MacLean ADDITIVE

Formetrix L-40

Metal Powders for Laser Powder Bed Fusion 3D Printing

Industrial die, printed using LPBF

Laser Powder Bed Fusion (LPBF) is one of the premier metal 3D printing technologies. It features density levels over 99% and among the highest available feature resolution in metals.

One major drawback to using this technology for many applications has been a lack of hard metals that are easily printable without cracking.

MacLean Additive has solved this challenge with a new class of steel powders that combine high hardness and toughness and are printable at room temperature using standard commercial equipment.

Applications:

- Tools, dies and fixtures
- Valves
- Gears

Formetrix L-40 Key Features:

- Case Hardening: Up to 70 HRC
- High Core Properties:
  - Hard: >50 HRC
  - Ductile: >10% Elongation
  - Tough: 65J (v-notch, as built)
- Easy to Print (RT to 200°C)

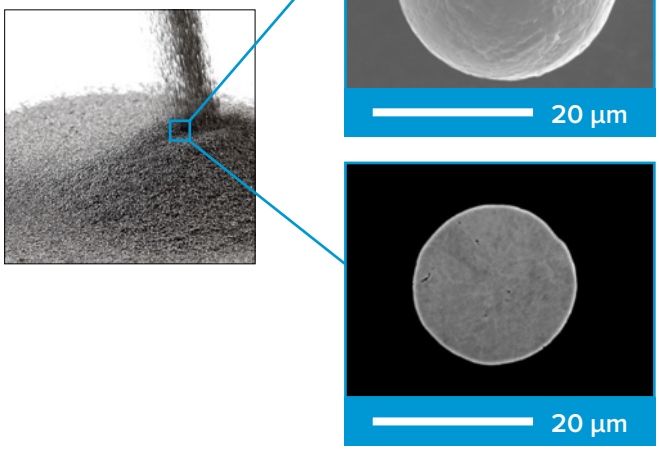
OUTPERFORM

Mechanical Properties When Printed Using Laser Powder Bed Fusion

Property	Formetrix L-40		
	As-Built	Heat Treated Core	Heat Treated Case
Hardness*, Rockwell HRC	46	51	66-70
Tensile Strength,** MPa	1500	1650	
Yield Strength,** MPa	1300	1350	
Elongation,%**	14+	10	
Charpy V-notch***, J	65		

*ASTM E384 **ASTM E8-E8m -16a ***ASTM E23- 16b

SEM Images of Formetrix L-40



Mechanical Properties When Printed Using Laser Powder Bed Fusion

Property	Formetrix L-40
Thermal Expansion Coefficient*, ppm/°C @ 20°C	11.2
Thermal Conductivity **, W/m·K @ 25°C / 200°C / 500°C	17.3 / 21.1 / 23.6
Specific Heat **, J/Kg·K @ 25°C / 200°C / 500°C	442 / 525 / 642

*ASTM E228 **ASTM E1461-13

Powder Chemistry

Element	Formetrix L-40 Weight %
Iron (Fe)	Balance
Chromium (Cr)	>10.5%
Nickel (Ni)	<5%
Molybdenum (Mo)	<5%
Copper (Cu)	<1%
Niobium (Nb)	<1%
Carbon (C)	<1%
Nitrogen (N)	<1%

Powder Properties

Material	Formetrix L-40
Melt Point, °C	1506
Density, g/cm^3	7.78
Morphology	Spherical
Size Range, µm	-53/+15

Standard Packaging

25 lb (11,3 kg)	Custom quantities upon request