

Ceramic Feedstocks

> Precision through Quality <



INIMATEC

For many years now, INMATEC Technologies GmbH has been developing and producing feedstocks for the ceramic injection moulding technique. Our feedstocks are used throughout the world. With comprehensive experience of all aspects of the ceramic injection moulding process, we are able to provide services along the whole process chain. Service and quality are our top priorities. And we are proud to be the market leader in Europe, which is a direct result of close cooperation with our customers and suppliers. Our team stands out for know-how, experience and high motivation. We remain with you from the initial development through to the final series production, and supply you with high quality ceramic feedstocks.

INMATEC
Technologies GmbH

INMAFEED – INMAFLOW – INMAPOM



Ceramics

DURABLE AND VERSATILE
MATERIAL OF THE FUTURE



INMATEC Technologies GmbH
Ceramics – Ceramic Injection Moulding
Feedstock – Quality Control
Mould construction
Scope of Services
Progress and Advancement
Consulting Service

INNOVATIVE – COMMITTED – PRAGMATIC

High quality ceramic components have become an essential feature of modern industrial applications.

This is because ceramic raw materials combine numerous excellent properties: they are hard, heat consistent, corrosion-resistant, light, bio-compatible, electrically insulating and conductive – all depending on their composition.

Modern shaping processes such as ceramic injection moulding or thermoplastic extrusion are opening up possibilities for further applications; for instance, where complex geometries are needed for mass production. Parts made by injection moulding can be found in many different industrial branches: automotive, lighting, textiles, jewelry and dentistry, as well as electronics, sensors and medical devices.



Injection moulding is widely used in the plastics industry to produce complex and intricate components – INMATEC makes this approach possible for ceramics.

The key advantage of powder injection moulding is the near-net-shaping design of the parts. Complex geometries usually do not need an elaborate cost-intensive post-processing.

Mass production to the highest quality standards is now feasible. By using standard injection moulding machines and automatic handling systems for the parts, the produc-

tion process can be automated to a large extent. INMATEC adds plastic binders - which soften when heated - to the ceramic powders. The obtained material, now called "feedstock", is then injected into the mould in the injection moulding machine. The part, referred to as the "green" part, is ejected from the mould in a dimensionally stable form. After debinding, i.e. removal of the plastic binder, the "brown" part is densely sintered in a furnace.

Ceramic Feedstocks

Ceramic Injection Moulding

PRECISION DOWN TO THE LAST DETAIL



The quality of the feedstock is decisive for the quality of the final manufactured part.

But what makes a high-quality feedstock?

- A homogeneous distribution of ceramic powder and thermoplastic binder
- A guaranteed high and uniform packing density of powder particles

- A uniform and reproducible shrinkage and highest dimensional stability after the sintering process
- A perfect granulate shape for steady process parameters during long production cycles
- A high green stability for handling, but also a simple and environmentally friendly debinding technique

INMATEC guarantees these feedstock properties by a special compounding process in combination with ongoing quality assurance.

Feedstock

DEVELOPMENT AND PRODUCTION

Apart from providing standard feedstocks, we also offer the development of customer-specific feedstocks.

Choices of raw material, powder composition and binder components are defined by the individual requirements for the part and application. As your partner, INMATEC

