MATERIALS FOR 3D PRINTING
COPPER

DANISH
TECHNOLOGICAL
INSTITUTE

CuCr1Zr

Copper alloy

CuCr1Zr has good material properties, such as corrosion resistance, high mechanical strength, and impressive thermal and electrical conductivity, even at high temperatures. Suitable for applications such as cooling systems and heat exchangers.

We print copper with Laser Powder Bed Fusion technology that prints in powder and uses a laser to weld the powder layers together. The technology requires support structure to attach the part to the build platform. The support is mechanically removed after printing.

The raw prints that come out of the printer have a surface finish similar to a cast metal part. The surface can subsequently be processed with various finishes.

The technology can print parts that meet ISO 2768-m 1 - however, the tolerances depend a lot on the geometry of the part.

MATERIAL PROPERTIES (STANDARD)	60 µm, 700 W – Raw print	Heat treated 2 hours at 500 °C
TENSILE STRENGTH [Rm]	255 ±5 MPa	
YIELD STRENGTH [Rp0,2]	170 ±5 MPa	
ELONGATION AT BREAK [A]	41 ±3 %	
VICKERS HARDNESS [HV5]	75 ±5	
ELECTRICAL CONDUCTIVITY	15,54 MS/m	44,28 MS/m
ELECTRICAL CONDUCTIVITY	26,79 % of pure Cu	76,34 % of pure Cu
POWDER DENSITY	8,9 g/cm3	
PART DENSITY	>99,6 %	

SURFACE TEXTURE	Raw	Media blasted	Processed
Average roughness [Ra]	23 ±2	11 ±1	0,8

Technology:
- Laser Powder Bed Fusion

Printers:
- SLM Solutions - SLM280

Build volume:
- 280 x 280 x 365 mm

Layer thickness
- 30 µm (fine)
- 60 µm (normal)

Possible post-processing:
- De-stressing
- Heat treatment
- Deburring
- Media blasting
- Conventional processing

Design features:
- Minimum feature size 0,6 mm
- Minimum channel size Ø2 mm
- Minimum wall thickness 1 mm
- Support for overhangs less than 45°
- Hole for emptying powder Ø5 mm

Design guides:
- Minimize the volume of the part as much as possible
- Avoid large changes in the cross-sectional area of the part
- Use camphors and roundings - they are "free"
- Consider the print orientation in your design

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