

# PERFECT TREATMENT FOR OPTIMIZED UTILIZATION

SOLUTIONS FOR THE FEED MILLING INDUSTRY AND  
ETHANOL PRODUCTION

02 | TIETJEN FOR THE FEED MILLING INDUSTRY AND ETHANOL PRODUCTION

## GOOD TREATMENT = GOOD DIGESTION.

No two digestive systems are the same – this is true for animals as well as for the artificial digestion taking place in the process of ethanol production. In every application the individual requirements have to be considered. We know most of them and develop individual solutions for individual needs in the feed-milling and ethanol industry worldwide.

### TAKING CARE OF THE DETAILS

An ideal treatment considers subsequent steps – whether they happen to be an animal digestion or a mechanical treatment. The basic rule is: "As coarse as possible, as fine as necessary."

Additionally several aspects of the components treated have to be taken into account: What is the oil, fat or water content? What about fibres and starch, the type and content of proteins? Moreover, timing aspects might be crucial as most of the products go through important changes during their time of storage.

### WE ARE PARTNERS

For decades we have been dealing in detail with grinding plants and know about the diversity of your needs for the production of high quality feed (livestock, aquatic feed or pet food) and in the production of ethanol (bio-ethanol, potable alcohol, brewing).

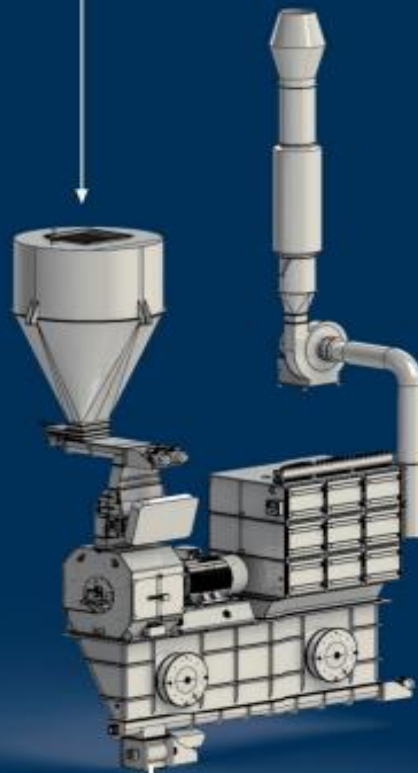
**Use our experience for your success!**

### THE RIGHT SOLUTION FOR EACH APPLICATION!



TJETJEN FOR THE FEED MILLING INDUSTRY AND ETHANOL PRODUCTION | 03

# IT ALL DEPENDS ON FINENESS.



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TIETJEN – GRINDING TECHNOLOGY

# HAMMER MILLS – OUR SPECIALTY.

We have been building hammer mills since 1956, now 48 different types for every need. More than 2000 systems have been delivered, custom-made, from the simple self-feeding grinding plant for the small business, up to the computer-controlled, large-capacity mill with automatic screen change for a 24-hour operation, without high personnel costs.

The machines run in all conditions worldwide, they are built to be robust and easy to maintain. The special design allows for a particularly energy-efficient operation. The power ratings vary from 11 to 450 kW. Tietjen hammer mills are considered extremely reliable and durable. For decades they have fulfilled a multitude of individual applications in particle size reduction.

**We have the right mill for your needs!**

Flexibility

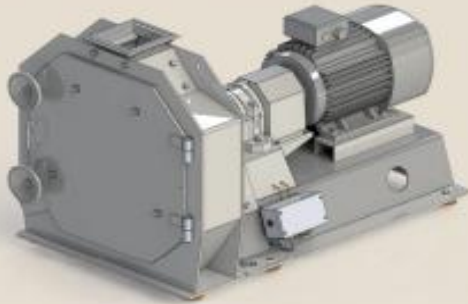


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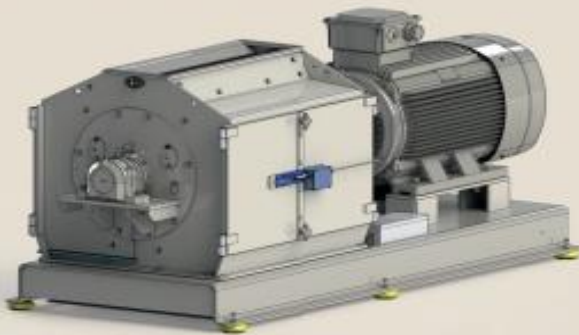
TIETJEN – GRINDING TECHNOLOGY

# ALWAYS AT FULL SPEED – THE HIGH-SPEED MILLS.

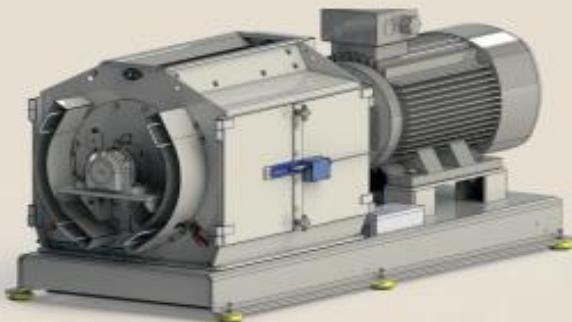
HIGH-SPEED MILL – TYPE VL



HIGH-SPEED MILL – TYPE VDK



HIGH-SPEED MILL – TYPE LDE



**HIGH-SPEED MILL**

The high-speed mill – the robust universal machine for the smaller to medium throughput.

