



TIETJEN VERFAHRENSTECHNIK

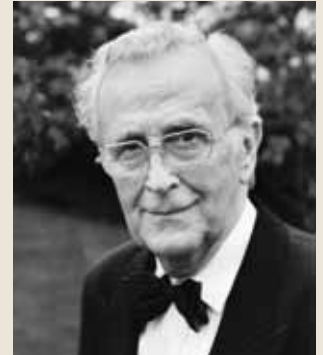
FOR A GOOD
BIOMASS DISINTEGRATION

TIETJEN
— DAS ORIGINAL —

FUTURE REQUIRES A HERITAGE



Hinrich Tietjen, 1891 – 1981



Johannes Tietjen, 1923 – 2006

The farmer and founder Hinrich Tietjen started in the 1920s with the preparation of pig feed. He was aware that not only feed constituents have a large impact on feed utilisation of animals and hence successful fattening, but especially the grain structure, deciding the amount of nutrients being extracted in the digestive system.

Complex biomass disintegration systems are our speciality. We design and manufacture disintegration system for many different biomasses.

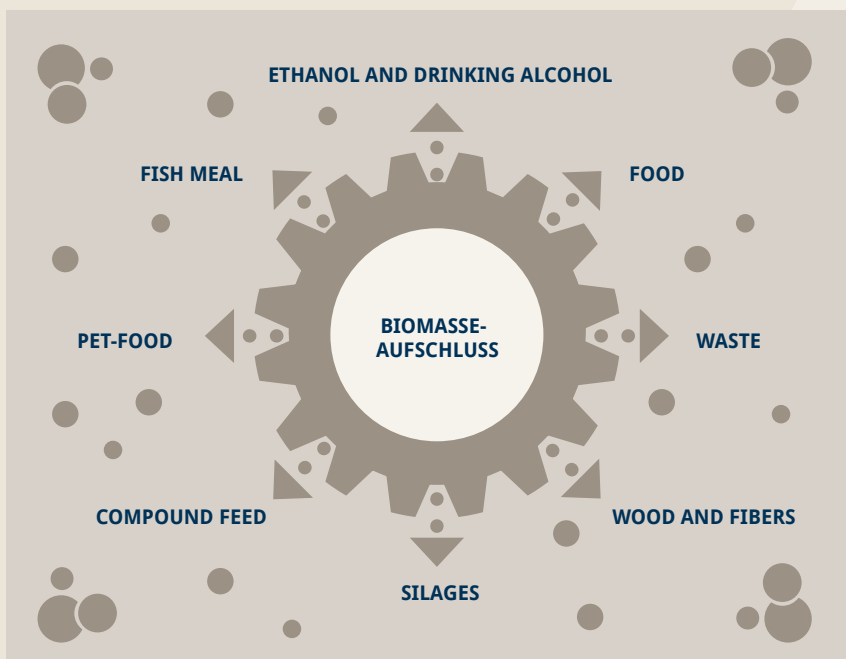
Various crushing machines were tried. When Johannes Tietjen, a trained engineer, took over the technical development, the first hammer mill was build in-house with a pneumatic control that was eventually patented internationally and in 1959 a separate engineering company was set up.

With the experience gained from their own feed production and engineering, father and son soon started to develop mills for wet milling. This enabled amongst other the wet processing of potatoes and beet and conveying with pumps. The company also developed plant engineering skills in addition to machine design.

The current owners Reimer Tietjen, Konrad Pumpe and Thomas Runde still manage the company with 40 staff like a family run company.

Over the last 50 years, since the supply of the first mill, over 2.000 systems have been supplied worldwide. New ideas are daily added.

This brochure is intended to present our services and products.





WHAT CAN WE DO FOR YOU? CONSULTING - DESIGN - CONSTRUCTION

We develop, design and manufacture disintegration systems for different biomasses in our factory in Schleswig-Holstein. This includes advice and project support as well as machine and plant engineering.

Complex biomass disintegration systems are our specialty. Thus our expertise includes not just the crushing technology but also the necessary infeed and convey-

or systems, including dust extraction and dust explosion protection as well as biogas substrate disintegration and separation of materials, each with the necessary pumps and separators.

