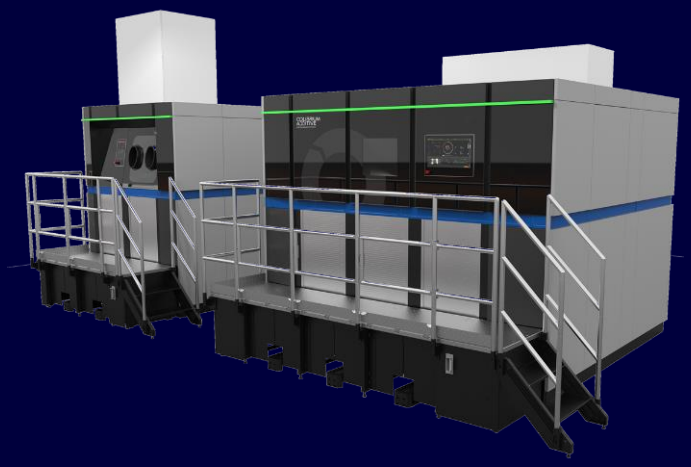
COLIBRIUM ADDITIVE
a GE Aerospace company

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

L-PBF Aluminum A205

Parameters for Colibrium Additive's M Line use of A20X™* Alloy



Aluminum A205

A20X™ is the registered trademark for aluminum alloy A205. Due to a unique solidification mechanism, this material exhibits a highly refined microstructure leading to exceptional high strength, exceeding e.g. the yield strength of AlSi10Mg by more than 150 MPa (+60%) in the T7 state. Additionally, A205 demonstrates excellent thermal stability, stress corrosion resistance, and comparatively superior fatigue properties to other AlSi-based additively manufactured alloys. These superior properties make this material an excellent choice for additively manufactured applications.

M Line Aluminum A205

Colibrium Additive developed a novel A205 parameter for use with the MLine. The balanced parameter is a 40 µm parameter that produces surface roughness less than 10 µm without bead blasting or shot peening, while delivering good productivity. In the heat-treated condition superior elongation compared to castings of the same alloy (AMS4471) can be achieved. The balanced parameter can be used with either a rubber or steel recoater blade, depending on application needs.

*A20X™ is a registered trademark of ECKART GmbH. Colibrium Additive is not affiliated with ECKART GmbH.

M Line Aluminum A205

Machine Configuration

M Line

Quad-laser architecture

Nitrogen gas

Powder Chemistry

A20X™ powder chemical composition according to AMS 7033 as provided by ECKART GmbH.

Particle size: 10-53 µm

Thermal States

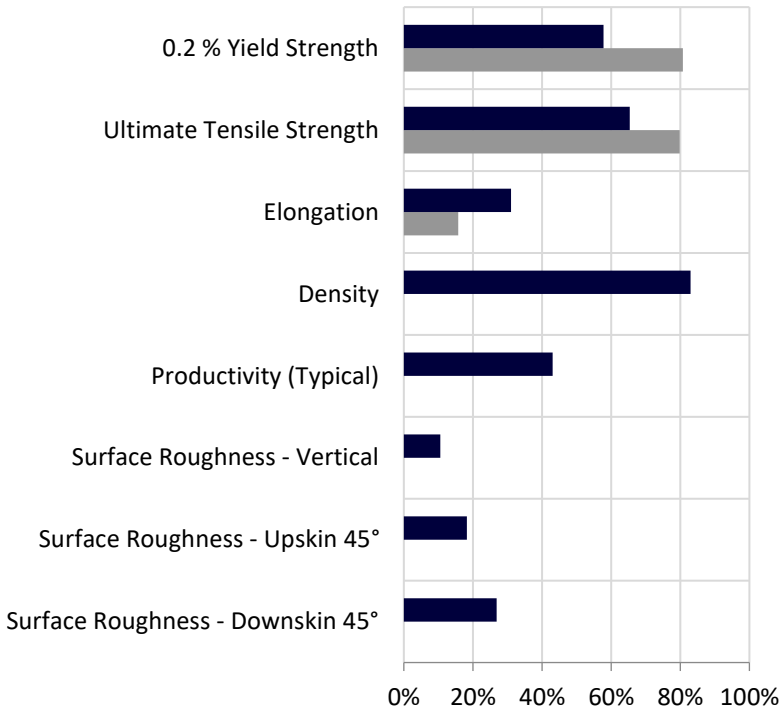
As-Built (AB)

T7 Solution Annealed + Age (T7 SOLN + AGE)

Please contact Colibrium Additive for more details regarding the heat treatment.

