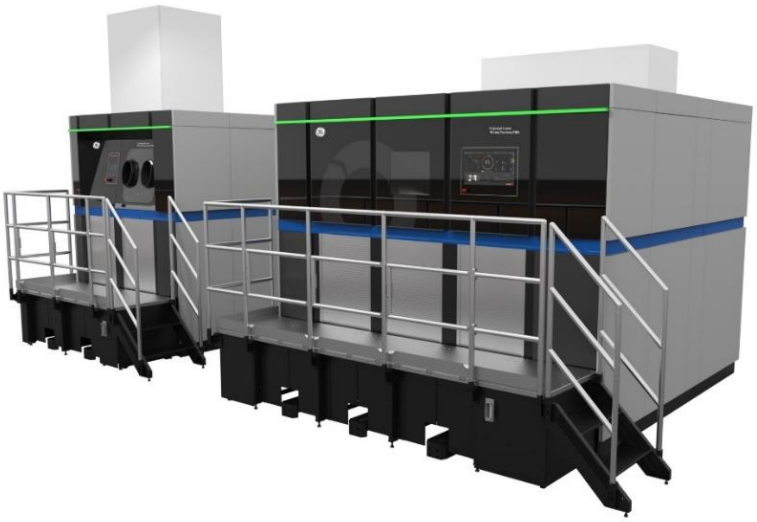
13 Al

22 Ti | 24 Cr | 26 Fe | 27 Co | 28 Ni | 29 Cu

M Line Cobalt Chrome

Parameter for GE Additive's Concept Laser M Line

Data in this material datasheet represents material built with 50 µm layer thickness and in a nitrogen atmosphere on a Concept Laser M Line machine. Values listed are typical.



Cobalt Chrome

Parts are fabricated from cobalt chrome alloys like ASTM F75 CoCr when excellent resistance to high temperatures, corrosion and wear is critical. It is an appropriate selection where nickel-free components are required, such as in orthopedic and dental applications due to the hardness and bio-compatibility necessary for long-term performance. Cobalt chrome alloys are used in additive manufacturing to print parts that often benefit from hot isostatic pressing (HIP), which combines high temperatures and pressures to induce a complex diffusion process that strengthens grain structures, producing fully dense metal parts.

M Line Cobalt Chrome

The CoCr parameters for the Concept Laser M Line is developed leveraging the performance of the previous machine generations. The base parameters deliver good surface quality while maintaining a very good density. The parameter has been optimized for use of steel blade recoater.

M Line Cobalt Chrome

With appropriate approval* Cobalt Chrome can be used for aerospace, orthopedic, and dental applications.

Data in this material datasheet represents material built with 50 µm layer thicknesses and in a nitrogen atmosphere on a Concept Laser M Line machine. Values listed are typical.

POWDER CHEMISTRY

Cobalt Chrome (CoCrMo) powder chemical composition according to ASTM F75.

MACHINE CONFIGURATION

- M Line
- Nitrogen gas
- Stainless steel recoater blade

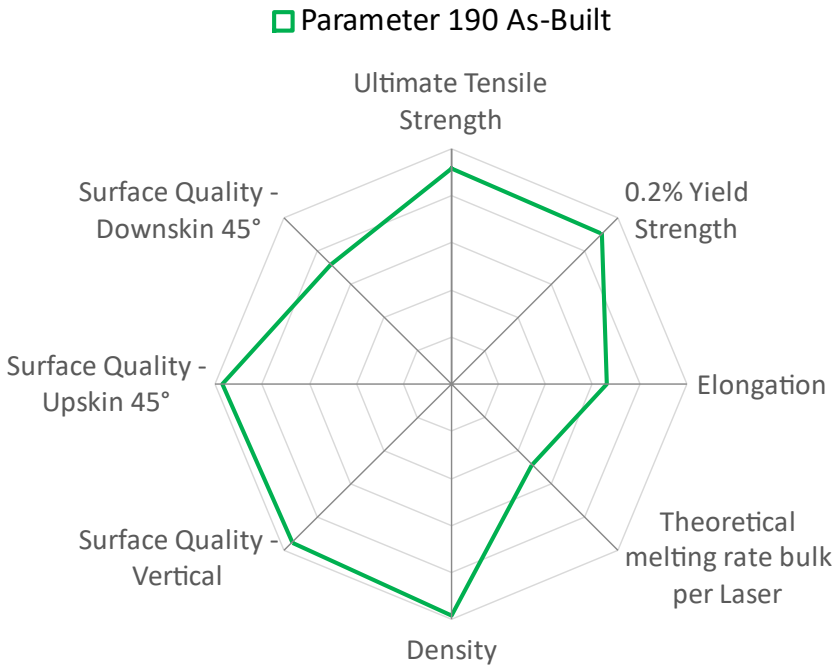
AVAILABLE PARAMETERS

- **Base Parameter 190** 50 µm layer thickness, steel recoater

THERMAL STATES

1. As-Built

PARAMETER COMPARISON



Spider Plot is generated by normalizing typical material data (containing both horizontal and vertical data) against a range defined for each material family. For **Cobalt Alloys,** the ranges are as follows: UTS: 0-1400 MPa, 0.2%YS: 0-900 MPa, Elongation: 0-60 %, Density: 99-100 % and Surface Quality (all): 40-5 µm.

TYPICAL BUILD RATE

Base Parameter

	(cm³/h)
Typical build rate* w/coating	10-50
Theoretical melting rate bulk per Laser[1]	14.6

[1]Calculated (layer thickness x scan velocity x hatch distance)

PHYSICAL DATA AT ROOM TEMPERATURE

	Surface Roughness Ra** - Overhang (µm)				Surface Roughness Ra** (µm)
	45°	60°	75°		
Upskin	6	5	4	H	--
Downskin	14	7	5	V	7

	Relative Density (%)		Hardness (HV10)		Poisson's Ratio	
Thermal State	H	V	H	V	H	V
As-Built	99.9	99.9	402	--	--	--

TENSILE DATA

Tensile testing done in accordance with ASTM E8 and ASTM E21

Test Temperature: RT	Modulus of Elasticity (GPa)		0.2% Yield Strength (MPa)		Ultimate Tensile Strength (MPa)		Elongation (%)		Reduction of Area (%)	
Thermal State	H	V	H	V	H	V	H	V	H	V
As-Built	218	166	1035	815	1385	1275	15	20.5	--	--

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.
** Roughness measurements have been performed according to DIN EN ISO 4287 and DIN EN ISO 4288. In general analysis of the surface quality is strongly dependent on the methodology used and therefore deviations might be observed depending on methodology used. Vertical and horizontal sidewalls have been characterized using a tactile system, overhangs using an optical system.