



Powder Material

Aluminum alloy AlSi10Mg is widely applied in the automotive and aerospace sector, due to its comparably high mechanical strength at very low specific density. Compared to conventional AlSi10Mg alloys, AlSi10Mg-Performance provides significantly higher strengths at the same elongations at break. Also, Aluminum does not show any corrosion. A further characteristic of this material is a very high heat- and electrical conductivity, rendering this material class a perfect candidate for cooling applications or within the electrical industry.

Physical Properties

|                      |                                         |
|----------------------|-----------------------------------------|
| Particle Size        | 40 µm – 68 µm                           |
| Density              | 2.69 g/cm³                              |
| Thermal conductivity | 221 W/mK                                |
| Melting range        | 570 °C – 590 °C                         |
| Thermal expansion    | 23.8 x 10 <sup>-6</sup> K <sup>-1</sup> |

Chemical Composition

|    |               |    |          |
|----|---------------|----|----------|
| Al | Balance       | Zn | < 0.10 % |
| Si | 9 - 11 %      | Cu | < 0.05 % |
| Mg | 0.20 – 0.45 % | Cr | < 0.05 % |
| Fe | < 0.20 %      | Ga | < 0.05 % |
| Ti | < 0.10 %      | V  | < 0.05 % |
| Mn | < 0.10 %      |    |          |

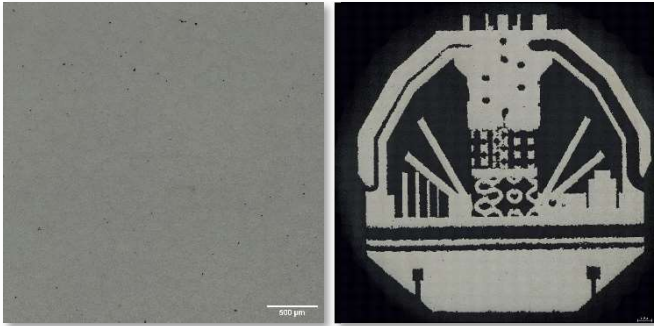


LPBF Process

|                            |          |
|----------------------------|----------|
| Layer Thickness            | 60 µm    |
| Laser Power Classification | 400 W    |
| Preheating Temperature     | 80 °C    |
| Theoretical Build-up Rate  | 44 cm³/h |

Denstiy

Relative Density > 99.5 %



Dimensional Accuracy

|           | As Built         | Sand Blasted    |
|-----------|------------------|-----------------|
| Tolerance | ± 280 µm or 1 %* | < 80 µm or 1 %* |

