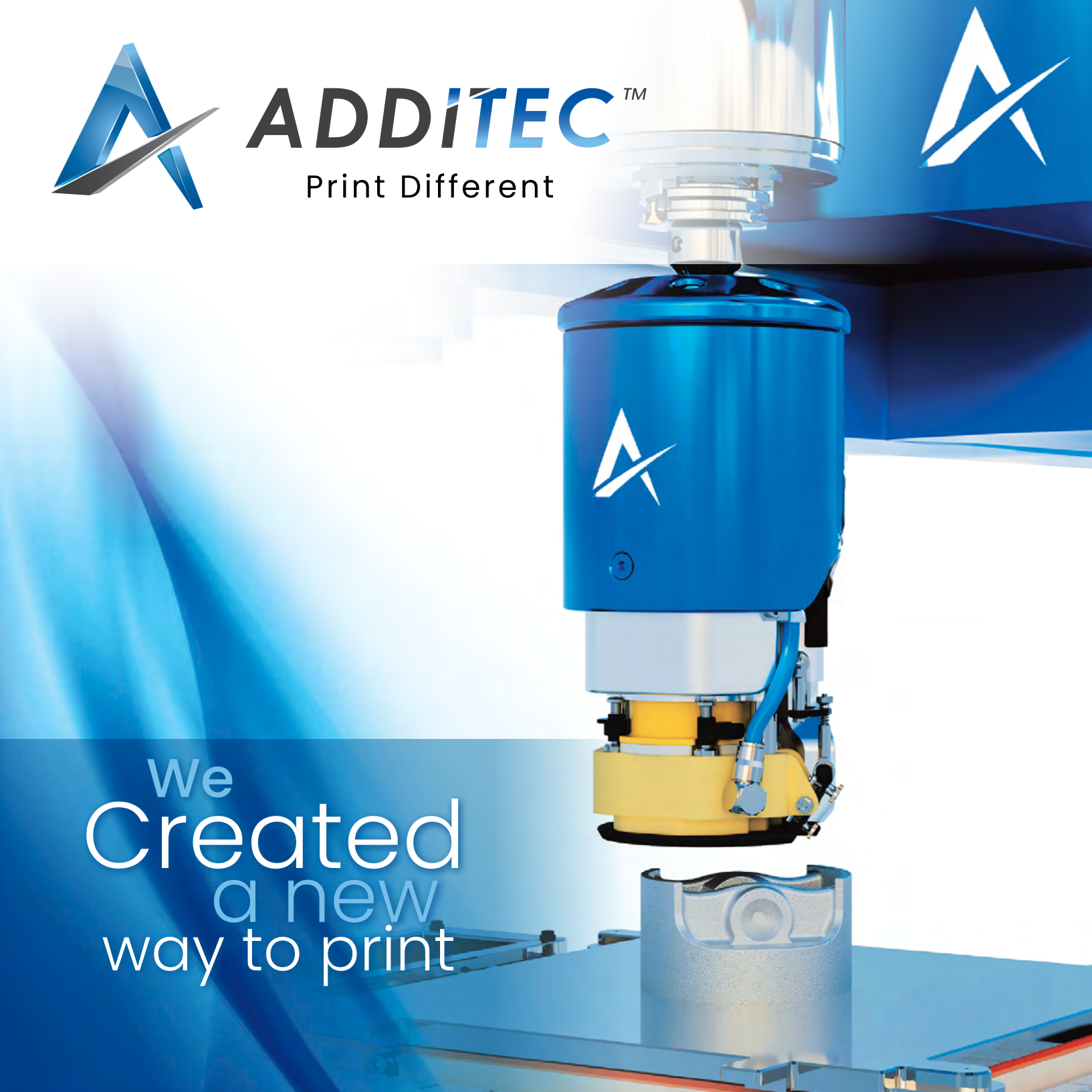
ADDITEC™

Print Different



We Created a new way to print

ADDiTEC™

Print Different

Content

Dear Friends,

I am delighted to welcome you to our company, ADDiTEC.

