GE Additive

CoCrMo

Cobalt alloy CoCrMo can be used for high temperature applications. This alloy offers excellent corrosion resistance and mechanical properties at elevated temperatures.

Data in this document represents material built with 50µm layer thickness and in a Nitrogen atmosphere on an M2 / M2 Multilaser machine. Values listed are typical.

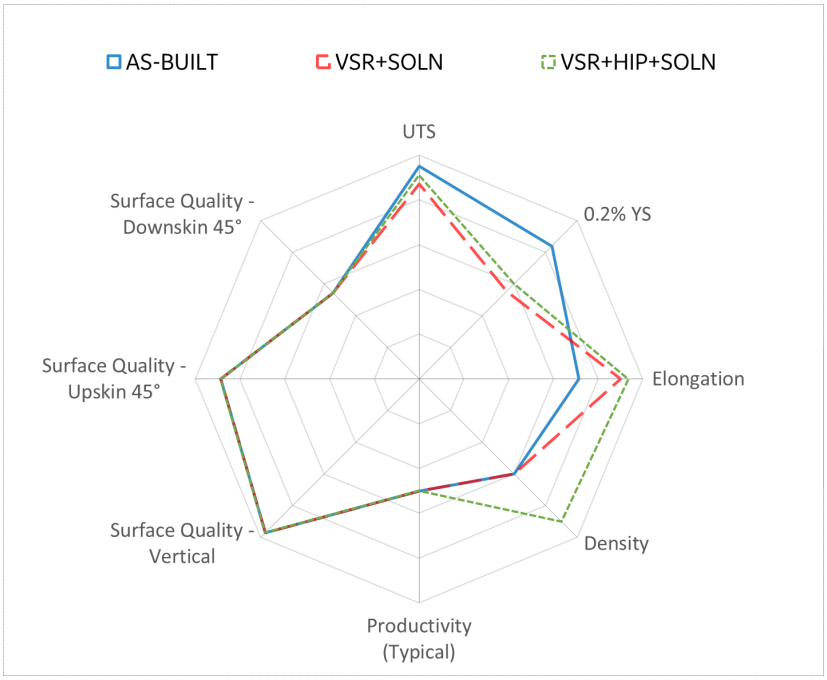
27
Co

POWDER CHEMISTRY

Element	Indicative value (wt%)
Cr	27.0-30.0
Mo	5.0-7.0
Ni	0-0.50
Fe	0-0.75
C†	0.08-0.16
Si	0-1.0
Mn	0-1.0
W	0-0.20
P	0-0.02
S	0-0.01
N	0-0.25
Al	0-0.10
Ti	0-0.10
B	0-0.01
Co	Balance

†CoCrMo (powder) chemical composition et al. according to ASTM F75 with exception of C content

SPIDER PLOT



BUILD DETAILS

- M2 / M2 Multilaser
- Nitrogen atmosphere
- Stainless Steel recoater blade
- 50 µm layer thickness
- Build rate w/ coating *[cm³/h] : 15.0
- Max. Build rate per Laser** [cm³/h]: 18.0

*Measured by using Factory Acceptance Test layout
**Calculated (layer thickness x scan velocity x hatch distance)

THERMAL STATES

1. AS-BUILT
2. VACUUM STRESS RELIEF+SOLUTION (VSR+SOLN): VSR: 1052°C, 2 hrs in vacuum; SOLN: 1190°C, 1 hr in vacuum
3. VACUUM STRESS RELIEF+HIP+SOLUTION (VSR+HIP+SOLN): VSR: 1052°C, 2 hrs in vacuum; HIP: 1204°C, 3-5 hrs, 100 MPa minimum; SOLN: 1190°C, 1 hr in vacuum

PHYSICAL DATA AT ROOM TEMPERATURE

	Surface Roughness - Overhang (µm)		
	45°	60°	75°
Upskin	9	7	6
Downksin	21	8	7

	Surface Roughness (µm)
H	--
V	6

	Porosity (% Density)		Hardness (HRC)		Poisson's Ratio	
Thermal State	H	V	H	V	H	V
As-Built	99.6	99.6	43	43	--	--
VSR+SOLN	99.6	99.6	--	--	--	--
VSR+HIP+SOLN	99.9	99.9	36	36	0.352	0.352

HORIZONTAL

Thermal State	Thermal Conductivity (W/m•K)	Coeff. Of Thermal Expansion (m/m/°C)	Thermal Diffusivity (m^2/s)	Specific Heat (J/K•kg)
As-Built	--	--	--	--
VSR+SOLN	--	12.6×10^{-6}	--	460
VSR+HIP+SOLN	12.2	11.5×10^{-6}	3.2×10^{-6}	452

VERTICAL

Thermal State	Thermal Conductivity (W/m•K)	Coeff. Of Thermal Expansion (m/m/°C)	Thermal Diffusivity (m^2/s)	Specific Heat (J/K•kg)
As-Built	--	--	--	--
VSR+SOLN	--	12.6×10^{-6}	--	460
VSR+HIP+SOLN	12.2	11.5×10^{-6}	3.2×10^{-6}	452

TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

Temperature: RT

	Modulus of Elasticity (GPa)		0.2% YS (MPa)		UTS (MPa)		Elongation (%)		Reduction of Area (%)	
Thermal State	H	V	H	V	H	V	H	V	H	V
As-Built	225	185	1060	870	1430	1330	17.1	20.1	--	--
VSR+SOLN	220	230	650	625	1245	1285	34.0	46.0	28.0	33.0
VSR+HIP+SOLN	230	225	695	685	1325	1315	44.3	47.9	37.9	39.8

Temperature: 650°C

	Modulus of Elasticity (GPa)		0.2% YS (MPa)		UTS (MPa)		Elongation (%)		Reduction of Area (%)	
Thermal State	H	V	H	V	H	V	H	V	H	V
As-Built	--	--	--	--	--	--	--	--	--	--
VSR+SOLN	175	170	335	325	935	990	25.3	39.4	23.1	33.1
VSR+HIP+SOLN	180	175	360	360	1060	1050	35.9	37.3	31.9	33.6

H: HORIZONTAL (XY) orientation
V: VERTICAL (Z) orientation

* All of the figures contained herein are approximate only. The figures provided are dependent on a number of factors, including but not limited to, process and machine parameters, and the approval is brand specific and/or application specific. The information provided on this material data sheet is illustrative only and cannot be relied on as binding.