

Injection-molded Ceramic Components Bring Smiles to Children

With ceramics, aesthetics and function now no longer have to oppose or compete with one another, a fact most effectively demonstrated by the dental crowns developed for children by FIMA CouronneTec GmbH & Co. KG. Kläger Spritzguss GmbH & Co. KG turned out to be the ideal company to mass produce these patented ceramic dental components.



Fig. 1
Crowns for deciduous teeth injection molded parts of zirconia

Whether grinding disks in coffee machines, nozzles for high-pressure cleaners, sprinkler systems, or filigree components for electrosurgery, the ceramic injection molding process (CIM) offers considerably greater freedom in parts geometry compared to machining processes – often with real cost benefits. CIM is also used in applications that were previously untenable.

Keywords
ceramic injection molding, ceramic parts (ZrO₂, Al₂O₃, ZTA/ATZ), PIM molds

Until recently, only the material itself and its outstanding properties have been highlighted. This is changing now that attractive and aesthetic components are becoming increasingly popular among designers, developers and engineers.

Most people are familiar with this visually impressive and smooth material from the watch and jewelry industry. In the meantime, ceramics are being used more and more by companies from the most diverse industries. For example, high-quality ceramic components used in automobile interiors or as operating elements for elec-

trical equipment and even eye-catching trim are helping innovative designers and their products to stand out from the crowd.

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Beautiful teeth improve quality of life, especially for children who still have their baby teeth

Despite good progress being made in reducing overall tooth decay, milk tooth decay continues to represent a serious problem in pre-school and school-age children. About every second or third child shows signs of carious lesions or fillings as a sign of previous tooth decay.

In extreme cases, if a tooth can no longer be repaired, the infected tooth is treated and then protected by firmly affixing a metal crown to the tooth. Not only does this “metal tooth” stand out, which can cause emotional stress for children, its

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material is nowhere near as strong or resistant as that of a natural tooth.

Partner company FIMA CouronneTec has successfully solved this problem by developing zirconium oxide crowns. A total of 8 different geometries each in 6 different sizes offers dentists the option of offering their young patients long-term provisional crowns for decaying baby teeth.

The material of choice is zirconium oxide. Already long established in the dental world, zirconium oxide has the ideal material properties for use in this industry. It is biocompatible, free of metals and therefore non-allergenic. It is hard, fracture-resistant and consequently stable over the long term. It is white and looks like a natural tooth. And, last but not least, the dentist can shape it down to the last detail so that it perfectly matches the tooth it is replacing.

Furthermore, this material has to be produced in the injection molding process which, in fact, remains the only forming process for manufacturing filigree, thin-wall (1/10 wall thickness) and complex components with their free form surface. CIM makes it possible to mass produce these tough and precise dental components cost efficiently. Outstanding material properties and the high design flexibility of the injection molding process create this extraordinary synthesis that ultimately makes implementing this idea feasible.

Kläger Spritzguss GmbH & Co. KG/DE turned out to be the ideal company to mass produce these patented ceramic dental components. Kläger is a full-service supplier for FIMA CouronneTec and therefore acts as its development partner and system supplier.

Located in Dornstetten in the Black Forest, the company designs tools, provides prototypes of them, prepares pilot series and handles serial production. This medium-sized company has about 100 employees and its core competence is precision injection molding. Kläger designs and manufactures high-precision injection-molded tools in-house and has been turning standard plastics, industrial plastics and high-performance ceramics into injection-molded products on behalf of brand name customers from the most diverse industries for decades.

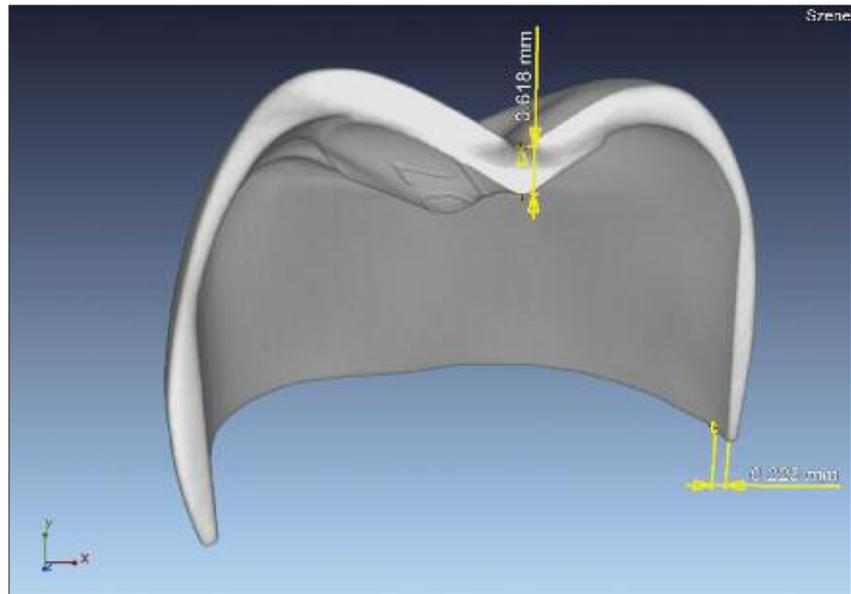


Fig. 2
Sophisticated geometry,
wall thickness between 0,225–0,62 mm

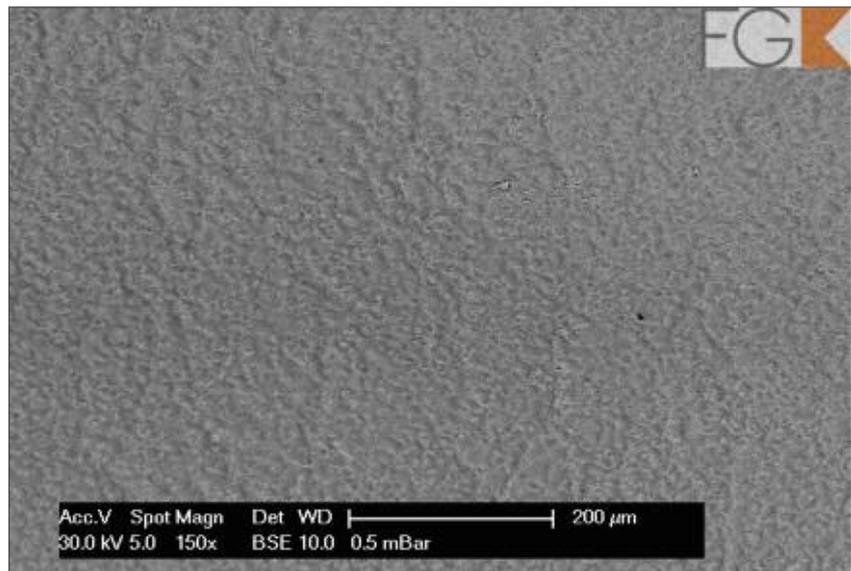


Fig. 3
Sappy structure

When it takes on projects, Kläger assumes complete responsibility along the entire supply chain, from engineering and mold construction to injection molding. The company's long-term experience, its high level of competence and the synergy effects generated from the company's interdisciplinary know-how enable it to complete projects quickly and reliably.

In addition to producing high-quality injection-molded plastic and high-performance ceramic products as "stand-alone products," Kläger also offers these products as hybrid assemblies produced from composites (ceramics/plastics/metal). When it comes to CIM, Kläger has taken a leading market position regarding quality, capacity and innovative strength.