MODULO 400

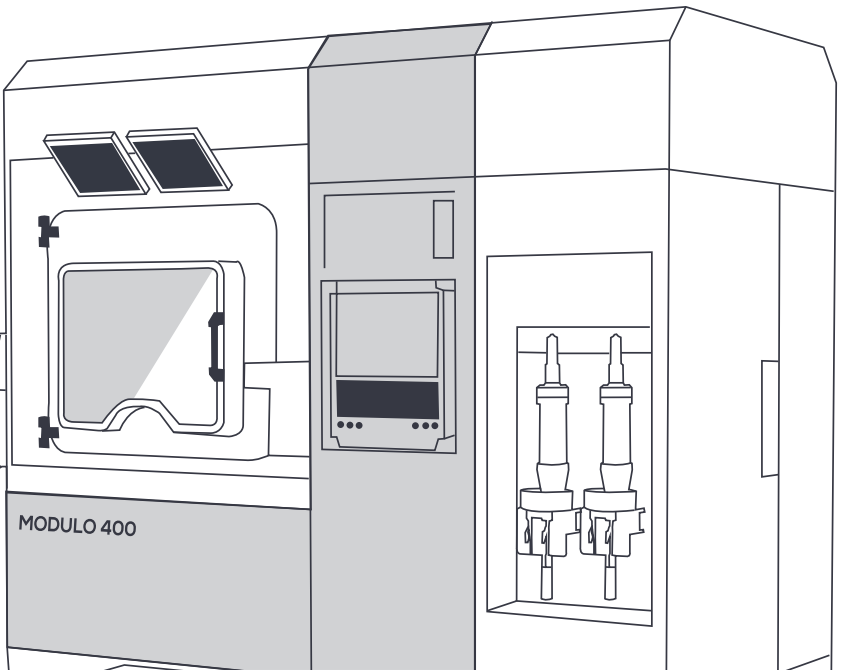
DIRECTED ENERGY DEPOSITION

AddUp
GLOBAL ADDITIVE SOLUTIONS

DESIGNED FOR THE NEEDS OF INDUSTRY

AddUp was created by Michelin and Fives after determining that the metal Additive Manufacturing (AM) machines on the market were not able to meet their requirements for high quality, serial production of maraging steel tire mold inserts. BeAM machines were added to AddUp's technology in 2018.

Our DED technology is designed for industrial production and equipped with numerous production monitoring systems. Suitable for the manufacturer of large parts, the repair of worn or deteriorated parts, and adding new features to existing geometries.



INDUSTRIAL BUILT FOR PRODUCTIVITY

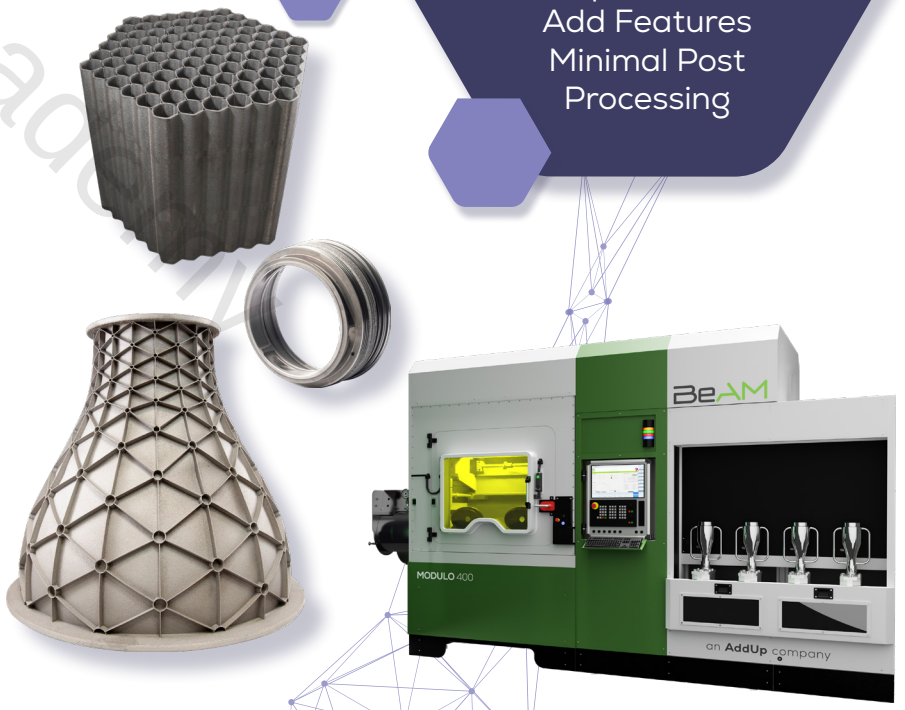
Reliability
High Volume
Production Ready

VERSATILE, UPGRADABLE MACHINES

In-house Nozzle Design
Upgradable Powder Feeders

OPTIMIZES COST, QUALITY, & TIME

Repair Parts
Add Features
Minimal Post Processing



STANDARD MACHINE CONFIGURATION

SIZE	
Overall machine height	2820 mm
Recommended height	3500 mm
Max floor load	200 kg/m²
Total machine weight	6600 kg