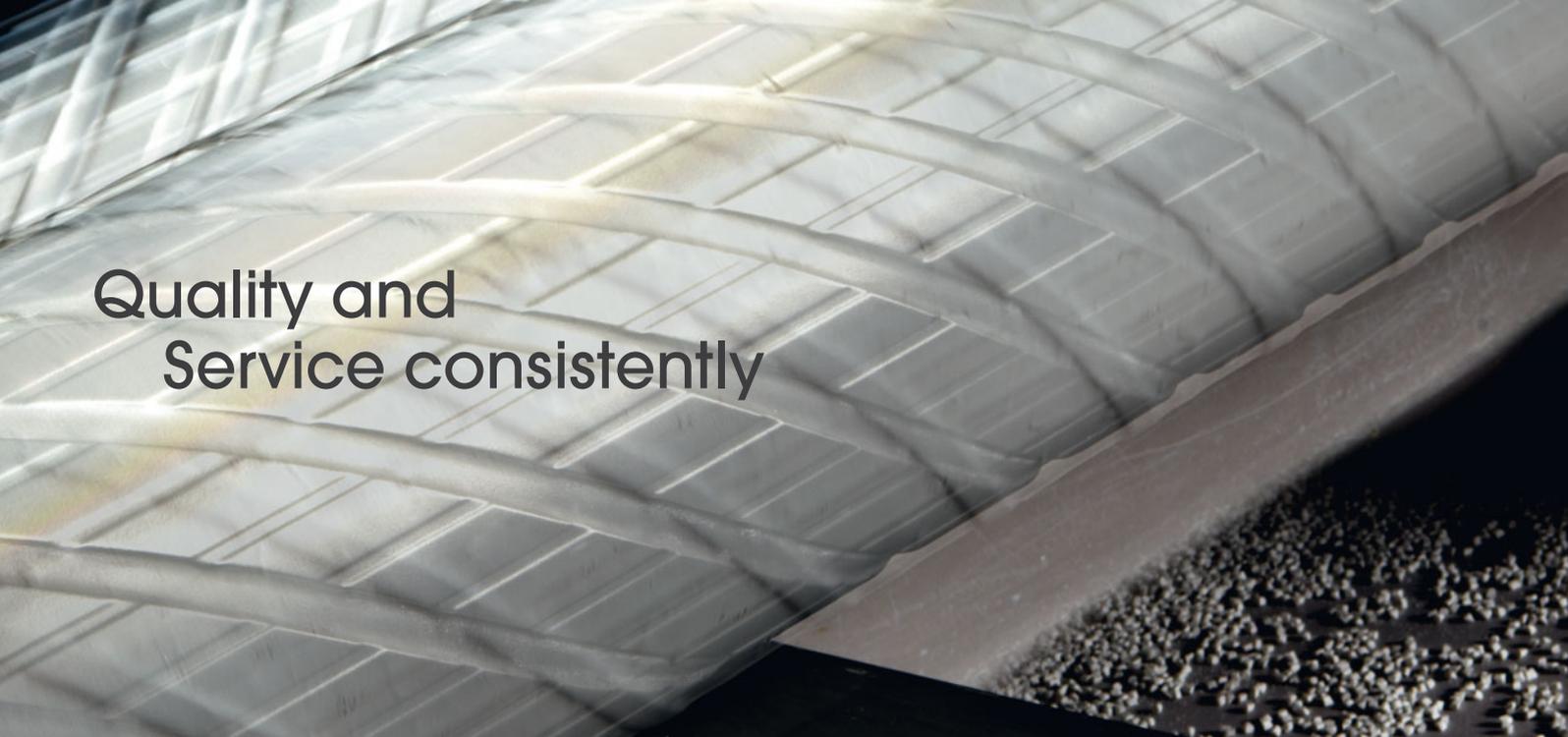
arranges the development from the laboratory through to completion and total readiness for production. Competent contact persons accompany each process step.

Absolute confidentiality is guaranteed. The formulation of the developed feedstock remains property of the customer.



Quality Control

FROM POWDER TO PART



Quality and Service consistently

One of our unique features is comprehensive quality control. We permanently monitor the quality of our produced feedstocks.

Powder and binder are further processed only after having passed the stringent inspection procedures. The binder content of the produced feedstock is then checked to ensure constant shrinkage from batch to batch. In addition, each feedstock is tested with regard to its process-abilities. The customer will receive a protocol with injection- resp. extrusion data. For each customer-specific feedstock a 'Certificate of Analysis' is issued.

On customer request we conduct further quality inspections, for example:

- Powder:** composition, phase analysis, particle size distribution, specific surface area etc.
- Feedstock:** rheology, mould-ability, debinding behaviour
- Sintered part:** microstructure analysis, scanning electron microscope (SEM), element mapping, etc.

INMATEC is certified according to the ISO/TS 6949. We are producing and working according to international quality standards.

