

YOUR PROCESS...  
...OUR CARE



MILLING & GRINDING

# MILLING & GRINDING

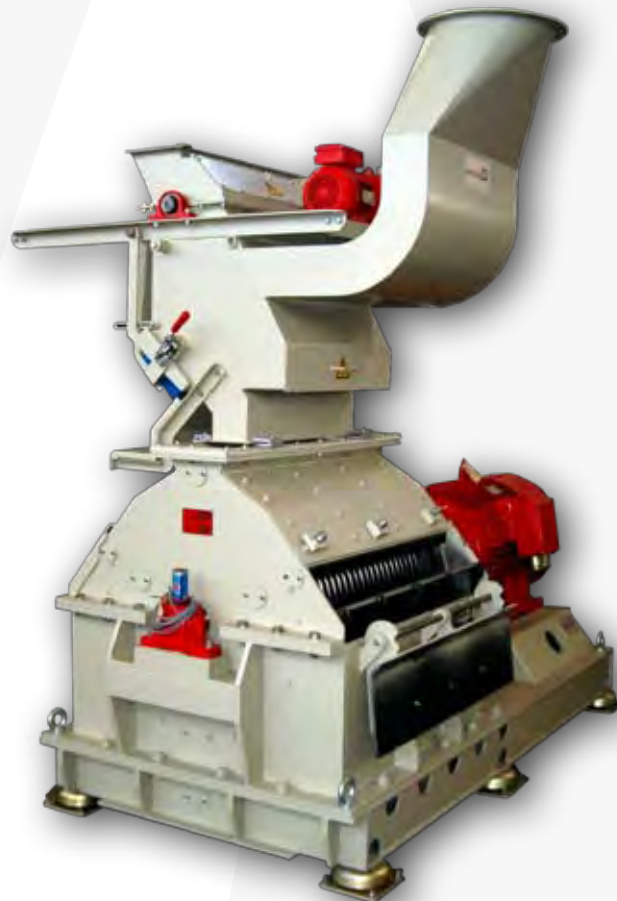




# Grinding, crushing and micronising

## **The right solution for every ingredient and desired result**

Dinnissen Process Technology supplies complete grinding systems - based on a combination of hammer mills, crushers, knife mills or grinding mills - for grinding, crushing and micronising ingredients to the right particle size and structure and converting them into the desired end product. Our tailor-made systems work well in practically any situation imaginable and are energy-efficient, extremely hygienic, flexible in use, and dust-proof or explosion-proof depending upon the specific requirements of the client. In addition, we offer you the option of testing your materials on our equipment in advance, thereby guaranteeing you the desired end result.



*Over 60 years of experience*

*Over 60 years of experience in bulk handling and solids processing for the food, feed, pharma and chemical industries.*



**Over 60 years of experience in grinding and breaking**

Dinnissen Process Technology has been developing grinding and breaking solutions for companies in the feed, food, pharmaceutical and chemical sectors for over 60 years. Our grinding systems deal with a wide range of products: from materials such as soybeans, nutmeg and corn, to hard ingredients such as citric acid, sugars and minerals. They grind them to the exact range of specifications required, not too coarse and not too fine. And they do so for ingredient flows ranging from 100 kg to 80 tons per hour and particle sizes ranging from 150  $\mu$  to 10 mm. Our expertise and experience enable us to find the right grinding solution for every situation. Easy maintenance and operation, optimal efficiency and reliability, and excellent durability are guaranteed for all our grinding-, hammer-, knife-, and breaking-mills.



*Your products tested beforehand*

*Your products and / or processes tested beforehand on our machines, guaranteeing optimum results.*



### **Hamex® Hammer mills**

Hammer mills are especially well-suited for grinding soft to medium-hard products (moderate fat content, fibrous or crystalline structures) such as grains, sugars and minerals, for particle sizes between 150  $\mu$  and 3 mm (D99 <800 micron to <4 mm). Inside the hammer mill, freely suspended hammers swing around at high speeds in the milling chamber. Depending upon the properties of the components fed into the mill, single hammers, double hammers or T-hammers are used. The resulting centrifugal force grinds the components against the special grinding plates on the inside of the milling chamber. The ground product then leaves the system via the exchangeable sieve.



