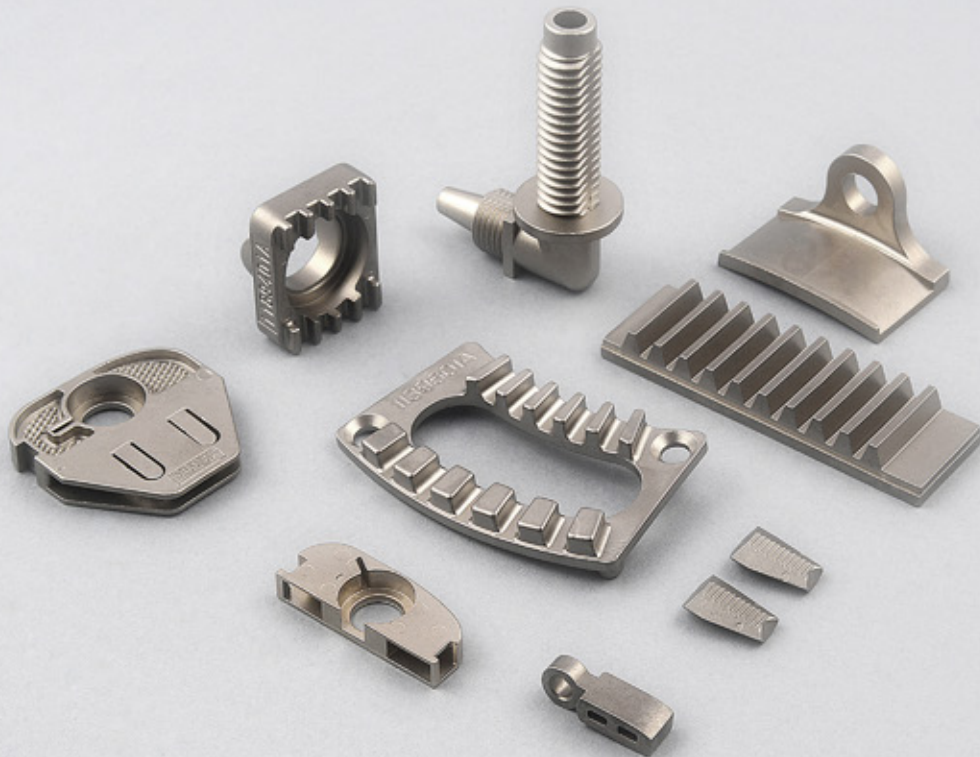
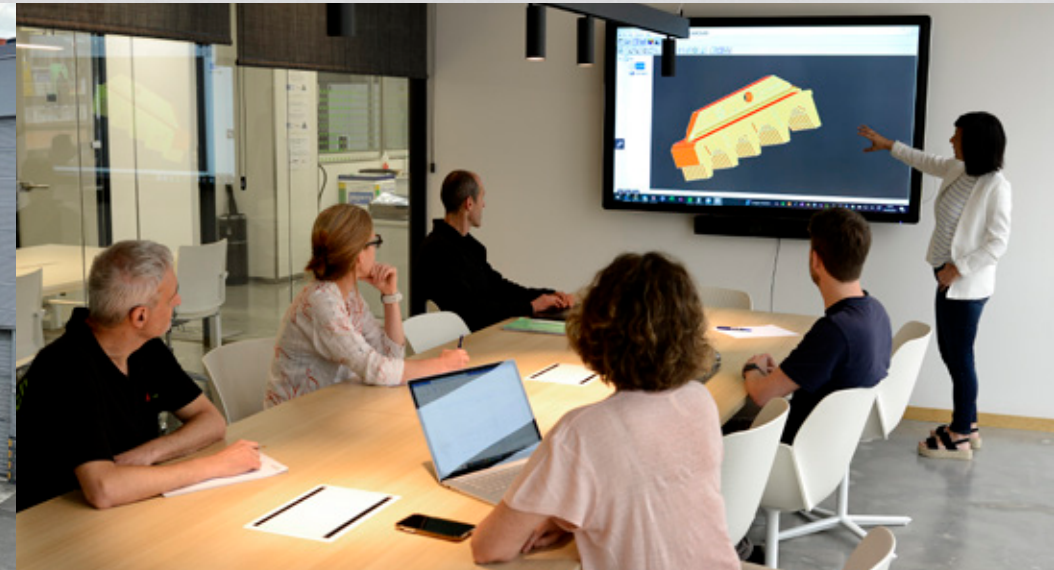




