

Harber Design Metal Materials

Our design metal materials provide the information you need to consider when designing a complex mim metal part and explain why powder metal injection is the right process for your application. Before determine metal injection molding (MIM) materials, you need to carefully analyze the design and application of the part, including the dimension tolerance, part design and mold design.

The manufacturer of metal injection molding (MIM) parts and the client must agree with the final performance requirements of finished parts, such as static and dynamic load, wear resistance, machinability and corrosion resistance, etc.

Apart from the austenitic stainless steel, the MIM materials can be subjected to heat treatment to get higher strength, hardness and wear resistance. The MIM ferrous parts that consist 0.3% or more combined carbon can be quench hardened and tempered. The percentage of carbon, alloy elements and remaining pore results in the degree of hardness under the given condition. Hardness can be increased to 55 HRC or higher through quenching.

Powder metallurgy is commonly used in PM and MIM metal injection, and carbon-based iron powder is often chosen as the main raw material for the production of iron-based structural parts by injection molding. For the production of alloys, small amounts of carbon-based nickel powders can be added. The advantage of these powders is that, because of their fine particle size (average are 5 microns), in the sintering process is easy to shrink, very suitable for injection molding. Injection molding parts production, it is best to use the high density of vibration of the powder, so that the metal powder in its mixture with the binder as high as possible, in order to reduce the number of binder to be removed.

Stainless steel powders can also be used to manufacture parts by injection molding. Atomized stainless steel powder with a particle size of less than 20 microns is suitable for injection molding. Injection molding can make high temperature strength alloys, such as Hastelloy alloys composed of 70% NI, 28% MO and 2% FE, which can be produced using a mixture of carbon-based MI powders and reduced MU powders with a particle size of less than 5 microns. Raw blanks made from the blended powders tend to shrink at high sintering temperatures. High sintering temperatures and fine powder sizes favor elemental diffusion to form uniform alloys. For high-density alloys of Cemented Carbide, even press blanks shaped by conventional pressing will approach the theoretical density when sintered.



Harber MIM Material Properties Table

<i>material grade</i>	<i>ingredient</i>	<i>tensile strength (Mpa)</i>	<i>yield strength (Mpa)</i>	<i>elongation (%)</i>	<i>durometer</i>	<i>density (%)</i>	<i>Areas of application</i>	
<i>stainless steels</i>	316L	Fe-17Cr-12Ni-2.5Mo	580	182	65	190HV	98	<i>Corrosion-resistant environments, as well as medical equipment and household goods.</i>
	304L	Fe-18Cr-9Ni	550	160	68	160HV	97	<i>Household goods, auto parts, medical equipment, building materials. Chemical, food industry, agriculture, marine components, etc.</i>
	17-4ph	Fe-16Cr-4Ni-4Cu-0.3Nb	1180	880	11	340HV	96	<i>Martensitic precipitation hardening stainless steel, used in the manufacture of shafts,</i>
	<i>Strengthening 17-4ph</i>	Fe-Cr-Ni	1550	1500	4	55HRC	96	<i>Turbine components, medical equipment, etc.</i>

	420	Fe-13Cr-0.2C	1130	690	6	45HRC	95	Applicable to precision machinery, electrical, equipment, instruments, instrumentation Watches, surgical instruments, household appliances, etc.
	440C	Fe-17Cr-0.9C	1000	750	2	55HRC	96	Suitable for high hardness and gentle environment, such as cutting tools Tablets, surgical instruments, tools, bearings, injectors, etc.
	Panacea	Fe-17Cr-3Mo-11Mn-0.9N	900	600	20	300HV	96	High nitrogen nickel-free and non-magnetic stainless steel, strong corrosion resistance, high ductility, non-magnetic, mainly used in consumer electronics and biotechnology. The field of physical medicine.
titanium	Ti	Ti	550	500	15	250HV	96.5	High specific strength alloys, aerospace, petrochemical, shipbuilding, Automotive, pharmaceutical and other industries
	TC4	Ti-6Al-4V	900	800	8	330HV	97	
Temperature-resistant alloys	HK30	Fe-25Cr-20Ni-1.2Nb	600	210	33	185HV	97	Aviation, aerospace, petroleum, chemical, naval, automotive, etc. High-temperature parts for the industry, such as turbine rotor blades, guide vanes and complete-cast turbines for gas turbines
	713C	Ni-13Cr-6Al-4.5Mo-2.5Nb-0.8Ti-0.15C	1000	750	5	38HRC	98	
the	Stellite 6	Co-29Cr-3Ni-4.5W-3Fe-1.5Mo-1.2C	890	540	1	40HRC	96	High-temperature and corrosion-resistant cobalt-based alloys, widely used in the development of Motor valves, high-temperature and high-pressure valves, turbine blades, etc.
	Cu	Cu	207	69	30		99	Electricity, light industry, machine building, construction industry, defence Industry, etc.

<i>rest</i>	FeNi	Fe-50Ni	420	170	20	50HRB	96	<i>Soft magnetic alloys with high permeability and low coercive force, widely used in Used in radio electronics industry, precision instrumentation, remote control and automatic control system and other fields.</i>
	Kovar	Fe-29Ni-17Co	520	350	42	60HRB	95	<i>Communication, Electronic Packaging</i>
	Fe2Ni	Fe-2Ni	1090	860	10	299HV	97	<i>Low alloy steel, widely used in construction machinery, ships, bridges, high-rise buildings, boilers and pressure vessels, electric power, Automotive and other industries</i>
	M2	Fe-4Cr-5Mo-6W-2V-0.9C	900	420	5	60HRC	97	<i>Molybdenum tool steels with low carbide inhomogeneity and toughness.</i>
								<i>The advantages of a high level of vibration and shock loads, suitable for the Moulds, such as deep-drawing moulds, punching moulds, etc.; and for the manufacture of drilling tools, screw combs, lathes, hobbing knives, etc.</i>
	F75	Co-28Cr-6Mo	750	550	10		95	<i>Non-magnetic cobalt-chromium-molybdenum alloy with high strength, corrosion and wear resistance. Widely used in orthopaedic and dental implants, also used by Apple mobile phones for camera rings strong Chemical parts.</i>

Size tolerance: $\pm 1\%$ mm Product range: **0.2-200g**

URL:<https://www.harbermetal.com>

+86 0769-82389116

+86 13480709275

sales@harber-mim.com