



**Materials for MIM**

Typical properties

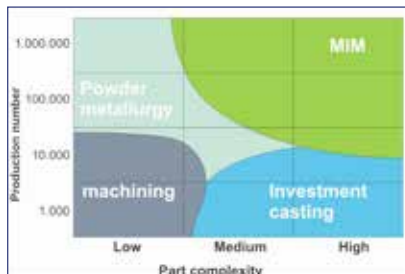
| DISCRIPTION                                     | Equivalent Standards                 | Min. Density (g/cm3) | Min. Yield Strength, Rp0,2 (Mpa) | Min. Ultimate Tensile Strength (Mpa) | Min. Elongation (%) | Hardness     |
|---|--------------------------------------|----------------------|----------------------------------|--------------------------------------|---------------------|--------------|
| <b>Heat treatable steels</b>                    |                                      |                      |                                  |                                      |                     |              |
| FN02 (N2 sintered)                              | MIM-4600                             | 7,5                  | 250                              | 500                                  | 3                   | 100-180 HV10 |
| FN02 (hardened)                                 |                                      |                      | 800                              | 950                                  | 3                   | 34 HRC       |
| 42CrMo4 (as sintered)                           | DIN 1.7225; AISI/SAE 8740;           | 7,4                  | 400                              | 650                                  | 3                   | 130-230 HV10 |
| 42CrMo4 (heat treated)                          | UNS G41400                           |                      | 1250                             | 1450                                 | 2                   | > 45 HRC     |
| 100Cr6 (as sintered)                            | DIN 1.3505; AISI E52100;             | 7,5                  | 500                              | 900                                  | 5                   | 230-290 HV10 |
| 100Cr6 (heat treated)                           | UNS G52986                           |                      |                                  |                                      |                     | > 60 HRC     |
| <b>Cementation steels</b>                       |                                      |                      |                                  |                                      |                     |              |
| FN02 (H2 sintered)                              | MPIF MIM-2200                        | 7,5                  | 150                              | 260                                  | 25                  | 90-110 HV10  |
| FN02 (case hardened)                            |                                      |                      |                                  |                                      |                     | > 60 HRC     |
| 8620 (as sintered)                              | DIN 1.6523; AISI/SAE 8740;           | 7,4                  | 400                              | 650                                  | 3                   | 190-230 HV10 |
| 8620 (carbonitrided)                            | UNS G86200                           |                      |                                  |                                      |                     | > 64 HRC     |
| <b>Stainless steels</b>                         |                                      |                      |                                  |                                      |                     |              |
| 316L  | DIN 1.4404; AISI 316L; UNS S31603    | 7,9                  | 180                              | 510                                  | 50                  | 120 HV10     |
| 430   | DIN 1.4016; AISI 430; UNS S43000     | 7,6                  | 200                              | 350                                  | 30                  | 100-150 HV10 |
| P.A.N.A.C.E.A.                                  | X 15 CrMnMoN 17 11 3                 | 7,5                  | 690                              | 1090                                 | 35                  | 28-32 HRC    |
| <b>Hardenable stainless steels</b>              |                                      |                      |                                  |                                      |                     |              |
| 17-4 PH (as sintered)                           | DIN 1.4542; AISI/UNS S17400;         | 7,6                  | 660                              | 950                                  | 3                   | 32 HRC       |
| 17-4 PH (H-900)                                 | SAE J467                             |                      | 950                              | 1100                                 | 5                   | 40 HRC       |
| 420W (as sintered)                              | Nb-mod. DIN 1.4028;                  | 7,6                  | 650                              | 800                                  | 1                   | > 55 HRC     |
| 420W (heat treated)                             | UNS S42020; AISI 420F                |                      |                                  | 1560                                 | 0,85                | > 61 HRC     |
| <b>Alloys for High temperature applications</b> |                                      |                      |                                  |                                      |                     |              |
| 310N (N2 sintered)                              | DIN 1.4848; UNS 94203                | 7,7                  | 450                              | 800                                  | 16                  | 235 HV10     |
| 310N (Ar sintered)                              |                                      |                      | 250                              | 600                                  | 40                  | 160 HV10     |
| <b>Special alloys</b>                           |                                      |                      |                                  |                                      |                     |              |
| Ti (CP)   | DIN 3.7056; ASTM Grade 4; UNS R50700 | 4,2                  | 480                              | 550                                  | 5                   | 160-240 HV10 |

Other materials are available on request

The data given are based on our experience to date. However, no liability can be assumed

MIM versus competing technologies

MIM technology proves economical where complex shaped components with close dimensional tolerances, demanding mechanical properties and excellent surface finish are required.