ALFA MIMtech

metal injection moulding technologies



ALFA MIMtech

Founded in 2004, the century-old company ALFA incorporated modern and innovative MIM technology, leading to the creation of ALFA MIMtech

ALFA MIMtech integrates all the steps of the manufacturing process for any part that is suitable for MIM technology, starting from concurrent engineering with the customer, design and production of injection moulds, drawing up the MIM process, as well as heat or surface treatments and any machining or assembly that may be required.



ALFA MIMtech provides the complete solution for any MIM project

Our commitment to innovation and continuous improvement entails the constant design of training programmes and investment plans.

Our fully integrated processes allow total control and supervision of the different manufacturing phases.

Wholly focused on customer service, we undertake to provide prompt quality solutions to the needs posed by our clients.





MIM Technology

Technology that adapts to your needs

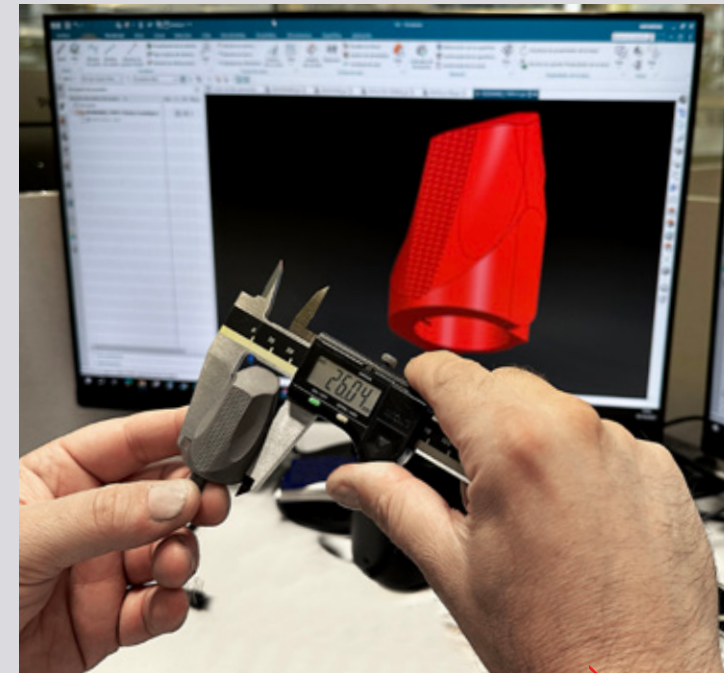
MIM (Metal Injection Moulding) is a manufacturing process for metal parts with superior mechanical and surface properties, with the flexibility of design inherent to thermo-plastic injection.

It combines the best of each technology

The flexibility of design and high productivity of thermo-plastic injection, combined with the high density sintering process, enable us to create parts with exceptional mechanical and surface properties, which can then be enhanced by heat and surface treatments to obtain the final part ready for use.

... and offers total precision

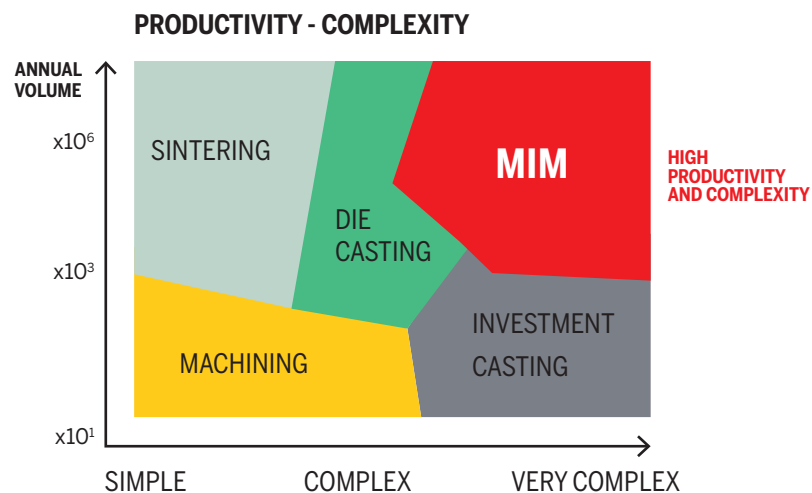
Highly complex, accurate and reliable products can be created, with properties similar to those of any machined, precision cast or laminated material etc...