We know that every customer has different requirements and objectives. Hence we try to understand the requirements of our customers first. Then together we define a common objective. We convince with experience, innovative ideas and proven products. Project management is support-

ted at all levels with a quality management system certified according to DIN ISO 9001. If there is something new to test, our stationary and mobile test equipment will be available.

Our staff is the key factor for our success. Their commitment and skills are continually enhanced. All employees perform project-based teamwork; Ideas and experiences are openly communicated. The focus is the collective, job security and thus the retention of knowledge and experience within the company.

We always strive to act in harmony with the environment. Equally important to us is our social responsibility that we practice at the company headquarter in Hemdingen and during the implementation of our projects worldwide.

We only do what we can do very well. The focus is on customers who appreciate us as professionals to realise their ideas.

We are happy to help



The Executives
Thomas Runde,
Reimer Tietjen and
Konrad Pumpe
(from the left.)



APPLICATIONS FOR EACH TASK THE BEST SYSTEM

Good solutions require experience and innovation. Typical for Tietjen is the combination of sound knowledge and the ambition to meet customer demands and be proud of a successful technical execution.



FEED & ETHANOL

High throughput - automatic operation

Excellent grain structures at high throughput rates are a prerequisite for a competitive feed production, but also for alcohol production. Hammer mills are among the most successful technologies in these industries and are used for the preparation of all cereals, oil crops, starch plants and by-products, single or as mix.

Tietjen systems disintegrate biomass mechanically. Impact crushing, is typically performed with a hammer mill, a cutting mill or a crusher or roller mill, each supplemented by suitable conveying and feed-in systems, vessels, dust removal engineering or pipelines and pumps.

FIBRES AND STALKS

Dry stalks or wet wood, we can do both

For fibre production, raw materials are cut, shredded or crushed depending on usage. Product qualities differ depending on grain sizes or fibre lengths.

Tietjen supplies equipment, machinery and complete plants for the processing of husks, stalks or grown wood in dry condition (dry grinding with aspiration) or with the addition of liquids (wet grinding).

For advanced fibre processing Tietjen systems are used, among other

- in power generation, e.g. alternative fuels, wood chips and straw for pellets
- in the construction industry, e.g. insulation materials, wood materials and filter media

- in animal husbandry, e.g. bedding material and feed
- in logistics, e.g. packaging materials and cardboard
- in food production, e.g. stabilizers, bulking agents and anti-caking agents

BIOGAS

The substrate disintegration that is effective

Sustainable biogas production requires an increase in efficiency for all types of gas plants, both in terms of technical equipment and flexible use of biomass. To achieve economic and environmental excellence, the maximum energy yield of materials and a cost efficient engineering is required that allows the best possible disintegration of energy crops, residue and waste streams.

Our hammer mills are among the most successful technologies for the processing of all cereals, oil crops, starch plants and by-products



Tietjen offers with Imprasy® a patented bio-mechanical process that disintegrates fresh masses down to the cell structure and simultaneously inoculates it with a biological additive. The combination of mechanical energy from an impact crusher and microorganisms enable the release of difficult to obtained nutrients, e.g. from woody fibres. The yield of raw material increases considerably and allows the use of hitherto barely used cellulose present in grass, solid manure and straw for biogas production.

FOOD RECYCLING & OFFAL

Waste recycling, separating biomass and packaging

Germany alone produces each year approximately fifteen million tons of organic waste from households, canteen kitchens, abattoirs and food manufacturing. This waste can be used as animal feed, for composting or as an energy source in biogas plants. In addition to the statutory framework, the use of such residues significantly depends on the proportion of inorganic or indigestible substances. The purity of organic waste is therefore of great importance for its subsequent use.

The Tietjen DRM-hybrid process allows for a simple and robust waste processing, the inorganic solids (e.g. packaging) and organic fractions with different dry matter

contents are cleanly separated and disintegrated in one operation. DRM-hybrid is used by the German market leader in food recycling, but is also available as a compact system for smaller facilities.

Another specialty is the wet macerator BiMix series for slaughterhouse waste of any kind. All processing systems are seamlessly incorporated by Tietjen into existing processing chains.

Tietjen offers the complete programme for every application.



DUST EXPLOSION PROTECTION

Grinding dry biomass often creates combustible dust that can cause an explosion. Manufacturers and suppliers, investors and operators are accordingly obliged to minimize that risk. This requires the compliance with national and international directives.

