

MIM & CNC

New Breakthrough Process for the High Demand Production
of the Wrought Metals and Precision Components

METAL INJECTION MOLDING



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Han Lien International Corp.

Han Lien International Corp was established in 1978 in Taiwan as first manufacturer of carbine hook and quick link, since then also was a leading exporter for products throughout the field of Chain & Cable, Industries, Marine, Building, Equestrian, Pet , Medical. Afterwards, the company devoted in Metal Injection Molding(MIM) development, a new powder metallurgy process can produce precise metal parts for more wide range of products, including automobiles, cellular phones, hand tools, dental instruments, pneumatic tools, power hand tools, surgical instruments, sporting goods, and laptop computers.

To better manage its long term strategic growth, and help our OEM customers lower their costs for global manufacturing at high product quality levels, Han Lien Shanghai office built in 1999 providing continual sourcing and logistic support, also acted as quality control and assurance office in China.

Not only offer engineering, quality control testing, sub-assembly, logistics and inventory management services that enable our customers to associate material handling costs and facilitate just-in-time delivery, we also have a team of designer in house and manufacturing personnel that can solve problems and provide solutions.

With over 30 years knowledge in products, Han Lien absolutely is your reliable business partner. You are welcome to visit our website <http://www.hanlien.com.tw>, or contact us hanlien@hanlien.com.tw for more information you need.

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Metal Injection Molding (MIM) definition:

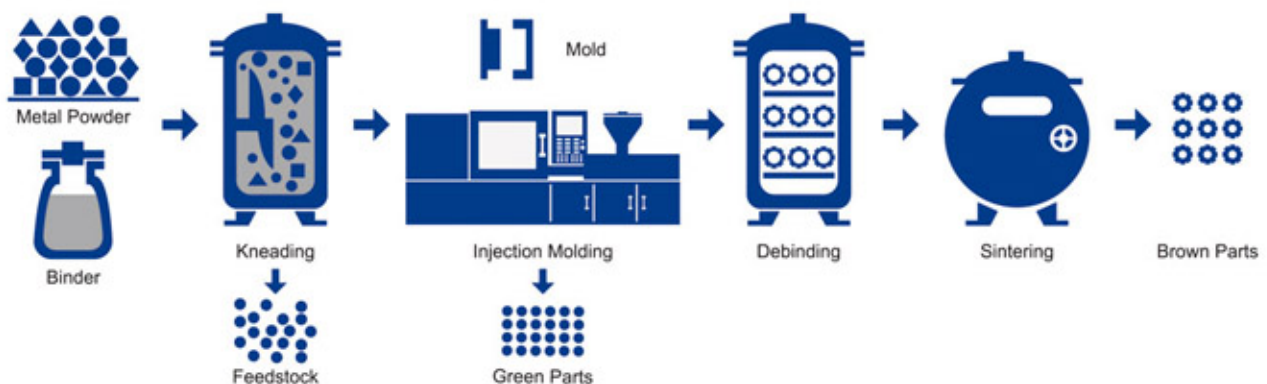
Traditional molding injection widely contains plastics, rubbers, pottery, liquid metal & powder metal etc. The Metal Injection Moulding (MIM) is a new upgraded Powder Metallurgy Process, very similar to plastic injection molding and high-pressure die casting that can create sintered components with high density and complicated configuration features without the need of machining.

Comparison between MIM and other processes:

Characteristics	MIM	Powder Metallurgy	Die Casting	Investment Casting	Machining
Complexity	High	Low	High	Fair	High
Min. Wall Thickness	0.5 mm	1mm	0.8mm	2mm	0.5 mm
Surface Roughness	Fine 1 μ m Ra	Coarse	Medium	Medium 5 μ m Ra	Fine
Mechanical Properties	Good	Fair	Poor	Fair	Good
Varieties of Materials	Many	Average	Few	Average	Many
Density	95~99%	< 95%	99~100%	99~100%	99~100%
Accuracy	Average	High	Average	Average	High
Plating Quality	Good	Poor	Fair	Good	Good
Productivity	High	High	High	Fair	Low
Cost	Average	Low	Low	Average	High

MIM Process Scheme:

The MIM utilize micro metal powder, referred to as metal dust to mix with plastic binder, then the feedstock is extruded, pelletized and loaded into precise multi-slide tooling. In the stage the injection component is referred as "Green" part. Next movement is to debind most of the plastic binder to be "Brown" prototype.