Comparison with other technologies

Metal Injection Moulding (MIM) technology has no competition in the production of large series of small parts with high geometrical complexity and superior mechanical properties.



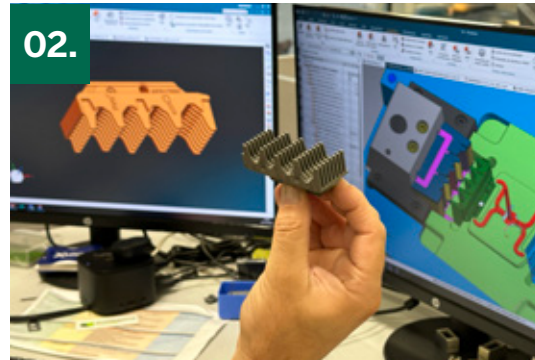


Process



RAW MATERIAL

Homogeneous mixture of metal powder and polymer, plasticisers and lubricants that makes it possible to inject the mixture into moulds to obtain the shape of the part



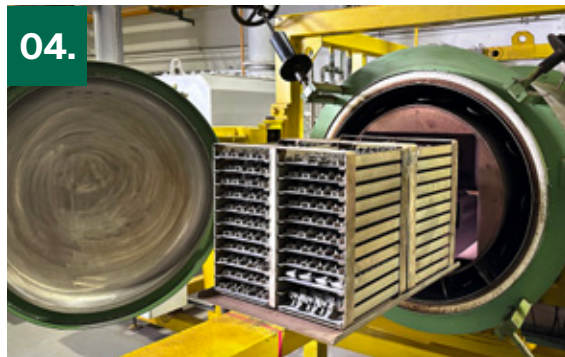
MOULD DESIGN

A mould is designed based on the requirements of the customer



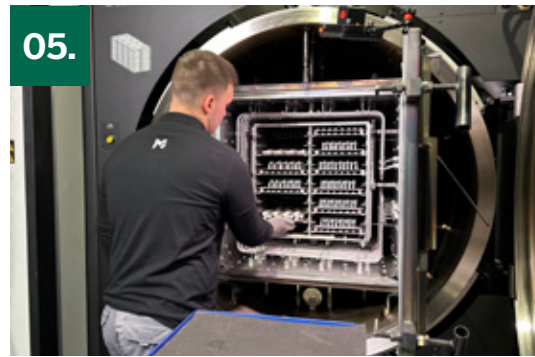
INJECTION

Injection of the mixture to produce the so-called "green part"



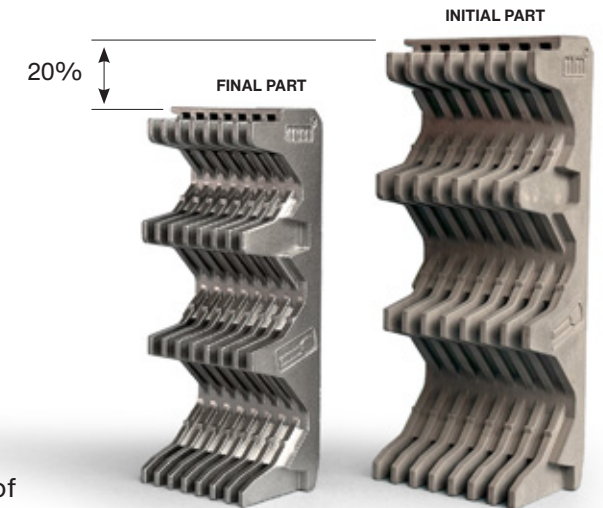
DEBINDING

All the components of the part that do not make up the composition of the final product are eliminated (polymers, plasticisers, lubricants...)