### *In-house development and manufacturing*

*Our products and custom-made solutions are developed, tested, manufactured and installed by our own people, providing you the best possible assurance in terms of quality and delivery time.*







## Hamex® Hammer mill with automatic sieve exchanger

The automatic sieve exchanger can accommodate 3 to 5 sieves, each of which holds 2 sieve elements. The automatic sieve exchanger allows you to automatically exchange sieve elements in your milling system, thereby minimizing downtime and loss of production. The automatic sieve exchanger system can also be fitted with a detection or intelligent camera system, enabling you to (automatically) monitor any potential damage to your sieve elements from the control room.



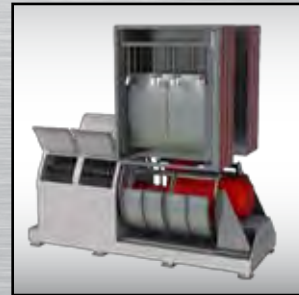
sieve elements entering milling system



sieve elements leaving milling system



sieve elements entering sieve holder



sieve elements leaving sieve holder

If the client wishes to have optimal control of the process, the system is fitted with a frequency controller. A high rotational speed produces a finely ground structure, whereas a low rotational speed produces a coarser structure. An automatic sieve exchanger and a quick exchange system for the hammers offer the client speed and convenience in situations where product changes are frequent.

The hammer mill systems provided by Dinnissen can also be fitted with a specially developed airflow system, which quickly and efficiently controls the flow of particles which have the right size. This increases capacity while at the same time reducing energy consumption.



*We take care of your entire process*

*Product intake, transport & handling, feeding, weighing, mixing & processing, milling, sifting and packaging: your entire process chain is in good hands at Dinnissen.*





### Finishers / Centrifugal mills

Our finishers and centrifugal mills offer reliable solutions for grinding products which are easy to break down such as hard bread, breakfast cereals or cookies to particle sizes of 2 mm or less. A finisher consists of a compact hammer mill in a solid sieve basket with airflow system. Hammers mounted around the rotor do the work while the broken pieces are sucked off through the sieve basket. Finishers are available in various models with processing capacities of 100 to 3000 kg per hour.

Centrifugal mills are suitable for grinding ingredients with a relatively large particle size distribution down to particle sizes of  $D_{99} = 100$  microns. To achieve this, the ingredients are fed into the mill and thrown at a sieve basket at a speed of 125 m/s. Centrifugal mills generate a great deal of air movement, which also has a cooling effect. These mills are fitted with single-sided bearing systems and can therefore be supplied with shafts that are easily removed and exchanged. This offers the client speed and convenience during cleaning operations and also ensures that the equipment can easily comply with ultra-strict hygiene requirements.



### Crushers

Dinnissen has developed a range of crushers for breaking lumpy materials and agglomerates. Depending upon your specific situation and the end result desired, we can provide you with coarse crushers, medium-fine crushers and fine crushers. Our crushers consist of a robust housing enclosing a rotating system. Incoming material is ground down between the rotor and the stationary component and ends up in the outflow. The low rotational speed of the crusher makes it possible to realize high throughput capacities with a minimum consumption of energy.

### Coarse crushers

Coarse crushers are suitable for breaking down soft to medium-hard pieces, lumps and agglomerates - such as milk powders, detergent powders, sugar lumps and resins - to particle sizes from 4 mm to 30 mm. Strips or knives attached around a central shaft turn at a slow speed and force the ingredients against a stator vane attached to the inside of the grinding chamber. These systems are also suitable for breaking down relatively moist and fatty lumps such as cocoa cake, filter cake, and cinnamon sticks.



## *Integrated approach to dealing with complex challenges*

*When dealing with complex challenges, we start by putting together a project team of our most experienced specialists. By working together as a team from day one, we can solve even the most difficult challenges.*

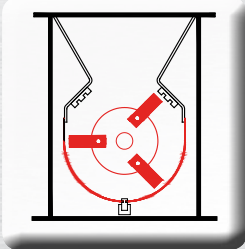
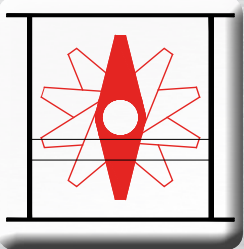
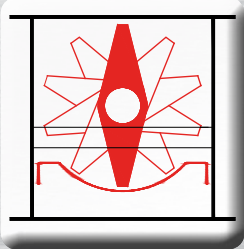
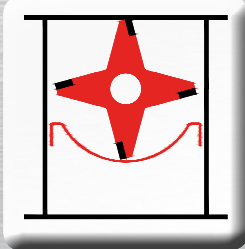


### Medium-fine crushers

In situations where a finer end result is required, we install the rotor above a sieve section. First, strips or knives attached around a rotor break the ingredients down by forcing them against a stator vane. Next, the broken pieces are further grated down by forcing them over the sieve. The entire process takes place at a low to moderate rotational speed. Medium-fine crushers are suitable for grinding down soft to medium-hard ingredients - such as nitrite, minerals, paprika and onion powder lumps - to particle sizes from 300 micron to 4 mm.