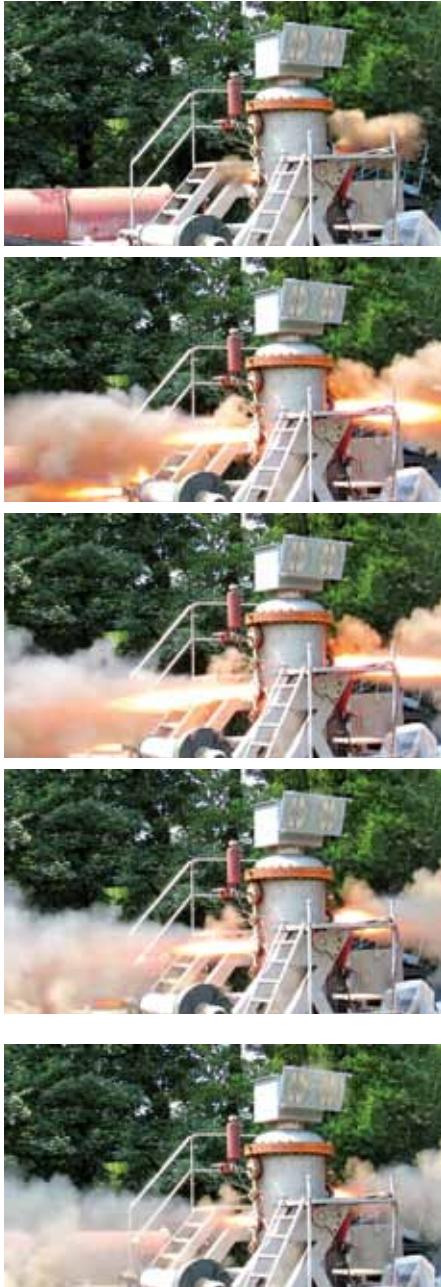
For over 20 years Tietjen designs preventative and constructive dust explosion protection in a variety of industries, to ensure systems are safer today. Tietjen products have been independently tested and certified in explosion tests by certification bodies under EU law.

Explosion protection measures must be implemented safely and practicable. Tietjen offers consulting expertise with practi-

cal relevance and thus the best conditions for economic solutions.

As an independent service our explosion protection experts analyse the risks in your system and offer advice from risk assessment to an explosion protection concept.

Efficient dust explosion protection - practical and compliant



Tietjen has contributed through its own research and development of pressure venting systems that milling plants are safer today.

The Tietjen Aspiration valve A-VENT shuts air intakes in case of an explosion or deflagration and will remain shut until the pressure is reduced.

Tietjen uses ignition and flameproof rotary valves as type-certified protection systems for explosion isolation.





PLANT ENGINEERING ACROSS INDUSTRIES AND INDIVIDUALLY OPTIMIZED

We develop solutions for a process to your specifications either as module supplier to you or in charge with overall responsibility. The objective is a maximum an economy, safety, reliability and ease of use.

ADVICE FROM THE START

We develop your ideas with our expertise, within the legal requirements and local conditions. We like to understand your philosophy and define the needs of time, money and resources.

PROJECT MANAGEMENT AND COORDINATION

On your behalf, we perform a quantity survey on site and assist you with concepts, talk to your civil engineer and energy provider. If required, we interact with municipalities and other regulatory agencies.

DEVELOPMENT AND TESTING

It is not always possible to solve problems immediately. Any new ideas might require trialling. We have stationary and mobile test equipment available as well as our own laboratory and a network of institutions and scientists that we can call on.

PLANNING & DESIGN

Sound planning provides information for decision makers and performers. Factual dependencies are represented across different levels. This requires drawings and images that we create with appropriate CAD systems with the smallest detail in 3D.

PRODUCTION & ASSEMBLY

Machinery and plant components are manufactured to design specifications and delivered and installed on time as agreed.

If everything comes from a single source, many questions can be answered quickly. We assume responsibility for you.

COMMISSIONING & TRAINING

Checking and acceptance of equipment confirms especially contractually guaranteed characteristics. We also ensure that aspects of operational safety were observed, the legal requirements are met and appropriate introduction and training of operating personnel enables a professional maintenance and inspection. Frequently training is repeated after some time. We care about every little detail to your satisfaction.



