

MELTIO



Applications Catalog





Application Overview



Near Net Shapes

Replacement of casting and forging near net shapes for prototyping, pilot runs and low volumes to avoid up front investment and minimum order quantities.



Lightweighting

Typical for the aerospace and aviation industries where weight savings have a significant impact on part cost and overall system efficiency.



Cooling

Incorporation of conformal cooling channels for increased performance, typically used in the aerospace industry, heat exchangers, molds and dies.



Repairs, Spares, and Obsolete Parts

Commonly used in mold repairs or heavy industries such as marine, rail way, mining and defense where parts are required for machinery in remote areas.



Combustion Chamber

Aerospace

This is the combustion chamber for a rocket engine with liquid cooling channels. Fresh fuel is flown past the combustion chamber to cool it down before it enters the engine to avoid overheating the chamber walls. This is a complex geometry that would never be made in a single-step process.

Size: 110,5 x 110,5 x 170 mm
Weight: 4,88 kg
System: Meltio M450

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 0,8 mm



Mining Drill Bit

Oil & Gas

It is attached to underground drills for drilling anchor points or exploratory holes in the mining and oil and gas industry. The component wears out quickly during operations in remote sites. There is a very small area of the part which wears out, teeth and surface.

Size: 96,5 x 96,44 x 91,3 mm
Weight: 3 kg
System: Meltio M450
Print time: 10 h 5'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm
Post-processing: CNC Machining



Glass Mold Core Manufacturing

Half of a mold for the glass bottle manufacturing industry. Has a fairly complicated geometry made with a difficult material to machine to ensure longer lifetimes. This part would normally be cast, therefore long lead-times and high up front investment. Meltio's LMD process offers unparalleled flexibility and impact to the company's bottom line in terms of part cost and lead time.

Size: 158,5 x 79,31 x 144,3 mm
Weight: 6 kg
System: Meltio M450
Print time: 24 h

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm
Post-processing: CNC Machining



Piston Prototype

Automotive

Converts heat energy into linear motion inside automotive engines. Traditionally made by casting in large lot sizes, requires precision machining. Meltio enables rapid manufacturing of single quantity prototypes with minimum material waste and increased design freedom.

Size: 52 x 29 ø mm
Weight: 756 g
System: Meltio M450
Print time: 3 h 30'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm
Post-processing: CNC Machining



Gas Turbine Fan Blade

Oil & Gas

Converts the expanding gas into rotational force inside a turbine to generate electricity. It is a very complex geometry made out of a difficult to machine material. Additive manufacturing affords greater geometry freedom which can increase process efficiency, whilst streamlining the supply chain by removing the mold-making and casting process; within a single gas turbine many different blade geometries are found further compounding the business case for Meltio Metal 3D Printing process.

Size: 35 x 75 x 135 mm
Weight: 1,11 kg
System: Meltio M450
Print time: 3 h 10'

Material: Inconel 718
Gas: Argon
Layer Height: 1 mm
Post-processing: CNC Machining



Watch Bezels

Jewelry

Holds watch mechanics and electronics, mass manufactured with highly sophisticated design and surface requirements. Difficult and very expensive to machine material for a high volume product, leading to cost savings due to the huge amount of lost material because of its low net weight geometry. Subtractive manufacturing cannot leverage high material removal rates due to the small feature size, further complicating the business case for traditional manufacturing.

Size: 53,37 x 44,59 x 10,85 mm
Weight: 155,93 g / 29,22 g per part
System: Meltio M450
Print time: 5 h 40'
56' per part

Material: Titanium 64
Gas: Argon
Layer Height: 0,8 mm
Post-processing: CNC Machining



Spline Shaft

Mining

Industrial component for torque transmission in heavy equipment. A low volume component which is hollow and difficult to machine, due to its geometry and material. Production time and cost in traditional manufacturing are 10x higher. The machining of the near-net-shape component can be done quickly and cheaply as only certain critical areas need machining.

Size: 132 x 132 x 193 mm
Weight: 6,6 kg
System: Meltio M450
Print time: 30 h

Material: Stainless Steel 308
Gas: Argon
Layer Height: 1,2 mm



Knee Implant

Medical

Medical component traditionally made from machining a billet of titanium which is a wasteful, time consuming and expensive process (tool wear). Also typically printed with SLM which reduces the post-processing but maintains a high component cost, Meltio enables low component cost by quickly producing a near net shape which can be machined in a cost-effective manner.

Size: 99 x 77 x 51 mm
Weight: 410 g
System: Meltio M450
Print time: 2 h

Material: Titanium 64
Gas: Argon
Layer Height: 1,2 mm
Post-processing: CNC Machining



Airfoil Cooling Blade

Energy

Cooling blade found on the hub of a multi-megawatt power plant generator. Forces air into the generator's housing to remove waste heat. Replaces complex welded assembly with large potential for manufacturing errors, allows for a better-optimized blade geometry and weight reduction, which increases generator efficiency.

Size: 200 x 152 x 55 mm
Weight: 516 g
System: Meltio M450
Print time: 3 h 50'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 0,5 mm
Post-processing: Polishing



Aircraft Engine Mount

Aerospace - CiTD

"Engine Mounts are high-performance structures that must withstand extreme loads and fatigue requirements. CiTD is developing new additive manufactured engine mounts for the new generation of electric A/C with high performances and reduced mass. Meltio's technology makes it happen on time, cost and quality. It has been developed under H2020 AMABLE program."