Intricate and complex parts that in the past have been either very difficult or very costly to produce through traditional manufacturing methods can be readily achieved with MIM and at significantly reduced prices and lead-times. Also, detailed features such as serrations, internal and external threads, text and graphical symbols can be moulded into the part, eliminating the need for expensive secondary operations.

MIM enhances product quality, reduces lead times and gives significant cost savings of anything up to 50%.

MIM Material Options:

There are a wide variety of materials available for metal injection molding, and they generally fall into a few categories:

Ferrous alloys - steels, stainless steels, tool steels, iron-nickel magnetic alloys, and specialty ferrous alloys such as Invar and Kovar

MIM process can utilize following kinds of considered materials:

- Low alloy steels
- Stainless steels
- High-speed steels
- Irons
- Cobalt alloys
- Copper alloys
- Nickel alloys
- Tungsten alloys
- Titanium alloys

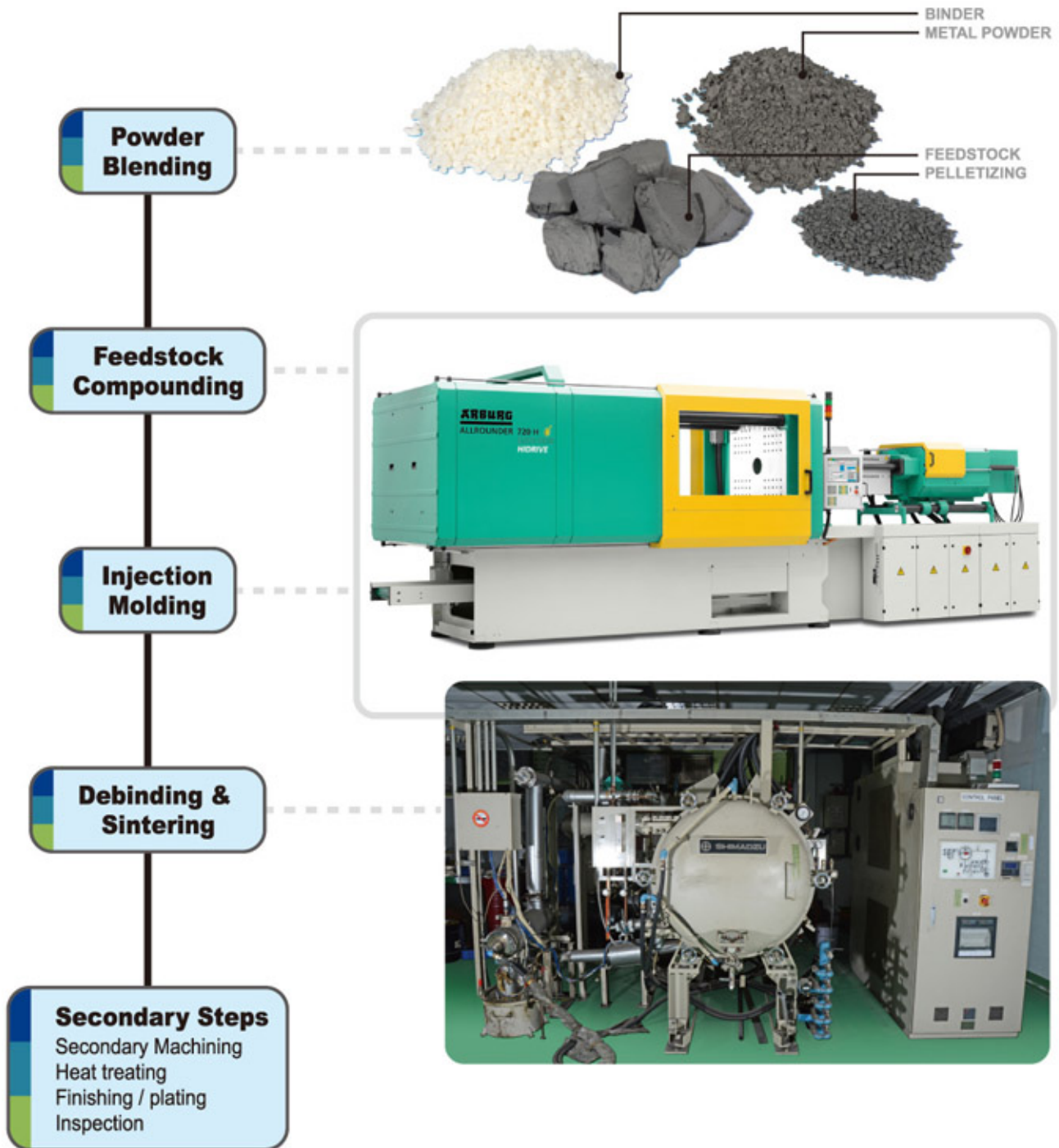
Typical properties:

