

Powder Material

Nickel Superalloy 718 has a very good yield strength, tensile strength, and creep rupture behavior. It offers exceptional structural strength up to 700°C operating temperature and an excellent oxidation resistance up to 1000°C. For this reason, Ni-SA 718 is the one of the most widely used materials used in turbines. Ni-SA 718 is ideal for high temperature applications in the aerospace and automotive industries below 700°C. In addition, Ni-SA 718 is a precipitation hardenable alloy, and by applying a heat treatment, the material properties can be tailored to your specific application.

Physical Properties

Particle Size	15 µm – 45 µm
Density	8.2 g/cm³
Thermal conductivity	11.2-11.7 W/mK
Melting range	1260 °C – 1335 °C
Thermal expansion	13.0 x 10 ⁻⁶ K ⁻¹

Chemical Composition

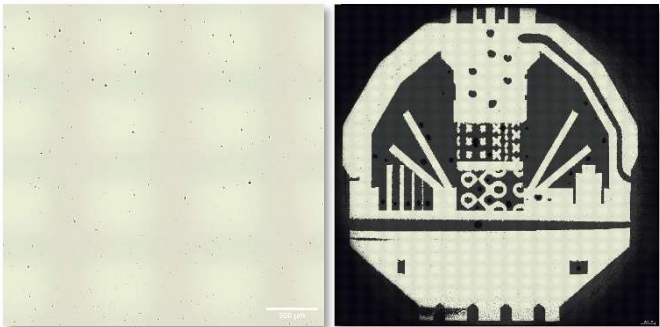
Fe	Balance	Mo	3.1 %
Ni	53 %	Ti	1 %
Cr	19 %	Al	0.5 %
Nb	5.20 %	C	0.04 %

LPBF Process

Layer Thickness	30 µm
Laser Power Classification	200 W
Theoretical Build-up Rate	6.9 cm³/h

Density

Relative Density > 99.5 %



Dimensional Accuracy

	As Built	Sand Blasted
Tolerance	± 180 µm or % 1 %*	± 110 µm or 1 %*

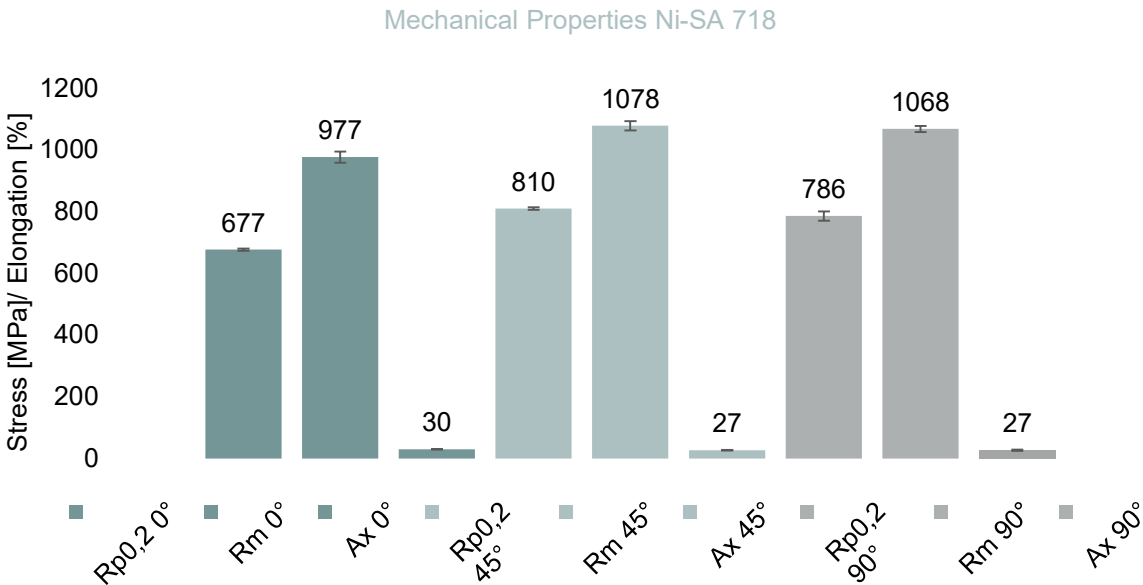
Minimum Wall Thickness (Vector) 120 µm

* 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)	164 ± 8	677 ± 4	977 ± 18	30 ± 1
45°	221 ± 24	810 ± 4	1078 ± 15	27 ± 1
90° (horizontal)	181 ± 14	786 ± 15	1068 ± 10	27 ± 2

