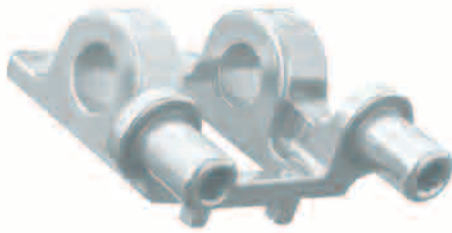




Powder metallurgical injection moulding MIM – Metal Injection Moulding

MIM – freedom of design is our strength



Powder metallurgically produced components are today utilised in almost all fields of technology. These products distinguish themselves by offering a wide range of materials, vast geometrical freedom of design, very high precision and suitability for large-volume production.



Powder metallurgical injection moulding (MIM) combines the well-known advantages of sinter materials with the shaping possibilities of plastic injection moulding technology.



Based on a lifetime's experience in the field of sintered metal technology, the MIM method has been successfully practised by the Schunk Group for more than 10 years.





Quantity/year

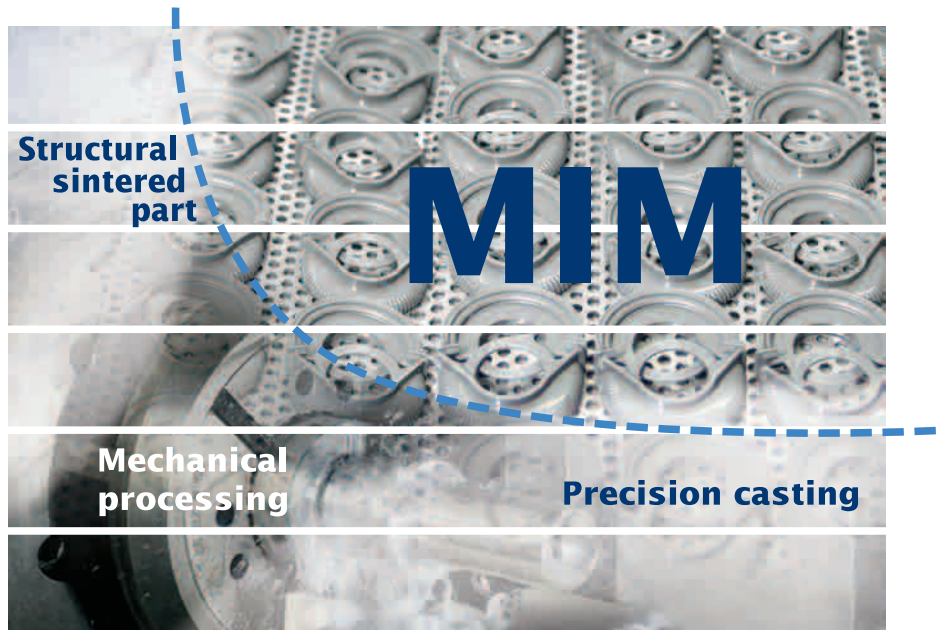
1 000 000

500 000

100 000

50 000

10 000



Metal Injection Moulding compared to other methods

Geometrical degree of difficulty:

small

medium

large

Cost-effective for large-volume products

Powder metallurgical injection moulding is a cost-effective manufacturing method for large-volume products. The initial cost of tooling can be offset when annual quantities exceed 50,000 parts, although, in exceptional cases, smaller quantities than this can still be produced in an economically reasonable

manner. MIM is particularly cost effective when its choice results in (I) machining and fabrication operations being reduced or even eliminated, and (II) obviating the need for design and processing restrictions when working with special alloys.

High geometrical degree of difficulty, precision and firmness

MIM is primarily used in the manufacture of minor and medium sized components (weight 0.1 to approx. 150 g) with very complex geometry. Functions, for which several components are required in other manufacturing processes, are combined in one component by means of the procedure. Undercutting, break-throughs and threads are producible. Mechanical processing is also economised on due to production that is close to the final shape.

The mechanical properties of the MIM components are, with a final density greater than 96%, comparable to that of conventional steels.

Up to now MIM components are applied in the fields:

- Automotive engineering
- Mechanical engineering
- Measurement and control technology
- Precision engineering
- Domestic appliances
- Lock and armature industry
- Tool engineering



Form, function, strength



Adjustment of backrests Driver bush

This MIM component is used as a central element for seat adjustment in passenger cars.