At ADDiTEC, we're more than just a company; we're dedicated to innovation and driven by our passion for redefining the boundaries of metal 3D printing. For years, we've embarked on a mission to explore the immense potential of this transformative technology, and I'm genuinely thrilled at the possibility of having you join us on this adventure.

We are thrilled to have recently acquired Elem Additive Solutions, a renowned company known for its groundbreaking Liquid Metal Jetting technology. This technology has the potential to revolutionize metal 3D printing by enabling the creation of intricate metal parts with unparalleled precision, speed, and cost-effectiveness, using standard metal alloys. With this strategic move, we are expanding our portfolio of metal 3D printing technologies, offering you a broader range of choices and flexibility for your metal AM requirements.

Welcome

At Formnext, we unveiled our latest products, the AMDroid and Hybrid3. The first production level AMDroid was shipped in January 2024. These unique systems stand as a testament to our dedication to innovation and will enable new frontiers in the commercialization of metal additive manufacturing, changing how parts are made.

At the core of ADDiTEC's mission is our desire to assist you in overcoming challenges and seizing opportunities through metal additive manufacturing. Our solutions are carefully tailored to meet your specific needs, whether you require turnkey systems, research and development support, specialized training, or assistance with application development.

Your satisfaction and success are of utmost importance to us. Our dedicated team of engineers and experts are always ready to address any inquiries or challenges you may face. Additionally, I extend a warm invitation for you to visit our USA innovation centers in Palm City, Florida, and Raleigh, NC. Here, you can witness our technology in action and engage with our passionate team.

As the CEO of ADDiTEC, I want you to know that our commitment to your success goes beyond mere words; it is a promise. We are genuinely thrilled about the prospect of collaborating with you to help you achieve your goals through metal additive manufacturing.

Thank you for trusting ADDiTEC as your additive and hybrid manufacturing partner.

Warm regards,

Brian Matthews

Our Journey

2015

ADDiTEC was established to develop novel AM technologies to change how metal parts are made

2018

Developed and patented novel multi-laser DED technology

2019

Co-founded Meltio in 2019 to manufacture and commercialize AM systems using ADDiTEC's multi-laser DED technology

2022

AMRC – S: Introduced our scalable robotic AM solution that allows for multi-robot configurations with multi-deposition heads to achieve scalability

Solutions Oriented
Breadth of experience in both system design and manufacturing, as well as applications for industry.

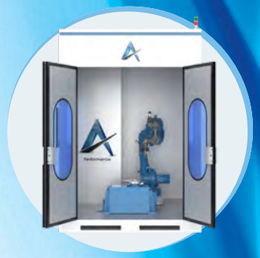
Pedigree
Proven disruptive innovation and go-to-market experience with over 100 high-pedigree customers and industry recognition.

Commercialization for industry.
Proven technology commercialization through direct sales and JV activities.

Technology
Novel disruptive technology portfolio encompassing years of development experience.

Financial Success
Consistent YOY growth for enhanced financial stability.

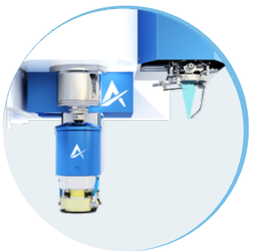
Performance AMRC-P: The first laser wire based portable additive manufacturing robot cell rated for reactive materials like titanium with a deposition rate as high as 4 kg/hr.



AMDroid: Introduced our portable robotic AM solution that provides all the benefits of a robotic architecture in a compact welded cell that is portable.

Completed acquisition of Elem Additive Solutions LLC from Xerox Corporation, creating new liquid metal printing technology offering.

2023



Launched ADDiTEC's novel hybrid manufacturing solution, Hybrid 3, with 3 technologies in one machine and sophisticated LMJ print head tool change capability for seamless integration.