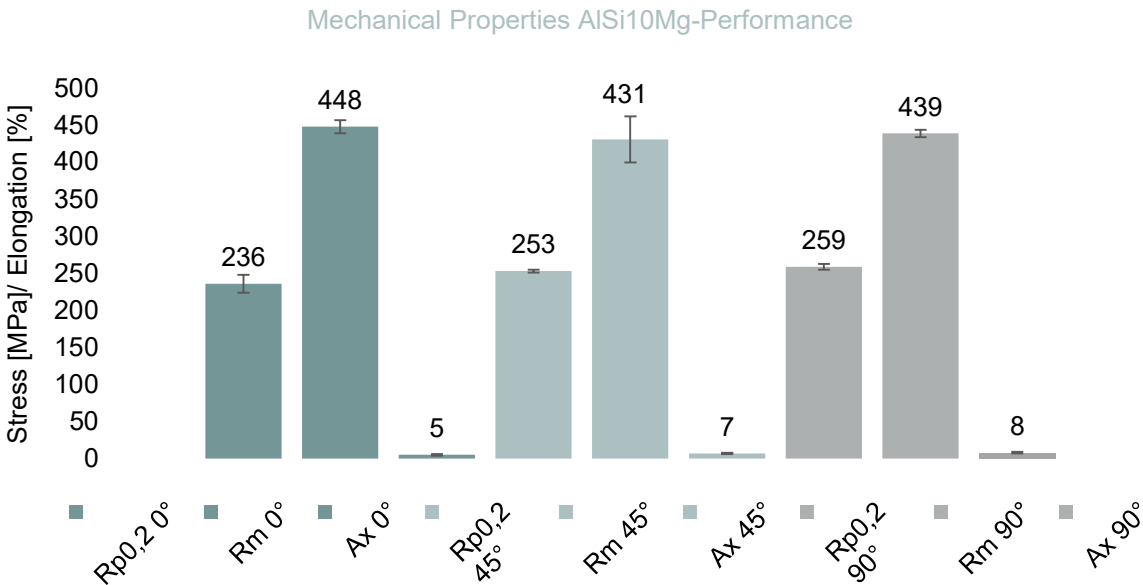
Minimum Wall Thickness (Vector) 220 µm

\* Whichever is greater. Evaluated on test artifact sample (see <https://aconity3d.com/job-shop>) and dependent on geometrical feature and size.



Mechanical Properties – As built According to DIN EN ISO 6892-1

| Orientation      | Young's Modulus [GPa] | Yield Strength $R_{p0,2}$ [MPa] | Tensile Strength $R_m$ [MPa] | Elongation at Break $A_x$ [%] |
|------------------|-----------------------|---------------------------------|------------------------------|-------------------------------|
| 0° (vertical)    | 90 ± 29               | 236 ± 12                        | 448 ± 9                      | 5 ± 1                         |
| 45°              | 81 ± 8                | 253 ± 2                         | 431 ± 31                     | 7 ± 1                         |
| 90° (horizontal) | 79 ± 7                | 259 ± 4                         | 439 ± 5                      | 9 ± 1                         |



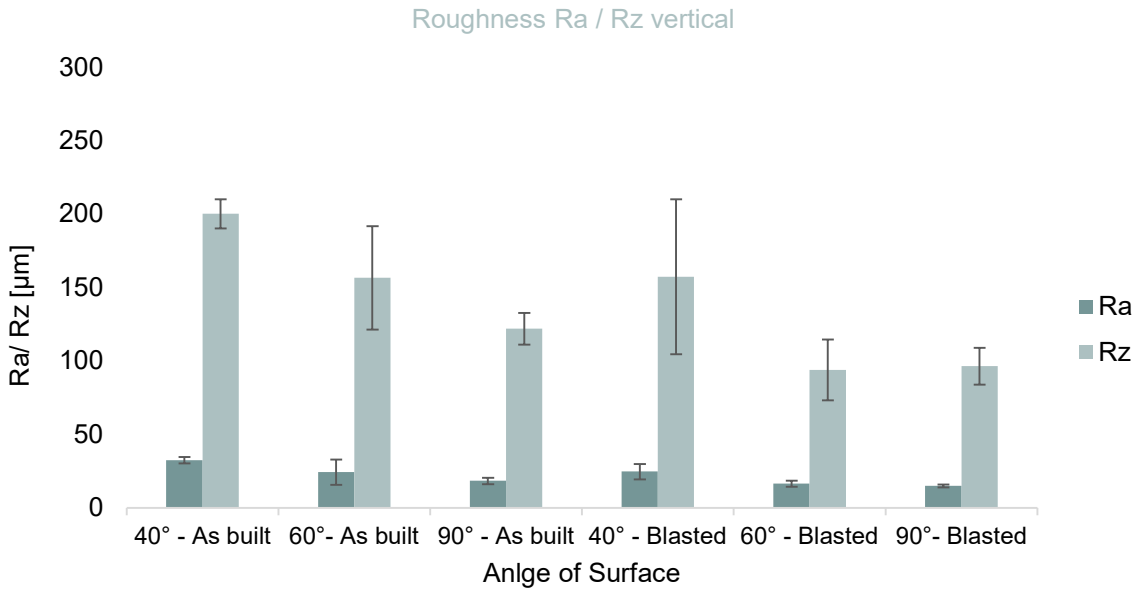
Mechanical Properties – Heat Treated<sup>1</sup>

| Orientation   | Yield Strength $R_{p0,2}$ [MPa] | Tensile Strength $R_m$ [MPa] | Elongation at Break $A_x$ [%] |
|---------------|---------------------------------|------------------------------|-------------------------------|
| 0° (vertical) | 207 <sup>2</sup>                | 345 <sup>2</sup>             | 4 <sup>2</sup>                |



