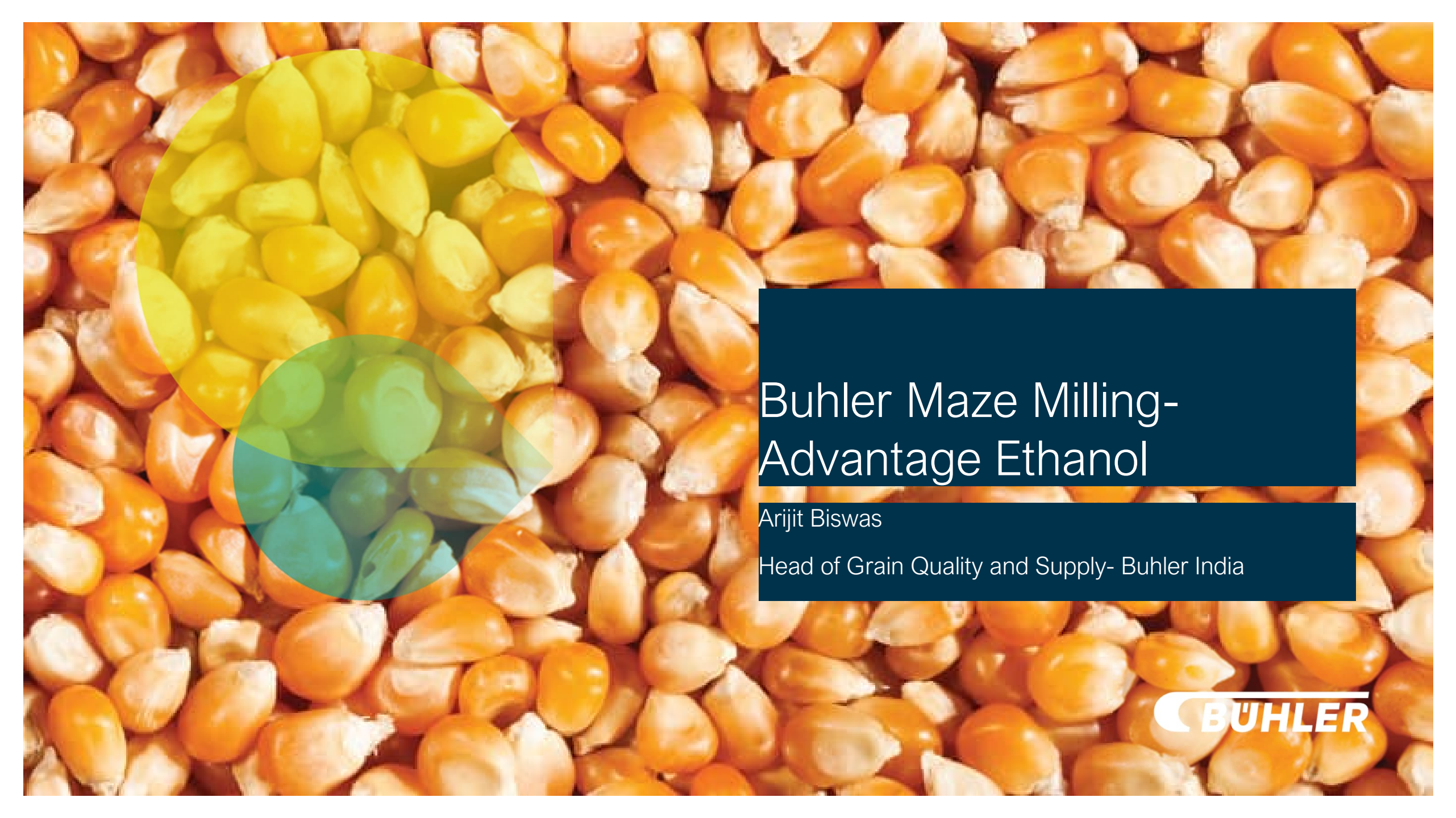




Buhler Maze Milling- Advantage Ethanol

Arijit Biswas

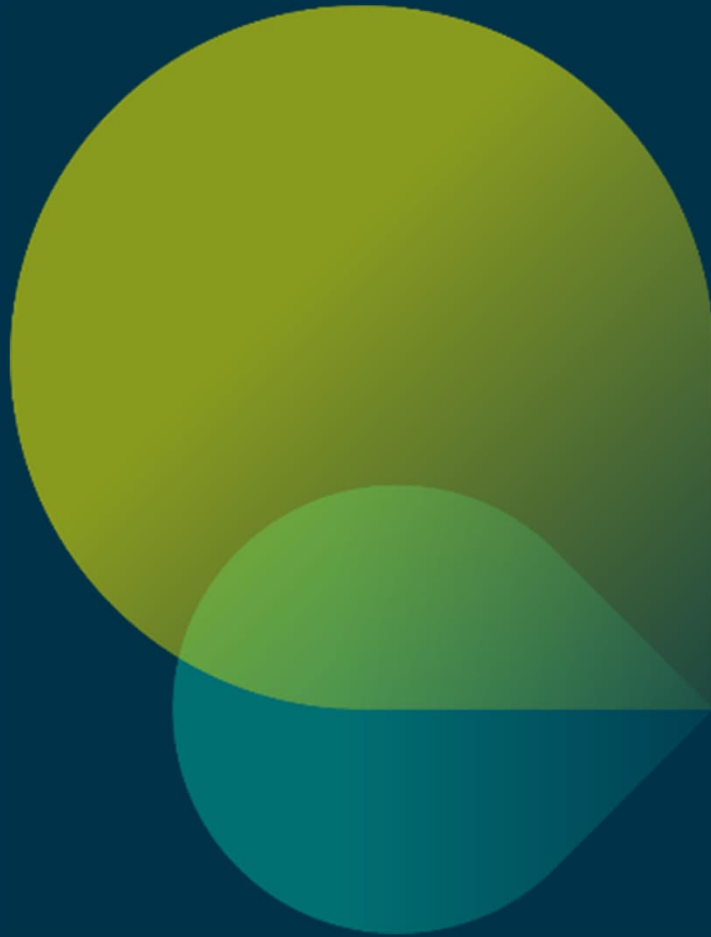
Head of Grain Quality and Supply- Buhler India