It serves the transmission of power resulting from the electromotive adjustment in the narrowest construction space. Schunk MIM-Technik also developed the jointing technology required to place the fixed stop absorption elements.



Passenger car – ignition lock

Door lock, lock caps

These MIM components are used in many European vehicles. Through the attributes of the MIM material they ensure a high degree of security against opening by force and, through the applied coatings, also satisfy maximum design and aesthetic requirements.

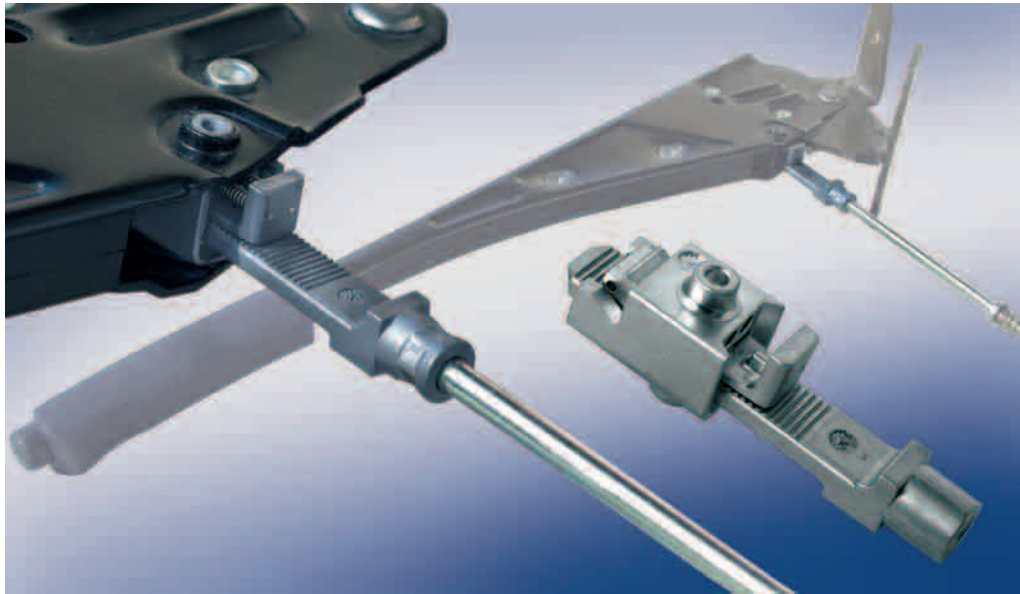


Pressure sensor Casing and lid

The sensor casing with lid is characterised by special magnetically soft attributes, which become possible through the use of specially selected MIM material. By means of MIM technology these components can be produced in their final outline without post-processing.

Readjustment of handbrake Toothed rack, clamp body and clamping jaw

The readjustment unit of a handbrake consists of three MIM components. Besides faster assembly of the handbrake cable, this unit particularly enables automatic readjustment in order to compensate for play. The MIM material and adequate heat treatment assure firmness, expansion and hardness in a narrow and precisely defined tolerance range and the ability necessary for power transmission.



Cylinder lock Cylinder body, protection against criminal entry

MIM components are widely used in the manufacture of locks. These are optimal in this market segment in regard to the warranted security. A hard (difficult to drill) material that can only be produced by means of MIM technology ensures this high-security requirement.



Profile joint Profile connector

The MIM steel component profile connector guarantees an extremely firm clamp-connection of aluminium profiles. The special construction of these components ensures simple and safe connection of profiles, which can again be disconnected without causing destruction. This eases assembly, adjustment and disassembly. The component is galvanically coated for reasons of corrosion protection.



