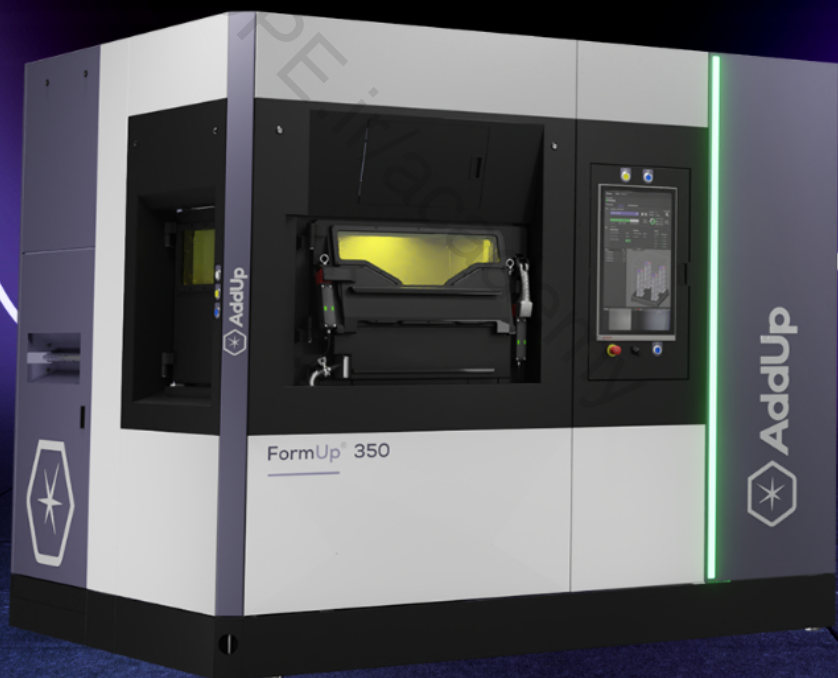


FormUp[®] 350

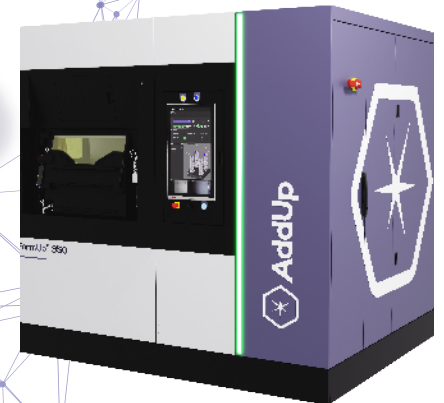
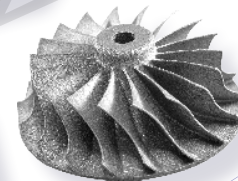
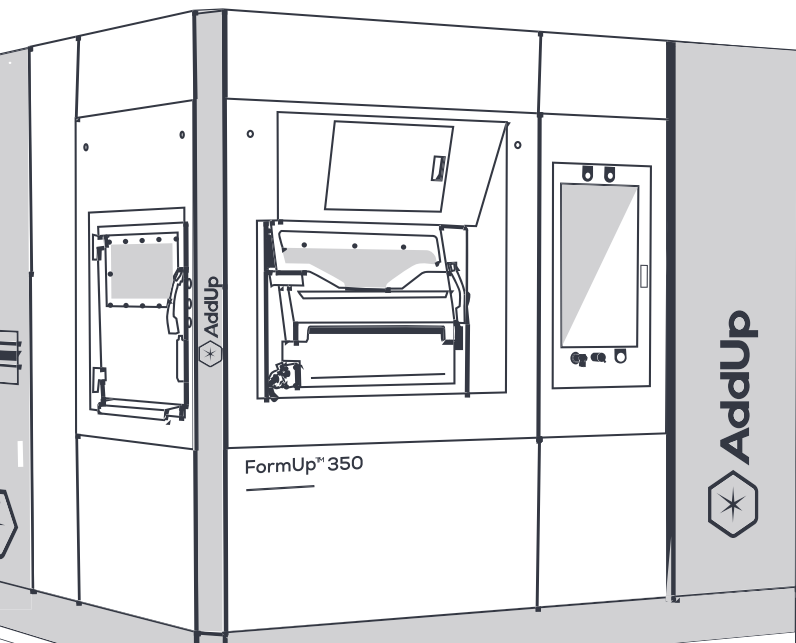
POWDER BED FUSION



CREATED BY INDUSTRY FOR 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. The collaboration sought to develop a Laser Powder Bed Fusion (L-PBF) machine that could build tire mold inserts and industrial parts with quality, accuracy, and repeatability at scale.

Find the best compromise between productivity and parts quality with AddUp's PBF technology. Our FormUp 350 machines are safe, efficient and scalable, integrating more than ten years of experience built by AddUp and Michelin in PBF technology, with safety at the heart of our concerns.