Metal Types	Density (g/cm ³)	Tensile Strength (MPa)	Elongation (%)	Hardness	Magnetic Response
316L	>7.5	500	40	HRB 50 ~ 60	N/A
17-4PH (As-Sintered)	7.5	900	6	HRC 23 ~ 26	Low
17-4PH (Heat-Treated)	7.5	1190	5	HRC 33 ~ 40	Low
4605 (As-Sintered)	7.5	440	15	HRB 70 ~ 80	Average
4605 (Quenched & Tempered)	7.5	1655	2	HRC 48 ~ 52	Average
4605 Modified	7.5	1800	8	HRC 48 ~ 53	Average
1010	7.6	700	12	HRB 70 ~ 80	Good
SKD-11 (D2) (Heat-Treated)	7.7	800	< 1%	HRC 58 ~ 63	Average
420	7.2	1200	1~2	HRC 46 ~ 50	Average
440C	7.6	800	< 1%	HRC 50 ~ 55	Average
Kovar	>8.1	Thermal Expansion Coefficient (CTE): 5.5x10 ⁻⁶ m/m/K			Average

MIM Applied Fields, Products:

- Automotive Systems - Steering Columns (actuators, ignition lock components), Sun Roofs (stop cams), Seating Mechanisms, Solenoids, Fuel Injectors
- Orthodontics – Brackets, Buccal Tubes
- Medical and Dental Instruments – Endoscopic Surgical Instruments, Scalpel Handle
- Firearm Components – Triggers, Sights, Safeties, Seer Blocks
- Ordnance – Guidance Fins
- Hardware and Lock Parts – Lock Cylinders, Bolts, and Sidebars
- Computers and Electronics – Disk Drive Components
- Electrical – Connectors, Switches

Simply Chart Specification of the MIM Process:

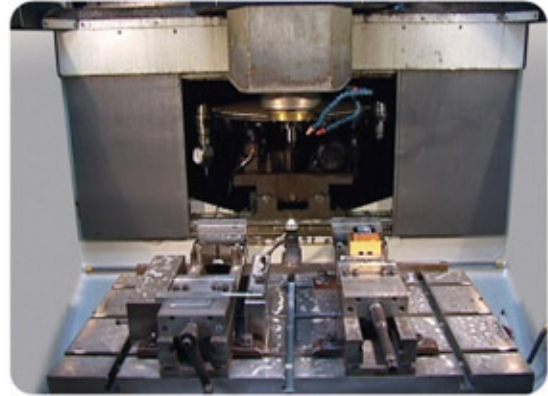


Suggested Tolerance for MIM Parts:

Dimensions in mm	Suggested Tolerance
25.0	+ / - 0.100
12.0	+ / - 0.050
6.0	+ / - 0.040
3.0	+ / - 0.030
1.0	+ / - 0.030



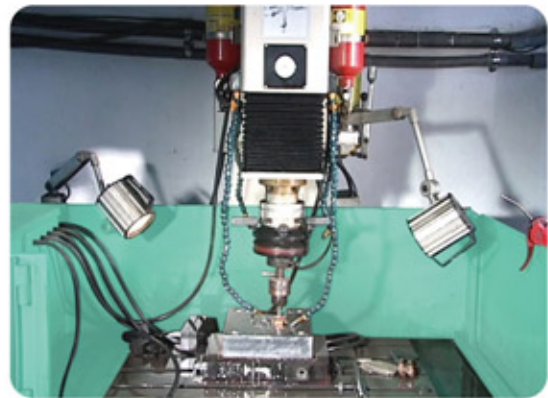
GTV96 Gantry Type Machining Center



GTV96 CNC



GTV96 CNC



CNC S550C Electrical Discharge Machine



Multi-Function 3D CMM (Measuring Digitize)



Load Tester Machine



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