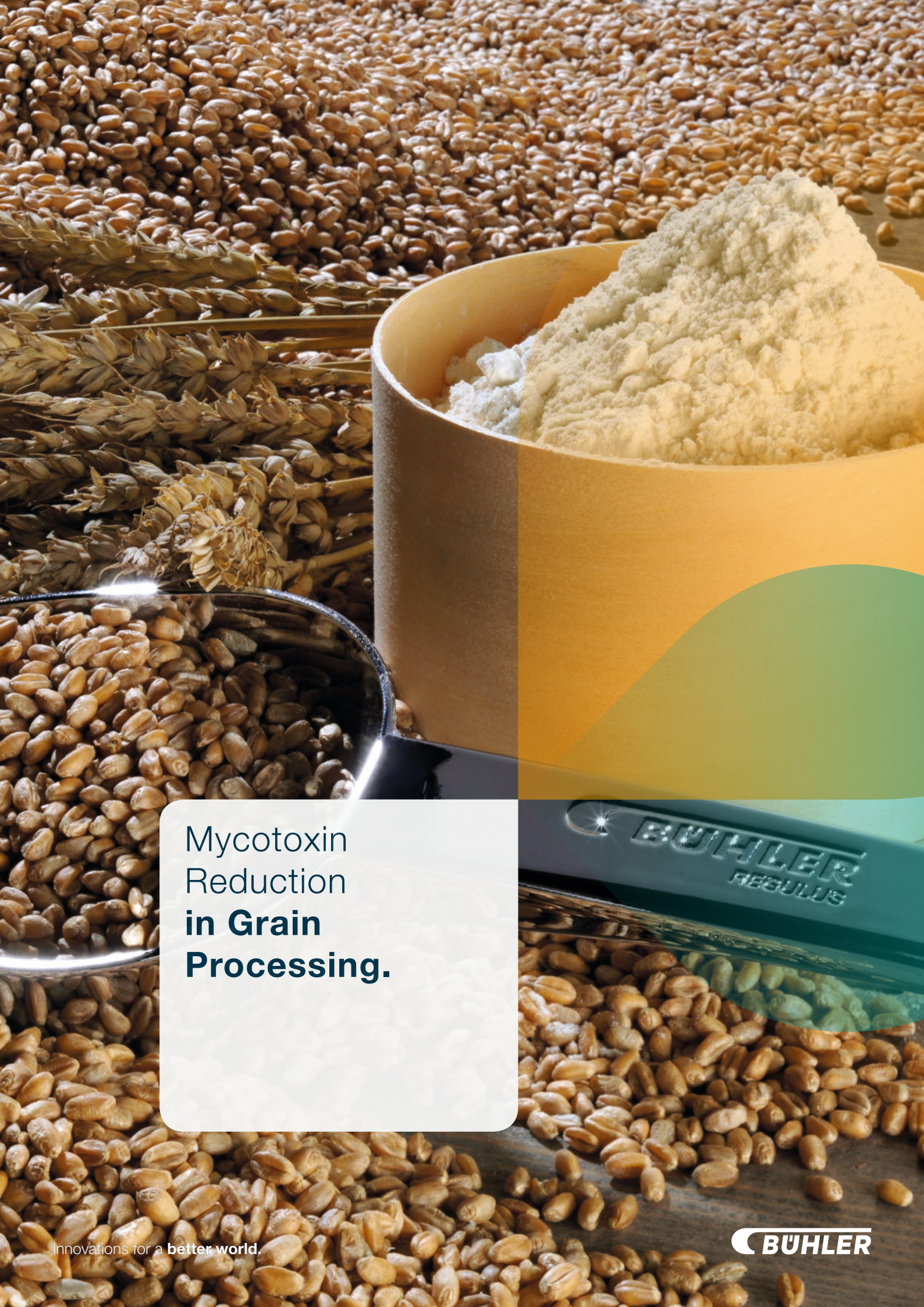


Mycotoxin Reduction **in Grain Processing.**

Innovations for a **better world.**

BÜHLER

Optimized grain processing. **For improved food safety.**

Mycotoxin contamination of agricultural raw materials used for producing foods and feeds is one of the most severe global health hazards for humans and animals. According to the UN Food and Agriculture Organization (FAO), as much as 25 % of all agricultural raw materials are contaminated with mycotoxins. Grain is affected with particular frequency.