Your Partner for Metal Additive Manufacturing

One-off cutting-edge research projects aimed at universities, research institutes and R&D departments

Customer training and support

Custom application work that fits your company's specific needs

Design for Additive Manufacturing (DfAM) for optimizing form and function of a part and enabling "Supply-chain in a Box"

Advanced system design and integration

Additive Manufacturing Process Design (AMPD) for manufacturing parts with technical standard acceptance and enabling commercially feasible AM adoption in industries

Serving a Diverse Range of Customers

- Aerospace
- Prominent Universities
- Major Research Centers
- Automotive
- Nuclear
- Technology Centers
- National Laboratories
- Repair Facilities
- Goverment Facilities
- Energy
- Service Bureaus
- MIning

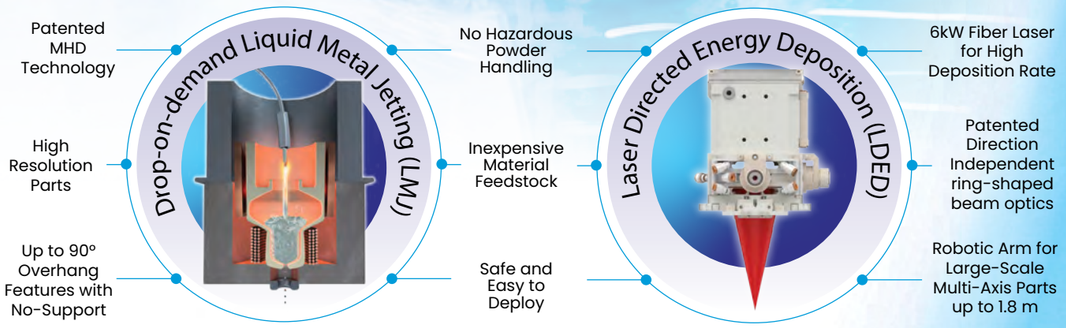
Two Novel Technologies

Liquid Metal Jetting

Our LMJ technology has over 10 years of development history, it uses a highly sophisticated drop-on-demand liquid metal printing process that is protected by over 300 patents. The technology affords high resolution parts with built-in closed loop process control, providing high quality and reliable output and the lowest part production cost in the industry.

Laser Directed Energy Deposition

Our high-power 6kW laser system brings intricate large designs to life using a cost-effective high throughout process. Our deployable robotic architecture allows you to max produce metal components that exceeds the current manufacturing capabilities.



2 System Platforms

AMDROiD™
Print Different

HYBRiD³™
Print Different

LDED technology

Laser Directed Energy Deposition Technology

High Performance LDED

Integrated Vacuum Pump
Enables rapid purge cycles for working with reactive materials like titanium.

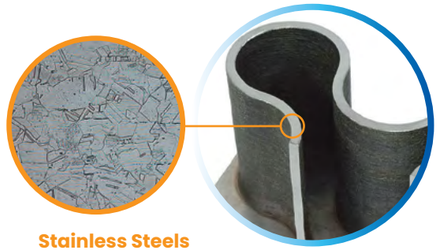
Industrial High-Power Fiber Laser
Provides exceptional beam quality and power range up to 6kW.

Precision Wire Feed System
State-of-the art precision wire feed system from DINSE, with built in wire straightening and feed pressure monitoring system. Also qualified for soft materials like Al.

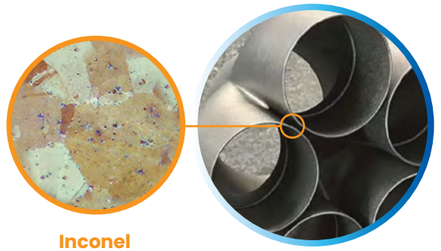
Closed-Loop Process Control
Included pyrometer enables melt pool temperature closed-loop control with automatic laser power modulation.

Class-Leading Processing Head
State-of-the art processing head from Precitec, with over a decade of development experience. Novel beam expansion process. Rated for high power.