- Optimized for coarse and fine grinding
- Speed between 1800 - 3600 1/min (30 - 60 Hz)
- Symmetrical housing, allows operation in both directions of rotation
- Hardened, swivel mounted inlet flaps at the type VL
- Hardened inlet flap with position switch for direction of rotation change for types VDK and LDE
- Hardened impact plates on both sides of the inlet
- Foreign body catch trap inside the grinding chamber
- Special rotor design, dynamically balanced, short run-down time
- Automatic door lock with standstill monitoring
- Tested and certified in shock-resistant and flame escape proof design up to 0.4 bar

**TYPE VL**

- Universal hammer mill for smaller throughput
- 2 screen segments, screen change without tools while the machine stands still

**TYPE VDK**

- Robust hammer mill for medium throughput
- 2 screen segments, screen change without tools while the machine stands still

**TYPE LDE**

- Robust hammer mill for medium throughput
- 2-screen segments fitted in screen cages, manual screen change while the machine is running (idling)

Typical grinding performance

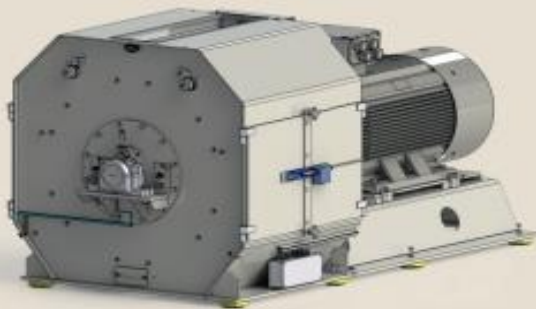
Hammer mill	broiler feed ø 3 mm	cattle feed ø 4 mm	pig feed ø 3,5 mm	wheat ø 3 mm	corn ø 3 mm
VL series	2 - 7 t/h	2,5 - 9 t/h	1,5 - 5,5 t/h	1,5 - 5 t/h	2 - 8 t/h
VDK series	6 - 40 t/h	5 - 45 t/h	3,5 - 30 t/h	3,5 - 29 t/h	5,5 - 45 t/h
LDE series	6 - 32 t/h	6 - 35 t/h	4,5 - 25 t/h	4,5 - 23 t/h	6,5 - 36 t/h

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## TIETJEN – GRINDING TECHNOLOGY

# COULD THERE BE A LITTLE MORE? OUR LARGE-CHAMBER MILLS.

### LARGE-CHAMBER MILL – TYPE GD



### LARGE-CHAMBER MILL – TYPE GDL



### LARGE-CHAMBER MILL

The Large-Chamber Mill, the power pack for maximum throughput.

- Optimized for coarse and fine grinding
- Speeds between 1000 - 1800 1/min (34 - 60 Hz)
- Symmetrical housing, allows operation in both directions
- Hardened inlet flap with proximity switches to sense change of direction
- Hardened impact plates on both sides of the inlet
- Foreign body catch-trap inside the grinding chamber
- Special rotor design, dynamically balanced, short run down time
- Beater changes in a few minutes using a beater-frame-system (Cassette exchange)
- Automatic door lock with stand still monitor
- Tested and certified in a pressure shock-resistant and flame escape proof design (ATEX category II 3) up to 0.4 bar

### TYPE GD

- 4 screen segments, screen change without tools while the machine stands still

### TYPE GDL

- 6 screen segments, screen change without tools while the machine stands still

#### Typical grinding performance

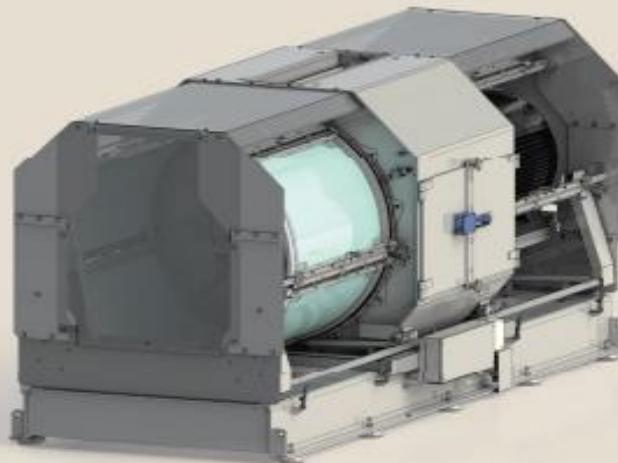
Hammer mill	broiler feed ø 3 mm	cattle feed ø 4 mm	pig feed ø 3,5 mm	wheat ø 3 mm	corn ø 3 mm
GD series	10 - 70 t/h	12 - 80 t/h	9 - 50 t/h	10 - 50 t/h	14 - 75 t/h
GDL series	14 - 70 t/h	16 - 80 t/h	11 - 50 t/h	14 - 50 t/h	17 - 75 t/h

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TIETJEN – GRINDING TECHNOLOGY

# THE ALL-ROUNDER – LARGE-CHAMBER MILL TYPE GDX.

The Hammer Mill GDX is designed for grinding compound feed, with frequently changing requirements, in the feed structure. The fully automatic screen change makes it possible to quickly change between two screen perforations by mouse click, while the machine is running. Together with a frequency converter (FC) controlled drive, this results in a maximum of variability in terms of the grist spectrum (see page 9).



## LARGE-CHAMBER MILL TYPE GDX

The large-chamber mill GDX – the specialist for maximum flexibility and different structures. By means of a sliding frame, eight screen segments can be combined for specific changes in the particle size distribution of the grist, without having to change screens.