Mycotoxins as a risk factor.

Mycotoxins are byproducts resulting from the metabolism of molds which, even in low concentrations, have a toxic effect on humans and animals. The most frequent mycotoxins in grain are aflatoxin, deoxynivalenol (DON), cearalenon, fumonisin and ergot alkaloids. Due to changes in the climate, mycotoxin contamination of grain continues to increase.

Ergot has a high potential for toxicity.

Mycotoxin reduction is urgent.

Mycotoxins are chemically and thermally stable. Infested grain kernels must be removed at the earliest possible point in the process. In many countries, legal limits are in force for mycotoxins. Various laboratory analysis methods can determine the mycotoxin content using a representative sample. The cleaning of grain is considered to be a core measure for reducing the mycotoxin content.

Infested corn (maize): A health hazard for humans and animals.

Bühler solutions improve food safety.

Bühler offers solutions for effective mycotoxin reduction along the entire value chain of industrial grain processing. These solutions range from drawing of representative samples to various cleaning solutions and automation. The focus is on efficient removal of mold-infested grains and grain fractions based on characteristics such as specific gravity and optical properties.

Cornerstones of successful mycotoxin reduction:

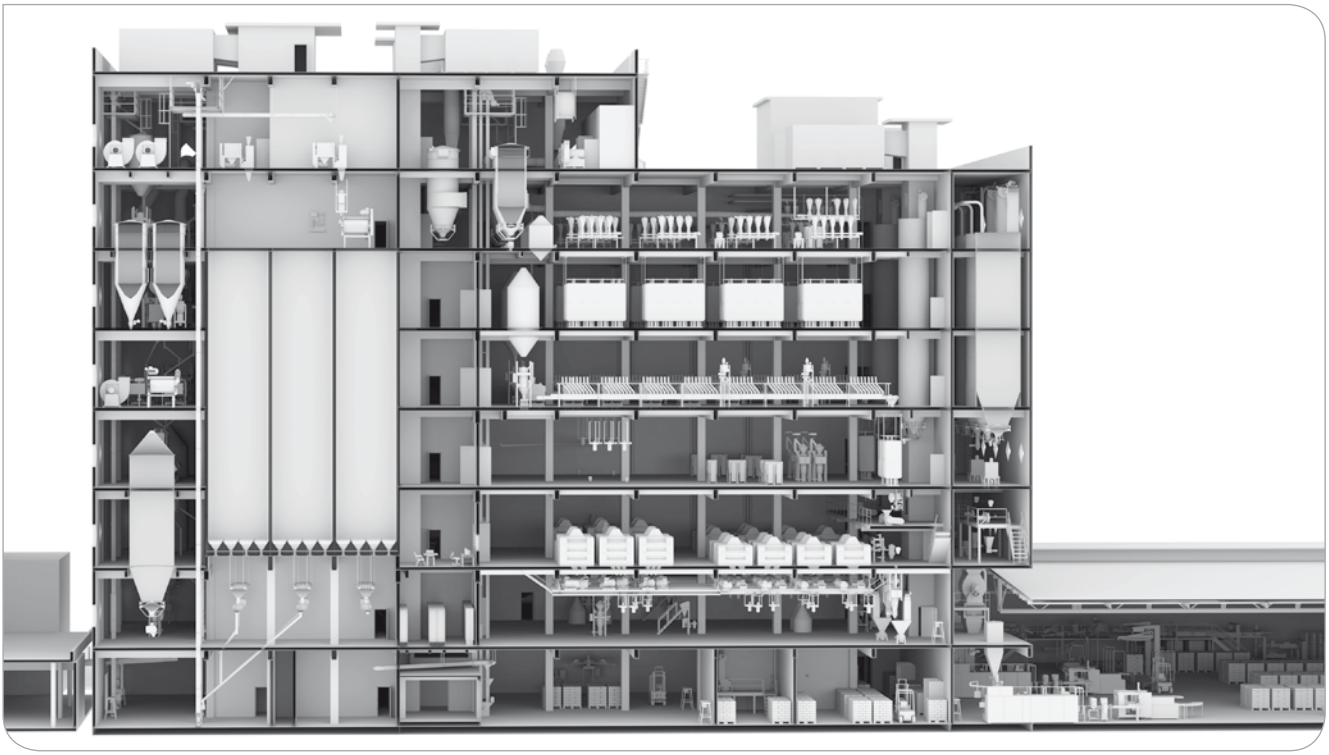
- Drawing of representative samples
- Removal of coarse, fine and low-density impurities
- Removal of grain with a low bulk density
- Optical sorting of discolored and defective grains
- Surface cleaning of grain
- Tracing through automation solutions
- Specialist consulting

