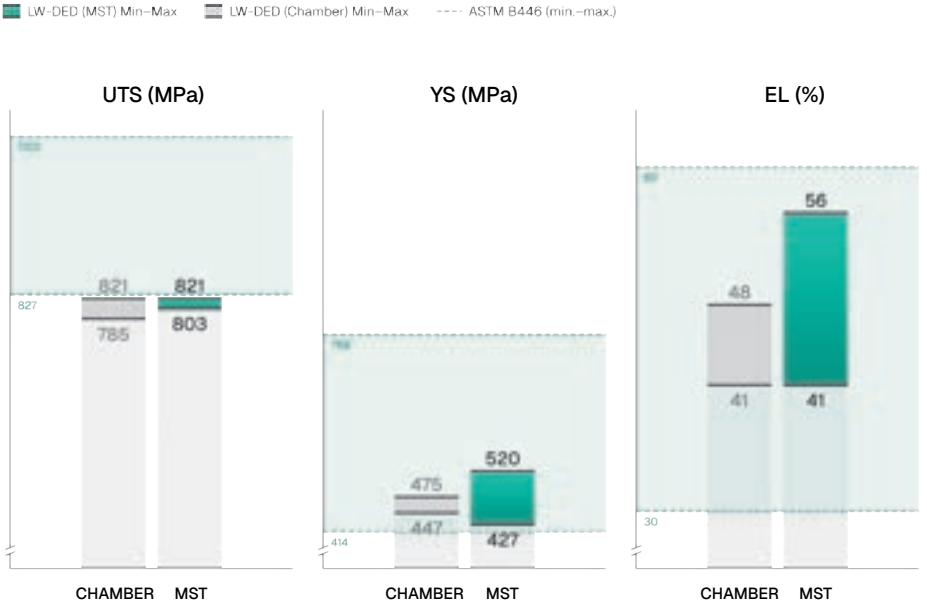
Characteristics

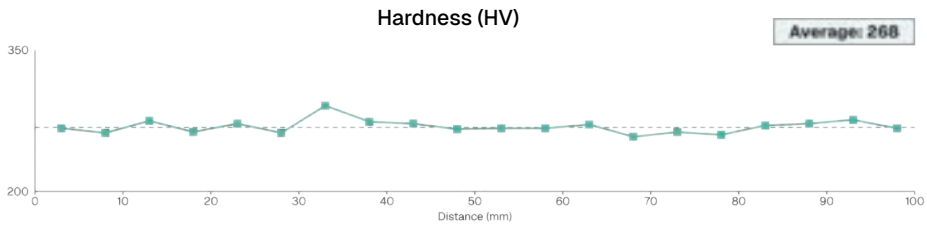
- High weldability
- High strength without heat treatment
- High corrosion resistance

Applications

- Aerospace: exhaust systems and ducting, thrust-reverser parts, combustor and afterburner components
- Defense & Maritime: seawater piping and valves, propeller and propulsion components

Mechanical Properties





[References]
1. G. Su, Y. Shi, G. Li, G. Zhang, Y. Xu, Improving the deposition efficiency and mechanical properties of additive manufactured Inconel 625 through hot wire laser metal deposition, Journal of Materials Processing Technology 322 (2023) 118175.
2. A. Gamon, E. Arrieta, P.R. Gradl, C. Katsarelis, L.E. Murr, R.B. Wicker, F. Medina, Microstructure and hardness comparison of as-built inconel 625 alloy following various additive manufacturing processes, Results in Materials 12 (2021) 100239.
3. ASTM International, ASTM B443 26, Standard Specification for Nickel Chromium Molybdenum Columbium Alloy and Nickel Chromium Molybdenum Silicon Alloy Plate, Sheet, and Strip, ASTM International, West Conshohocken, PA, USA, 2026. [ASTM]
4. LabAM24 conducted testing through a third-party accredited analysis institution