POWDER	
Powder feeder count	2
Powder feeder technology	Vibration
Powder feeder capacity	2.5 L (approx. 13 kg of standard steel)
Powder flow rate range	1 - 50 g/min
Closed loop control system	Optical sensor of the amplitude displacement

MECHANICAL DESCRIPTION	
Axis count	Simultaneous 5
Linear axis stroke	X= 800 mm, Y= 410 mm, Z= 450 mm
Rotary axis stroke	B= +/-110°, C= +/-360°

TABLE	
Table diameter Ø	400 mm
Build volume	650 x 400 x 400 mm
Maximum table load	100 kg
Sensors	Temperature Sensors
Monitoring	Optional process monitoring package

CNC	
Controller	Siemens 840DSL
Compatability	G-code

FILTRATION	
Laser filtration	Door
Air extraction filtration	3 levels: Prefilter, HEPA, Chemical Filter

GAS SUPPLY	
Gas required	Argon
Gas consumption	Up to 20 L/min

OPTIONAL CONFIGURATION	
A	24Vx nozzle with 2000 W laser
B	Controlled atmosphere
C	Automatic tool changer
D	Touch probe (requires option C)
E	Electrical supply 400 V/60 Hz
F	Additional hoppers

The Modulo 400 is made up of 3 modules:

Process Module
- 5 axis kinematics
- powder-tight enclosure
- laser safety class 2
- DED deposition nozzle
- Air extraction & filtration unit

Peripheral Module
- Powder feeders
- User console
- Electrical cabinet

Laser Module
- Laser source
- Chiller

PARAMETERS & MATERIALS

All deposition parameters are modifiable:

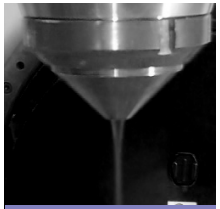
- Powder flow rate
- Deposition speed
- Laser power

To optimize the material properties:

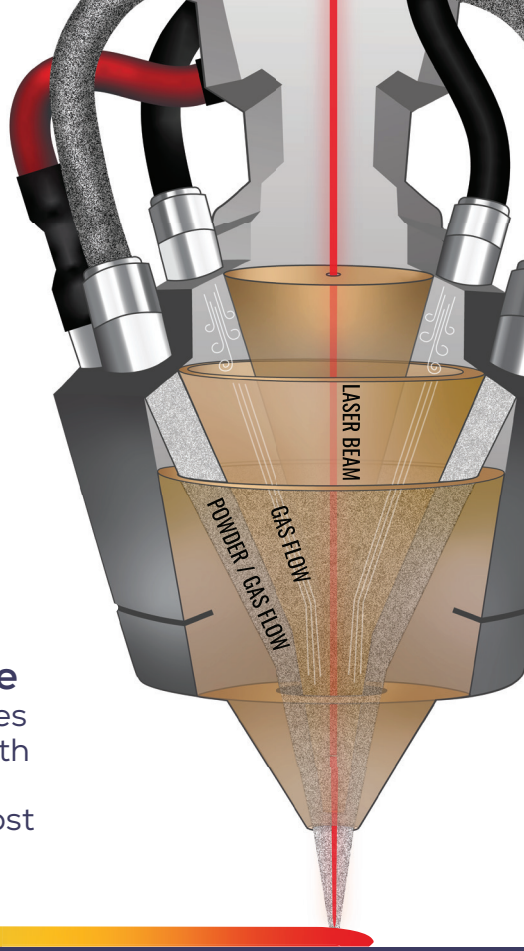
- Adjust the bead aspect ratio
- Optimize the melting layer dilution
- Minimize porosity
- Optimize the microstructure
- Minimize the heat affected zone
- Avoid material oxidation

NOZZLES FOR DIRECTED ENERGY DEPOSITION MACHINES

Single Gas Flow



Dual Gas Flow



The Co-Axial Difference

Our in-house designed nozzles achieve a smoother finish, with better meltpool control, and less overspray for minimal post processing.

Our Directed Energy Deposition machines allow the use of many different types of metal powders. Here are some of our machine tested materials:

- Ti64
- Stainless steel 316L
- Stainless steel 17-4PH
- Maraging steel 300
- H13
- CoCrWC
- CuAl
- Inconel 625
- Inconel 718
- Hastelloy X
- R&D possible for other alloys

NOZZLE	10Vx - STANDARD	24Vx - OPTIONAL
Deposition width	0.8 mm-1.2 mm	1.8 mm-2.2 mm
Deposition accuracy	+/-0.1 mm	+/-0.2 mm
Average deposition rate	15-25 cm^3/hr	90-150 cm^3/hr
Laser power range	200-500 W	400-2000 W
Standard laser power	500 W	2000 W
Optical fiber type	Ytterbium Fiber	Ytterbium Fiber
Optical fiber diameter	200 µm	600 µm
Electrical supply voltage	400 v-50 Hz	460 v-60 Hz

CONNECT

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