SINTERING

A thermal process in which the porous solid of metal particles is transformed into a dense solid (density > 95%) with the microstructure of the alloyed metal of which it is composed

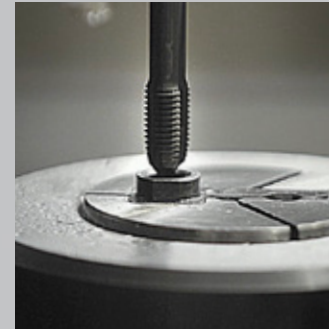




ALFA MIMtech undertakes to supply the finished part integrating the processes necessary to obtain all dimensional, mechanical, surface, aesthetic or functional requirements

MIM technology allows for the subsequent application of a wide range of treatments to endow the part with different properties.

An extensive network of collaborators allows ALFA MIMtech to deliver the finished part, whatever final treatment may be required.



| | | | |
|--|---|---|--|
| SURFACE TREATMENT <ul style="list-style-type: none">· BALINIT· BICOAT· CERAKOTE· ZINC COATING· CHROME COATING· PHOSPHATED· SHOT BLASTING· ULTRASOUND CLEANING· NIQUEL PLATING· BLACKENING· PAINTING· POLISHING· SUR SULF· TUMBLING | | THERMAL TREATMENT <ul style="list-style-type: none">· HARDENING AND TEMPERING· CASE HARDENING· CARBONITRIDING· ANNEALING· HIP (Hot Isostatic Pressing)· NORMALIZING· IONIT-OX· GAS NITRIDING· PRECIPITATION HARDENING· NITROCARBURIZING· TENIFER· PASSIVATION | |
| QUALITY <ul style="list-style-type: none">· LIQUID PENETRANT INSPECTION· X - RAYS· METALLOGRAPHY TEST | MACHINING <ul style="list-style-type: none">· THREAD MACHINING· LAPPING· GRINDING· COUNTERSINK· BURNISHING· REAMING | OTHERS <ul style="list-style-type: none">· COINING· SHAPING· ASSEMBLING· DEBURRING· PAINTING | |





