OSPREY® MOULD TOOLING ALLOYS FOR ADDITIVE MANUFACTURING

DATASHEET

GENERAL DESCRIPTION

Osprey® mould tooling alloy powders, include maraging steel, stainless steel and hot work tool steel powders. Manufactured by inert gas atomization, using optimised process parameters and equipment designed for Additive Manufacturing, with the option to melt under vacuum for enhanced melt cleanness and low non-metallic inclusion counts. Alloy powders designed specifically for Additive Manufacturing processes, including Laser & Electron - Beam Powder Bed Fusion, Binder Jet, Direct Energy Deposition and Laser Cladding. Suitable of applications including conformal cooled plastic mould tools and tire mould segments & sipes.

- Maraging steels have low carbon contents, that can be heat treated, to high and ultra-high hardness, without distortion
- Mould tooling stainless steel combines high mechanical strength, hardness and corrosion resistance
- Hot work tool steel suitable for operation at high temperature in die casting applications

CHEMICAL COMPOSITION (wt %)

Osprey® 18NI300 Maraging Steel

C	Mn	P	S	Si	Ni	Cr	Mo	Ti	Co	Others
<0.03	<0.1	<0.01	<0.01	<0.1	18.0	<0.25	5.0	0.7	9.0	0.10 Al, Bal. Fe

Osprey® MAR-60HRC Ultra-High Hardness Maraging Steel

C	Mn	P	S	Si	Ni	Cr	Mo	Ti	Co	Others
<0.03	<0.1	<0.01	<0.01	<0.1	13.0	<0.3	10.0	0.2	15.0	0.10 Al, Bal. Fe

Osprey® 420 Stainless Steel

C	Mn	P	S	Si	Ni	Cr	Mo	Ti	Co	Others
0.3	<1.0	<0.04	<0.03	<1.0	-	13.0	-	-	-	Bal. Fe

Osprey® H13 Hot Work Tool Steel

C	Mn	P	S	Si	Ni	Cr	Mo	Ti	Co	Others
0.35	0.3	<0.01	<0.01	1.0	-	5.0	1.5	-	-	1.0 V, Bal. Fe

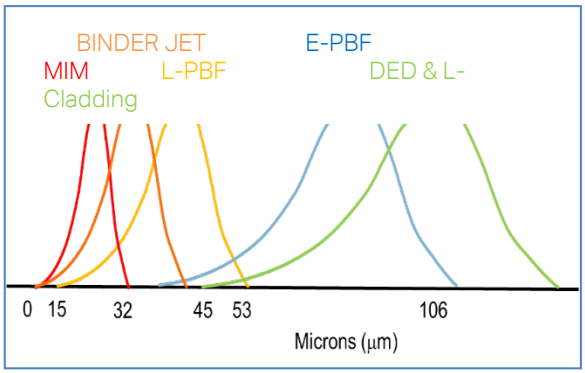
Alloy modifications available by request.

New developments include Cobalt free maraging steels.

POWDER SIZE DISTRIBUTION

Available in a range of customised powder sizes suitable for different AM platforms:

- Metal Injection Moulding
  < 32 µm, < 22 µm, <16 µm, < 10 µm & < 5 µm
- Binder Jet
  <45 µm, <38 µm, <22 µm, <16 µm
- Laser beam - Powder Bed Fusion, (L-PBF)
  e.g. 53 to 15 µm & 45 to 20 µm
- Electron Beam - Powder Bed Fusion, (E-PFB)
  106 to 45 µm
- Direct Energy Deposition (DED) & Laser Cladding
  150 to 53 µm & 90 to 45 µm



Other powder size range distributions are available by request.

MECHANICAL PROPERTIES

Typical mechanical properties of Osprey® Mould Tooling Alloy powder designed for L-PBF in as built & heat treated condition evaluated at room temperature.

Alloy	Condition	Direction	Yield strength	Tensile strength	Elongation	Hardness
			MPa	MPa	%	HRC
18NI300	As built	Horizontal	960	1176	17.6	39
		Vertical	785	1036	16.6	39
	Heat Treated	Horizontal	2013	2094	5.2	54
		Vertical	1961	2052	7.2	54
MAR-60HRC	As built	Horizontal	1279	1423	16.8	42
		Vertical	1301	1405	16.9	42
	Heat Treated & Optimised	Horizontal	2477	2640	1.8	60
		Horizontal	2142	2350	3.7	57
420	As built	Horizontal	1050	1340	4.0	52
	Heat Treated	Horizontal	1280	1750	9.0	51
H13	Stress Relieved	Horizontal	1750	2000	3.6	54