Materials Data

SS 316L Fe Alloy

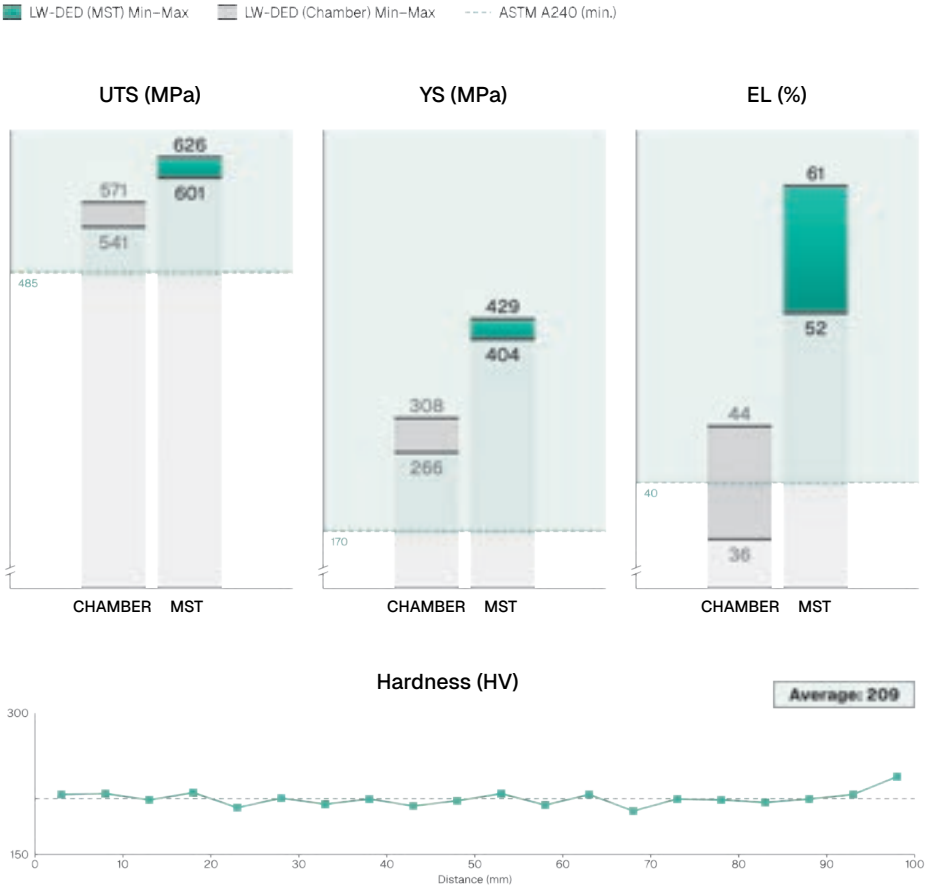
Characteristics

- High corrosion resistance
- High ductility and toughness
- Good weldability
- Cost efficiency

Applications

- Maritime: marine fittings, deck hardware, valves and pump housings
- Industrial: chemical processing equipment, pressure vessels, large structural parts and repair

Mechanical Properties



[References]
1. V. Tesponen, K. Lipiäinen, S. Afkhami, I. Poutiainen, Mechanical and microstructural properties of 316LSi stainless steel manufactured via laser-directed energy deposition with rear lateral wire material feeding, Weld World 70 (2026) 589–602
2. ASTM A240/A240M, Standard Specification for Chromium and Chromium Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Applications. ASTM International, West Conshohocken, PA, USA
3. A. Shakibi, A.T. Khaing, A. Yah, M. Eshraghi, Build size and infill effects on SS316L microstructure in laser wire directed energy deposition, Materials & Design 265 (2026)
4. LabAM24 conducted testing through a third-party accredited analysis institution

Built with MST

With MST, LabAM24 solutions can build large metal parts with precision and material integrity without oxidation, making them well suited to scalable aerospace and defense applications.

C103 Rocket Nozzle Extensions

for Korea Aerospace Research Institute (KARI)

Material	C103
Wire Dia.	Ø0.8 mm
Dimensions	Ø150 x 70 mm
Wall Thickness	1.0 mm
Weight	0.4 kg
Actual Deposition Time	6.2 hr
Quantity	3 units



