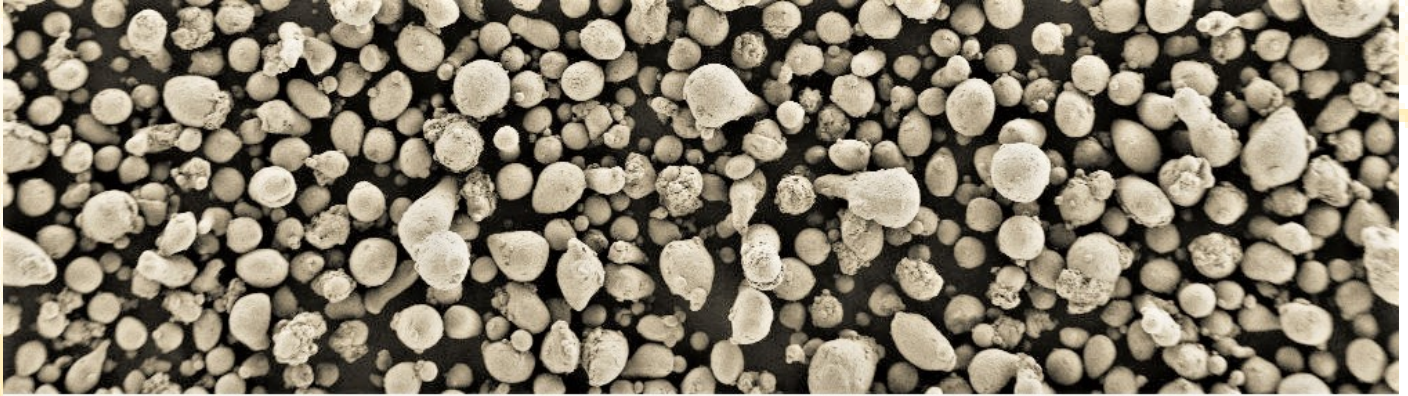


Materials Data Sheet

A 2 0 5 G A S A T O M I S E D P O W D E R



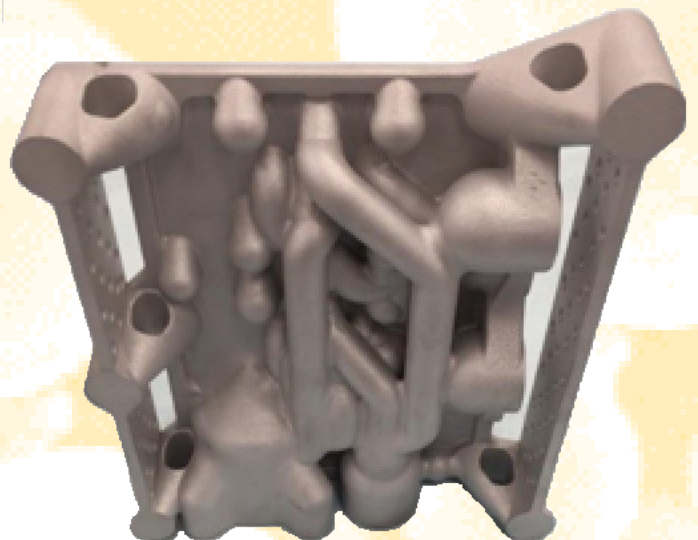
A205 is a lightweight aluminium powder derived from the aerospace approved (MMPDS) A20X[™] alloy, developed and patented by AMT Ltd. With a unique mode of solidification that is an important feature of this patented Al-Cu-TiB₂ alloy, A205 is ideal for Additive Manufacturing (AM). The high cooling rates achieved during Additive Manufacture, produces a high density, crack-free and non-dendritic microstructure. This makes A205 one of the leading high strength aluminium alloys for Laser Powder Bed Fusion (LPBF) with exceptional high temperature and fatigue properties.

The powder is compatible all the leading metal LPBF equipment suppliers, and is suitable for trials with blown powder deposition equipment. A205 has already received approvals for use in the aerospace sector, and has been used in other sectors including the space, defence, and high-end automotive industries.

Particle Size Distribution

A205 powder is supplied, as standard, with a D₁₀ of 20 micron and a D₉₀ of 63 micron. The particle size distribution has been developed specifically to meet the requirements of all powder bed fusion machines.

- **High strength**
- **High temperature performance**
- **Gas atomized**
- **20-63µm**



NATEP Project — HighSAP, demonstration part.

Composition

The composition conforms to alloy specification AMS 4471, with the weight percentages shown in the table below, as determined by wet chemical methods in accordance with ASTM E 34, and by spectrochemical methods in accordance with ASTM E 1251.

Al	Cu	Mg	Ag	Ti	B	Si	Fe	Others, each	Others max.
Bal.	4.2 - 5.0	0.20 - 0.33	0.6 - 0.9	3.00 - 3.85	1.25 - 1.55	0.1 max.	0.08 max.	0.08 max.	0.17 max.

Properties

Density

Bulk density of the alloy : 2.85 g/cm³

Density achieved in Laser Powder Bed Fusion >99.7% without addition HIP operation.

Tensile Properties (room temperature)

	As built	Stress Relieved ¹	Heat Treated ²
Tensile Strength (MPa)	357 – 394	312	450 – 511
Yield Stress (MPa)	350 – 385	310	390 – 440
Elongation (%)	12 -15	20	10 – 13
Young's Modulus (GPa)	74	77	79

All mechanical testing at room temperature to ASTM B57. Hardness minimum of 140HV. Test bars machined prior to testing. NONE OF THE TEST BARS HAVE BEEN HIP TREATED.

- (1) Stress Relieved on the build plate at 300°C for 2 hours, air cooled.
- (2) AMT Proprietary Heat Treatment, involving solution treatment, quench and then precipitation hardening, to T7 condition

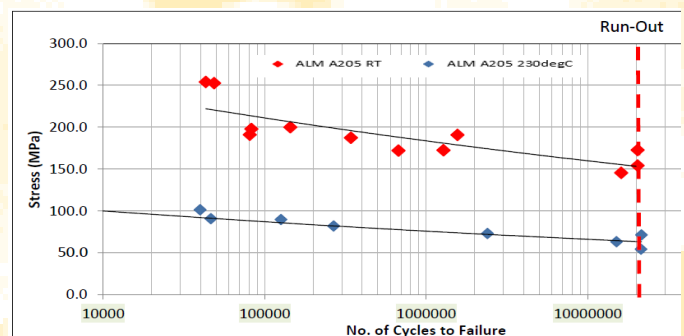
Elevated temperature tensile Properties

Unlike other commonly used aluminium alloys A205 does not experience significant loss in mechanical properties at operating temperature above 125°C, and has double the strength of an Al-Sc alloy at 200°C.

Temp.	Tensile Strength	Yield Stress	Elongation
20°C	511MPa	445MPa	11%
100°C	423MPa	375MPa	10%
150°C	369MPa	354MPa	20%
200°C	331MPa	311MPa	15%
250°C	224MPa	215MPa	12%

Fatigue

The fatigue properties of test bars manufactured from A205 powder show properties similar to the cast A20X alloy and superior to A357 (AlSi7Mg) castings.



Courtesy of Rolls Royce (NATEP, HighSAP programme)

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