### Fine crushers

In situations where soft to medium-hard ingredients have already been coarsely broken or where ingredients contain only a small percentage of particles that need to be ground down, you can rely on our fine crushers. Fine crushers operate exclusively on the basis of the grating principle. Strips attached to the rotor force the ingredients over a sieve attached to the inner side of the grinding chamber at a low rotational speed. An additional strip forces the ingredients over a sieve section. In these crushers, ingredients can be grated down to particle sizes of from 300 micron to 4 mm.

				
<b>Machine Type</b>	Finisher	Coarse crusher	Medium-fine crusher	Fine crusher
<b>Working Principle</b>	Crushing and sieving	Cutting with knives	Cutting / grating with knives and sieve	Grating over sieve

### Cutters / Knife mills

If you wish to grind products such as foodstuffs which can be cut relatively easily, you can take advantage of the benefits of a knife mill. As with the hammer mill, multiple knives are attached around a rotor. They do their cutting work as they revolve around, assisted by stationary knives installed in the grinding chamber. The knives can be replaced and adjusted easily, allowing you to quickly and flexibly realize the proper grinding fineness for your ingredients. Our cutting/knife mills are fitted with frequency controls as well as an airflow system, which increases the capacity while reducing energy consumption

### Roller mills / Crumblers

Hard and compact products such as grains can easily and effectively be processed into medium-sized or larger pieces in a breaking mill. Such a mill offers you multiple advantages including low energy consumption, low heat generation, high production capacity and a homogeneous end result. It features ribbed roller elements which move at different speeds relative to each other. After passing the various rollers once, twice or three times, the ingredients have been cut, crushed and broken down to the right size. The distance between the rollers used by Dinnissen can be easily and variably adjusted, and the rollers can be supplied in every profile commonly used. You can specify the desired gap distance with an accuracy of 0.2 mm.

 *Service and warranty near you all over the world*

*A global network of reliable dealers and agents guarantees you fast and accessible service wherever you are.*



**XS<sup>4</sup>**

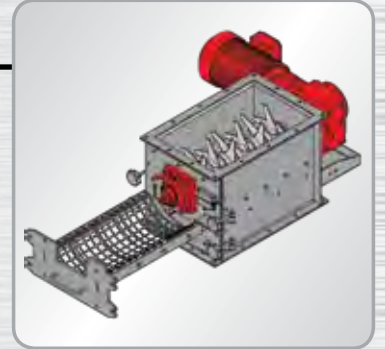
## MILLING TO THE FOURTH POWER

**XS<sup>1</sup> Quality**  
extra gentle,  
intensive, compact

**XS<sup>3</sup> Economic**  
extra friendly pricing and  
low energy consumption

**XS<sup>2</sup> Speed**  
extra fast and efficient

**XS<sup>4</sup> Access**  
extra fast and easy to clean



### Hygiene and food safety

For our clients in the food sector, for example, we have developed grinding and crushing equipment which complies with the strictest requirements in the areas of hygiene, food safety and prevention of contamination. We can supply grinding and crushing equipment made of coated steel, polished stainless steel (304 or 316L) or electrolytically polished stainless steel. If requested, we can fit grinding mills, hammer mills, knife mills and crushers with automatic cleaning systems based on compressed air, vacuum drying, or hot steam. In some cases, for reasons related to hygiene, explosion hazard, or the release of toxic or allergenic substances, the grinding equipment must be completely impervious to very fine particles. For such situations in particular, we developed the Hygienic Compact Containment Concept. This prevents fine particles and microorganisms from entering as well as leaving the grinding equipment. XS4 Milling is the name of this grinding concept, which also ensures optimal accessibility to the inner mechanism of the grinding system so that it can be cleaned quickly, effectively and hygienically. XS4 Milling also stands for fast and high-quality grinding and crushing with low energy consumption.