- Optimized for coarse and fine grinding
- Speed between 1000 - 1800 1/min (34 - 60 Hz)
- Automatic screen change while the machine is running (idling)
- 8 screen segments, can be combined in any way
- Control cabinet for screen adjustment
- Strong welded-steel construction with symmetric design, allowing rotation in both directions
- Hardened inlet flap with proximity switches to change direction of rotation
- Large hardened impact plates at both sides of the mill inlet area
- Catch-trap for foreign bodies inside the grinding chamber
- Special rotor design, dynamically balanced, short run-down time
- Special beater fastening in support frames (cassette-exchange), beater change in just a few minutes
- Automatic door lock with stand still monitor
- Tested and certified in a shock-resistant and flame escape proof design (ATEX category II 3) up to 0.4 bar

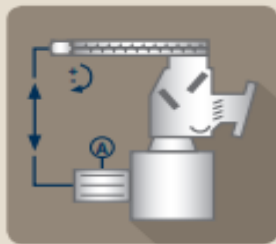
Typical grinding performance					
Hammer mill	broiler feed ø 3 mm	cattle feed ø 4 mm	pig feed ø 3,5 mm	wheat ø 3 mm	corn ø 3 mm
GDX series	14 - 60 t/h	16 - 70 t/h	11 - 45 t/h	14 - 45 t/h	17 - 65 t/h

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## TIETJEN – GRINDING TECHNOLOGY

# PERFORMANCE-ORIENTED DOWN TO THE LAST DETAIL.

Feed recipes and other raw materials are ground efficiently when the following parameters of the grinding system are in harmony:



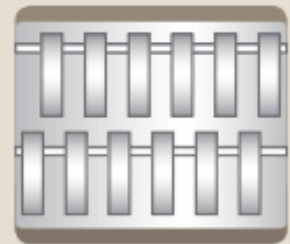
Load dependent dosing of the raw material into the grinder



Chamber load, i. e. relationship between grinder size and drive power



Grinder chamber design, especially at the impact zones



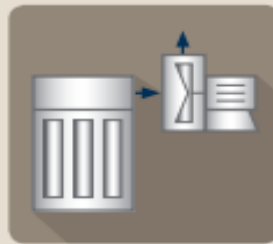
Hammer configuration in relation to screen width



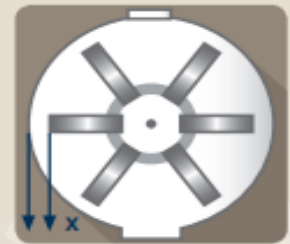
Energy input, i. e. tip speed/ peripheral speed of the tools



Screen configuration, i. e. relationship between perforation, screen size and plate thickness



Aspiration and dust separation of a system



Distance between beater and screen

The grain structure is mainly determined by the energy input, the beater configuration and the beater peripheral speed. The screen only limits the maximum grist size.

The beater tip speed is calculated by the motor speed and the rotor diameter.

High Speed Mill VL/ VDK/ LDE = 104 –124 m/sec  
 Large Chamber Mill GD/ GDL/ GD<sub>X</sub> = 94 –112 m/sec



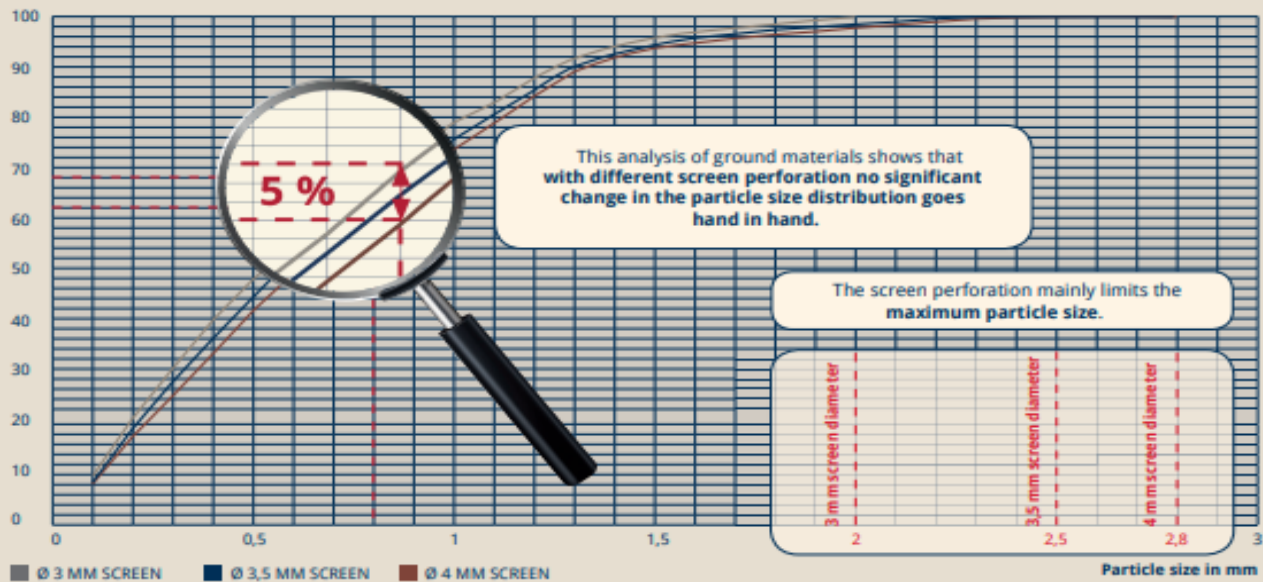
## TJETJEN – GRINDING TECHNOLOGY

The two diagrams show the two most important factors influencing the grinding process. Although the particle size distribution of the ground product (wheat in our example) can be manipulated by changing the screen diameter, the effects are significantly lower than with the variation of the speed. On the other hand the

change in the rotational speed has a significantly greater effect on the particle size structure. A speed-controlled Tietjen GDx large-chamber mill with speed drive, together with the fully automatic screen change, offers you all the options for producing the most particle size structures.

