

GERMANY

# KRAHN Ceramics New on the Market: Realize your Vision

At formnext 2019 in Frankfurt am Main, the newly formed KRAHN Ceramics GmbH presented itself for the first time to a wide international public. The company based in Hamburg sees itself as a project partner for the processing of ceramic and metal powders. Through all process stages, KRAHN Ceramics supports its customers, from the raw material to the finished component. The portfolio comprises products and services like powders and binders, preparation and shaping processes, debinding and sintering as well as surface finishing. KRAHN Ceramics is part of the KRAHN Chemie Group, which for realization of this novel business idea has, amongst other things, brought together two already well-known names: first the internal ceramics division of KRAHN Chemie GmbH, which has been established for thirty years, and second eMBe Products and Service GmbH, a specialist for the formulation of feedstocks for thermoplastic processing (pressing, extrusion, injection moulding) of ceramic and metal powders, which was acquired in May 2019. At formnext, Ceramic Applications met with Dr Stefan Stolz (StS), Managing Director of KRAHN Ceramics, and spoke with him about the need for a holistic project partner, hurdles hindering the launch of products on the industrial market and customer feedback at the trade fair.



Fig. 1  
Dr Stefan Stolz,  
Managing Director of KRAHN Ceramics

**CA:** What considerations have been triggered by the decision to strengthen the Technical Ceramics Division at KRAHN?

**StS:** Our many years of experience have shown that a holistic technology partner for the ceramics is missing from the market – someone who offers both: the development, selection and provision of raw materials as well as support during all downstream steps in the value creation chain, at the end of which is the independent, trouble-free production of components. We have observed that the bottleneck

in certain resources – for example, professional know-how or simply manpower – sometimes prevents our customers from launching new product ideas onto the industrial market. KRAHN Ceramics can immediately provide support here. For our extended services we see enormous potential in user segments where ceramics is not yet known or has not been tested as a material, even though it may be associated with numerous advantages.

**CA:** What idea is behind KRAHN Ceramics? What position do you want to take in the market?

**StS:** KRAHN Ceramics sees itself as an innovative project partner and idea provider who works together with customers to realize tailor-made solutions. The range of services covers the supply of raw materials (powder), the development of a suitable binder, the development of a dedicated feedstock and the right further processing to the finished

## KRAHN Ceramics: Technical Centre in Dinslaken

Ceramic and metal materials offer a wide spectrum of applications in diverse industries. In the automotive industry, the materials are used, for instance, in the interior or under the hood of vehicles. Moreover, they are suitable for the manufacture of a wide range of machine components in engineering, and enable in medical engineering the fabrication of high-performance implants, crowns and bridges as well as dental brackets. In the watch and jewellery industry, too, with the help of these materials, desirable designs can be achieved. But the application portfolio has not been exhausted by a long way – the advantages associated with ceramics and metals can be relevant for the realization of many future product ideas.

Key features of ceramic as a material are its high hardness, with the associated scratch resistance as well as refined haptics. In addition, the long lifetime and biocompatibility are material assets that are relevant for many medical applications. Not least the heat, chemical and mechanical resistance as well as the unique electric properties offer various advantages.

In the metals segment, especially in comparison with plastics, the higher temperature resistance and better mechanical stability as well as higher thermal and electrical conductivity should be emphasized.

Metallic or ceramic components are fabricated in a multi-stage process chain (Fig. 2)

### Process steps

#### Raw materials

The starting point for the fabrication of sintered ceramic and metallic components are raw materials in powder form. KRAHN Ceramics provides support in the selection and provision of these raw materials. KRAHN Ceramics also accompanies the realization of specific development projects with powders provided by the customers. For the processing, organic aids are always necessary, like, for example, binders. KRAHN Ceramics produces the majority of its product portfolio of organic auxiliaries itself, under the brand names Embelube®, Embemould® and kcmix®, and sells these coordinated to its powder portfolio. The product spectrum comprises binders for aqueous, solvent-based, thermal and catalytic debinding as well as special organic additives such as dispersants and plasticizers for material processing.