### Working safely and preventing explosion hazards

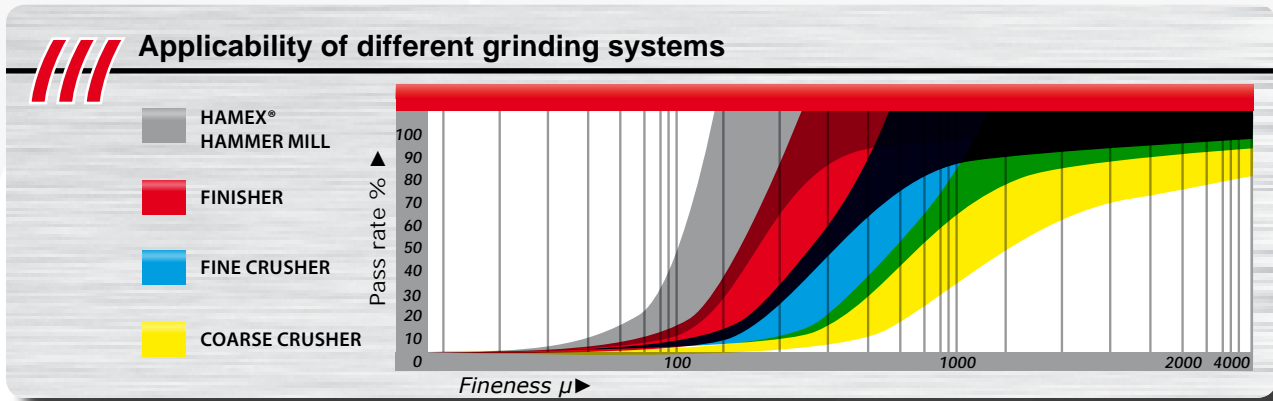
Your personnel, production assets and buildings are very valuable assets. It goes without saying that all our equipment more than complies with the requirements for worker safety, release of fine particulate matter, and prevention of explosion hazards. If you work with flammable organic products, additional care must be taken in this area, and we can supply the appropriate fittings. For example, we ensure that all grinder housings and breaking equipment are grounded, and we install magnets and metal detectors to prevent the occurrence of sparks and sources of fire. We also install sensors to detect sparks and excessive temperatures. If specific situations require pressure to be released or a controlled explosion to take place, we install safety discs, pressure release valves, or flame extinguishers. We supply grinding and crushing equipment which can withstand high pressures (up to 10 bar) as a possible solution for working with powders with a minimum ignition energy of < 3 mJ. Our "Closed-Loop" design grinding systems have a low-oxygen grinding chamber in which the oxidation of your product is reduced to a minimum. We minimize the production of noise by installing shock crushers and eliminating vibrations.

## *In-house service department*

*Our in-house service department helps prevent problems and resolves any issues that may arise quickly and efficiently.*







### Flexible grinding and crushing

With a single investment, you can ensure that you are optimally prepared for producing a wide variety of products and ingredients now as well as in the future, by taking advantage of our flexible grinding solutions. We supply systems that can be cleaned very quickly and even automatically. We can fit our hammer- and knife-mills with automatic frequency-based controls. This allows you, during the grinding process, to switch to a different tip speed and airflow for the hammers and knives without switching off the equipment. This allows for variable control of the particle grinding size, thereby saving time and increasing the throughput capacity of your production process.

### Robust, heavy-duty design

A long, dependable lifespan and minimum maintenance are crucial for the cost-effectiveness of grinding and crushing equipment. Thus it goes without saying that all our equipment is made to last, ensuring that you can rely on 20 to 30 years of trouble-free operation. We can fit our milling, grinding and crushing equipment with automatic shunting systems for metals and rocks, thereby preventing damage and contamination. We also fit grinders with an overload protection device. Grinders which operate at low rotational speeds are fitted with a rotor which reverses direction for a moment if the maximum load is reached. To prevent damage to rollers and roller profiles, we use a flexible bearing system which automatically allows contaminants to pass through. Hammers, knives and sieves are available in hardened models and can, of course, be easily replaced.