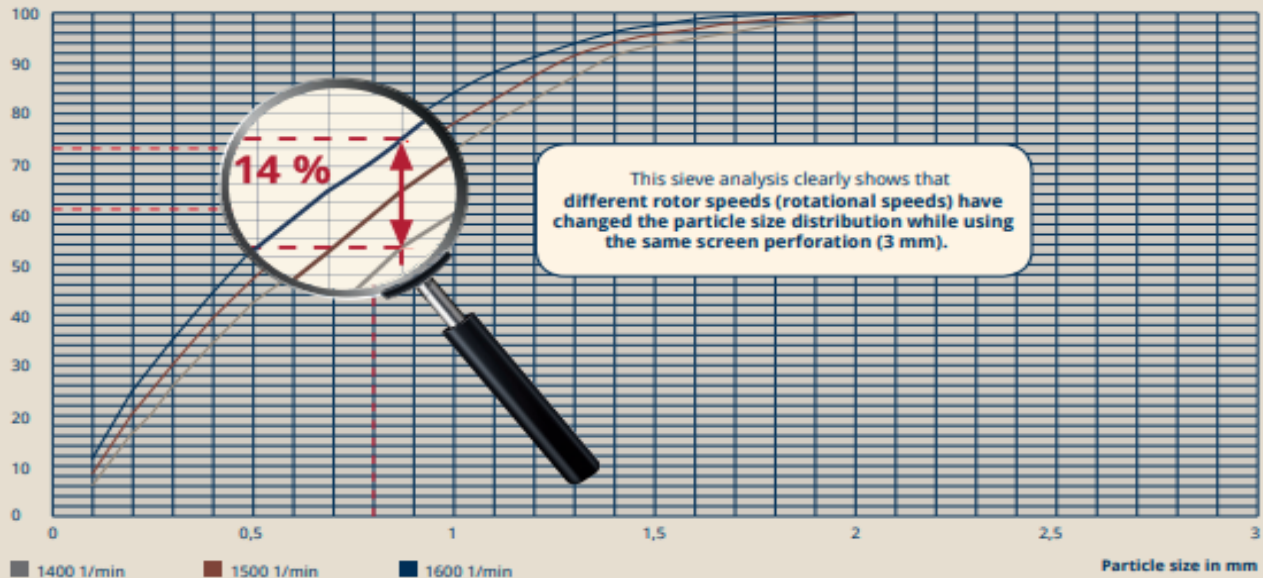
### INFLUENCE OF THE SIEVE DIAMETER ON THE PARTICLE SIZE DISTRIBUTION

Passage in %



### INFLUENCE OF ROTATIONAL SPEED ON THE PARTICLE SIZE DISTRIBUTION

Passage in %



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## TIETJEN – GRINDING TECHNOLOGY

# WELL FED – OUR FEED SYSTEMS.

Only with the optimum feed, and with the right dosage of feed, the grinding system can be operated efficiently. The distribution of the feed material across the whole width of the hammer mill has a significant influence on the grinding process and ensures a lower wear operation. All feeders also serve to supply the aspiration air for the grinding process.

**Tietjen offers the appropriate feeding technology, tailored to the product characteristics and the structural situation in the plant!**

- 1 Air gravity separator (AGS) with dosing screw
- 2 Drum feeder (DA)
- 3 Vibration feeder (R)



Hammer mill for grinding the product

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#### AIR GRAVITY SEPARATOR TYPE AGS WITH DOSING SCREW



The **air-gravity separator type AGS** is suitable for the continuous separation of foreign bodies from bulk materials. Dosing is carried out in combination with a dosing screw, which can also transport difficult-flowing bulk materials, such as flour, and can be used for transport.

- Magnetic cascade with 2 magnets for the separation of magnetic impurities
- Air separation of non-magnetic impurities by the aspiration air
- Easy cleaning through side doors and pull-out magnets and foreign-body catch trap
- Load-dependent dosage in combination with frequency controlled dosing screw
- Tested and certified in shock-resistant and flame escape proof design up to 0.4 bar

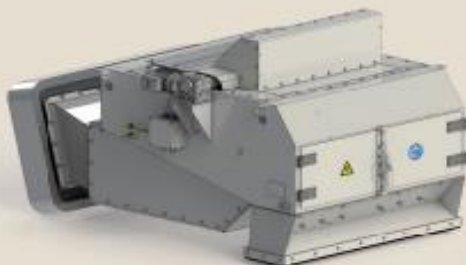
#### DRUM FEEDER TYPE DA



The **drum feeder type DA** is suitable for the continuous separation of foreign bodies from bulk material. The compact design and the feeding of the mill directly from the pre-bin characterize this variant.

- Magnetic cascade with 2 magnets for the separation of magnetic impurities
- Air separation of non-magnetic impurities by the aspiration air
- Easy cleaning through side doors and pull-out magnets
- Sliding door for cleaning the foreign body catch trap
- Load-dependent dosing in combination with frequency converter
- Manual layer height adjustment, automatic layer height adjustment as an option
- Pneumatic shut-off flap for explosion insulation and for shutting off the feeder
- Tested and certified in shock-resistant and flame escape proof design up to 0.4 bar

#### VIBRATION FEEDER TYPE R



With the **vibration feeder type R** free-flowing bulk materials can be conveyed and dosed. In addition, it is suitable for poor-flow materials and bulky products.

- 1 magnet for the separation of magnetic impurities
- Easy cleaning through front door and swing-out magnets
- Load dependent dosing in combination with thyristor control
- Manual layer height adjustment, automatic layer height adjustment as an option
- Tested and certified in shock-resistant and flame escape proof design up to 0.4 bar

