Material Data Sheet

Bronze CuSn10 / CC480K[1]

General

Bronze is a copper-tin alloy and a construction material consisting of high elongations at medium hardness. Good wear and corrosion behavior, especially against atmospheric influences due to a dense protective layer on the surface, characterize this material. These tribological and corrosive resistances allow usage of CuSn10 as structural material for pump housings, blade wheels or hydraulic turbines. Further applications include instrument panels, diffusers, impellers, and general machine engineering.

Material Structure

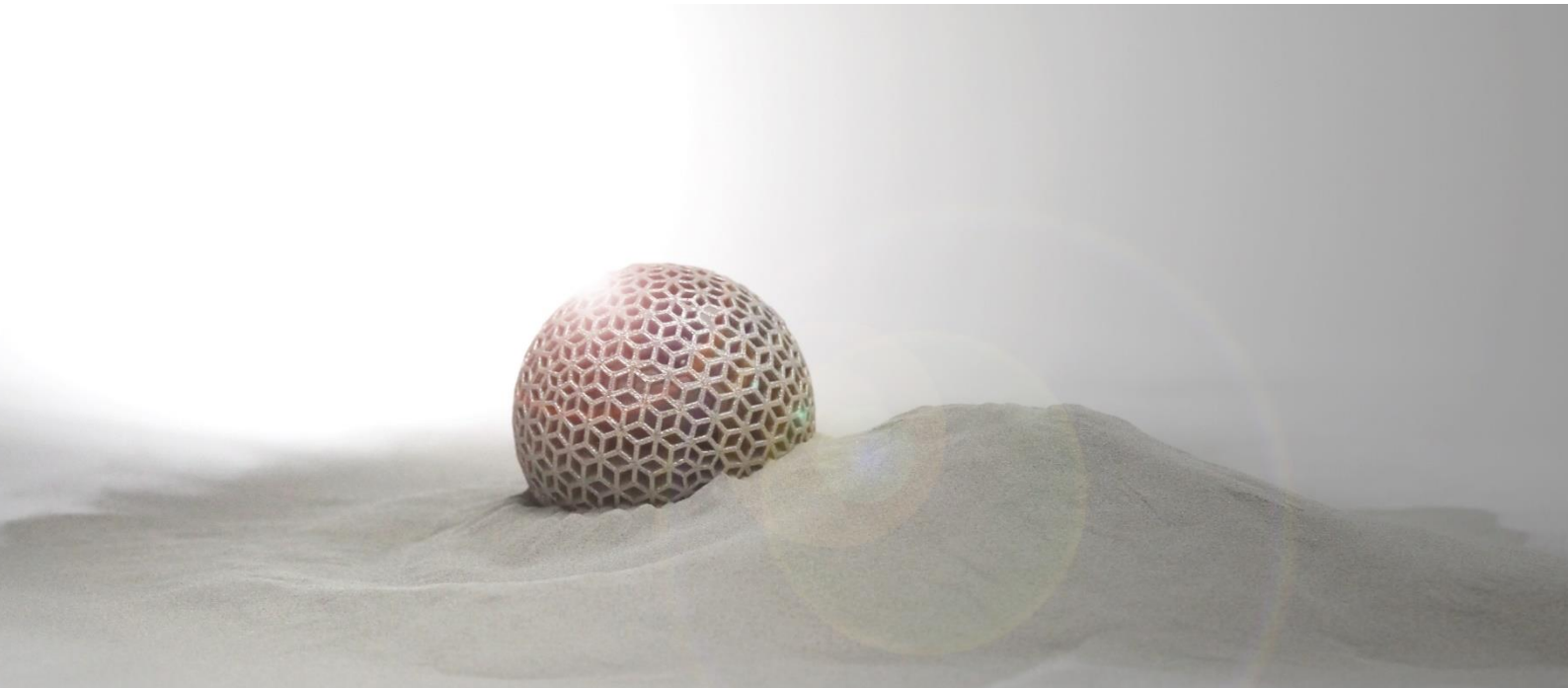
SLM®-processed components out of CuSn10 exhibit a homogeneous, nearly non-porous texture, with mechanical characteristic values in the range of material specifications. Through subsequent processing such as hardening, heat treatment or hot isostatic pressing (HIP), the components' properties can be adapted to meet specific requirements.