*Your products tested beforehand*

*Your products and/or processes tested beforehand on our machines, guaranteeing optimum results.*

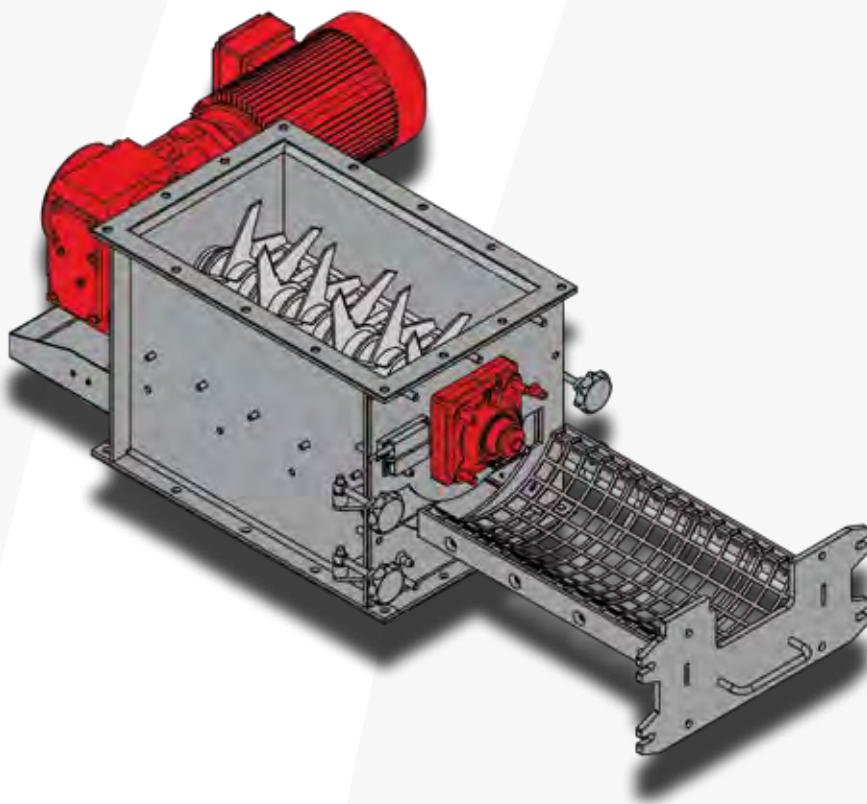


### **Well-managed input of ingredients**

Dinnissen also provides equipment for controlling the supply and feeding of ingredients to mills, grinders and crushers. Depending upon the specific needs of the client, we supply systems based on screw-type feeders, feeder rollers, special rotating blades and ATEX feeders. These systems allow you to continuously control the inflow of (a uniform) product, thereby guaranteeing the quality and reproducibility of your end product.

### **Energy-efficient grinding and crushing**

Low energy consumption minimizes CO2 emissions and maximizes the financial results of your company. Naturally, we fit our grinding and crushing equipment with modern and energy-efficient motors. But we also take additional measures to ensure that the grinding and/or crushing process takes place as efficiently as possible. For example, we remove all material which has been sufficiently ground down as quickly as possible to minimize the load on the grinders. We have also developed a solution which allows us to achieve a larger surface area for the sieve and breaker plates without enlarging the machine. The result: a very energy-efficient grinding concept.



### *In-house development and manufacturing*

*Our products and custom-made solutions are developed, tested, manufactured and installed by our own people, providing you the best possible assurance in terms of quality and delivery time.*





### Applications

- |                              |                     |                           |                             |
|------------------------------|---------------------|---------------------------|-----------------------------|
| • Filter/cocoa cake          | • Citric acid       | • Glass                   | • Meat                      |
| • Ceramic ingredients        | • Detergent powders | • Fertilizer              | • Gelatine                  |
| • Pigments                   | • Titanium dioxide  | • Charcoal/graphite       | • Bread, biscuits, cake     |
| • Sugar/dextrose/<br>lactose | • Milk powders      | • Resin                   | • Muesli, breakfast cereals |
| • Salts / nitrates           | • Pet food          | • Leafy herbs,<br>peppers | • Cellulose panels          |
|                              | • Cinnamon sticks   |                           | • Paper waste material      |

### We can manage the entire process

Thanks to over 60 years of experience in process technology, our expertise is not limited to milling and grinding technology alone. We also have a great deal of in-house expertise when it comes to the intake and transport of even the most difficult powders as well as accurately weighing, feeding, grinding, mixing, sieving and packaging a wide range of materials. We design and develop our own technology and have extensive in-house manufacturing and service facilities.

### Advance testing guarantees good results

Our D-innocenter® testing facility allows us to test your ingredients in practice on our equipment. This enables us to work together with you to develop the best possible solution and provide you with the best possible assurance that the desired results will actually be achieved.