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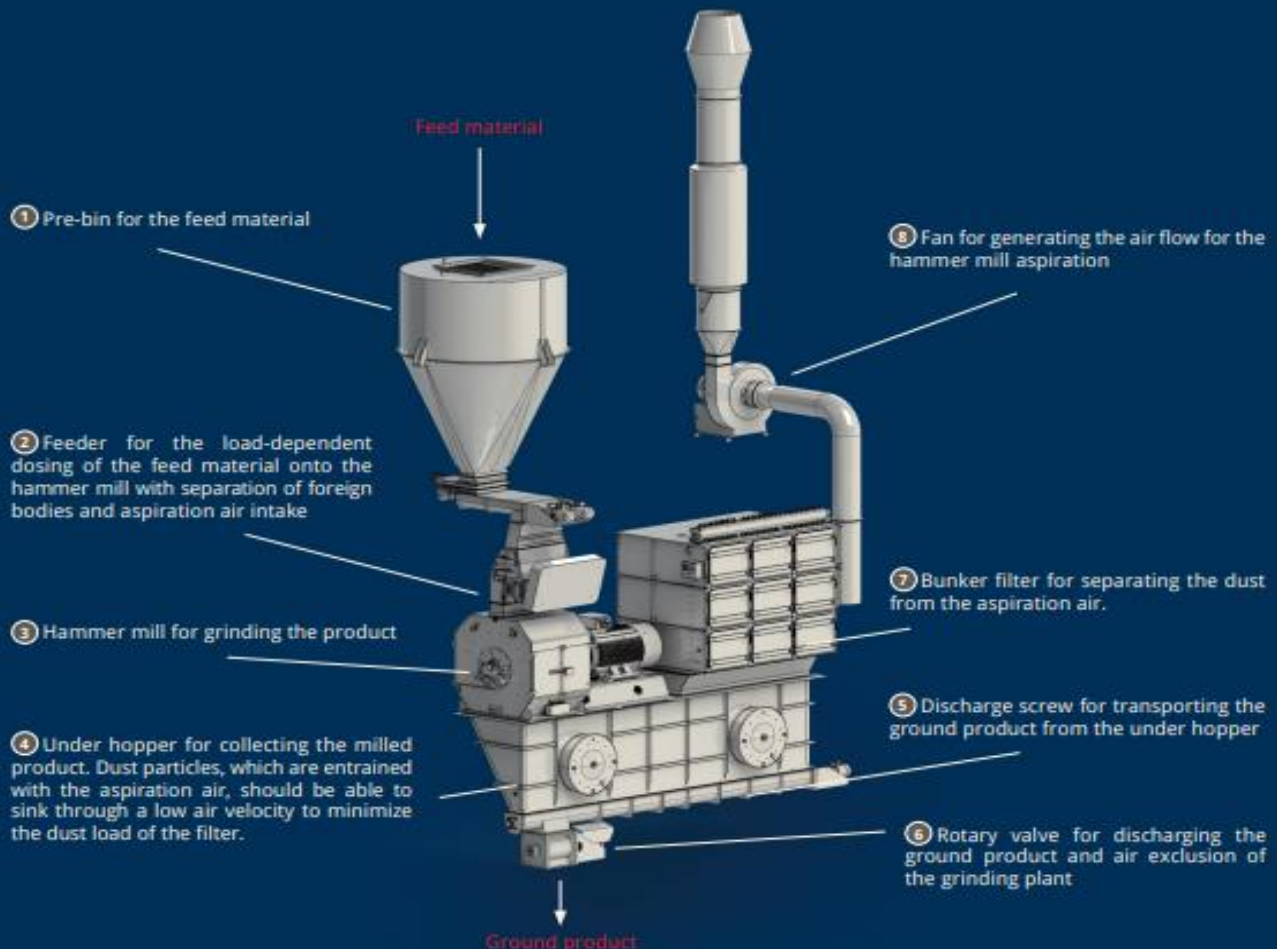
## TIETJEN – GRINDING MODULE

# MECHANICAL OR PNEUMATIC?

The aspiration of the mill and the discharge of the ground product are just as important as the grinding itself. For every application and mill type, Tietjen offers the suitable grinding module, taking into account product characteristics, space conditions in the plant and with regard to explosion protection.

Selected components are carefully matched to each other so that optimum interaction in the grinding process is guaranteed.