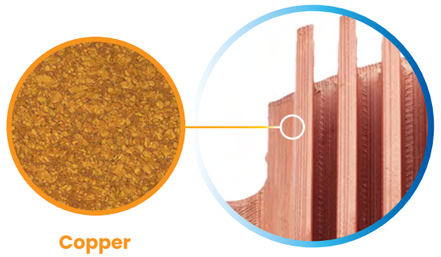
Selection of Tested Wire Materials



Stainless Steels
Fully supported:
316L (EN 1.4404) 3001 (E014316) and 304 (EN 1.4307).

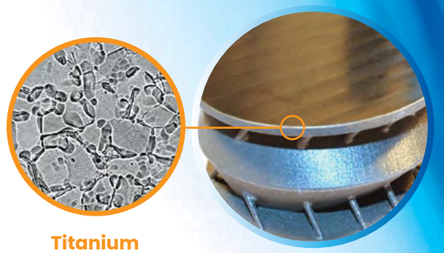


Inconel
Fully supported: Inconel 718 and Inconel 625 (EN 2.4600).



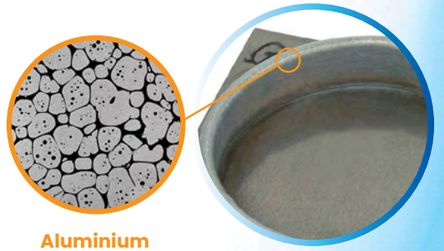
Copper
Under Development

LDED Materials



Titanium
Fully supported: Titanium Grade 5 (EN 3.7165).

Carbon Steels
Fully supported:
SAE 4140 (EN 1.7225) and A-5.18:ER70S-6 (EN 1.5130).



Aluminium
Under Development

Features

The **AMDroid** is the first laser-wire based portable additive manufacturing robot cell rated for reactive materials like titanium with a deposition rate as high as 4 kg/hr. The AMDroid provides all the benefits of a robotic architecture in a compact welded cell that is portable, allowing installation and the first printed parts in just one day. The AMDroid features state-of-the-art software tools to accommodate complex multi-axis geometries, making printing easier and more accessible for experienced and new users. It is designed, developed and integrated by our innovative engineering team, and powered by a proprietary user interface command center. ADDiTEC has partnered with major industrial robot brands to allow for seamless integration for large scale robotic 3D printing.

Specifications

Deposition Technology

Maximum laser power	6 kW
Laser type	Fiber laser
Laser wavelength	1032 nm
Layer thickness	0.8 -1.2 mm ø
Maximum Deposition rate	4 kg/hr
Wire feed stock	0.8 -1.2 mm
Build volume	5.8′ x 4.1′ x 4.5′
Processable materials	Iron, nickel, titanium, copper, and aluminum alloys
Shielding	Localized (Argon or Nitrogen)
Cooling	Active water cooling
Deposition software Process control	ADDiTEC
Process control	Melt pool temperature (Pyrometer) based closed loop laser power modulation along with wire feeder control

Motion Technology

Motion axes	6 + 2
Robotic partners	ABB, FANUC and YASKAWA
Robotic motion software	Adaxis or Aibuild configured, compatible with other software programs

Portable Cell

Cell volume	7.5′ x 9′ x 10.6′
Inert chamber system	Vacuum and Argon
Oxygen sensor	0% minimum measurable oxygen level
Fume management system	HEPA air filter
Total weight	12500 lbs approx.

Wire feeder rated for common metals including Al & Cu

6 kW fiber laser for high deposition rate

Capable of simultaneous wire powder deposition for new alloy development

Robot arm for multi-axis large-scale geometries

Hermetically sealed portable enclosure for forward deployment

Integrated Vacuum Argon system to inert enclosure for reactive materials.