#### Formulation

For the development of formulations, KRAHN Ceramics draws on the product portfolio of organic substances from its own production, which are established on the market

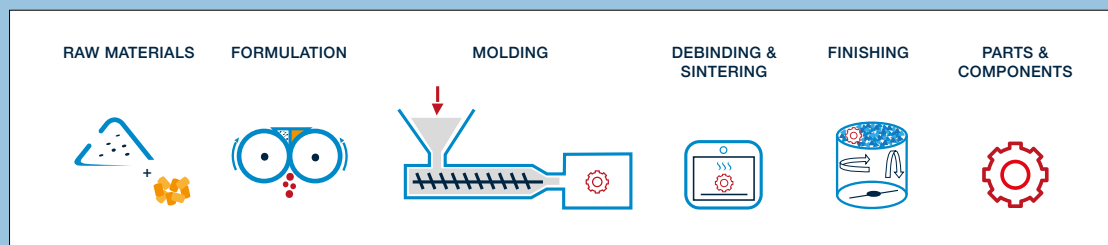


Fig. 2  
Process chain for the fabrication of metallic and ceramic components



Fig. 3  
Kneader for preparation of thermoplastic bodies

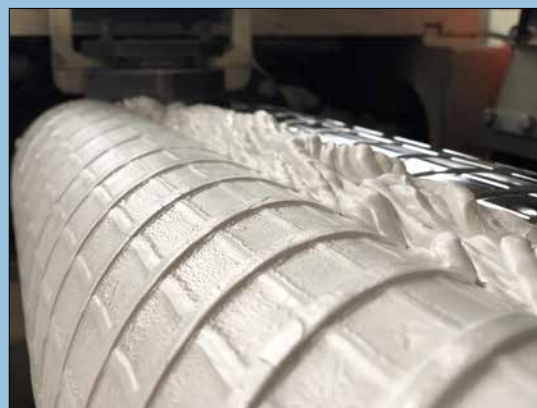


Fig. 4  
Shearing roller for preparation of customer-specific compounds



*Fig. 5  
Injection moulding unit for making prototypes*

and are steadily further developed. In this way, customer-specific ready-to-use product solutions (kcmold®) are created, e.g. compounds for thermoplastic processing, slips for casting processes, granulates for pressing applications or also filaments for Additive Manufacturing.

**Molding**

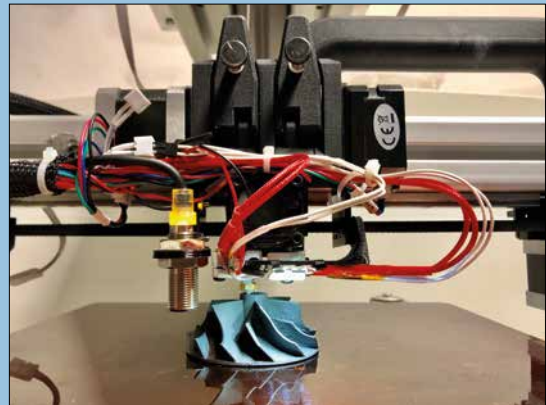
Testing and process development are performed in the company's own Technical Centre in Dinslaken. Typical shaping methods are pressing, injection moulding, extrusion, slip casting or tape casting. Sample models can be made fast for customers on filament printers with inhouse-developed metallic and ceramic filaments.

**Debinding/Sintering**

The debinding process is either purely thermal or based on a multistage process with upstream partial debinding with which debinding times can be shortened consider-



*Fig. 7  
High-temperature furnace for sintering*



*Fig. 6  
3D-printer during the production of ceramic and metal samples*

ably. Worth particular mention is environmentally friendly debinding with the help of water.