### GRINDING MODULE WITH MECHANICAL DISCHARGE

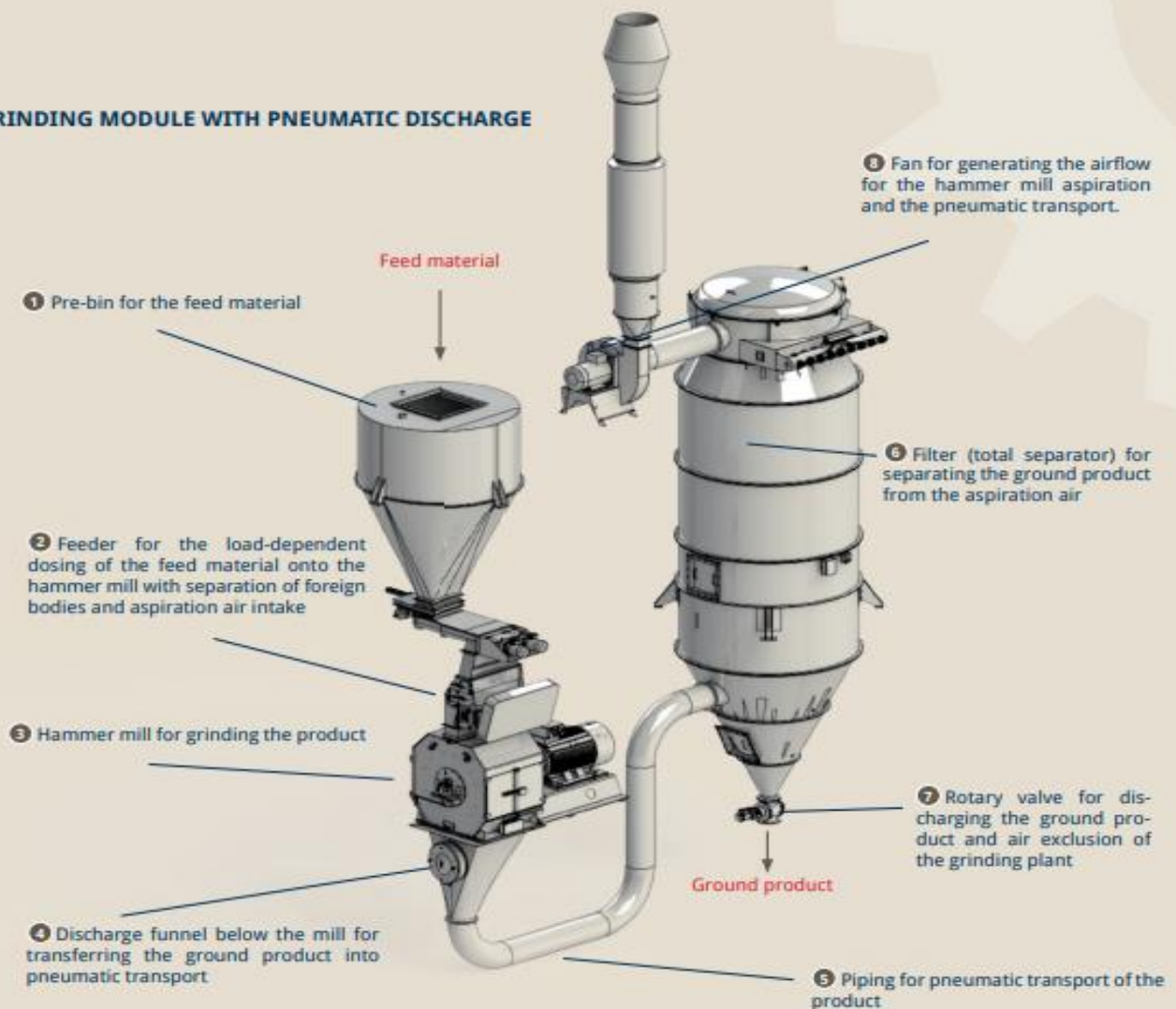


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TIETJEN - GRINDING MODULE

# THAT IS THE QUESTION.

## GRINDING MODULE WITH PNEUMATIC DISCHARGE



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## TIETJEN – MEASUREMENT AND CONTROL TECHNOLOGY

# NOT A GUESSING GAME – SENSORS AND CONTROL.

In order to fully utilize the performance of a grinding system for different products and to ensure the optimal workload, precise control with a user-friendly interface is of great importance. All essential measuring and control equipment is therefore part of our standard equipment.

We incorporate our know-how in process engineering into process automation and manufacture tailor-made control cabinets with appropriate process visualization. Since everything comes from a single source, no loss of information occurs, and process technology is optimized to get the best possible result.



Air flow measurement to control the fan for more energy efficiency

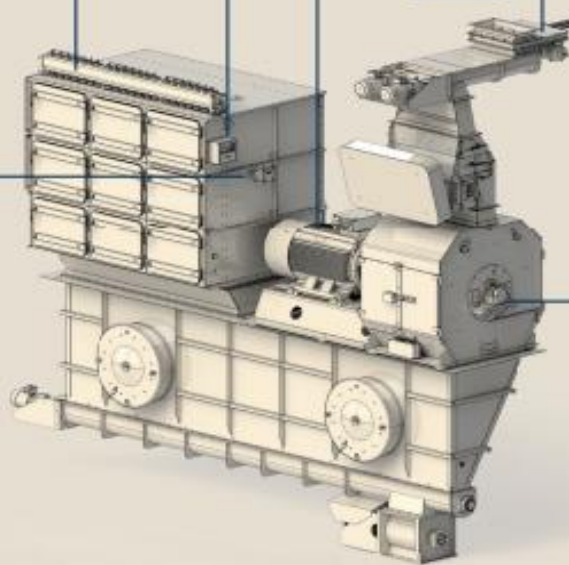
Automatic filter control for reliable filter cleaning



Load-dependent dosing of the hammer mill through Tietjen TCU mill controller for optimum use of the mill



Vacuum controller (VC) to monitor the vacuum in the under hopper for more process safety



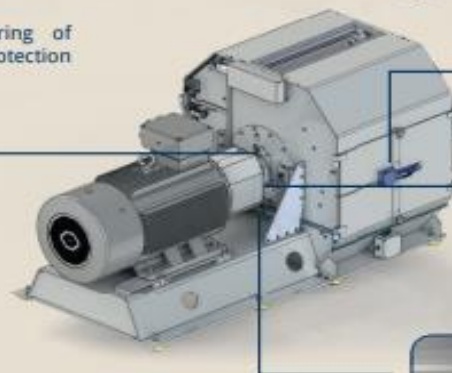
Temperature monitoring of mill bearings for protection against overheating



Automatic door locking and standstill monitoring for operator safety



Temperature monitoring of mill bearings for protection against overheating



Temperature monitoring of the grinding chamber to prevent overheating



## TIETJEN – DUST-EXPLOSION PROTECTION CONTROLLED SAFETY.

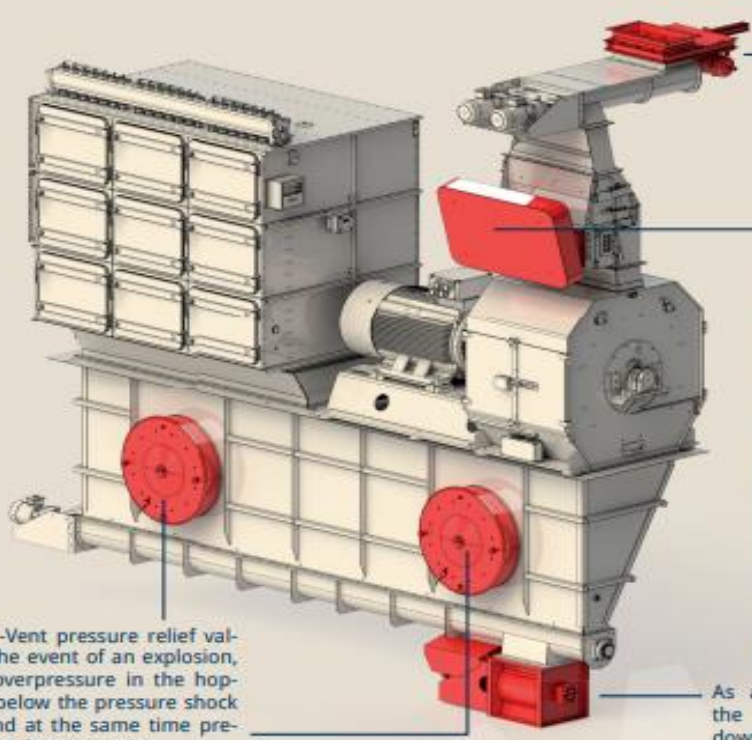
It is through our own research and development of pressure relief systems, that grinding systems are safer today. All of our machines and equipment are explosion proof and flame resistant, designed for reduced explosive overpressure of at least 0.4 bar. Tietjen safety technology fulfills the necessary safety requirements and is delivered with EC-Declaration of Conformity according to ATEX Directive 2014/34/EU.