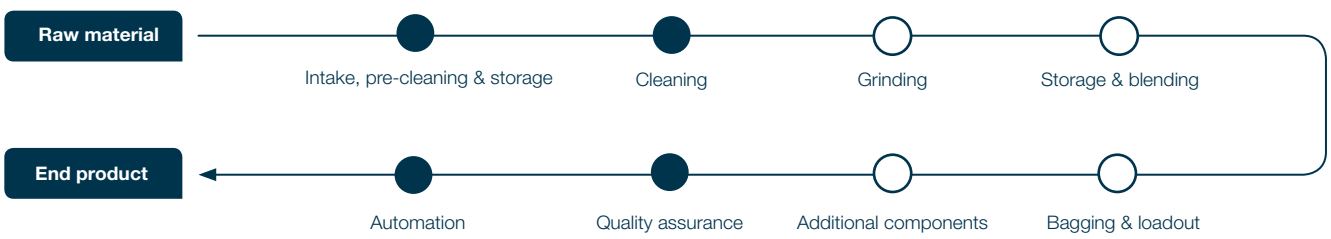
Process-oriented complete solutions.
For markedly lower mycotoxin contamination.

Bühler offers integrated process solutions along the entire chain of industrial grain processing which enable the risk of unacceptable mycotoxin contamination to be effectively reduced.

Completely integrated solutions.

Though the risk of mycotoxin contamination of grain can be reduced by sound agricultural practice, it can never be fully ruled out. Bühler offers its customers completely integrated solutions for efficient reduction of mycotoxins in end products. They comprise the following plant sections: Intake (reception), pre-cleaning, cleaning, and quality assurance. Additionally, Bühler automation solutions ensure dependable product traceability along the entire value chain.





Quality assurance during intake.
For reliable grain analysis.

Drawing representative samples from incoming grain deliveries is a precondition for achieving accurate mycotoxin content analysis results. Low-density particles, dust caused by product abrasion during process operations, shriveled grains and broken kernels have a markedly higher mycotoxin concentration. The risk of cross-contamination is drastically reduced by targeted pre-cleaning.

Sample and automatic sample collector.

Representative samples are essential for product traceability. They provide the basis for achieving a monitored product quality that can be retraced at any time. The sampler draws a representative amount of grain for analysis, while the sample collector automatically collects samples across an extended period of time.

Separator Classifier.

The Separator Classifier has been designed for efficient pre-cleaning of grain, removing both coarse and fine impurities. Low-density particles contained in the grain, which often have a perceptibly higher mycotoxin content, are selectively removed by using an aspiration channel or an air-recycling aspirator. In addition, dust can be separated by centralized dust control of the intake (receiving) hopper to prevent contaminated dust from entering the process.

Bühler process technologies for mycotoxin reduction in intake and pre-cleaning:

	Wheat	Corn (maize)	Rye	Barley	Malted barley
Sampler and sample collector MZEA / MZET	•	•	•	•	•
Cleaning / screening machine LAGA	•	•	•	•	
Cleaning machine LAAB	•	•	•	•	•
Recycled air cleaner LAIA	•	•	•	•	•
Drum screen LAKA	•	•	•	•	
Separator Classifier MTRB	•	•	•	•	
Aspiration channel MVSG/H	•	•	•	•	•

Efficient cleaning.
For top-class end product quality.