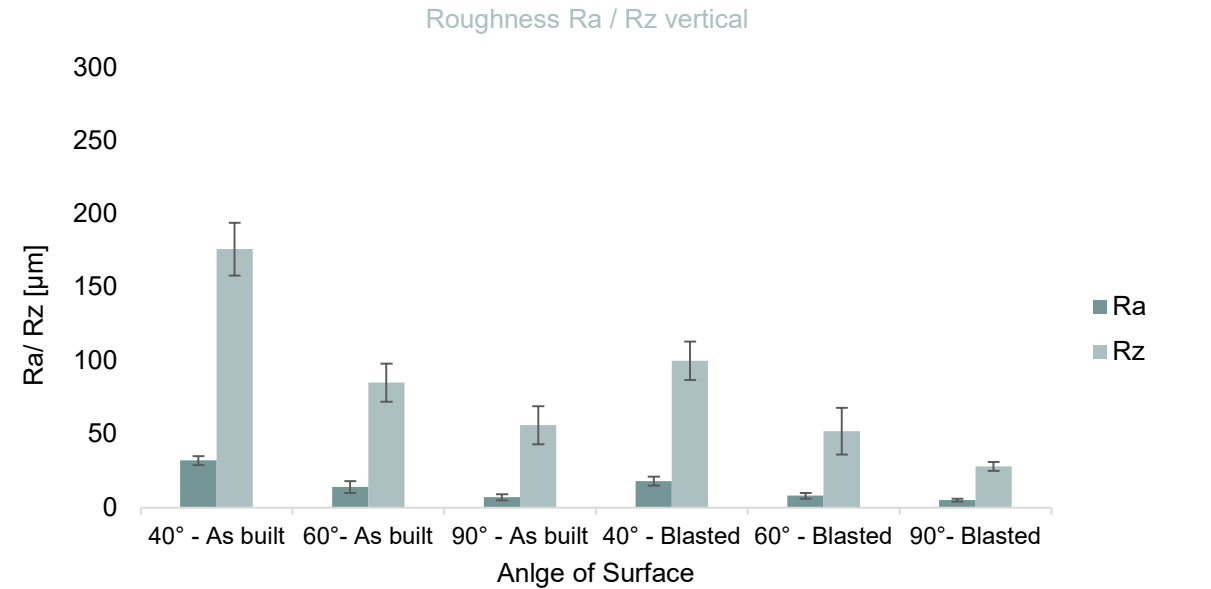


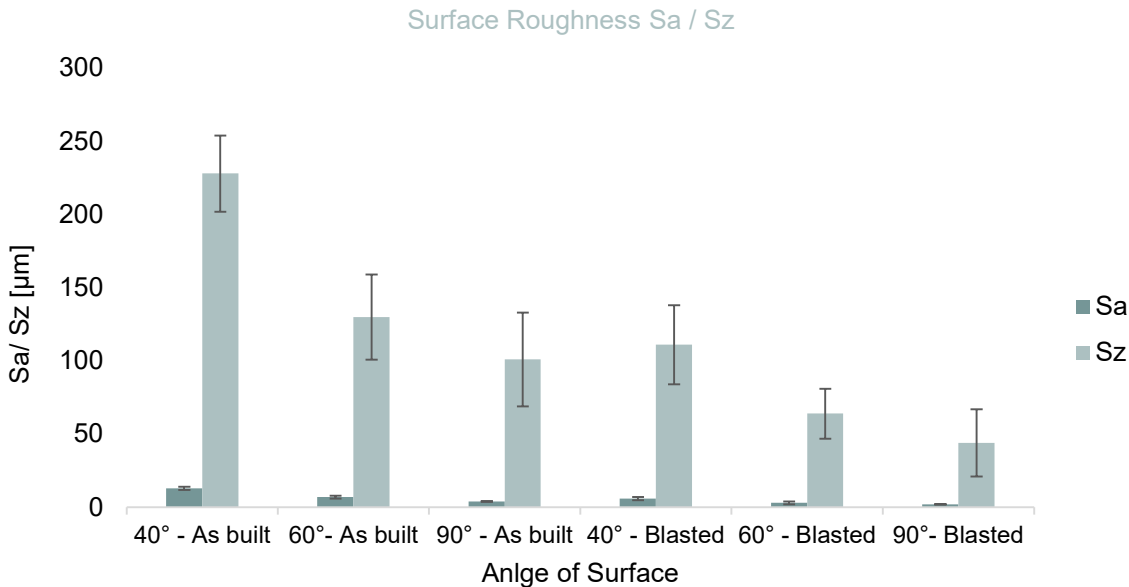
Mechanical Properties – Heat Treated¹

Orientation	Yield Strength $R_{p0,2}$ [MPa]	Tensile Strength R_m [MPa]	Elongation at Break A_x [%]
0° (vertical)	600	920	27

Surface Roughness

Condition	As Built			Sand Blasted		
Orientation relative to platform	40°	60°	90°	40°	60°	90°
Ra vertical [µm]	32 ± 3	14 ± 4	7 ± 2	18 ± 3	8 ± 2	5 ± 1
Ra horizontal [µm]	35 ± 9	12 ± 4	8 ± 4	19 ± 6	8 ± 2	4 ± 1
Rz vertical [µm]	176 ± 18	85 ± 13	56 ± 13	100 ± 13	52 ± 16	28 ± 3
Rz horizontal [µm]	177 ± 35	90 ± 36	76 ± 55	102 ± 24	49 ± 12	28 ± 5
Sa [µm]	13 ± 1	7 ± 1	4 ± 1	6 ± 1	3 ± 1	2 ± 1
Sz [µm]	228 ± 26	130 ± 29	101 ± 32	111 ± 27	64 ± 17	44 ± 23





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.

¹ Classification A, according to ASTM F3055 – 14A

² Minimum specifications according to ASTM F3055 – 14A

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