Today, legislators and insurance companies are increasingly demanding a clearly structured and clearly documented explosion protection concept. According to local laws and policies, devices and protective systems, as well as safety, control and regulation devices, which have a safety function, must be checked within 3 years, by a qualified person or specialist company.

We stand by your side from the beginning with advice and action:

- Inspection and analysis of your system
- Classification of your entire facility in zones
- Joint development of your concept
- Preparation of the required documents
- Negotiation with the competent authorities

Protocols and work instructions, developed together with partners, help us and you with the competent preparation of documentation for the authorities or internal departments. Through periodic inspections and maintenance of the safety devices we ensure their permanent functionality.

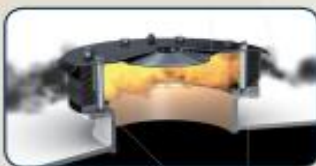


The Tietjen safety slide insulates the grinding plant from the pre-bin when the product buffer is missing during shut-down.

The Tietjen aspiration valve (A-Vent) is open during normal operation and closes at explosion overpressure, reliably preventing flames escaping the air intake.

The Tietjen E-Vent pressure relief valve opens in the event of an explosion, so that the overpressure in the hopper remains below the pressure shock resistance, and at the same time prevents the flame from escaping.

As an ATEX protection system, the rotary valve insulates the downstream process in case of an explosion.



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## TIETJEN – SYSTEM EXPERTISE

# THE RIGHT COMBINATION BRINGS THE BEST RESULTS.

### A SECURE FUTURE

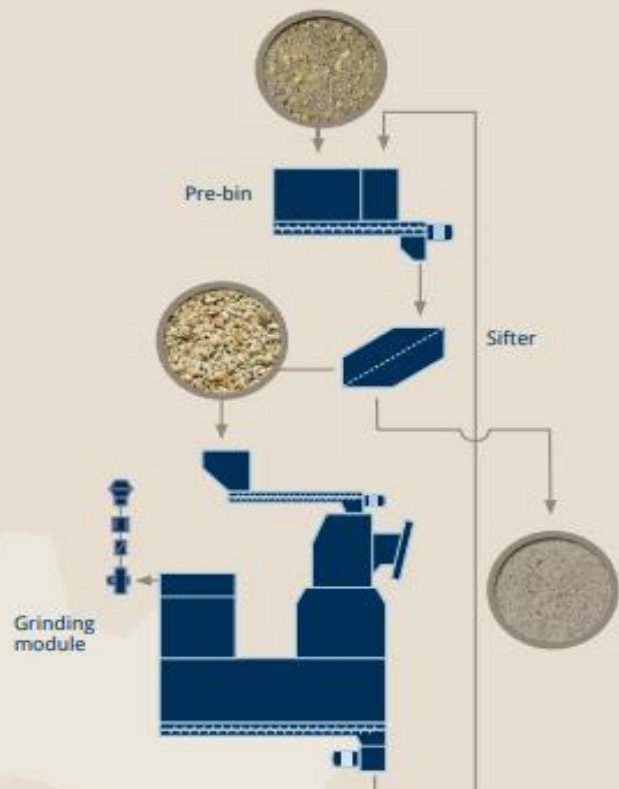
Good advice is part of the first thoughts about the future. We will gladly clarify the possible future conditions in the run-up to a project. What future changes are expected in the commodity markets, e. g. use of genetically modified biomass? What legal guidelines are to be taken into account, e. g. regarding the protection of the workplace? What are the sales product requirements change, e. g. regarding product hygiene? Which of the anticipated changes are to be already taken into account today in the plant concept?

### INDIVIDUALITY

Each plant is optimised. We analyze the customer requirements and specify an individual process diagram. The perfect grinding system – unique, reliable and designed for the future – is the result of the combination of precisely matched individual components.