1.6m Rocket-shaped Part

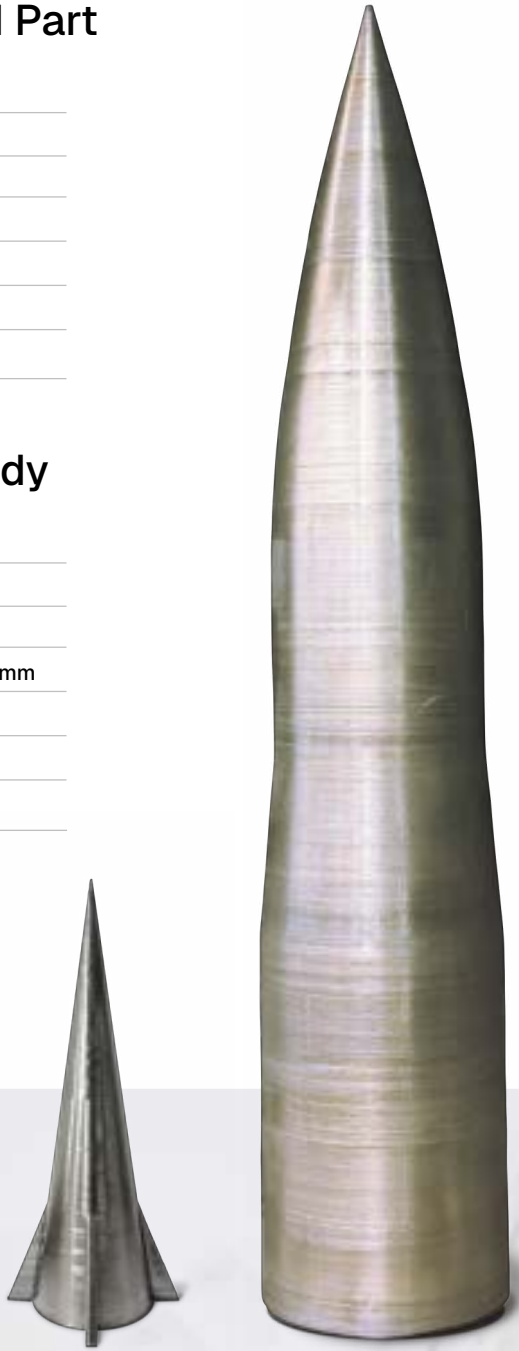
Demonstrator

Material	Inconel 625
Wire Dia.	Ø0.8 mm
Dimensions	Ø300 x 1,600 mm
Wall Thickness	1.4–1.6 mm
Weight	16.6 kg
Actual Deposition Time	75 hr

Hypersonic Glide Body

Demonstrator

Material	Ti-6Al-4V
Wire Dia.	Ø0.6 mm
Dimensions	200 x 200 x 500 mm
Wall Thickness	0.9 mm
Weight	0.5 kg
Actual Deposition Time	5 hr



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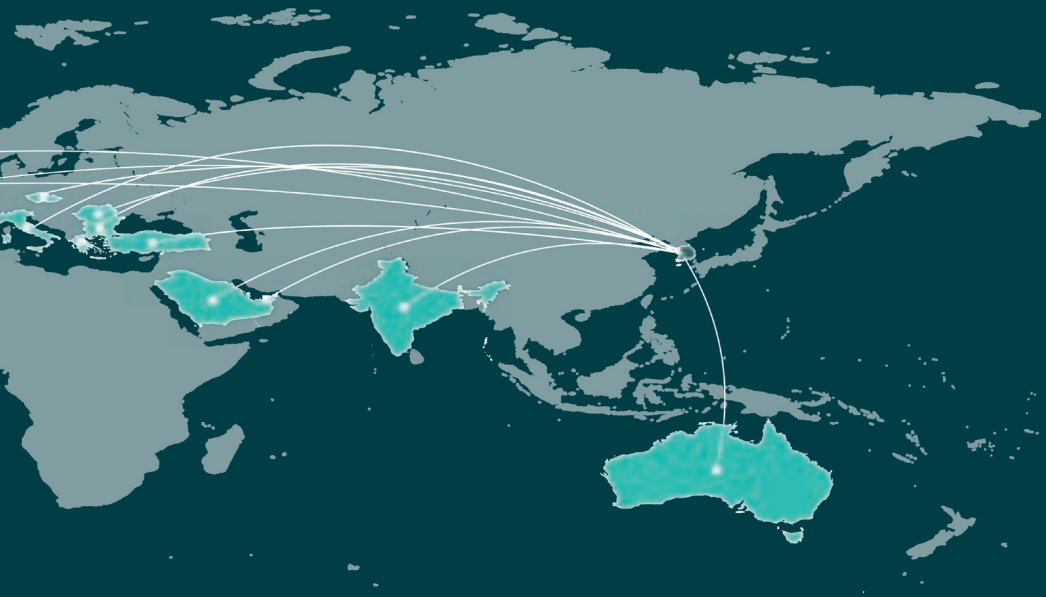
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