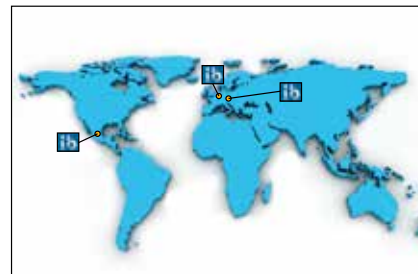


Global appearance

ITB Precisietechnik B.V.  
The Netherlands

ITB Transito S.R.O.  
Czech Republic

ITB DIM  
Mexico



**COMPLEX METAL PARTS**



**METAL INJECTION MOLDING**



**COMPLEX SHAPES  
3D DESIGN FREEDOM  
SMALL STEEL PARTS  
LARGE VOLUMES  
COST EFFECTIV SOLUTIONS**





# ITB Precisietechnik B.V.



## The MIM process

An injectionable starting material, consisting of very fine metal powder and plastic powder (granulat) like plastic, this material is processed into molded parts with a conventional plastic injection machine (plastic injection molding). After injection, the total plastic content which made the shaping possible is leached out of the molded parts without the parts themselves losing their shape. In a further 2 steps the parts will be debind and sintered, thereby obtaining metallic properties.

## Why choose ITB?

- Experience**  
 ITB Precisietechnik B.V. is a family business, that started in 1966 as a tool shop. Later started with plastic injection molding and stamping. ITB designs and produces its own tools and production processes. With this technical knowledge we can fulfill all requested quality standards and support you in every phase of your design.
- Service**  
 Also in production and logistics we developed as a one stop company with our facilities in Czech Republic and Mexico. In these low cost facilities we can support you also with optimized assembly solutions of plastic and metal parts and/or third parts, automated or manual.
- Quality**  
 Backed by quality assurance equipment like CMM and 3D machines, in addition to a state of the art lab. ITB ensures quality both in metrology and metallurgy. TS 16949, ISO 14001 and GMP certification is our Standard. In our plastic injection molding department we have a cleanroom class 100.000.
- Markets we work for**

## MIM Technology , guide lines

- Weight of the parts 1 gram till 100 gram
- Volumes from +/- 10.000 parts up
- Complex geometry
- High precision parts
- Best material properties
- Wide range of materials
- Excellent surface qualities without finishing
- All surface & material treatments possible

## Advantages MIM at ITB

- 15 years metal injection molding experience
- Own tool shop
- Own design department
- 15 years production of titanium parts
- Batch furnaces and continuous furnace
- Secondary operations in house and with partners
- Experience and development in Micro MIM, Cu & soft magnetic alloys

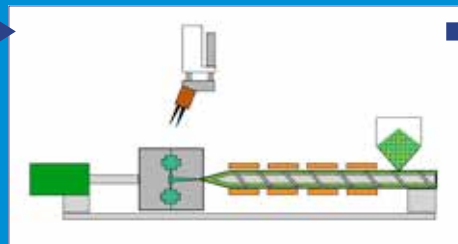
## Metal Injection Molding

### Basic process steps

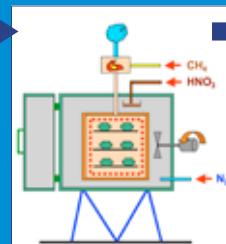
01. Mixing & granulating
02. Injection Molding
03. Debinding
04. Sintering



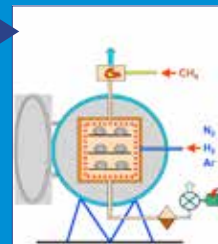
01. Mixing & granulating



02. Injection Molding



03. Debinding



04. Sintering

Telecom industry  
 Medical devices  
 Powertool industry  
 Machine industry  
 Bicycle industry

Automotive  
 Electronic products  
 Consumer industry  
 Leisure industry  
 Locking systems