

New Materials and Application

Powder Injection Moulding (PIM)

centro tecnológico da cerâmica e do vidro | coimbra | portugal



Innovative near net-shape process for ceramic and metallic components



automotive component (Fe-8Ni)

Powder Injection Moulding (PIM)

Innovative process for the production of high complex shape and precision components made in a ceramic or metallic material. PIM combines design flexibility and of plastic injection moulding and the variety of materials used in powder technologies.

This technology is ideal for:

- complex functional components
- series production
- high material demands



ceramics scissor (alumina)

Fields of application

- automotive industry
- aerospace technology
- medical and dental devices
- consumer goods
- microsystems and sensors
- electronics
- tooling







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a partner for business competition

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The PIM process

In this multistage process, aided by a binder, the powder is shaped in an injection moulding machine forming the net-shaped part. Further part treatments lead to the final densified final part, with similar material properties comparing to the conventional technologies.

Production of complex shaped and high precision parts (up to 200 g-steel), offering the design capabilities of plastic injection moulding for the production of metallic



MIM not only carries significant low production time and cost advantages but also makes possible forming of until now impossible or economically not viable shapes.



PIM process production diagram

automotive component (stainless steel)

PIM Technology Characteristics

Complex shaped components

Complex part until now only possible to be produced in plastic can be also produced in a cost competitive way in metal or ceramic by PIM.

Wide range of materials

- carbon steels (examples: 1010, 1060)
- low alloy steels (Fe-8Ni, Fe-2Ni-0.5C, 42CrMo4)
- stainless steels (304L, 316L, 440C, 17-4PH)
- tool steels (M2)
- soft magnetic alloys (Fe, Fe-3Si, Fe-50Ni)
- nickel and titanium alloys (Inconel, Ti-6AI-4V)
- hard metals (WC-Co)
- technical ceramics (alumina, zircónia)

High precision

A typical tolerance of 0.3% of nominal dimensions, which means, it would not be needed secondary operations.

Products and Services

Operating by contract or by the frame of national or international funding, CTCV supply customized products and services of development and innovation, including:

- viability studies and prototypes
- technology transfer to industry
- materials development (feedstocks)
- processing tests compounding, moulding, debinding and sintering
- mould concept and design
- PIM process development for new applications
- material characterization and testing





ceramic feedstock (porcelain)

microcomponent (stainless steel)