A technically usable component is realized subsequently with a sintering process in a high-temperature process. In the KRAHN Ceramics Technical Centre, these processes are trialed in collaboration with the customer.

**Finishing**

By means of vibratory finishing, required surface effects can be selectively achieved. Here, centrifugal disc, drag and stream finishers or bowl vibrators are used.

**Parts/Components**

In this way, processes evolve for components suitable for series production, which can be made in large unit numbers. KRAHN Ceramics supports customers at specific points with individual services as well as with the set-up of the entire process chains.



*Fig. 8  
Disc finishing machine for surface finishing*

part. Processing parameters over the entire process chain to the optimum shaping process are agreed in close consultation with our customers. Also the further processing of the shaped components, like drying, debinding and sintering as well as machining/finishing in the green or sintered state is part of the service at our new technical centre in Dinslaken.

**CA:** *Your aspiration to operate as a technology partner on the market is a high one. How can you realize comprehensive formulation developments?*

**StS:** My team has not only the relevant professional training, but also many years of field experience in the ceramics-producing and raw materials industries. In addition, with the integration of eMBe, we have taken over extensive formulation and processing know-how for ceramic and metal powders, which we can use in the development of new formulations.

**CA:** *How do you set your activities apart from those of your customers whom you supply with formulation components (raw materials/additives)? Is a new competition situation emerging?*

**StS:** No, on the contrary. We want to work with our customers to develop business with new products, and support them individually with the services they need. Especially for newcomers to the manufacturing of metal or ceramic components, support in the set-up of the process engineering is also part of these services. We coordinate joint product development to prototypes or small-scale production, the goal being for the customer to ultimately take over production independently. We are partners on eye-level and support our customers also in respect of the market placement of new products. We want to realize project ideas together with the customer – true to the KRAHN Ceramics motto: Realize your Vision.

**CA:** *With these services, can you envisage pushing ahead with a broader introduction of Additive Manufacturing (AM) in the industrial production of ceramics or facilitating companies specializing in other materials an entry into ceramics?*

**StS:** Yes, definitely. The placing of ceramics in even more interesting applications is one of the drivers for our vision. However, this not only applies to AM, but also for all powder processing technologies, e.g. injection moulding, extrusion and dry pressing. Besides ceramic powders, this applies similarly for metal powders. We regard AM primarily as an incubator as with these processes the possibility is created to advance to the prototype of a component in the shortest possible time. That is a crucial approach for us as a product developer.

**CA:** *With a very “fresh” stand at the formnext trade fair in Frankfurt am Main in November 2019, you presented your company to a very international trade fair public for the first time. How was the response from the domestic and international visitors?*



Fig. 9  
Team of KRAHN Ceramics at formnext 2019

**StS:** Extremely positive. We were particularly pleased that existing customers consider the concept to be right. At formnext, our employees were completely taken up with talks and giving out information – we have struck the right chord there. We were already able to hold lots of talks about concrete customer projects and those planned for the future. Particularly exciting was the interaction with trade fair visitors in which we were able to arouse their curiosity about ceramic and metal materials for the first time. For such contacts, formnext is the ideal marketplace because product developers from all sectors come to find out about solutions for projects or ideas for new products.

**CA:** *Are there any ideas to develop other services besides these new services along the ceramic technology chain?*

**StS:** Innovation is part of the DNA of KRAHN Ceramics – wherever a need arises for our customers, we proactively offer or develop solution. With the to-date unique business model of KRAHN Ceramics, we are already proving this. Today, we already offer a wide service and product portfolio. For us, the focus is utilize this possibility to the full and to successfully realize the many project enquiries together with our customers.

**CA:** *What geographic market cover are you planning for your widened services?*

**StS:** With KRAHN Ceramics, besides cultivating the European market, we have our eye on the USA and Asia. Here we can draw on the already established structures and networks of the OTTO KRAHN Group. Consequently we have internal access to a great deal of market-relevant information to be able to develop business.

**CA:** *Thank you for talking to us.*

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