Table of materials



| <div>➤➤</div> | MATERIALS | | | | | | | | | | | | | | |
|-------------------|-----------|---------------------|--------------------|-----------------|---|-----------------------|--------------------|---------------|--------------------|------------|--------------------------|----------|-----|----------|-------|
| | Material | Equivalent | | | Characteristics | Mechanical Properties | | | | | | | | | |
| | | | | | | MIM | | | | | MIM incl. Heat Treatment | | | | |
| | | Elastic limit | Tensile resistance | Elongation | | Hardness | Corrosion (h@ sal) | Elastic limit | Tensile resistance | Elongation | Hardness | Density | | | |
| | | Rp 0,2 (Mpa) | Rm (Mpa) | A (%) | | HV, HRc | h | Rp 0,2 (Mpa) | Rm (Mpa) | A (%) | H | (gr/cm3) | | | |
| Carbon steel | FN02 | - | - | MIM 2200 | Case hardening | ≥150 | ≥260 | ≥25 | ≥80HV10 | - | - | - | - | ≥710HV10 | ≥7,5 |
| | FN0205 | - | - | - | Hardening and tempering | ≥170 | ≥380 | ≥3 | ≥125 HV10 | - | ≥1000 | ≥1200 | ≥2 | ≥55HRC | ≥7,5 |
| | FN08 | - | - | - | Case hardening | ≥210 | ≥380 | ≥15 | ≥130 HV10 | - | - | - | - | ≥600HV10 | ≥7,5 |
| | | | | | Hardening and tempering | ≥400 | ≥700 | ≥3 | ≥250 HV10 | - | ≥1100 | ≥1250 | ≥3 | 40HRC | ≥7,5 |
| | 4605 | - | - | MIM 4605 | Hardening and tempering | ≥400 | ≥600 | ≥5 | ≥150 HV10 | - | ≥1500 | ≥1900 | ≥2 | ≥50HRC | ≥7,5 |
| | 8620 | 21NiCrMo2 | 1.6523 | SAE 8620 | Case hardening | ≥400 | ≥650 | ≥3 | ≥220 HV10 | - | - | - | - | ≥800HV10 | ≥7,4 |
| | 42CrMo4 | 42CrMo4 | 1.7225 | SAE 4140 | Hardening and tempering | ≥400 | ≥650 | ≥3 | ≥200 HV10 | - | ≥2150 | ≥1450 | ≥2 | ≥47HRC | ≥7,45 |
| | 8740 | 40NiCrMo 2-2 | 1.6546 | AISI 8740 | Hardening and tempering | ≥530 | ≥860 | ≥8 | ≥200 HV10 | - | ≥1400 | ≥1600 | ≥5 | ≥510HV10 | ≥7,5 |
| | 100Cr6 | 100Cr6 | 1.3505 | AISI E 52100 | Hardening and tempering, wear resistant | ≥500 | ≥900 | ≥5 | ≥290 HV10 | - | - | - | - | ≥60HRC | ≥7,5 |
| Stainless steel | 316L* | X2CrNiMo 17 13 2 | 1.4404 | AISI 316L | Non-magnetic | ≥180 | ≥510 | ≥51 | ≥120 HV10 | 96 | - | - | - | - | ≥7,9 |
| | 304 | - | - | - | Non-magnetic | ≥170 | ≥630 | ≥60 | ≥130 HV10 | 72 | - | - | - | - | ≥7,9 |
| | 17-4PH* | X5CrNiCuNb 17 4 | 1.4542 | AISI J467 | Ferromagnetic, martensitic (hardenable) | ≥660 | ≥950 | ≥3 | ≥30HRC | 8 | ≥950 | ≥1100 | ≥5 | ≥39HRC | ≥7,6 |
| | 420 | X20Cr 13 | 1.4021 | AISI 420 | Ferromagnetic, martensitic (hardenable) | ≥1200 | ≥1400 | ≥0,85 | ≥600 HV1 | 2 | ≥1300 | ≥1600 | ≥2 | ≥60HRC | ≥7,4 |
| | 310 | G-X40CrNiSi 25 20 | 1.4841 | AISI HK30 | Refractory, resistant to high temperatures | ≥450 | ≥600 | ≥16 | ≥235 HV10 | - | - | - | - | - | ≥7,72 |
| | PANACEA | X15 CrMnMoN 17 11 3 | - | - | Non-magnetic, without Nickel | ≥600 | ≥900 | ≥35 | ≥300 HV10 | 96 | - | - | - | - | ≥7,55 |
| Softmagnetic | FeSi3 | - | 1.0884 | - | Alloy Softmagnetic | ≥300 | ≥500 | ≥20 | ≥120 HV10 | - | - | - | - | - | ≥7,4 |
| | FN50 | - | 1.3926 | - | Alloy Softmagnetic | ≥150 | ≥400 | ≥20 | ≥100 HV10 | - | - | - | - | - | ≥7,85 |
| Special alignment | Ti | - | 3.7065 | ASTM Ti grade 4 | Titanium | ≥480 | ≥550 | ≥5 | ≥190 HV1 | - | - | - | - | - | ≥4,2 |
| | N90 | NiCr20 Co 18 Ti | 2.4632 | SAE J775 | Nimonic® 90, Heat resistant | - | - | - | - | - | ≥790 | ≥1270 | ≥33 | ≥38 HRC | ≥8,18 |
| | GHS-4 | PL Ni40 Cr12 Mo6 | - | - | Heat and wear resistant | - | - | - | - | - | ≥600 | ≥800 | ≥2 | ≥37 HRC | ≥7,90 |
| | THOR | - | - | - | Ultra-strong steel, Hardening and tempering | - | - | - | - | 24 | ≥1500 | ≥1850 | ≥5 | ≥50 HRC | ≥7,75 |

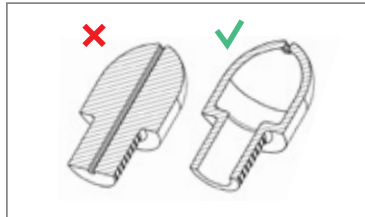
* Various degrees available



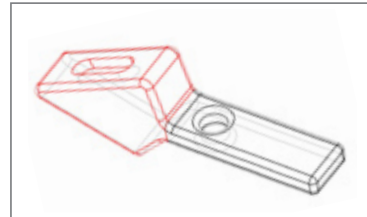


Design Recommendations

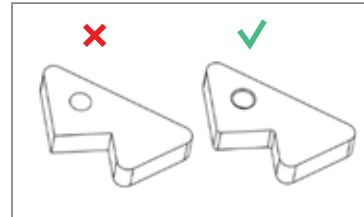
To design a MIM part, the following factors should be taken into account