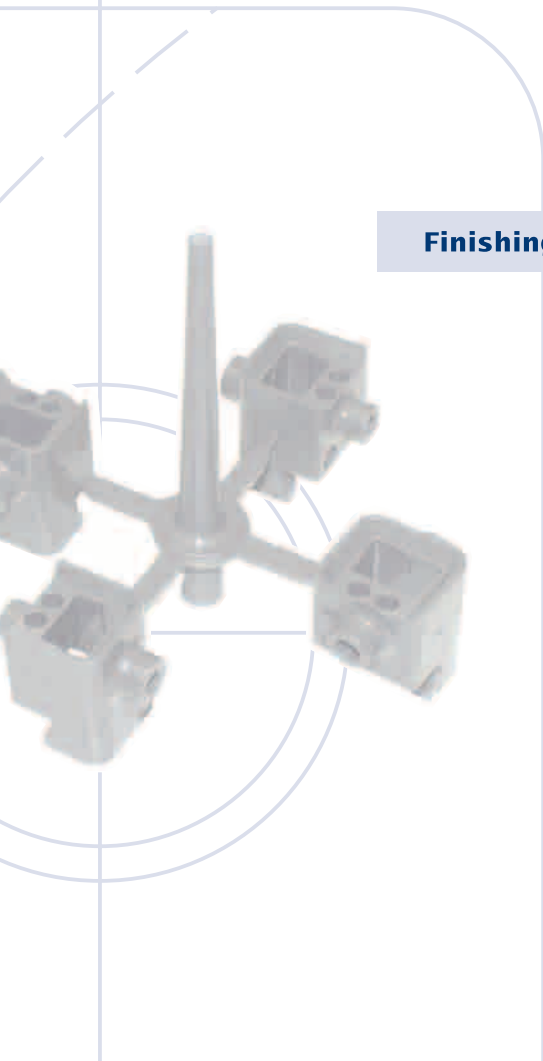
Approved technology for high demands

The manufacturing process

Blending of fine metal powder with organic binder to a homogeneous compound is characteristic for the MIM technology. This compound is, analogous to plastics processing, processable on injection moulding machines. In the injection moulding process, moulded bodies are manufactured, which already feature all typical geometrical characteristics of the completed component.



The removal of the organic binder subsequently takes place in a debinding process. Through high temperature sintering the residual porous moulded bodies shrink into components with the final geometrical characteristics. All imaginable heat and surface treatments, as applied to conventionally manufactured components, are applicable in the subsequent finishing processes.



Wide range of materials



Multifarious materials can be used with Schunk MIM technology – probably including the material that meets your requirements. A multitude of materials has been developed and made available in addition to the traditional MIM materials with iron as a basis and nickel and carbon as alloying elements.

MIM steels for use in the conventional area; those are among other things:

- unalloyed and low alloyed steels,
- rust and acid resistant stainless steels,
- high-speed steels.

Their characteristics do unimportantly differ from the materials that are meltmetallurgically produced.

We can furthermore use materials, the characteristics of which are clearly superior to those of conventional materials or which cannot be processed using conventional technologies or only with great difficulty.

Those are in particular

- highly wear-resistant materials,
- highly heat-resistant materials,
- magnetically soft materials.

The company Schunk MIM Technik offers self-developed binder systems and produces the materials on its own premises. Thus we are independent of the market and in the position to produce and test new materials for you (corresponding to your requirements).

Freedom of design

The procedural possibilities of Schunk MIM-Technik offer you a wide diversity of design.

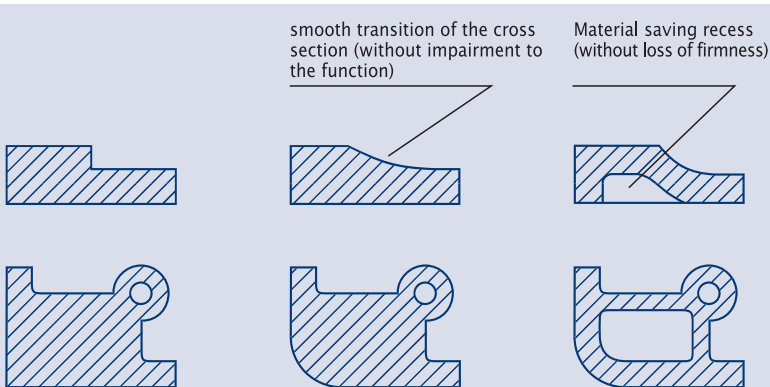
- Component weight: 0.1 ... approx. 150 g
- Component deviations: max. 150 mm
- Wall thickness: 0.3 ... 12 mm
- Tolerances:
 - ± 0.3 % from the nominal size
 - ± 0.5 % from the nominal size, process compatible
- Surface finish: Rz 4... 6.3 µm

The component construction can take place according to the design guideline (VDI-guideline 2006).