**AUSTING FEED MILL,
DAMME / GERMANY:**

High volume production of feed for agriculture.



**BIOGAS PLANT MEILNER,
WURMANSQUICK / GERMANY:**

Disintegration of fermentation substrate with Imprasyn® enables 15% more gas yield and conversion of feed materials of up to 85% whole grain-type plants and grass silage.



**MARS PETCARE SITES IN SOUTH AFRICA, BRAZIL,
AUSTRALIA, CHINA, GERMANY, GREAT BRITAIN
AND THE UNITED STATES:**

Preparation of compounds for dog and cat food. Planning and implementation of complete milling lines from one source.



**PRESIDENTIAL INITIATIVE ON BANANA INDUSTRIAL
DEVELOPMENT, NYARUZINGA / UGANDA:**

Preparation of dried bananas as starch carrier. Indestructible technology for remote locations, on-time start-up and on-site training.



**GLEN TURNER,
BATHGATE / SCOTLAND:**

Crushing of wheat for whiskey distillery with annual alcohol production of 25 million litres. Wet milling enables lean plant design with no dust pollution or explosion hazard.



**AGRANA,
PICHELSDORF, AUSTRIA:**

Disintegration of 500,000 metric tons of cereals per year to produce bio-ethanol and protein feed. Plant with explosion-proof dry milling.



**SEPARATING AND CRUSHING OF PACKAGED
FOOD WASTE AT SEVERAL LOCATIONS FOR A
LEADING RECYCLING COMPANY.**

Effective separation of organic and inorganic waste.



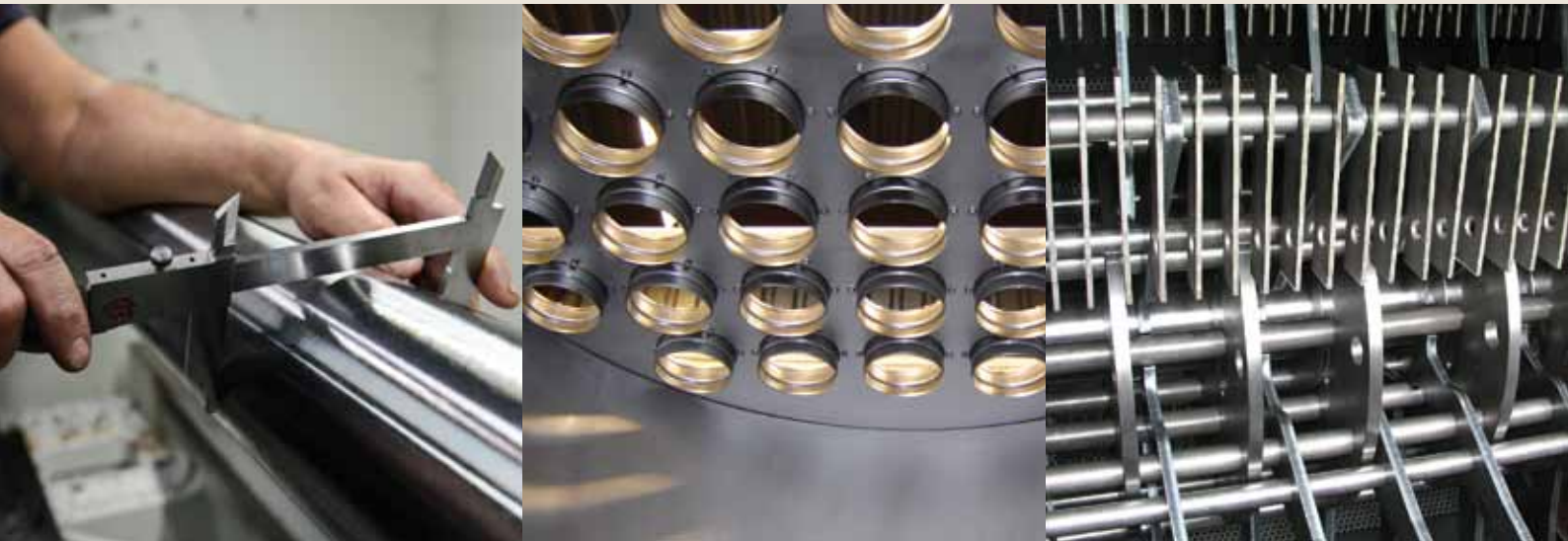
**PELET GRUPA,
NOVSKA / CROATIA:**

Crushing of fresh wet wood for pellet production. Production of suitable particle size without regrinding.