Parameter Availability and Thermal State Comparison

- Balanced Parameter 315 AB
  400 W, 40 µm layer thickness, steel recoater
- Balanced Parameter 315 T7 SOLN+AGE
  400 W, 40 µm layer thickness, steel recoater



Bar plot is generated by normalizing typical material data (containing both horizontal and vertical data) against a range defined for each material family. For high strength aluminum-based alloys, the ranges are as follows: 0.2%YS: 0-500 MPa UTS: 0-600 MPa, Elongation: 0-50%, Density: 99-100%, Productivity: 5-60 cm^3/h, Surface Quality (all): 5-40 µm. 0% in the bar plot indicates the lower range value, 100% indicates the upper range value

Balanced Parameter 315 - 400 W / 40 µm

Typical Build Rate

	(cm^3/h)
Typical build rate with coating[1]	28.7
Theoretical melting rate bulk per laser[2]	21.9

[1] Using standard Factory Acceptance Test layout and 4 lasers
[2] Calculated (layer thickness × scan velocity × hatch distance)

Tensile Performance at Room Temperature

Thermal State	Sample Size	YM (GPa)	0.2% YS (MPa)	UTS (MPa)	Elongation (%)	Area Reduction (%)
As-Built H	12	74	310	390	15.5	28
As-Built H - ST	12	74	310	390	15.5	28
As-Built V	64	74	265	390	15.0	23
T7 SOLN+AGE H	4	75	405	480	8.5	---
T7 SOLN+AGE V	8	73	400	470	7.0	---

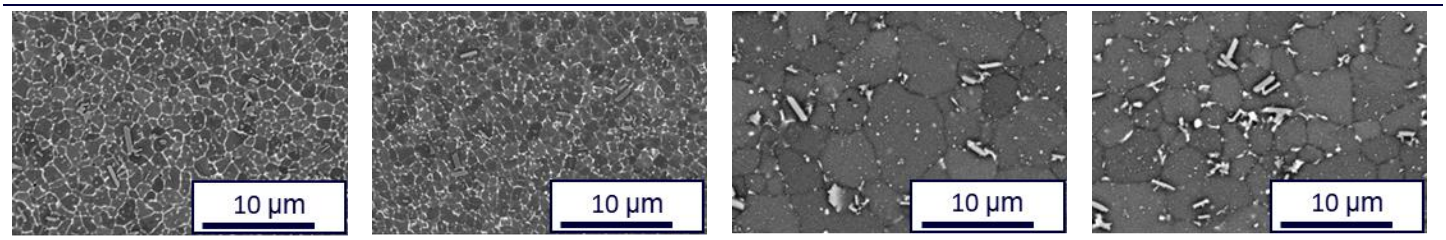
	Overhang Surface Roughness, Ra (µm)		
	45°	60°	75°
Upskin	12	9	7
Downskin	15	12	7

Surface Roughness, Ra (µm)	
H	---
V	9

Thermal State	Relative Density (%)		Hardness (HV5)
	H	H	H
As-Built	99.8	99.8	108
T7 SOLN + AGE	99.6	99.6	---

Microstructure

As-Built		T7 SOLN + AGE	
H	V	H	V



Scanning electron microscope images in As-Built and T7 Solution Annealed and Age condition as defined previously.

Data Sheet Nomenclature and Notation

H: Horizontal, perpendicular to build direction
V: Vertical, parallel to build direction
Other angles are measured from horizontal.

ST: Stitched, parts built by multiple optical systems

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.

Tensile evaluations were performed according to ASTM E8 or E21, depending on test temperature.

All figures and data contained herein are approximate and/or typical only and are dependent on several factors including but not limited to process and machine parameters. The information provided on this material data sheet is illustrative only and cannot be considered binding.