Possible through MIM

More favourable

Better

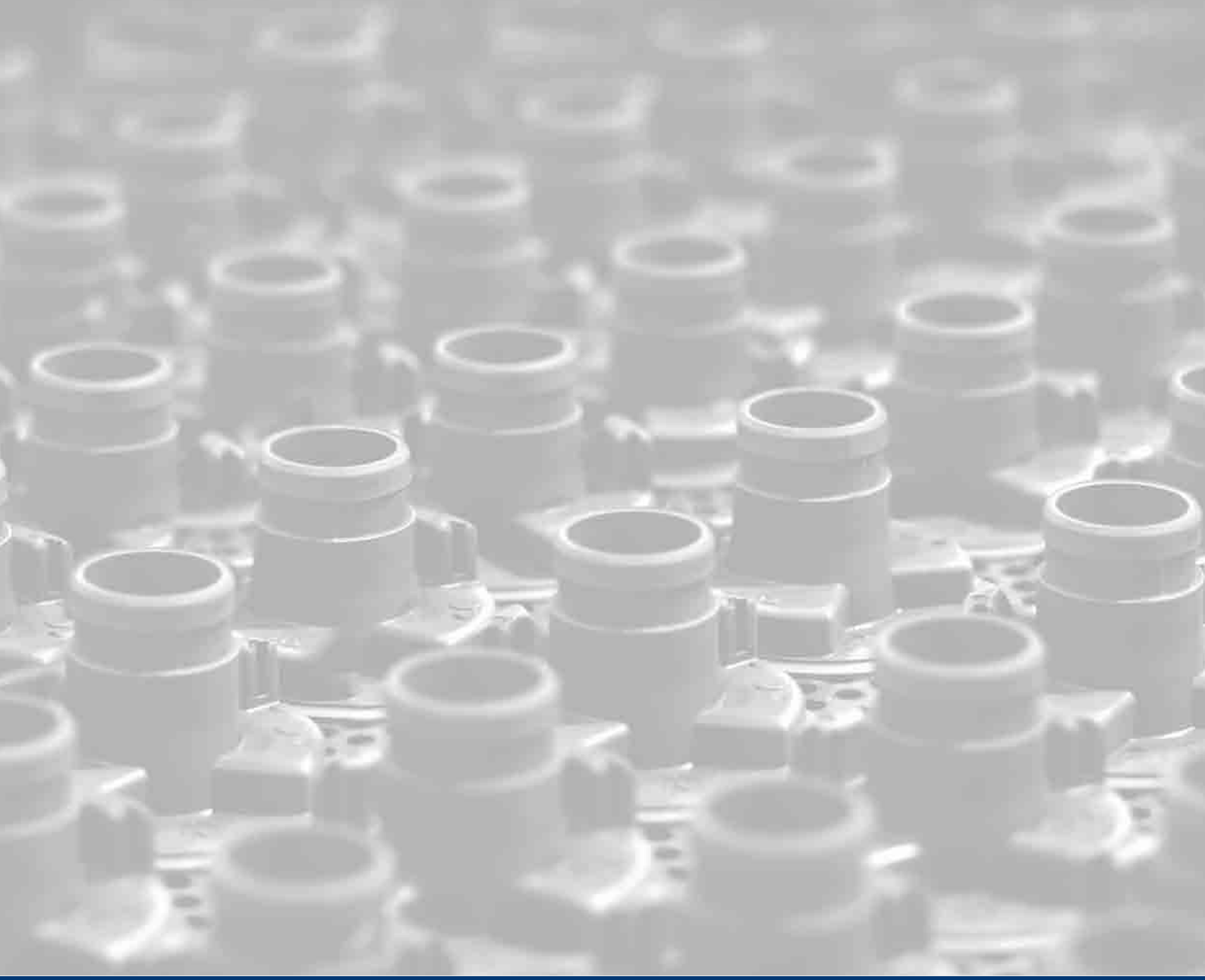


Design with us from the start

With the MIM method you have practically unlimited possibilities as far as construction and application of material are concerned. The demonstrated possibilities are only intended as suggestions for optimal design of your component.

Our experienced team is gladly available for questioning and suggestions.





Schunk MIM-Technik

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