**FISH PROCESS COMPANY,
QESHM/IRAN:**

Fishmeal production for the feed industry. Defined product requirements for the industry with changing raw materials.



PRODUCTS

TIETJEN - THE ORIGINAL

Tietjen products are recognized for over 50 years. This has developed a strong customer focus over the years and a comprehensive knowledge of upstream and downstream processes for biomass disintegration. This creates trust.

For the benefit of our customers Tietjen offers a range of proprietary products. The focus is mill construction, characterized by

- best quality of all products
- advanced technologies
- fast and always available service

HAMMER MILLS

Tietjen produces 48 types of hammer mills that are optimized for every purpose, from simple, self-feeding milling systems for a small business to large computer-controlled industrial sized mills with automatic screen change for a 24-hour operation without staff. The machines operate worldwide in all conditions, are robust and easy to maintain and allow especially energy-efficient operation. The drive powers vary from 11 to 450 kW.

All mills and dosing equipment for dry milling with aspiration air and filtration are pressure shock resistant and flame proof. They were tested in explosion tests and certified accordingly, to meet the highest demands for reliability, e.g. ATEX Directive 94/9 / EC.

Tietjen hammer mills are considered to be extremely reliable and durable. For decades they meet world wide a variety of individual crushing requirements.

We support you with integrating our mills into your plant concept.

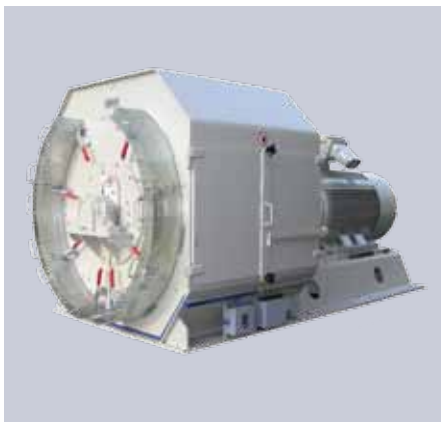
Even for 20 year old mills, we still supply any spare part. We are proud of that and our customers rely on us.

Complete programme for dry and wet crushing

HAMMER MILLS FOR DRY MILLING

- Single milling of grains and oilseeds
- Mixed milling of feed formulation
- Fibre disintegration: Separating and shredding fibres

High throughput – automatic operation



HAMMER MILLS FOR WET WOOD PROCESSING

PIONEER, Wide chamber mill for fine grinding of wet wood with up to 55% water content. Production of particle sizes suitable for pellet production without regrinding.

Can do wet and dry



IMPRASYN SUBSTRATE DISINTEGRATION

The ruminant for the biogas plant:

- Synchronous impact crushing and inoculation of the fermenter contents with microorganisms
- Better fermentability of fibre-rich feedstock (e.g. manure and grass)
- Higher gas yield

The substrate disintegration that is effective



DRM-HYBRID

- Precise separation of organic and inorganic material in one operation
- Crushing of biomass as legal requirement for hygienisation

For best recycling of packaged food



GDX TECHNOLOGY

- fully automatic screen and rotation direction change with the machine running
- variable speed with frequency inverter
- up to 355 kW at FI
- proven under the toughest endurance conditions

Saves time and money when milling

Product replacement in a few Seconds by fully automatic screen change with the machine running



DOSING EQUIPMENT AND CONVEYORS

Whether packaged or bulk material, dry, liquid or gaseous: General requirements for conveyor systems are a safe, careful and energy-efficient transport and precision dosing within a load-dependent process.

Tietjen focuses on its core competency: Material handling and dosing fixtures for systems to process natural products.