Agenda

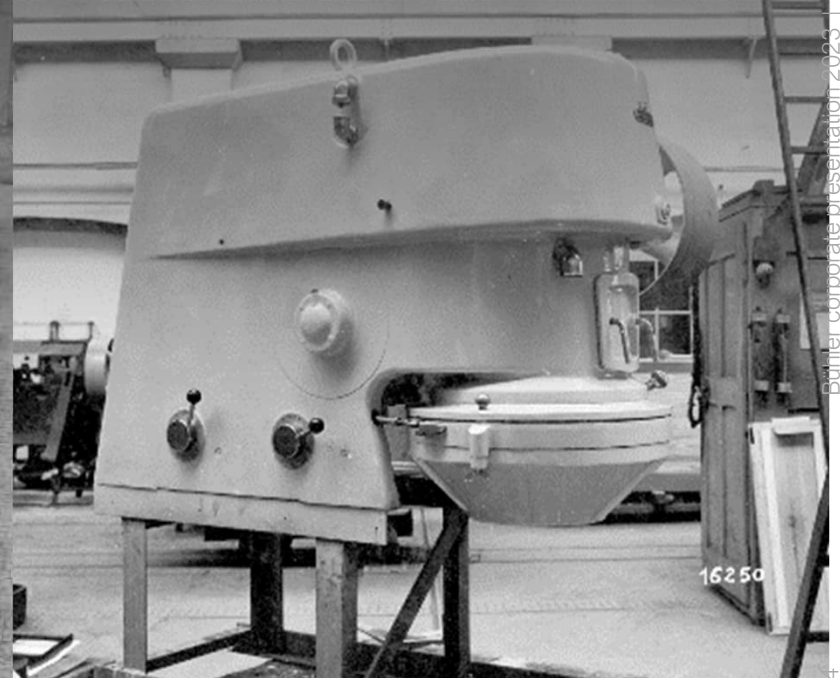
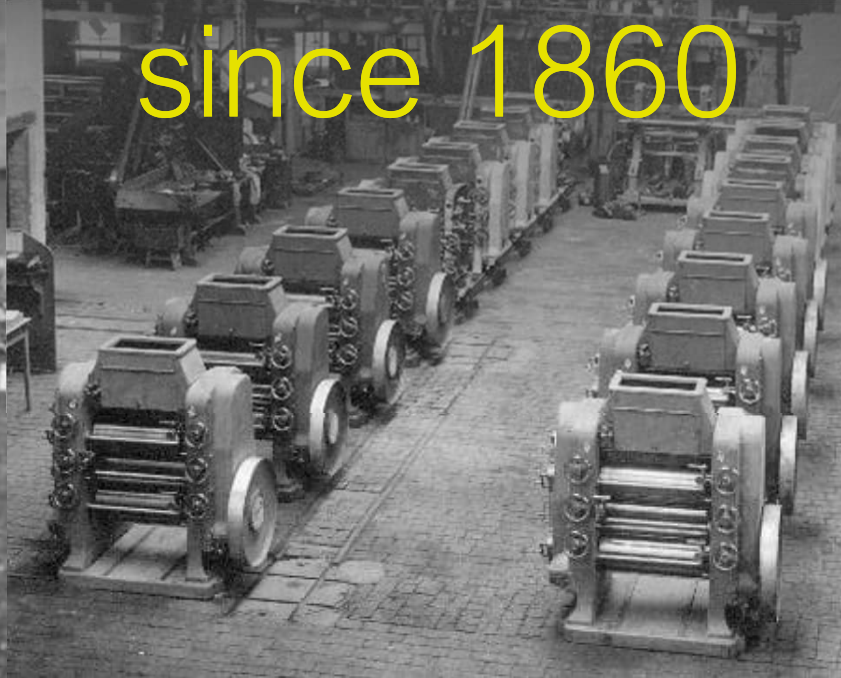
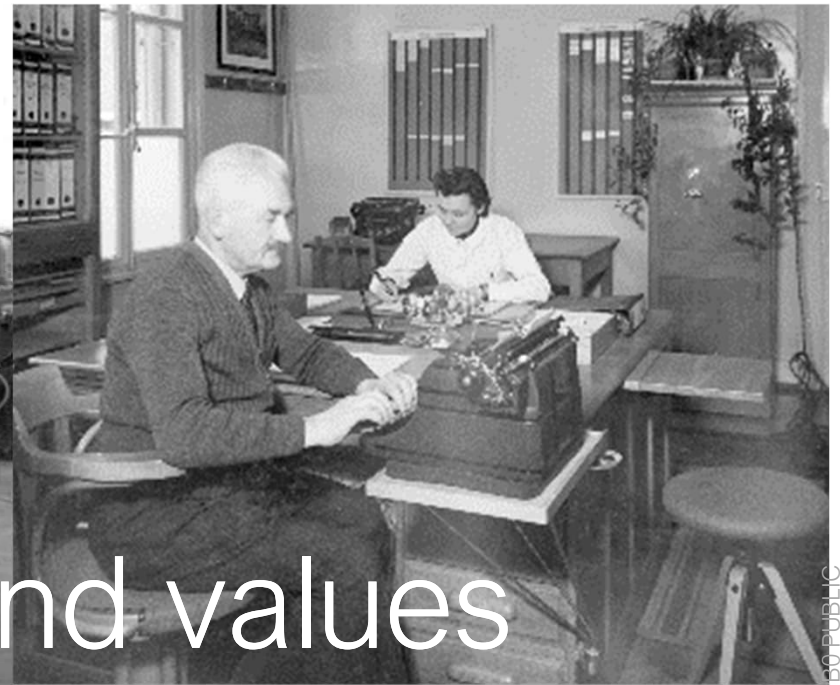
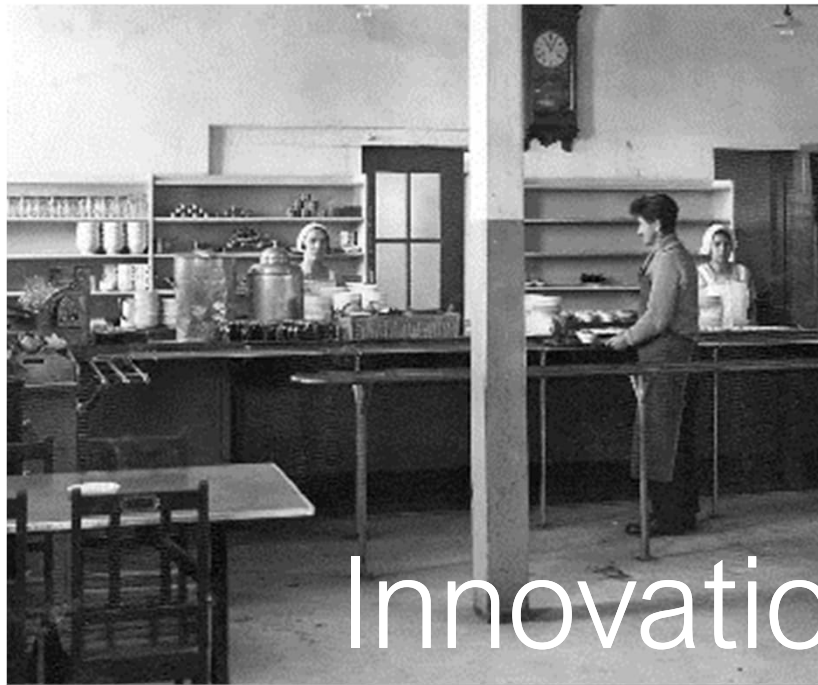
- 01 Introduction to Buhler
- 02 Maize milling and Buhler
- 03 Maize drying solution
- 04 Maize de-germination
- 05 Maize milling