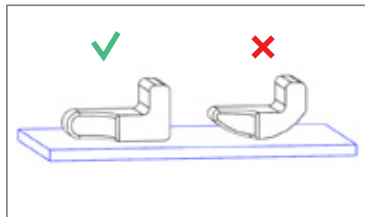
Avoid sudden changes in thickness



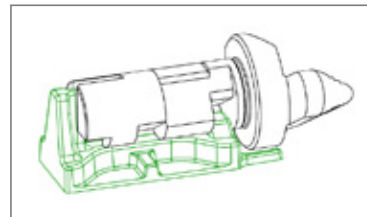
Avoid areas with accumulation of material



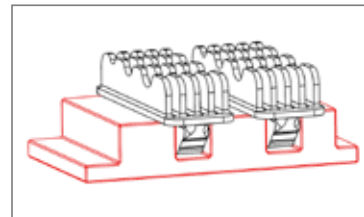
Apply radii on inside edges



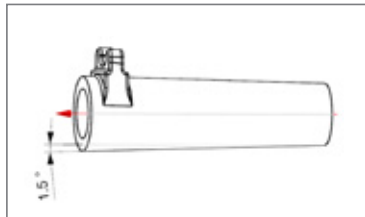
Preferably provide a flat surface to support the part



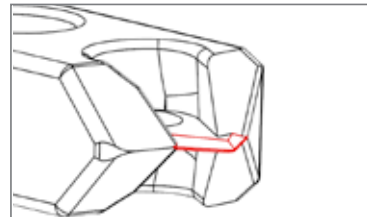
Option to use printed/injected part for support



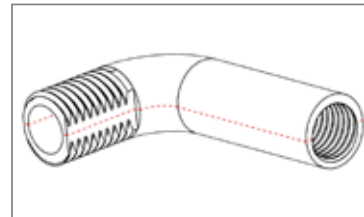
Option to use ceramic supports



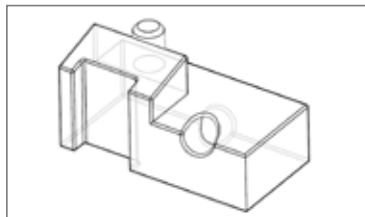
Allow for adequate draft angles for certain surfaces



Sharp edges on external areas allowed



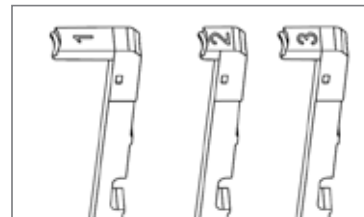
Advisable to apply flat face for external thread



Holes / clearances / grooves



Possibility to generate knurling / marking / text



Possible use of interchangeable inserts for production of different models in the same mould

Tolerances

The MIM process has a tolerance of $\pm 0,5\%$, although tighter tolerances can be discussed depending on factors such as material, location of the injection point, thermal treatment and the shape of the part, as well as any additional operations (straightening, machining, special controls on process or high precision adjustment of tooling). In any case, it is recommended:

- To specify tight tolerances only on functional dimensions
- To avoid tight tolerances on dimensions affected by parting lines, ejectors and injection points
- To allow for greater tolerance on position dimensions