- mechanical transport
- pneumatic transport
- hydraulic transport

**The best path – cost-efficient,
fast, reliable**

SEPARATION TECHNOLOGY

A part of known separation methods are mechanical separation processes. Solids should be removed from a gas or a liquid with gauze. In a disintegration process of natural products, where dust is generated, Tietjen recommends technically simple and robust dust collection equipment:

- pocket or bag filter for separation of dry dust
- cyclones, for example, for product separation during pneumatic conveying
- separators (drum cleaners) to separate lighter solids, e.g. fibres and stalks

DUST EXPLOSION PROTECTION

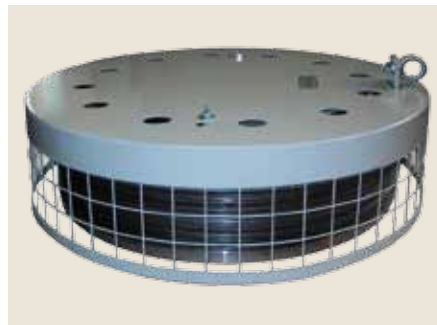
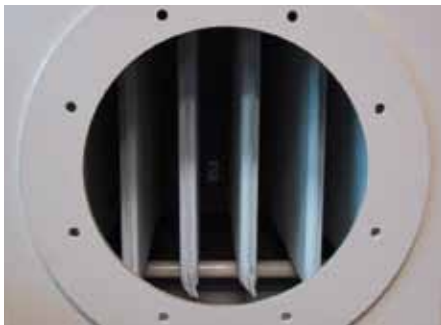
Tietjen has contributed through its own research and development of pressure relief systems that milling plants are safer today.

All Tietjen products that can be used in dusty environments or disintegrate flammable substances, are build and tested explosion pressure shock resistant and flame proof to a reduced explosion pressure of 0.4 bar.

Dust explosions pose enormous risks. Tietjen safety technology meets the necessary safety requirements and comes with EC Declaration of Conformity according to the ATEX Directive 94/9 / EC (ATEX 100a), also available with CE declaration for the overall system in accordance with EC Machinery Directive 2006/42 / EC (Annex II B).

For an economical constructive explosion protection we offer:

- safety slide above the inlet of feeders
- aspiration valve for safe air inlet (A-Vent)
- relief valves to release pressure from mill plants (E-Vent)
- flame proof rotary valves
- fire protection equipment according to local conditions



Advanced technologies and traditional crafts are not a contradiction for Tietjen. Best quality and durable products for many years are the result.



SERVICES

WE ARE OPEN FOR YOU AT ANY TIME

Many years of experience and innovative thinking are the basis of our services. For individual international projects we rely on a network of reliable and powerful partners.



MAINTENANCE & REPAIRS

Our experienced installation team performs reliable and on time service and repair of your equipment on-site or in our workshops. Our aim is to keep your production downtime to a minimum. Therefore, the work will frequently take place at weekends. For long-term reliability, we offer a periodic inspection, which is contractually agreed and guarantees a reliable and robust documentation. Of course you can also count on us in case of emergencies.

SPARE PARTS SUPPLY

A significant part of our business is the supply of consumables and spare parts. Deliveries are made from our central warehouse in Schleswig-Holstein (Germany) usually within 48 hours of order, in case of an emergency even faster. We ship worldwide with selected reliable freight forwarding and courier services. We are happy to obtain for you any external parts at short notice.

**We guarantee the availability
of spare parts for at least 20 years**

MILESTONES

For nearly 100 years, we promote innovation and do not forget this tradition. Associated with that are smart people, especially many customers who inspire us with their ideas.

1924: The farmer Hinrich Tietjen begins to improve feed for his own livestock with various devices. He wanted more eggs, more milk and more meat with lower feed consumption. As electrical supply, he built a 25m high lattice tower with a wind turbine that drives a generator.