Marta Garcia - CiTD Engineering & AM Director

Size: 95,6 x 95,6 x 215,75 mm
Weight: 502 g
System: Meltio M450
Print time: 3 h 50'

Material: Titanium 64
Gas: Argon
Layer Height: 1,2 mm
Post-processing: CNC Machining



Injection Mold Half

Manufacturing

Tool for high pressure injection molding of plastic components. Very difficult to machine geometry due to poor tool access to occluded areas requiring the use of small tools which have low material removal rates. Due to high mass and density not suitable for powder metal printing while fine features limits the effectiveness of WAAM. Meltio produces the part at a low cost with minimum post-processing requirements.

Size: 140 x 140 x 297 mm
Weight: 15 kg
System: Meltio M450
Print time: 70 h

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm



Concrete Bagging Nozzle

Mining

Wear part used for fillings bags with cement. Production quantity too low to justify casting, very complex geometry to machine due to hard material requirements, high aspect ratio holes (hollow) and irregular surface which require the use of milling, rather than turning, using long tools with low removal material rates further increasing the cost of the component. Meltio delivers a 10x cost reduction for this low-volume application.

Size: 99 x 116 x 258 mm
Weight: 1,78 kg
System: Meltio M450
Print time: 6 h 15'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm



Prototype Bearing Block

Mining

Component that holds bearing in place as part of a concrete manufacturing plant. This is a wear component that is required for the production plant to operate. Digital manufacturing enables the optimization of stock and a cost-effective production of replacement parts. A heavy and bulky geometry like this one would not be cost-effective for powder metal 3D printing while machining would require warehousing of stock billets of the correct size and would lead to significant material waste.

Size: 143 x 143 x 75 mm
Weight: 6,5 kg
System: Meltio M450
Print time: 24 h 38'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm



Turbo Impeller

Automotive

Converts exhaust gas pressure into rotary motion in turbo machinery. Traditionally made by casting in large lot sizes, requires precision machining. Meltio enables rapid manufacturing of single quantity prototypes with minimum material waste and increased design freedom.

Size: 140,3 x 140,3 x 47,7 mm

Weight: 1,85 kg

System: Meltio Engine

Robot Integration

Print time: 5 h 48'

Material: Stainless Steel 316L

Gas: Argon

Layer Height: 0,6 - 1,2 mm



Helical Coil

Oil & Gas

Technology demonstrator to showcase the wide process window of the Meltio Engine Robot Integration. The uniqueness of this 3D printed feat lies in non-planar slicing, optimizing the thicknesses of each point within an individual layer. This approach to slicing lends itself to many complex geometries in five axis additive manufacturing.

Size: 60 Ø mm pipe, 354 x 376 x 525 mm
Weight: 3,56 kg
System: Meltio Engine
Robot Integration
Print time: 13 h 46'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 0,4 - 0,8 mm
Post-processing: Polishing



Naval Propeller

Marine

Five bladed propeller for midsize commercial vessel. Traditionally, after casting the part would undergo a machining and polishing step to meet the requirements of the marine industry. Meltio's process allows to forego the expensive and time enable process whilst improving on the accuracy of the near net shape to be post-processed, allowing manufacturers to quickly innovate with extremely low overhead.

Size: 600 Ø mm, 250 mm
Weight: 12,1 kg
System: Meltio Engine
Robot Integration
Print time: 43 h 40'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 0,6 - 1,2 mm
Post-processing: Polishing



Overhang Test

Design to showcase Meltio's capabilities in printing with the deposition head oriented non-vertically. Meltio's process remains stable even when printing at angles greater of 90 degrees as surface tension is the dominating force. Powder LMD alternatives often cannot work at the angles required by this geometry. This feature is particularly interesting for repairing parts that cannot be easily positioned such as large molds by allowing for in situ repair.

Size: 350 Ø mm, 180 mm
Weight: 2,14 kg
System: Meltio Engine
Robot Integration
Print time: 6 h 26'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 0,6 mm



Spherical Tank

Oil & Gas

Pressure vessel for aerospace applications which contains propellants in liquid form. A near perfect spherical shape is required due to the large forces acting on the tank. 3D printing with laser metal deposition offers clear advantages over traditional manufacturing in terms of design freedom, material savings and overall part production cost. Specifically, Meltio's wire process allows for more precise deposition of material with less heat input leading to thinner walled tanks.

Size: 500 Ø mm sphere
Weight: 29,6 kg
System: Meltio Engine
Robot Integration
Print time: 81 h 20'

Material: Stainless Steel 316L
Gas: Argon
Layer Height: 1,2 mm



Topology Optimized Beam Construction

High-performance structural member for light-weight construction environments. Optimization of its profile allows for the creation of higher strength to weight components for a variety of industries without the inherent size constraints of powder bed additive manufacturing systems. The precise laser wire process enables the production of parts that require minimal post machining.

Size: 170 x 130 x 900 mm

Weight: 5,95 kg

System: Meltio Engine
Robot Integration

Print time: 19 h 5'

Material: Stainless Steel 316L

Gas: Argon

Layer Height: 0,6 mm



Engine Manifold

Motorsport

Guides gases from engine to exhaust. To achieve the highest performance the manifold needs to be optimized continuously. 3D printing allows unparalleled geometry freedom and avoids multiple welds and complex manual setups for the low volumes of motorsport production quantities. Meltio's wire LMD process is unique as it enables 3D printing of very smooth walls on large components while avoiding internal support structures by using 5 axis.

Size: 205 x 360 x 473 mm

Weight: 5,22 kg

System: Meltio Engine

Robot Integration

Print time: 19 h 23'

Material: Stainless Steel 316L

Gas: Argon

Layer Height: variable layer height

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