Chemical composition [Mass fraction in %][7]

Cu	Sn	Ni	Cr	Nb + Ta	Mn	Si	P	S	C	N	O
Balance	9.00 – 10.00	/	/	/	/	/	/	/	/	/	/

Powder properties

Particle size[7]	20 – 63 µm	Particle shape[8]	Sphärisch
Mass density[2]	8.74 g/cm³	Thermal conductivity	59 W/(m·K)



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Layer thickness 30 µm[3]		As-built
Build-up rate [6]	[cm³/h]	9.1 cm³/h
Component density[5]	[%]	≥ 99.5 %

Tensile test[9]			M	SD
Tensile strength	R_m	[MPa]	516	15
Offset yield strength	$R_{p0,2}$	[MPa]	385	14
Elongation at break	A	[%]	22	5
Reduction of area	Z	[%]	21	3
Young's modulus	E	[GPa]	109	9

Hardness test[10]		M	SD
Vickers hardness	HV10	160	6

Roughness measurement[11]			As-built	
			M	SD
Roughness average	Ra	[µm]	9	1
Mean roughness depth	Rz	[µm]	54	6

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Layer thickness 50 µm[4]	As-built

Build-up rate [10]	[cm³/h]	17.3 cm³/h
Component density[11]	[%]	> 99.5 %

Tensile test[12]			M	SD
Tensile strength	R_m	[MPa]	495	17
Offset yield strength	$R_{p0,2}$	[MPa]	373	7
Elongation at break	A	[%]	16	5
Reduction of area	Z	[%]	16	3
Young's modulus	E	[GPa]	116	16

Hardness test[13]		M	SD
Vickers hardness	HV10	159	1

Roughness measurement[17]			As-built	
			M	SD
Roughness average	Ra	[µm]	10	2
Mean roughness depth	Rz	[µm]	71	13

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The properties and mechanical characteristics apply to powder that is tested and sold by SLM Solutions, and that has been processed on SLM Solutions machines using the original SLM Solutions parameters in compliance with the applicable operating instructions (including installation conditions and maintenance). The part properties are determined based on specified procedures. More details about the procedures used by SLM Solutions are available upon request.

The specifications correspond to the most recent knowledge and experience available to us at the time of publication and do not form a sufficient basis for component design on their own. Certain properties of products or parts or the suitability of products or parts for specific applications are not guaranteed. The manufacturer of the products or parts is responsible for the qualified verification of the properties and their suitability for specific applications. The manufacturer of the products or parts is responsible for protecting any third-party proprietary rights as well as existing laws and regulations.

[1] Material according to DIN EN 1982:2017.

[2] Material density varies within the range of possible chemical composition variations.

[3] Material data file: Bronze_SLM_MBP2.2_30_Stripes_FS_T0_400Watt_V5101

[4] Material data file: Bronze_SLM_MBP2.2_50_Stripes_FS_T0_400Watt_V5101

[5] Optical density determination by light microscopy.

[6] Theoretical build-up rate for each laser = layer thickness x scan speed x track distance.

[7] With respect to powder material.

[8] According to DIN EN ISO 3252:2001.

[9] Tensile test according to DIN EN ISO 6892-1:2017 B (DIN 50125:2016 – B6x30); orientation: 0°, 90°; heat treatment: none; testing machine: Zwick 1484; load range: 200 kN; testing speed: 0,008 1/s; testing temperature: room temperature; test laboratory: internal. Test samples were turned before tensile test.

[10] Hardness testing according to DIN EN ISO 6507-1:2018.

[11] Roughness measurement according to DIN EN ISO 4288:1998; λc = 0,8 mm.

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