Model Sample

Print Time: 5 h
Material: Ti6-Al-4V
Wire diameter: 1 mm
Model Size: 13 x 13 x 20 cm
Model Weight: 2.3 lb
Aplication: Prototyping

Print Time: 2h 50m
Material: 316 L
Wire diameter: 1 mm
Model Size: 10 x 10 x 16 cm
Model Weight: 1.2 lb
Aplication: Prototyping

Print Time: 45 min
Material: Aluminum 2219 (AlCu3)
Wire diameter: 1.2 mm
Model Size: 12 x 12 x 8 cm
Model Weight: 0.4 lb
Aplication: Prototyping

Print Time: 1.5 h
Material: TA6V
Wire diameter: 1 mm
Model Size: 20 x 20 x 5 cm
Model Weight: 0.5 lb
Aplication: Aerospace Flange

Four Blade Turbine

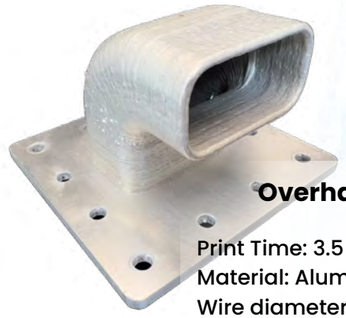
Print Time: 30 h
Material: Stainless steel 316L
Wire diameter: 1.2 mm
Model Size: 35 x 28 x 28 cm
Model Weight: 17 lb
Aplication: Energy Industry

Helix Wind Turbine

Print Time: 26 h
Material: Stainless steel 316L
Wire diameter: 1.2 mm
Model Size: 67 x 34 x 34 cm
Model Weight: 17.5 lb
Aplication: Wind Power

Rocket Nozzle

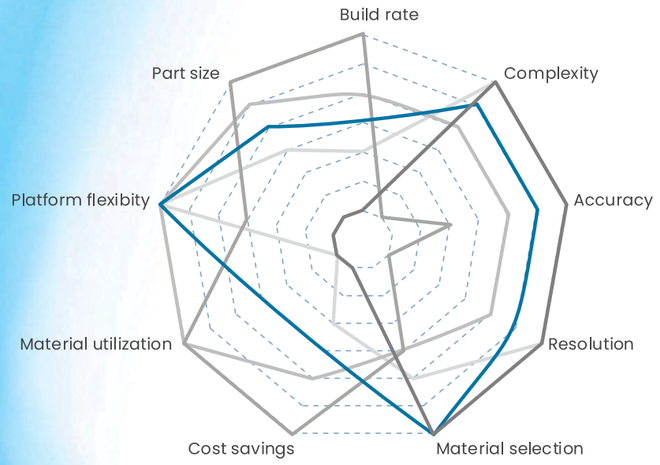
Print Time: 52 h
Material: Stainless steel 316L
Wire diameter: 1.2 mm
Model Size: 63 x 55 x 55 cm
Model Weight: 28 lb
Aplication: Aerospace Industry



Overhang Test

Print Time: 3.5 h
Material: Aluminum
Wire diameter: 1.2 mm
Model Size: 13 x 14 x 9 cm
Model Weight: 0.6 lb
Aplication: Prototyping

The Benefits of a Laser Wire/Powder DED Process



- Laser powder DED
- Laser wire DED
- Wire arc DED
- Laser wire/powder DED
- Powder bed fusion

Cost savings
Low raw material (wire feedstock) cost and equipment cost reduces the overall cost of good sold (COGS) for parts produced using laser wire DED.

Platform flexibility
Decoupling the deposition technology from the motion enables integration with small scale gantry systems for new materials development, CNC systems for hybrid manufacturing, and robotics for large-scale multi-axis geometries

Material utilization
100% of the wire feedstock enters the melt pool providing highest material utilization among AM processes.