The aim of grain cleaning is to dependably remove contaminants and impurities. The grain is graded on the basis of differences in shape, size, specific gravity and optical properties. Cleaning allows the content of health-endangering substances such as mycotoxins and ergot alkaloids to be markedly reduced.

High-capacity grain cleaner.

Vega high-capacity grain cleaners have been designed to remove coarse impurities, sand, and low-density particles, as well as grade the grain by kernel size. Low-density matter such as dust and straw is separated in an air-recycling gravity separator. The sand screens ensure reliable elimination of sand and foreign matter, which often pose a high risk of mold infestation.

SORTEX optical sorter.

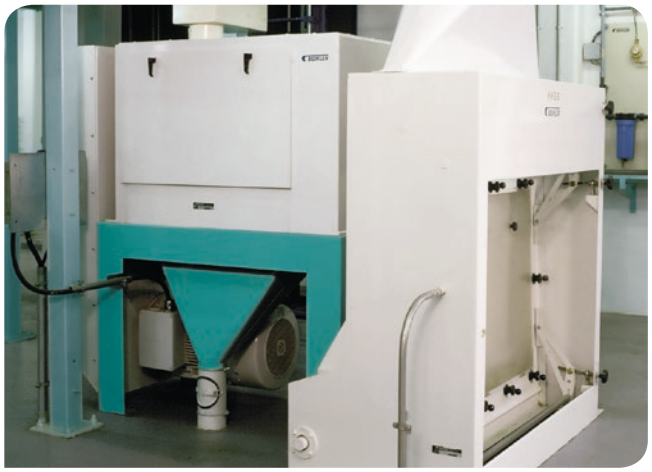
SORTEX sorters set new standards in the field of optical sorting. This efficient and reliable process technology enables even very slight color deviations and hard-to-differentiate defects, as well as foreign matter to be detected. Ergot sclerotia and mold-infested grains posing a high risk of mycotoxin contamination are selectively identified and separated on the basis of their optical properties.

Bühler process technologies for mycotoxin reduction in cleaning:

	Wheat	Corn (maize)	Rye	Barley	Malted barley
Vega high-capacity grain cleaner MTVA	•	•	•	•	•
Aspiration channel MVSG/H	•	•	•	•	•
Concentrator MTCB	•	•	•	•	•
Impact machine MJZD-G	•				
Optical sorter SORTEX	•	•	•	•	•

Surface cleaning, peeling and degermination. **For less contamination.**

The application of efficient surface cleaning technology noticeable reduces undesirable surface contamination, for example bacteria, mold, mycotoxins, and heavy metals. Surface cleaning and intense peeling and degermination of corn (maize) improve food safety while also increasing the yield.



Scourer.

The scourer reduces the mold and mycotoxin content of the raw material by intense product scouring. An aspiration channel or an air-recycling aspirator are attached to the downstream end of the scourer. They carefully separate detached hull particles or surface dirt, which often have a high mycotoxin content, from the grain.

Degerminator.

The degerminator is used for intense decortication and degermination of corn (maize). The degermination process allows mold adhering to the grain surfaces to be substantially reduce.

Bühler process technologies for mycotoxin reduction in surface treatment and degermination:

	Wheat	Corn (maize)	Rye	Barley	Malted barley
Scourer MHXS	•		•		
Peeler MHXM-W	•		•		•
Vertical whitener MTPA	•			•	•
Air-recycling aspirator MVSQ	•		•	•	•
Degerminator MHXM-M		•			

Technologies, automation and process expertise. **For maximum control of production processes.**

Production processes and product quality are always under control with Bühler automation solutions.

Reliable process control.

Bühler automation systems increase plant performance and uptime while ensuring traceability of raw materials and end products involved in the overall process.

Risk prevention – quality assurance.

The BühlerWinCos® process control system offers a number of functions to increase product safety and quality:

– Product traceability
– Quality data management
– Hygiene management

Bühler initiative: focus on more food safety.

Bühler strives to play a vanguard role in providing high-performance process technologies and solutions that allow food safety to be efficiently controlled and optimized. Bühler's innovative automation solutions control production processes and ensure end products with a consistent product quality. Moreover, experienced Bühler specialists pass on their food safety expertise to customers.

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