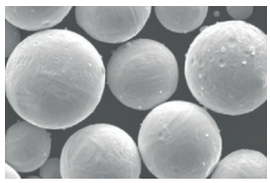
ADDITIVE MANUFACTURING CENTERS
NORTH AMERICA

Offering End-to-End Additive Manufacturing Services - from powder to commercialization.

STEP 1: Powder

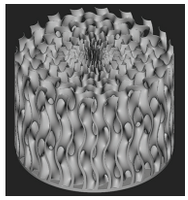
Metal Powder tailored to customer applications (BÖHLER, Uddeholm and other leading providers).

- **Tool steel**
- **Stainless steel**
- **Nickel, cobalt, titanium, and aluminum based alloys**

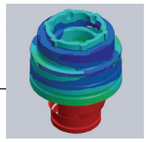
STEP 2: Design

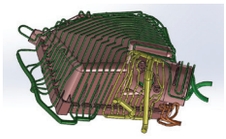
Design expertise in multiple industries such as Die Casting, Injection Molding, Oil & Gas, Aerospace, Turbomachinary; as an example: conformal cooling applications.

STEP 3: Simulation

FEA, CFD, heat transfer, plastic molding, metal casting, topology optimization.





STEP 4: AM Build

- **Laser Powder Bed Fusion**
- **Offers both prototyping & serial production**
- **Process parameters qualified per customer requirements**


STEP 5: Post Processing

- **Automated de-powdering**
- **Baseplate removal via Wire EDM**
- **Shot peening**
- **Tumbling**
- **Abrasive flow machining**
- **Electro-polishing**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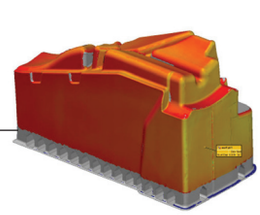
voestalpine
ONE STEP AHEAD.

STEP 6: FARO Arm Inspection

Verify as-built measurements by comparing directly to CAD file Verification of product quality by performing 3D inspections, dimensional analysis, reverse engineering and more.

- **Accuracy and repeatability ±25 µm**
- **Scan Rate 300 frames per second**



STEP 7: Heat Treatment: voestalpine Thermo-Tech

- **Built on centuries of excellence and expertise in metal heat treatment**
- **Process controlled in-house to ensure quality**
- **Internal R&D capability to develop property sets tailored to customer application**

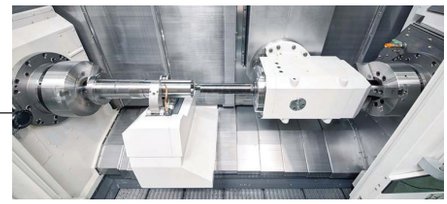
STEP 8: Material Testing

Verify material properties with:

- **Tensile testing**
- **Hardness testing**
- **Fatigue testing**
- **Bending test**
- **Charpy impact testing**
- **Microstructure inspection**
- **High temperature tensile testing**
- **Powder morphology**

STEP 9: Finish Machining

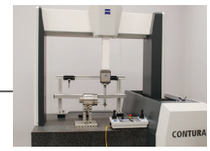
- **Access to the necessary final machining capabilities such as: turning, milling, grinding, polishing**
- **Example of in-house capabilities: Nakamura-Tome NTRX-300L for fast, cost-efficient precision machining**



STEP 10: Final Inspection CMM: ZEISS

CONTURA 7 700 x 700 x 600 mm measurement envelope.

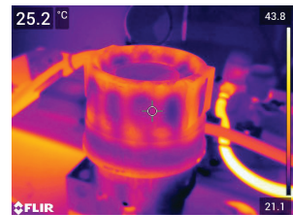
- **Achievable accuracy: 1.5 + L/350 µm**



STEP 11: Flow Testing

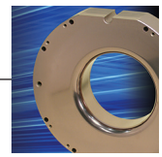
Advanced inspection for internal flow channels

- **Flow rate vs. pressure data (water)**
- **Pressurize and hold up to 150 psi**
- **Thermal images to confirm channel clearance & function**



STEP 12: Coatings: voestalpine eifeler Coatings

Achieve surface finish requirements with voestalpine eifeler Coatings' latest PVD (physical vapor deposition) coating technology; designed to improve performance and tool life, allowing components to function in environments they otherwise may not be able to operate in.



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