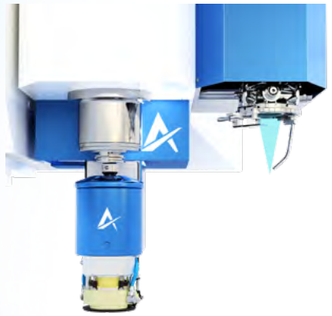
Complexity
Integrating the deposition technology to a robotic arm enables multi-axis printing for highly complex geometries.

Part size
Integrating the deposition technology to a robotic arm enables large-scale printing where size limitation does not exist.

Accuracy
Tolerances of up to ± 0.01 inches can be achieved with optimized tool path and process parameters.

Liquid Metal Jetting Technology

HYBRiD^3 ™
Print Different



Manufacturing System with Liquid Metal Jetting, Laser Directed Energy Deposition and CNC Machining.

Features

Liquid metal jetting (LMJ) and laser directed energy deposition (LDED) are two additive processes desired within a hybrid manufacturing system as both processes use low-cost COTS welding wire to print near-net shape parts with 100% material utilization. With LMJ we unlock high resolution capability while with LDED we unlock high deposition rate capability. In addition, multi-material capability is enabled by having two additive processing heads within a single system. The subtractive process within a hybrid manufacturing system provides post-machining capabilities to achieve desired surface finish and tolerances for parts printed using the two additive processes

Industrial High-Power Fiber Laser

Provides exceptional beam quality and power range up to 6kW.

Class-Leading Processing Head

State-of-the art processing head from Precitec, with over a decade of development experience. Novel beam expansion process. Rated for high power.

Closed-Loop Process Control

Included pyrometer enables melt pool temperature closed-loop control with automatic laser power modulation.

Deployment Mechanism

Integrated mechanism to deploy and retract the processing head automatically through the process tool path code.

Precision Wire Feed System

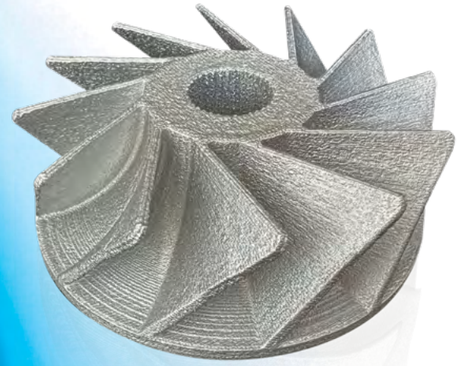
State-of-the art precision wire feed system, with built in wire straightening and feed pressure monitoring system. Also qualified for soft materials like Al.

Specifications

Parameter	Laser DED	LMJ
Maximum Laser Power	6 kW	-
Laser Type	Fiber laser	-
Laser Wavelength	1080 nm	-
Layer Thickness	0.8 – 1.2 mm	0.24 mm (min.)
Maximum Deposition Rate	4 kg/hr	0.5 kg/hr
Wire Feed Stock	0.8 – 1.2 mm ø	1.6 mm ø
Resolution	2.5 mm	0.5 mm
Process control Closed Up	Yes	Yes

CNC Machining
Build volume
40” x 20” x 25”
Max. Spindle Speed
12000 rpm
Max. Cutting Speed
21.2 m/min

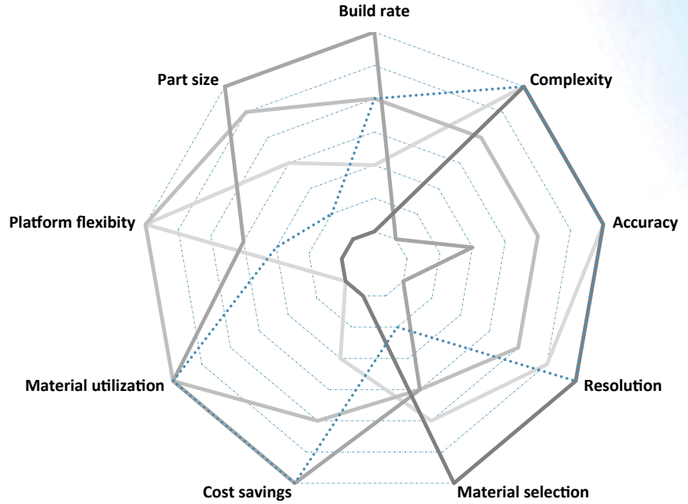
Materials	Iron, nickel, aluminum, and copper alloys
Shielding	Localized (Argon or Nitrogen)
Cooling	Active water cooling
Slicing software	ADDiTEC