Mould Construction

FROM PROTOTYPE TO OPTIMISED SERIES PRODUCTION

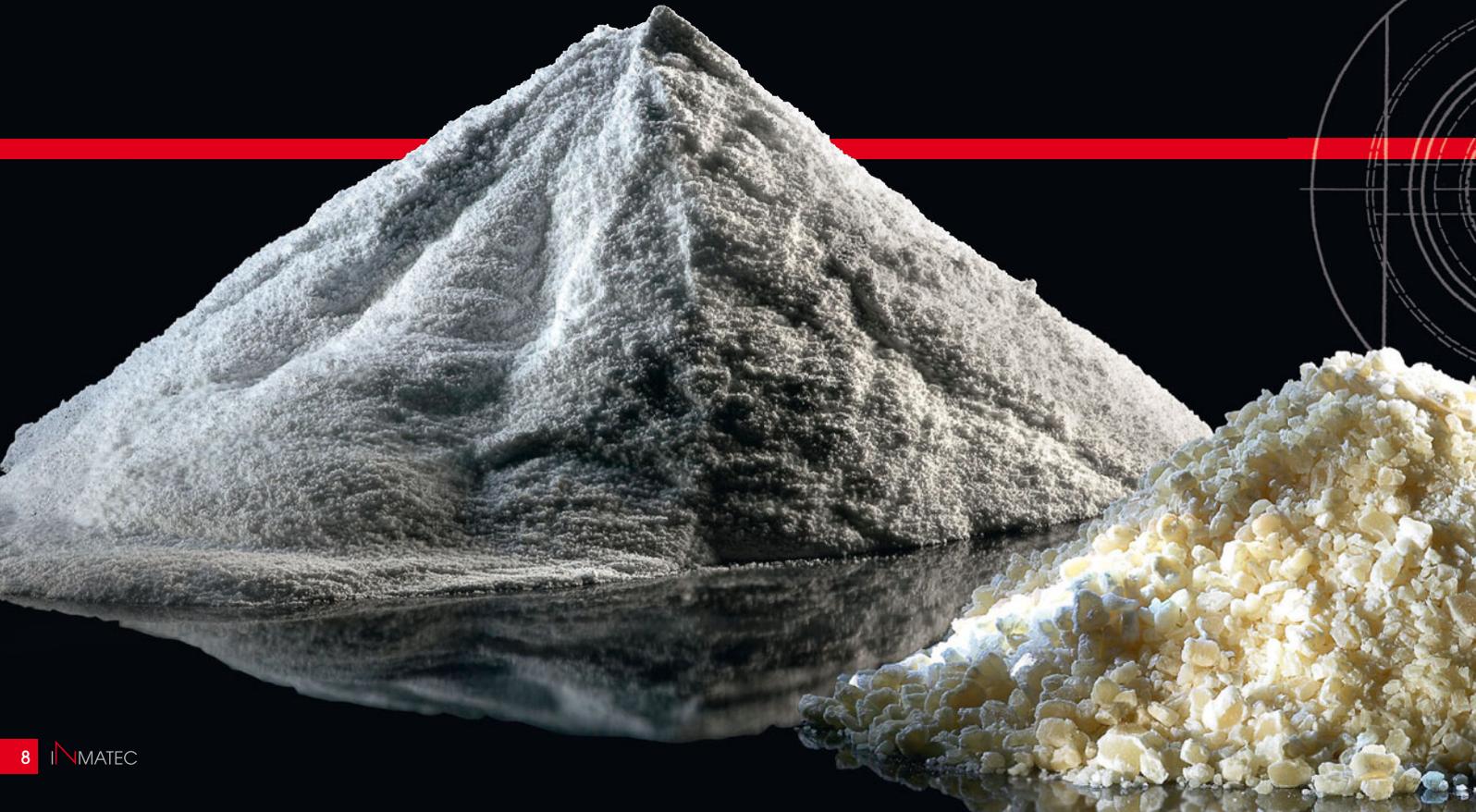
In addition to the feedstock, the mould plays a crucial role in ceramic injection moulding. Construction of the mould differs in important ways from that used in plastic injection moulding.

The part shrinks to its final size during sintering. This dimensional change must be incorporated into the mould design. The precision of the part depends directly on the precision of the mould. Parts that are close to their final form and require little or no finishing can only be produced with high precision mould inserts, preferably made of hard metal.

With INMATEC as your competent partner, you can benefit from our wealth of experience, right from the initial phase of the part design process.

INMATEC will develop the mould together with you from prototype construction through to the optimised production mould.

The moulds can be brought into service both in our injection moulding lab and by our development engineers in your facility.



Our services range from innovative consultation on material and mould development through to project management when ceramic injection moulding systems are being established. We guarantee ongoing service and long-term cooperation.

Our services:

- Development and production of application- and customer-specific feedstocks for ceramic injection moulding
- Analysis and quality control of the ceramic raw materials and the resulting feedstocks
- An own injection moulding lab for the development of ceramic feedstocks

- Technical advice regarding mould construction and part realization
- Development and improvement of prototype moulds
- Technical support with the construction of production moulds
- Assistance in the debinding and sintering processes both on process and also system peripherals.
- Development of complete production lines and support services until series production readiness.

You yourself decide to what extent you wish to take advantage of our services – we will support you at every stage of the injection moulding process.

Scope of Services

QUALITY AND SERVICE – CONSISTENTLY



Apart from striving for excellence in our own company, we are committed to driving technological advances in the industry as a whole. For us it is of particular importance to promote technological developments that fully exploit the potential role that ceramic injection moulding techniques can play in modern industrial applications. In 2008 therefore, together with other companies and research institutes, we founded the "Expertenkreis Keramikspritzguss" with the German Ceramic Society as the umbrella organisation.

The main aim of the "Expertenkreis Keramikspritzguss" is the development of the whole ceramic injection moulding

process to increase key aspects such as part precision, process reliability and cost-effectiveness. With the "Expertenkreis Keramikspritzguss", the various partners are establishing a corporate brand "Keramikspritzguss" in Germany and Europe to provide optimum customer value and to strengthen our position with respect to the global competition.

A key benefit arising from this association includes granting all members access to integrated solutions tailored to individual needs.

Networking: Progress and Advancement

GERMAN EXPERTS CIRCLE FOR CERAMIC INJECTION MOULDING



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Do you have an idea that you would like to see implemented as a ceramic part? Do you need a special feedstock for your application? Do you need a mould for the production of a ceramic part? Do you want us as raw material experts to support you during meetings with your customer?

We are always happy to support you! Our competent sales team with many years of experience is able to provide advice in the choice of raw materials, the feedstock production and also in the mould and process development.

Consulting Service

FROM INSPIRATION TO APPLICATION

INMATEC – by conviction!

EMPLOYEES' SENTIMENTS

„Learn something new every day and
enough free space for personal development.“

“Fairness with the employee, honesty with
the customer, professional work”

“Innovative, human, solid as a rock”

“Independent work requested,
innovation demanded”

“Solution-driven work”

INMATEC

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