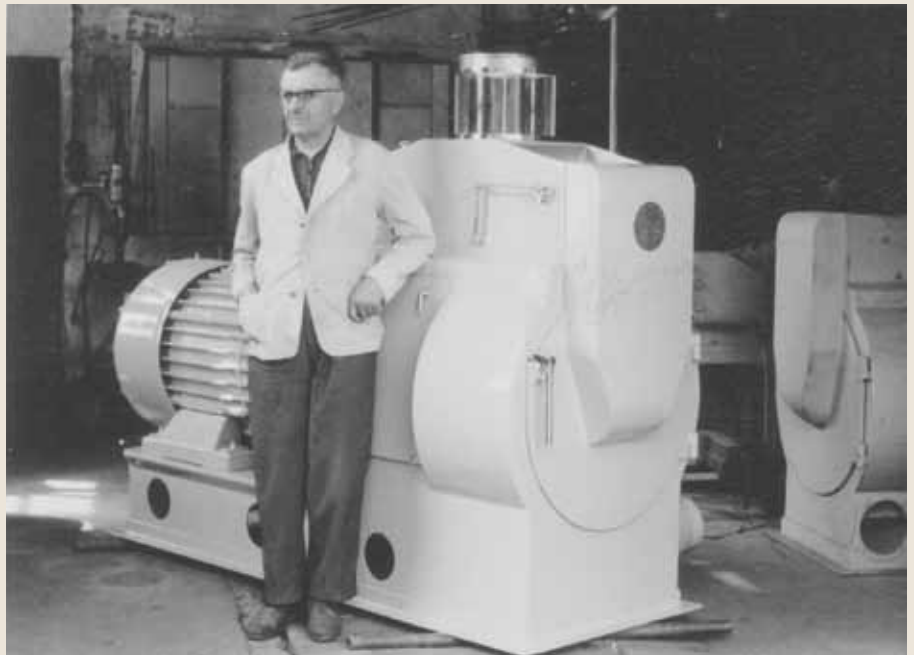
1925

1932: Buildings destroyed by fire. The reconstruction also includes modern equipment for mixed feed production for the local market.

1957: The mechanical engineer John Tietjen joins the company and assumes the development of technical systems from his father. His brother Herman continues to produce animal feed.

1959: Tietjen machine and mill construction is established. Based on a self-conveying, self-regulating machine, the production of the TURBO AUTOMATIC MILL commences

1962



with power ratings up to 75 kW. The controller receives worldwide patent protection. Our own farm is abandoned.

1965: Feed manufacturers demand higher throughput rates. Tietjen responds with new ranges and power ratings up to 200 kW. The first machines are exported to France and Sweden.

1967: The Company expands and builds new production capacities near the old site.

1974: Feed production is internationally more and more automated. Tietjen produces a new series, the LDX, used within a 2-stage milling system with intermediate screening. The screen change takes only seconds and is remotely controlled and fully automatic while the machine is running.

1979: The industry demands ever greater performances. Feed is produced industrially in 3-shift operations. Tietjen provides large capacity hammer mills with up to 450 kW power and with shortest acceleration and deceleration times and fastest hammer change according to the motto „keep the grinder running“.



1961



1975

1985: The aircraft engineer Reimer Tietjen joins the company, first as an assistant manager. The aim is to strengthen research and development work in all areas of bio-mass processing.

1990: Reimer Tietjen establishes the Tietjen Verfahrenstechnik GmbH and develops, parallel to the family business, additional projects for plastic recycling.

1992: The industrial sized mill GDx with remote-controlled, fully automatic screen change, while the machine is running, is the new flagship of the company. With variable speed the mill meets demands for highly variable mill materials at throughput rates of up to 80 tons per hour.

1993: The New Generation follows: Reimer Tietjen takes over from his father Johannes and is now responsible for the management of the company and thus the social obligation for the benefit of its staff.

1993-94: In advance of new legislation on occupational safety such as the EC Machinery Directive, cooperation with the trade association in Germany starts, to demonstrate the pressure shock resistance and flame proof safety of Tietjen devices and to impact new rules for better practicality.

1995: The programme is expanded with one- and two-shaft sword crushers, designed and tested for use in the chemical industry.

1998: Company restructuring: The machine and mill construction company is integrated into the Tietjen Verfahrenstechnik GmbH. The new name corresponds to the extended field of activity and expertise in plant construction and process engineering.

2005: With the DRM-hybrid system, the company is launching another innovation. At its heart is a double rotor mill to unpack food and simultaneously crush the content.

2011: After four years of development IMPRASYN®, the substrate preparation for biogas production is launched and patented. For the first time a mechanical process is combined with a biological process.

2014: The Company expands. New buildings are commissioned at the site Hemdingen, in order to provide additional services to meet customer demand..

2014



TIETJEN

— DAS ORIGINAL —

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