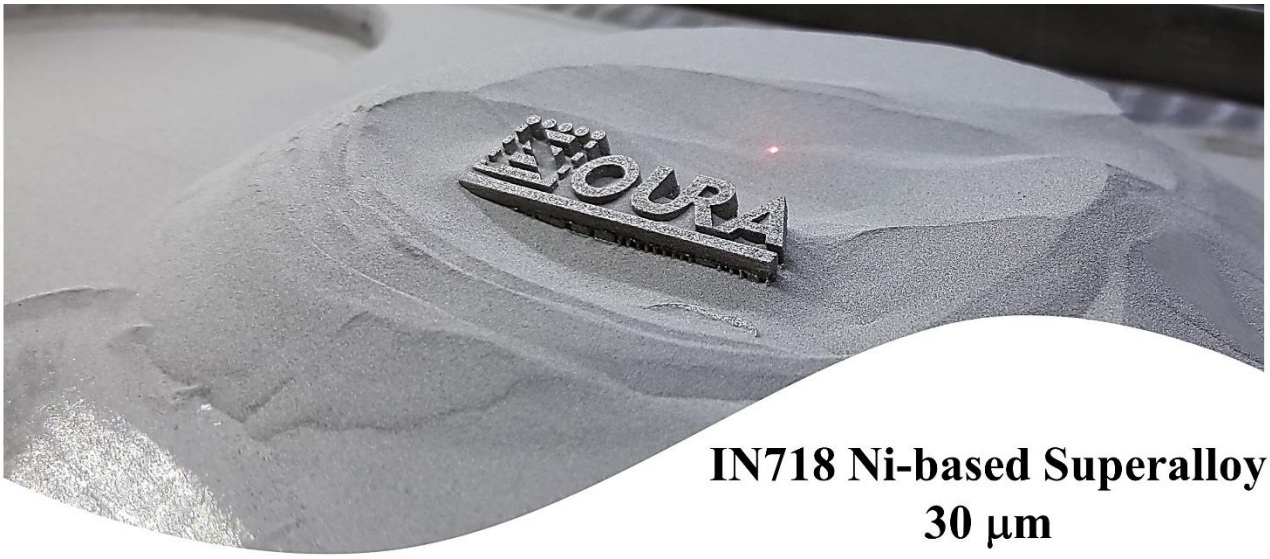

- **Inconel 718 Overview**

  Inconel 718 is one of the widely-used Ni-based superalloys that has been manufactured via selective laser melting (SLM) method. Excellent mechanical properties and corrosion resistance up to 650℃ are the main unique characteristics of this material. So, it can be appropriate for a wide range of applications in the aerospace and power plant industries.

V. 05- September 2022
Noura Materials R&D Dept.

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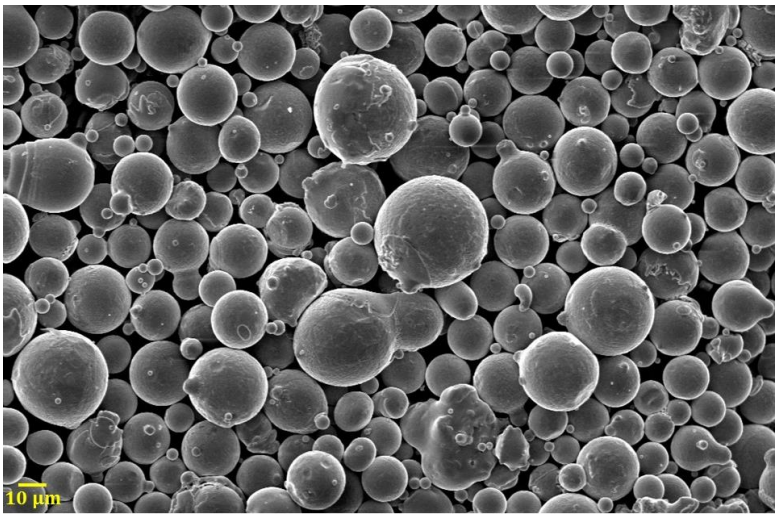
- **Powder Characteristics**

Chemical composition [1]

Element	Min.	Max.
C	-	0.08
Mn	-	0.35
Si	-	0.35
P	-	0.015
S	-	0.015
N	-	0.05
Cr	17	21
Co	-	1
Mo	2.80	3.30
Nb	4.75	5.30
Ti	0.65	1.15
Al	0.20	0.8
Fe	Bal.	
Cu	-	0.3
Ni	50.00	55.00
B	-	0.006

[1] Chemical composition corresponds to ASTM F3055-14a



Morphology of IN718 powder

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- ## Processing conditions

Parts that are reported in this document are built under the following conditions:

Parameters	
Powder type	Inconel 718
SLM machine	NOURA M100P
Coater blade type	Soft
Chamber inert gas	Ar
Sieving module	53 µm
Machine software	Noura SLM software
Parameter set	IN718-HQ
Layer thickness	30 µm
Volume building rate [2]	8-12 cm^3/h

[2] Laser scanning time is considered to determine the volume building rate. Other factors, such as coating time, have an impact on total build time effectively.

- ## Relative density

Relative density was measured > 99% via image analysis method. Using thicker layer thicknesses may have an impact on sample's density. It is noted that relative density of the samples is directly related to SLM system, software version, machine installation and preparation, powder and build project, and parameter settings.

- ## Roughness of the parts

As-built	Ra < 12 µm
After shot peening	Ra < 6 µm

[3] Roughness of the parts is directly related to the orientation of the surface with respect to the building platform.

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- **Mechanical properties [4]**

➢ **Room-temperature tensile properties (As-built)**

State	UTS (MPa)	El (%)
As-built Horizontal	**1024±30**	**27±5**
As- built Vertical	**970±50**	**28±4**

➢ **Room-temperature tensile properties (Heat- treated [5])**

State	UTS (MPa)	El (%)
Heat-treated Horizontal	**1370±50**	**13±4**
Heat-treated Vertical	**1320±50**	**15±4**

[4] Samples have been fabricated and then mechanically machined according to **ASTM E8**, Specimen 4.

[5] Heat treatment procedure per AMS5664: Solution annealing 1060 °C/ 1 h/ AC. Double step aging treatment: 760 °C/ 10 h followed by furnace cooling with 55 °C/h down to 650 °C/ 8h/ AC.

➢ **Hardness**

Hardness	HV.
As-built	**320±23**
Heat-treated	**480±30**

Followed data are gained based on particular defined test procedures and supported by Noura if all of the experiments are done in the same circumstances used by NOURA including SLM system, software version, machine installation and preparation, powder and build project, parameter settings, and sample preparation. Any deviation from the above-mentioned settings can influence the reported values. It is noted that following data are reported based on our knowledge and experience at the time of publication. Accordingly, the data may be subjected to change as a result of progressive process improvement. NOURA does not warrant any properties or fitness of the parts for a specific purpose, unless explicitly agreed upon. This also applies regarding any rights of protection as well as laws and regulations.

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