

FRIATEC – 150 Years of Shaping our Future

FRIATEC AG is one of the leading international suppliers of corrosion- and wear-resistant materials made of ceramics and plastics.

Fig. 1

FRIATEC AG

- Founded in 1863
- Covering an area of approx. 350000 m²
- Almost 1100 Employees
- Turnover in 2012: EUR 172,5 million
- Specialist for corrosion- and wear-resistant materials
- Industrial activities: plastic products, mechanical engineering and industrial ceramics
- Modern congress center for customer training

(source: Friatec AG)



The technological roots of the company, which was founded as a brickworks in Mannheim, Germany, in 1863, are technical ceramic products made of corrosion-resistant, chemical stoneware. In the 1960s the company invested intensively in the production of plastics. In 1961 the development of alumina components was started, production began in 1963. In the year 1978, the company acquired the Degussit product group from *Degussa*, the first manufacturer of high-purity ceramics. The ceramic products business is now managed in a separate business division of FRIATEC AG. Other divisions are Technical Plastics, Building Services Division and Pumps.

FRIATEC in its anniversary year

In 2012 FRIATEC AG generated EUR 172,5 million in sales revenue. The export quota stood at 56 % (EU: 26,3 %, Asia and CIS: 18,6 %, America 5,9 %, others: 5,7 %). The costs for research and development (R&D) totalled EUR 5,4 million. The average workforce in the busi-

ness year 2012 was 1062 employees (including 800 at the Mannheim base plus 50 apprentices). Investments for renewing manufacturing equipment, optimizing production processes and modernizing the IT infrastructure amounted to EUR 5,7 million last year.

The employees' know-how forms an important basis for manufacturing outstanding products and ensuring high quality. It is extremely important to the company to foster new talent. With FRIATEC Junior-trade, a modern training company was created back in 1994, which guarantees the qualification of the young talent in a practice-oriented scheme. FRIATEC is combating the lack of a skilled workforce with internal apprenticeships and further training. This includes apprenticeships in five occupations as well as dual bachelor courses.

The anniversary year could be started on a firm footing. Despite weak forecasts for the global market as well as economic activity on the domestic market, FRIATEC expects a slight increase in the sales revenue over the next two years. FRIATEC is very committed to future markets requiring technological developments on the basis of ceramics. Proven competence in the field of ceramic-metal composite technology recently led to the company landing a major order from the *Institute of High Energy Physics* in Peking/CN for construction of the world's largest particle accelerator.

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Keywords

corrosion/wear-resistant ceramics,
high vacuum applications,
joining technologies



Fig. 2
Tubus/camera housing
(source: Friatec AG)



Fig. 3
Spacer can
(source: Friatec AG)



Fig. 4
High-voltage insulator for electron sources;
Ø 560 mm × 450 mm length (source: Friatec AG)

Ceramics-related milestones in the company history

In 1863 the foundation for the company was laid. With changing names and organizational forms – through “*Deutsche Steinzeugwarenfabrik*” and “*Friedrichsfeld GmbH*” to *FRIATEC AG*, the materials specialist has asserted itself over one and a half centuries of extremely eventful German history. This year *FRIATEC* is celebrating its 150th anniversary. In the following, important stations in history the ceramics perspective are listed.

- 1863 Founding of the „Reinhard’schen Ziegelwarenfabrik“ in Mannheim-Friedrichsfeld.
- 1874 First mention of clay pipes from Friedrichsfeld. Production of clay pipes was increased sharply in the 1880s.
- 1888 Production of chemical stoneware as a trail-blazing innovation.
- 1890 Growth in “clay pipes” required high investment. For this reason, the decision was taken to increase the capital and transform to *Badische Thonröhren AG*.
- 1900 Gold medal at the world exhibition in Paris for a corrosion-resistant stoneware container with a capacity of 6000 l. The development of acid-resistant containers for chemicals becomes more and more important. The company name had already been changed in 1894 to *Deutsche Steinzeugwarenfabrik für Canalisation und Chemische Industrie*.
- 1913 Supply of sewage systems for 180 German towns.
- 1924 Introduction of first tube presses.
- 1930 Expansion of the export market as chemical stoneware enjoys a high worldwide demand.
- 1950 Following losses caused by the Second World War, demand for stoneware pipes rose steeply as a result of the building boom. In

- 1956 two tunnel kilns were installed for firing these pipes.
- 1961 Development of alumina components and intensified cooperation with the Cremer Research Institute in Rödental, production 1963.
- 1979 Takeover of *Rhein-Plastik-Rohr*. In 1985, this led to the establishment of the Technical Plastics Division, which is still a mainstay for the company.
- 1982 Stoneware pipe production ceases as plastic replaces ceramics in most applications. Forward-looking development of laboratory bench tops made of ceramics.
- 1987 Renamed to *Friedrichsfeld GmbH Keramik- und Kunststoffwerke*. Technical ceramics has become very important. A restructuring process lasting several years reaches its conclusion.
- 1993 *FRIATEC* enters the capital market, and changes its name accordingly to *FRIATEC AG Keramik- und Kunststoffwerke*.
- 2003 The *Aliaxis-Group* takes over *FRIATEC AG*. With more than 100 companies, *Aliaxis* is the world’s largest manufacturer of PVC pipe systems for the construction industry, industry and utilities. *Aliaxis* employs 14 200 people and realized sales amounting to EUR 2,377 billion in the business year 2012.

