

Aluminium and its alloys

The metal materials with perfect balance properties.

General

Aluminium and its alloys are essential metal materials for many traditional fields, and also show high potentials for various AM applications/methods. They present perfect balance properties and behaviors for many applications, and have numerous variants due to the combination of low specific-weight, fine micro-structures, high conductivity, good corrosion resistance, excellent compatibility with other metal or non-metal materials.

Aluminium and its alloys have excellent physical and mechanical properties except that they are not subjected to high temperature environments (i.e. over 100 °C). They are much more lightweight than titanium, nickel and steel alloys, and easier to be manufactured with various processes.

Aluminium and its alloys are also the cost advantageous materials compared with traditional alloys as titanium and nickel.

Over the years, lots of efforts have been made to develop different tailored Al alloys for various applications which needed either high strength, high conductivity, good corrosion resistance or balance properties.

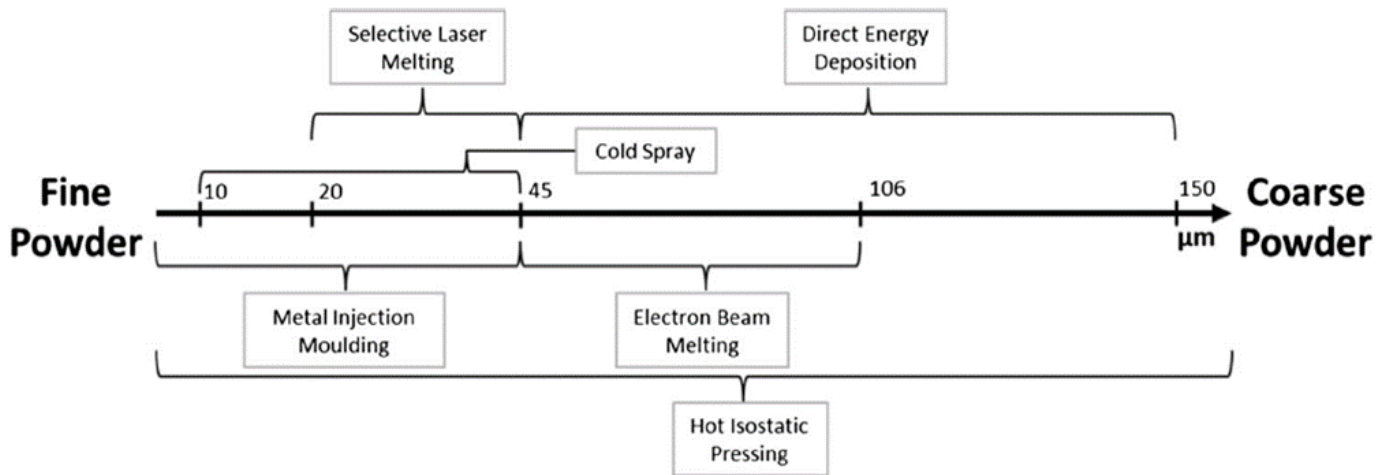
So the applications for Aluminium and its alloys have the following features:

- Light-weight
- Low temperature
- Good physical and mechanical properties
- Good corrosion resistance
- Low cost
- High conductivity
- Good balance properties

Different components manufacturing processes, like Additive manufacturing (SLM, SEBM, DED, etc.), Metal Injection Molding (MIM), Hot Isostatic Pressing (HIP) Powder Metallurgy (PM), require the metal powders with the specific characterizations of Particle Size Distribution (PSD), Morphology, Flowability, Purity, Density, etc. The high-quality powders are essential to gain the high-quality components.

PSD is a very important characterization for additive manufacturing and has the significant impact on following several factors:

- Price, of the powder due to the production outputs
- Flowability, linked to process control and reliability during part manufacturing
- Reactivity and purity (especially oxygen content), due to the surface area
- Process parameters, strong impact on energy density and layer-build rate
- Part design, like layer thickness, surface finish and feature resolution