LMJ Examples

Produces complex parts with an entirely unique, proprietary and highly sophisticated liquid metal jetting process, printing high resolution parts in a wide range of Al alloys. More materials under development.

The Benefits of the Liquid Metal Jetting Process



Cost savings
Low raw material (wire feedstock) cost and equipment cost reduces the overall cost of good sold (COGS) for parts produced.

Complexity
Up to 90° overhang features have been demonstrated. Most complex gyroid designs have been fabricated.

Build Rate
Up to 0.5 kg/hr. deposition rates have been demonstrated with droplet frequency of 400 Hz.

Resolution
Sub-1mm feature sizes have been demonstrated with optimized nozzle selection and process parameters

Material utilization
100% of the raw material is utilized in this process as the wire is melted in a crucible and ejected as droplets to create a part

Accuracy
Tolerances of up to ± 0.30 mm can be achieved with optimized tool path and process parameters

Customer Testimonials

Amorphology Inc.

"Functional grading with multiple materials allows us to develop gear components for robotics that cannot be fabricated with conventional metallurgy. The ability to tailor the properties of a gear via alloy composition gives us an entirely new design freedom when developing precision mechanisms. Whether it's improving the wear resistance of gear teeth while maintaining toughness in the rest of the part or using high-value steel in combination with low-cost steel to save cost, multi-material additive manufacturing is allowing us to innovate in the way that we approach gears for robotics." –

Dr. Glenn Garrett, Amorphology CTO

California State University

"We are very excited about this collaboration. Together with our multi-scale capabilities, this ADDiTEC developed DED technology will enable us to explore new horizons in additive manufacturing and microstructural engineering of advanced metallic alloys. It will also provide an advanced manufacturing solution to our MakerSpace and will enable education of underrepresented groups of students on this growing technology." -

Dr. Mohsen Eshraghi

Minnesota State University

"We are very excited for this collaboration between MSU Mankato and ADDiTEC. "This partnership will allow us to test and expand the boundaries of additive manufacturing in developing new and unique materials which can improve human life." –

Dr. Kuldeep Agarwal

University of Toledo

"Among many possible metal additive technologies, this ADDiTEC developed DED technology stood out to us because it can use welding wire for feedstock instead of powdered metal. The part can also be used directly from the machine instead of requiring a post-process like sintering. These qualities make it ideal for students and the current workforce that have familiarity with welding technologies and materials while exceeding quality expectations because uses precise lasers instead of an electric arc." –

Dr. Adam Schroeder

Penn State University

"ADDiTEC's DED technology will be used for the following research objectives 1) Validation of melt pool and microstructure modeling. We are specifically interested in iron- and nickel-based alloys. We will integrate the modeling framework with machine learning to develop robust predictive models. 2) Development of novel alloy systems such as oxide dispersed iron alloys as well as functionally graded structures. 3) Understanding high-temperature tensile, fatigue, and creep properties of iron- and nickel-based alloys." –

Professor Amrita Basak

Partners

Robotic Partners

ABB FANUC YASKAWA

Academic Affiliations

Miami University · PennState · The California State University · The University of Toledo · FAMU Florida Agricultural and Mechanical University · Binghamton University · University of Virginia · Oregon State University

Government Partners

Memberships & Affiliations

America Makes · the FloridaMakes network

ADDiTEC™

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TRI-TECH 3D

STANFORD MARSH GROUP

Tri-Tech 3D

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North Staffs Business Park,
Stoke-On-Trent, ST6 4BF

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