The company history shows how *FRIATEC AG* has succeeded in remaining competitive and opening up new markets on the back of constant further development and restructuring whenever the markets have required it. Today *FRIATEC AG* is an internationally operating company supported by a broad base. Jointing technology for pipe systems, products made of high-performance ceramics and pumps for demanding fluids are just some of its innovative solutions.

Innovative solutions with ceramic components from FRIATEC

Already its forerunner Friedrichsfelder Tonwaren was a company that manufactured outstanding technical products. Worth special mention are the company's foundation developments in bioceramics in the 1960s. Tailored alumina materials for implants (hip joint ball and dental implants) were developed. These business lines were later sold as FRIATEC shifted its focus to applications in industrial markets.

FRIATEC's Ceramics Division concentrates on applications in mechanical engineering, the chemicals, foodstuffs and pharmaceuticals industries, medical engineering (X-ray systems and oncological radiotherapy), high temperature technology and electrical engineering, surface finishing, developments for fuel cells and high-tech components for scientific research (accelerator components, components for ultra-high-vacuum applications). Head of the Ceramics Division, *Dr. Reinhard Grybowski (RG)*, gave us an insight into FRIATEC AG's activities in this field.

CA: *FRIATEC supplies standard and speciality components. Do you make everything yourself or do you buy in parts?*

RG: Our depth of in-house production is the strength of our FRIALIT®-DEGUSSIT® product range because we have all process steps in-house from the purchasing of raw materials through tailored body preparation to the full spectrum of ceramic shaping processes, the necessary sintering processes to 1800 °C and green and hard machining or coating technology. Only in this way can we guarantee the highest quality and application-oriented material solutions from the broad range of oxide ceramics (alumina and zirconia). Complementing these materials, components made of silicon carbide and silicon nitride are produced based on green ceramic machining.

Our products are used whenever very high requirements have to be met. We meet the responsibility of producing

everything according to precise specifications in an accountable process to achieve relevant certification. We specialize in niche applications, i.e. production of small to medium unit numbers. Mass production of standard components is not how we work.

CA: *FRIATEC invests selectively in R&D. What are the most important areas of work in your development department?*

RG: R&D is driven strongly by applications. The work is multifaceted as it spans from supporting production technology, stewarding the product range to designing new components, with the assistance of FE simulation.

CA: *What new things have been recently introduced into your production technology?*

RG: We produce a significant percentage of large components. For this we operate an isostatic press (pressure: 2000 bar) for mouldings that are then green- and hard-machined. An additional state-of-the-art machining centre for finishing complex geometries and a large-size coaxial press (max. pressure: 160 t) have been recently commissioned. We have installed one of the largest lapping plants, which is used partly for contract work.

We possess extensive know-how in joining technology (soldering, gluing, clamping, shrinkage, cermet technology). This is a distinctive feature in our portfolio as we can develop customer-specific composite modules from ceramic/metal in collaboration with our customers' designers.

CA: *What product developments do you think are particularly important?*

RG: It is not necessary to push a specific topic into the foreground as the further development of existing products is just as important as creating new ones. Our product range is very dynamic as our customers are constantly improving their system solutions and we have to ensure that our ceramic components are adapted accordingly in time. Our specialists contribute their experience when it comes to ceramic-compatible design of new components, and as already men-

tioned, also with the help of simulation techniques.

CA: *The Pumps Division also uses ceramics in centrifugal pumps. Is it an advantage to have a user of ceramic components as a partner within the group?*

RG: Certainly we get feedback where ceramic proves indispensable or more economic than metal or plastic alternatives. Within the group, naturally a close development partnership has become installed. For new applications, that is essential. We also cultivate very good external relationships, e.g. with Siemens (medical engineering) or Zeiss (high-performance cameras). So, for instance, we were able to create ceramic-to-metal components for X-ray systems and radiotherapy or ceramic casings with a complex geometry for speciality cameras. With regard to scientific applications, I should mention cooperation partners such as DESY (Deutsches Elektronen-Synchrotron), the Jülich Research Centre, the Helmholtz Centre in Darmstadt, the Karlsruhe Institute of Technology, but also CERN in Switzerland. Here we have developed speciality ceramic-to-metal components for particle accelerators or individual concepts for vacuum chambers as well components for use in high-vacuum technology.

CA: *FRIDURIT Laboratory Technology is also affiliated to the Ceramics Division. Is acid-resistant stoneware still relevant there?*

RG: Chemical stoneware as a silicate ceramic has been a proven material for the production of laboratory bench tops and laboratory sinks for many years. Compared to other materials used for laboratory work tops, these products remain flawless and new-looking despite tough day-to-day laboratory work. This certainly has a future if you consider the growing requirements for laboratory quality standards. Resistance to chemicals, scratch resistance, heat resistance and hygiene remain key demands in laboratory operations.

CA: *Thank you for your comments. KS*