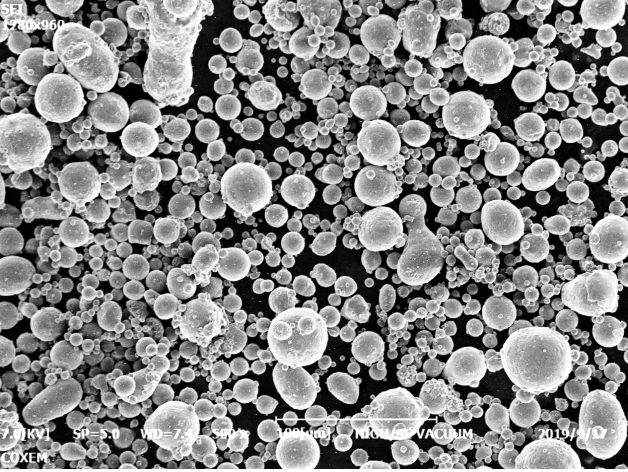
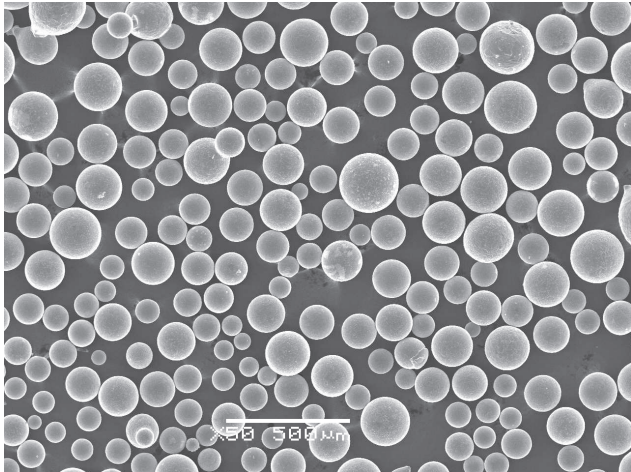


Technical Data

Chemical Composition (Only part of Al-alloys are listed), wt%													
Designation	Al	Si	Fe	Cu	Mn	Mg	Zn	Ti	Ga	V	Other		Standard
											Each	Total	
1050	≥99.50	≤0.25	≤0.40	≤0.05	≤0.05	≤0.05	≤0.05	≤0.03	-	≤0.05	≤0.03	-	ISO 209 or GB/T 3190
1060	≥99.60	≤0.25	≤0.35	≤0.05	≤0.03	≤0.03	≤0.05	≤0.03	-	≤0.05	≤0.03	-	
1070	≥99.70	≤0.20	≤0.25	≤0.04	≤0.03	≤0.03	≤0.04	≤0.03	-	≤0.05	≤0.03	-	
1080	≥99.80	≤0.15	≤0.15	≤0.03	≤0.02	≤0.02	≤0.03	≤0.03	≤0.03	≤0.05	≤0.02	-	
1090	≥99.90	≤0.07	≤0.07	≤0.02	≤0.01	≤0.03	≤0.01	≤0.03	≤0.03	≤0.05	≤0.01	-	
2008	Bal.	0.5-0.8	≤0.40	0.7-1.1	≤0.30	0.25-0.50	≤0.25	≤0.10	-	≤0.05	≤0.05	≤0.15	
2014	Bal.	0.50-1.2	≤0.7	3.9-5.0	0.40-1.2	0.20-0.8	≤0.25	≤0.15	-	-	≤0.05	≤0.15	
3002	Bal.	≤0.08	≤0.10	≤0.15	0.05-0.25	0.05-0.20	≤0.05	≤0.03	-	≤0.05	≤0.03	≤0.10	
3102	Bal.	≤0.40	≤0.7	≤0.10	0.05-0.40	-	≤0.30	≤0.10	-	-	≤0.05	≤0.15	
3003	Bal.	≤0.6	≤0.7	0.05-0.20	1.0-1.5	-	≤0.10	-	-	-	≤0.05	≤0.15	
3203	Bal.	≤0.6	≤0.7	≤0.05	1.0-1.5	-	≤0.10	-	-	-	≤0.05	≤0.15	
6060	Bal.	0.3-0.6	0.1-0.3	≤0.10	≤0.10	0.35-0.60	≤0.15	≤0.10	-	-	≤0.05	≤0.15	
6061	Bal.	0.4-0.8	≤0.7	0.15-0.40	≤0.15	0.8-1.2	≤0.25	≤0.15	Cr:0.04-0.35	≤0.05	≤0.15		
6063	Bal.	0.2-0.6	≤0.35	≤0.10	≤0.10	0.45-0.90	≤0.10	≤0.10	Cr:≤0.10	≤0.05	≤0.15		
AlSi10Mg	Bal.	9.0-11.0	≤0.55	≤0.35	≤0.50	0.2-0.5	≤0.35	-	-	-	-	-	
AlSi7Mg	Bal.	6.5-7.5	≤0.20	≤0.05	≤0.05	0.3-0.4	≤0.05	≤0.20	-	-	-	-	
AlSi12	Bal.	10.0-13.0	≤0.25	-	≤0.10	-	≤0.20	-	-	-	-	-	
Tailored	Can be customized as requested by customers												

Particle size		
Type 1	0-25 μ m	ASTM B214 or ISO 13320 or ASTM B822
Type 2	0-43 μ m	
Type 3	15-45 μ m	
Type 4	15-63 μ m	
Type 5	53-106 μ m	
Type 6	53-150 μ m	
Type 7	Customized, can be sieved per customer's specification	

Other properties	
Hall flow	These properties links to the manufacturing methods, can be provided after contract signing.
Apparent density	
Tap density	
Morphology	

Typical SEM picture(s)	
 <p>Produced by Gas atomizing</p>	 <p>Produced by PREP</p>