### TRANSPARENCY OF COSTS

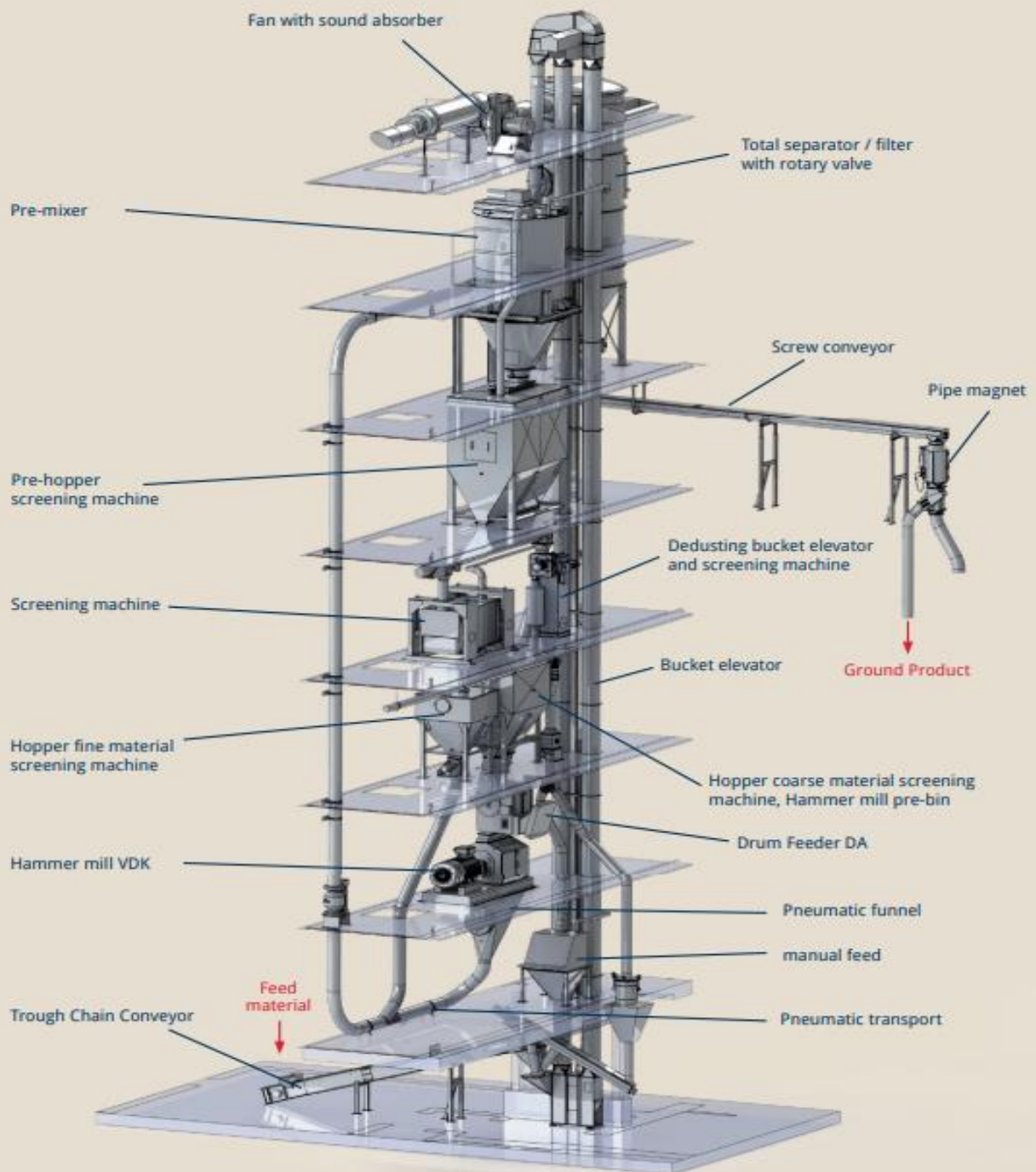
If you are asking for a performance reserve or extraordinary high flexibility, we know the options and can relate them to the future operational costs in your plant. This is what our customers need for a clear long-term investment decision. Moreover, we assess the costs in subsequent steps and related technical sections, costs for service, maintenance and wear parts. You should always expect a total cost of ownership perspective from us – from concept and engineering to the last year of operation of our machines. Our project teams are small and work closely with our customers. They guarantee a direct information flow. At Tietjen, we traditionally practice "all our hands for the next project, but only one face to the customer".





## EXAMPLE OF A TYPICAL PLANT PROJECT

In a limited space, on a footprint of only 2.5 x 6 meters, this project realized a complete grinding line for a special feed. The plant consists of an elevator, pre-mixer, screening machine and grinding module and also includes the entire materials handling technology. As the general contractor, Tietjen was responsible for the entire system, from the design to the assembly and commissioning.



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## TIETJEN – SERVICE

# WE WON'T KEEP YOU WAITING.

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, 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 any external parts for you at short notice.

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



#### CONCEPT 1: ONETIME INSPECTION

- Inspection of the system
- Qualified report
- Recommendations for action
- Implementation



#### CONCEPT 2: IMMEDIATE MAINTENANCE

- Combined inspection and maintenance
- Provision of spare parts
- Replacement of parts, if required



#### CONCEPT 3: ROLLING INSPECTION

- Inspection at fixed intervals
- Regular scheduled maintenance



#### YOUR DECISION

We are happy to arrange an individual maintenance contract according to your plant specifications. This offers you not only a cost advantage compared with the single application maintenance measures. Also, the maintenance contract provides a maximum of comfort and safety, because we plan the necessary maintenance intervals, keep the dates in mind and ensure the smooth operation of your system.

## TIETJEN – REFERENCES

# INTERNATIONALLY SUCCESSFUL.

From Australia to Zimbabwe, from agricultural farms to well-known international corporations – Over 2000 Tietjen systems have already been installed worldwide. The following references are only a small selection.

### FEED MILLING INDUSTRY

**Agravis**  
 (various locations, Germany)

**Al-Qaed Feed Co.**  
 (Mansoura, Dakhlia, Egypt)

**Austing**  
 (Oldorf, Germany)

**Aveve**  
 (various locations, Belgium)

**Connolly's Red Mills**  
 (Goresbridge, Ireland)

**Cooperl**  
 (Montreuil S. Perouse, France)

**Denkavit**  
 (Voorthuizen, Netherlands; Montreuil  
 Bellay, France)

**Deutsche Tiernahrung Cremer**  
 (various locations, Germany)

**H. Bröring Mischfutterwerk GmbH**  
 (various locations, Germany)

**Halychina Zahid**  
 (Ukraine)

**J. Müller**  
 (Bremen, Brake, Germany)

**Lantmännen**  
 (Lidköping, Sweden)

**Lloyds Animal Feed**  
 (various locations, Great Britain)

**Miloubar**  
 (Ashrat, Israel)

**Raiffeisen Niedersachsen Mitte**  
 (various locations, Germany)

**Rubin Mühle**  
 (Lahr-Hugsweiler, Germany)



### ALCOHOL AND ETHANOL PRODUCTION

**Agrana**  
 (Pischelsdorf, Austria)

**Bioagra**  
 (Goswinowice, Poland)

**Euro-Alkohol GmbH**  
 (Lüdinghausen, Germany)

**Inpasa**  
 (Dpto. de Canindeyú, Paraguay)

**Mount Everest Brewery**  
 (Indoor, India)

**Verbio Ethanol**  
 (Schwedt, Zörbig, Germany)

**Wm. Grant & Sons Distillers**  
 (Girvan, Great Britain)



## *The Grinding People*

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— DAS ORIGINAL —

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