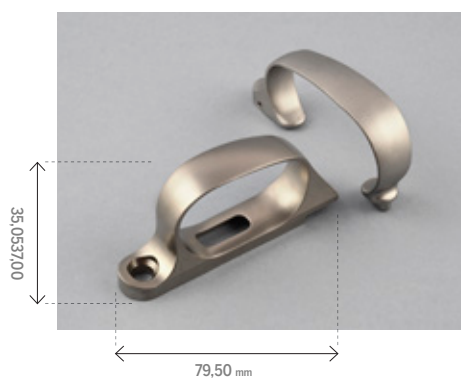
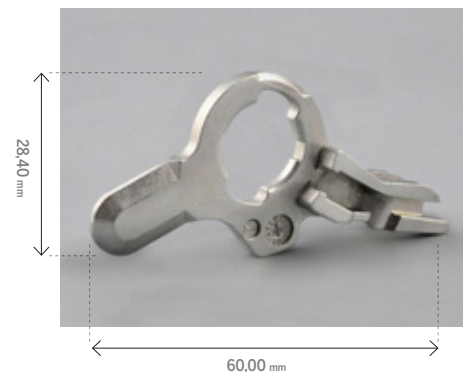
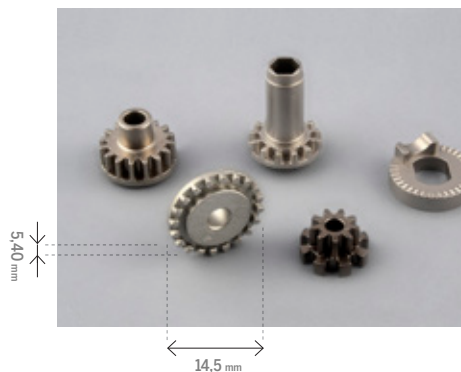
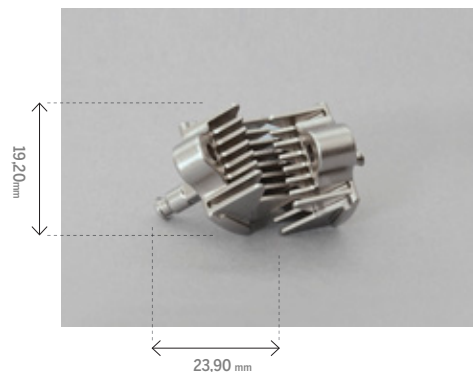
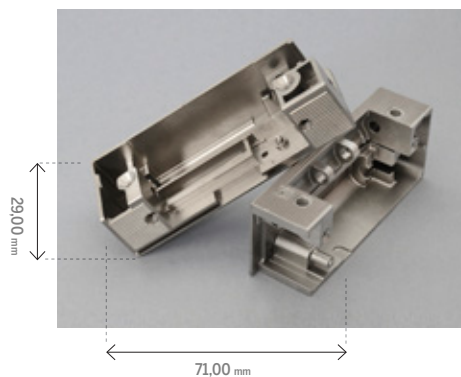
| SIZE | TOLERANCE | FIELD |
|-------------------------------|-----------|--------|
| Up to 6 mm | 0,05 | 0,10 |
| 6 - 12 mm. | 0,08 | 0,16 |
| 12 - 20 mm. | 0,12 | 0,24 |
| 20 - 35 mm. | 0,19 | 0,38 |
| 35 - 50 mm. | 0,26 | 0,52 |
| Más de 50 mm. | 0,05 % | |
| SHAPE AND POSITION TOLERANCES | | |
| Alignment and concentricity | | ±0,5 % |
| Flatness | | ±0,5 % |
| Perpendicularity | | ±0,5 % |



Sectors

ALFA MIMtech produces MIM parts for a wide range of sectors:

Locksmiths, tools, arms, sport and leisure, luxury, medical, automobile, robotics, sensors, ...





Quality and Responsibility

Quality and Responsibility

To guarantee the quality and reliability of its products, ALFA MIMtech processes incorporate:

- Analysis of carbon and sulphur content
- 3-D measurement, optical and conventional
- Destructive tests: hardness, tensile, resilience ...
- Non-destructive tests: magnaflux, liquid penetrant inspections ...
- Metallographic tests
- X rays
- Gauges
- Callipers and assembly tools



R+D+i

ALFA MIMtech actively participates in R + D and innovation projects, collaborating with technological centres, universities, and other enterprises. The company works with cutting edge technology in the field of the development of new components, digitalization, automation or additive manufacturing, all placed at the disposal of our customers. Furthermore, ALFA MIMtech is a member of INNOBASQUE, the Basque Innovation Agency, and has been granted the Innovative SME award.