Surface Roughness

| Condition                        | As Built |          |          | Sand Blasted |          |          |
|----------------------------------|----------|----------|----------|--------------|----------|----------|
| Orientation relative to platform | 40°      | 60°      | 90°      | 40°          | 60°      | 90°      |
| Ra vertical [µm]                 | 32 ± 2   | 24 ± 9   | 18 ± 2   | 25 ± 5       | 16 ± 2   | 15 ± 1   |
| Ra horizontal [µm]               | 29 ± 5   | 20 ± 4   | 18 ± 2   | 19 ± 7       | 13 ± 3   | 10 ± 3   |
| Rz vertical [µm]                 | 200 ± 10 | 157 ± 35 | 122 ± 11 | 157 ± 53     | 94 ± 21  | 96 ± 13  |
| Rz horizontal [µm]               | 197 ± 72 | 116 ± 32 | 118 ± 33 | 122 ± 39     | 74 ± 19  | 56 ± 14  |
| Sa [µm]                          | 22 ± 5   | 12 ± 2   | 10 ± 1   | 11 ± 1       | 6 ± 1    | 6 ± 1    |
| Sz [µm]                          | 259 ± 39 | 217 ± 34 | 182 ± 44 | 181 ± 28     | 108 ± 27 | 101 ± 34 |



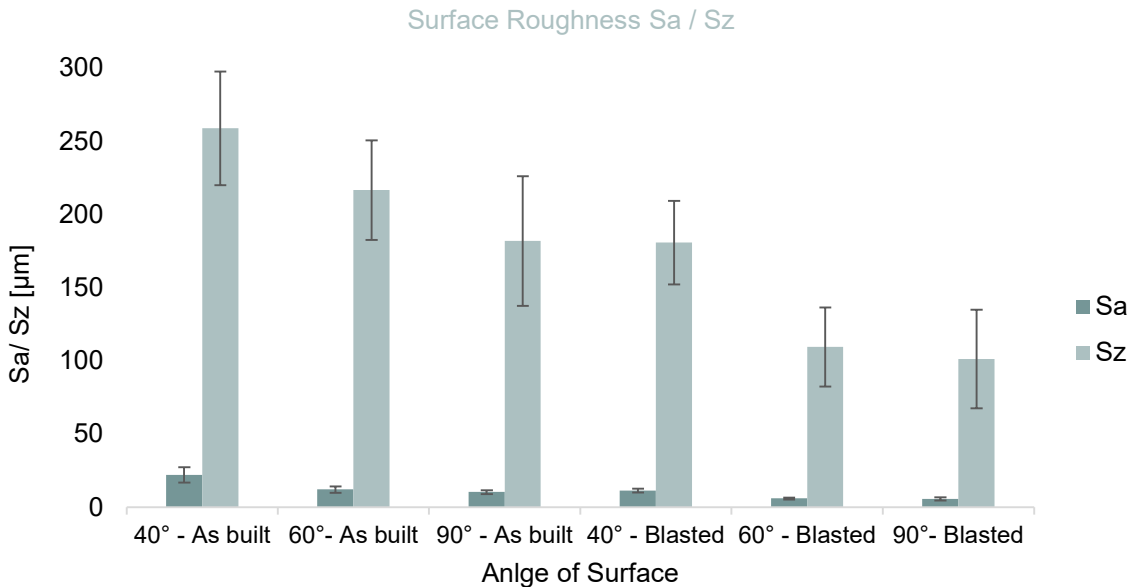
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All values are related to the standard process of Aconity3D and are subject to natural volatilities depending on applied powder material, process parameters and surrounding conditions. Changes in laser spot size and other process conditions might have an influence on the values.

<sup>1</sup> Classification SR2, according to ASTM F3318 – 18  
<sup>2</sup> Minimum specifications according to ASTM F3318 – 18