STANDARD MACHINE CONFIGURATION

SIZE

| | |
|--------------------------|---|
| Machine dimensions | L= 2.55 x W= 2.2 x H= 2.2 m |
| Weight w/o powder device | 4 tons |
| Build volume | 350 x 350 x 350 mm (~43L) - no bolt holes |

POWDER

| | |
|--------------------------|---|
| Powder recoating device | Bidirectional roller or scraper (brush or silicone) |
| Standard powder module | For non-reactive and medium PSD |
| Autonomous powder module | For all types of powder, continuous supply |
| Sieving | Sieving device integrated w/multiple mesh sizes |
| Powder recovery | High HSE powder recovery during production |
| Vacuum | Inerted and integrated |

LASERS

| | |
|-------------------|--|
| Optical type | Up to 4 Ytterbium continuous fiber lasers |
| Laser power | 500 W |
| Spot diameter | 70 µm |
| Platform coverage | 100% coverage by each laser |
| 3D scanners | 2 axes for X/Y displacement + 1 axis for focus |
| Max speed | 10 m/s |
| Accuracy | 35 µm |
| Wavelength | 1070 nm |

PART PROPERTIES

| | |
|------------------------------|----------------|
| Avg. time between production | 1 hour or less |
| Precision | Up to 0.1 mm** |
| Density | Up to 99.99%** |

FILTRATION

| | |
|-------------------------|---|
| Laser glass protection | Cross jet system |
| Fume and fusion residue | Filtration device w/automatic unclogging Calcium carbonate residue passivation |
| Filter lifetime | > 3 years |

GAS SUPPLY

| | |
|--------------|---|
| Gas type | Argon or nitrogen with programmable O ₂ levels |
| Laminar flow | Adjustable from 0.5 to 3 m/s |

SOFTWARE

| | |
|--------------------|------------------------|
| CAM solutions | AddUp Manager or Ntwin |
| Remote maintenance | AddUp Remote Control |

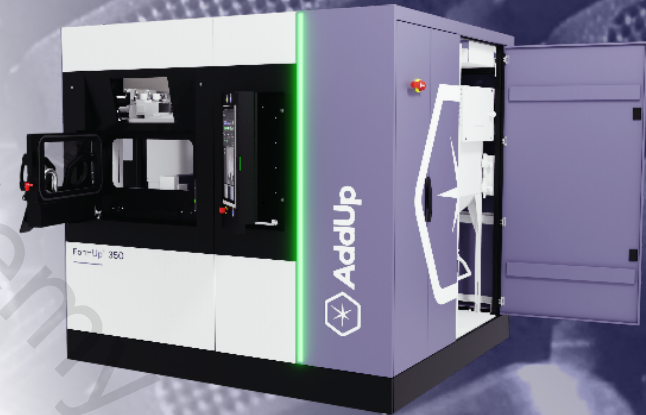
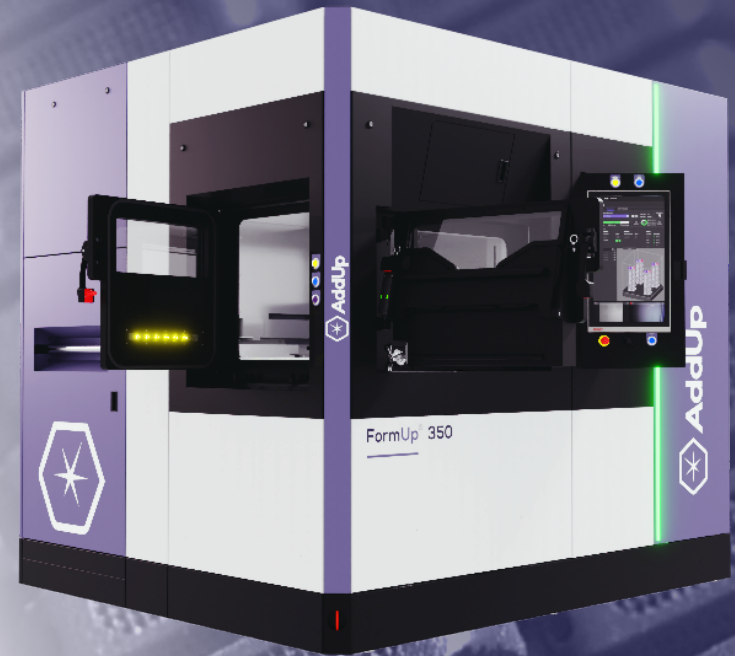
VISUALS

| | |
|---------------|-----------------------------------|
| Visualization | Supervision camera on every layer |
|---------------|-----------------------------------|

* Up to 370mm using a less thick platform

**depending on part geometry, material, and melting parameters used

***with AddUp validation



OPTIONAL CONFIGURATIONS

| | |
|---------------------|---|
| Handling | Glove box |
| Interoperability | OPC-UA / MQTT |
| Visualization | Camera for HD pictures |
| Simulation software | Distortion Simulation AddOn |
| Monitoring | AddUp Dashboards Recoat Monitoring Melting Monitoring |

RECOATERS & MATERIALS

Our roller system allows support-free production of your cantilevered parts and 10 µm reduction in arithmetic roughness (Ra) regardless of the surface angle.



The architecture of the FormUp 350 allows you to use all types of metal powders, even the most reactive ones, such as titanium and aluminum alloys in fine powers. Here are some FormUp 350 tested materials:

- AlSi7Mg
- AlSi10Mg
- Ti64
- Stainless Steel 316L
- Stainless Steel 17-4PH
- Maraging Steel 300
- Inconel 718
- Inconel 625
- R&D possible for other alloys

A MACHINE DESIGNED FOR OPERATOR SAFETY

Operators work in a completely safe environment with the FormUp 350's Autonomous Powder Module, which houses the powder storage, machine feeding, and unfused powder recovering and sieving. There is no exposure to smoke and melt residues with the inclusion of the automatic passivation filter system, which allows for safe waste disposal.



MONITORING SOLUTIONS

AddUp Dashboards

Collects and displays data for an unlimited number of AddUp machines regardless of their location and displays a summary on an overview home screen.





Melting Monitoring

Provides visibility of the printing at the microscopic scale in real time. This system makes it possible to characterize any defects without destroying the part.

Recoat Monitoring

An automatic analysis of the quality of the powder bed, which proactively corrects faults during production. Operates on a closed loop principle.

CONNECT

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