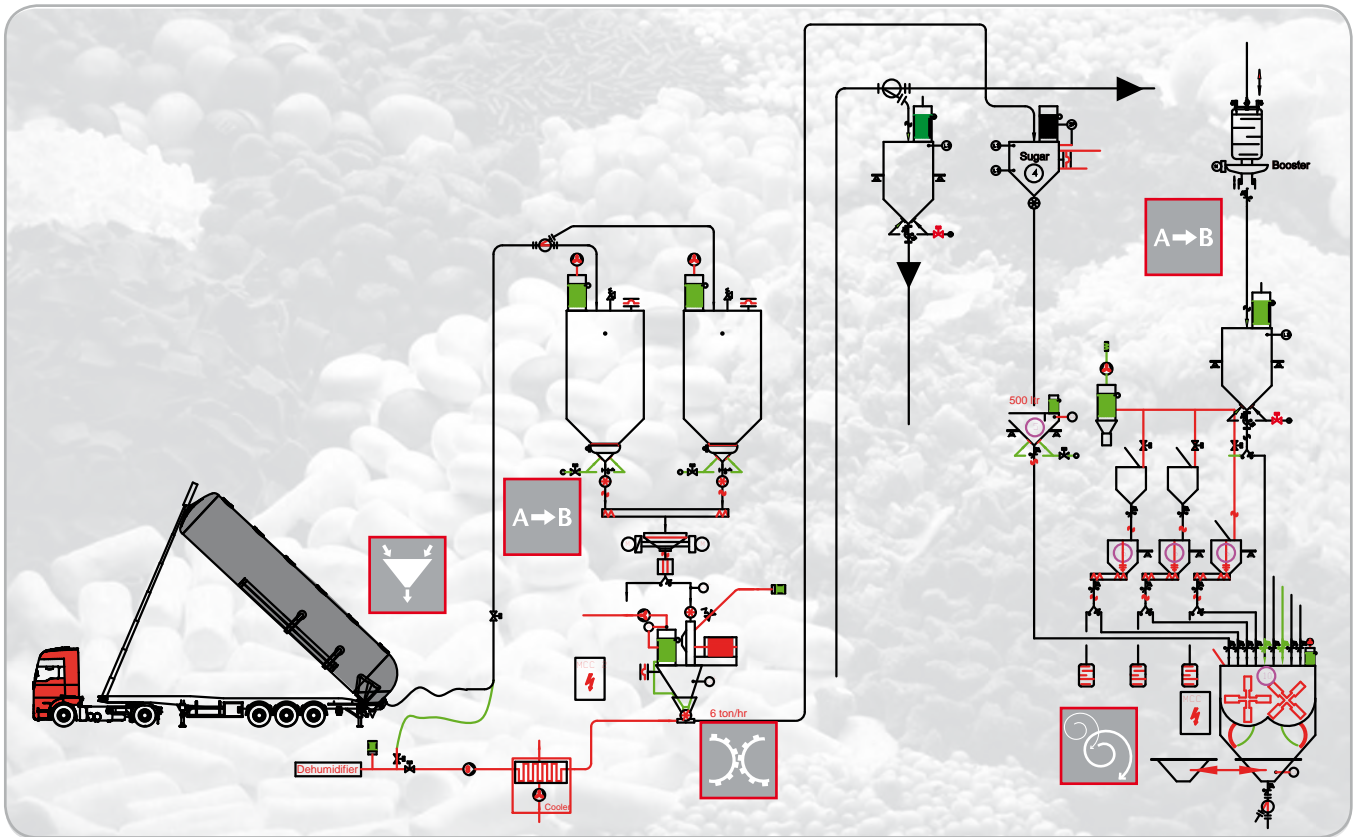


*We take care of your entire process*

*Product intake, transport & handling, feeding, weighing, mixing & processing, milling, sifting and packaging: your entire process chain is in good hands at Dinnissen.*







*Total process with: feeding, pneumatic conveying, inline sifting, **milling** etc.*

## Seven strengths of Dinnissen

- More than 60 years of experience
- Your products and/or processes tested on our equipment in advance
- In-house development and manufacturing
- We take care of your entire process
- Integrated approach for dealing with complex challenges
- Service and warranty all over the world in your vicinity
- In-house service department helps prevent problems and resolves them quickly and efficiently

YOUR PROCESS...  
...OUR CARE



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