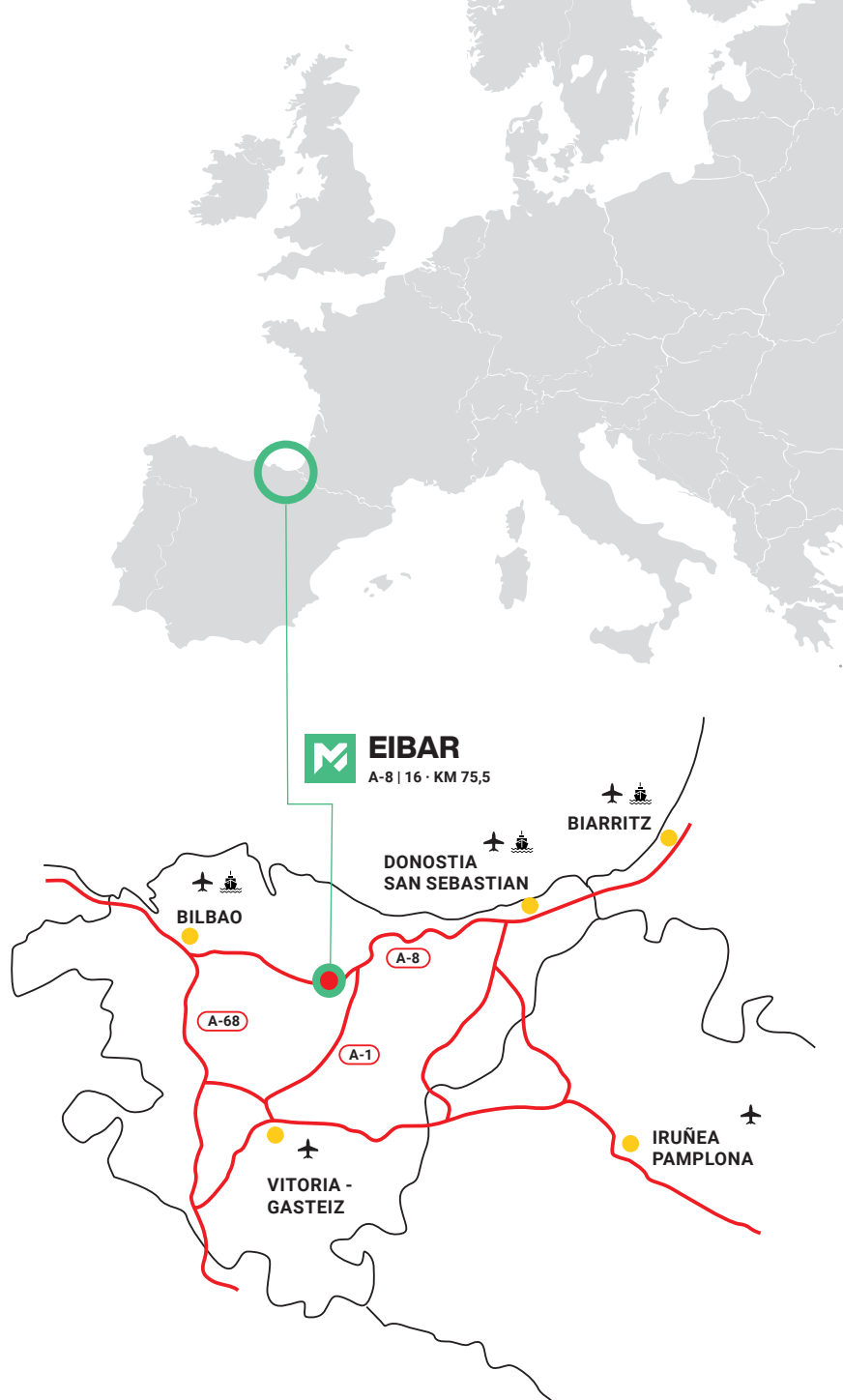
ALFA MIMtech is always willing to carry out any kind of test requested by the customer

ALFA MIMtech recognises its responsibility with regard to the protection of the environment as an integral part of its commitment to quality.

Certifications:

ISO 9001 · ISO 14001 · OHSAS 18001





EIBAR
A-8 | 16 · KM 75,5



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MIMtech

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