01

Introduction to Buhler



Innovation, education, and values
since 1860

Bühler is part of the everyday life of billions of people



6:30 a.m.



7:15 a.m.



10:00 a.m.



3:00 p.m.



7:00 p.m.



7:00 a.m.



7:30 a.m.



12:00 p.m.



6:00 p.m.

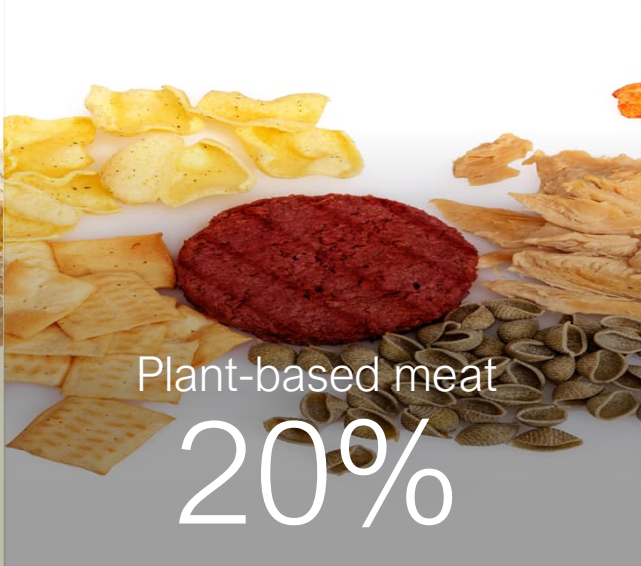


8:00 p.m.





Milling Solutions
65%



Plant-based meat
20%

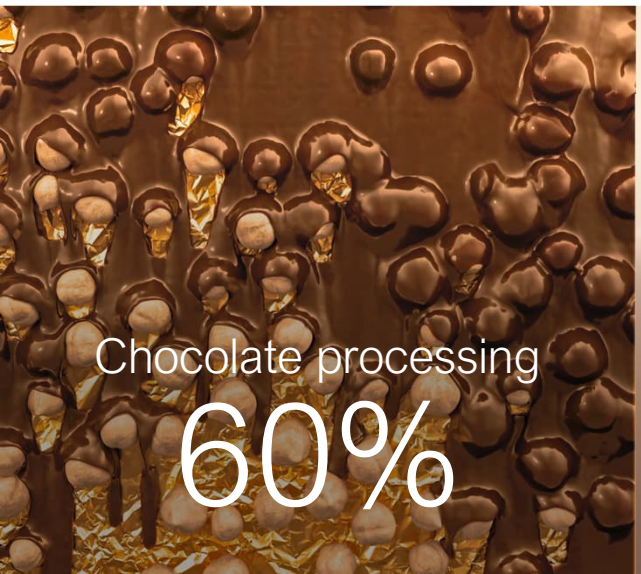


Malting
75%



Glass coating
35%

Market leadership in the industries we are active in



Chocolate processing
60%



Wafer
50%



Die-cast parts in cars
25%



Packaging inks
20%

Close to customers

Global network

Family owned

Innovation and education



12,700
FTE employees



140
Countries



CHF 3.0 bn
Turnover

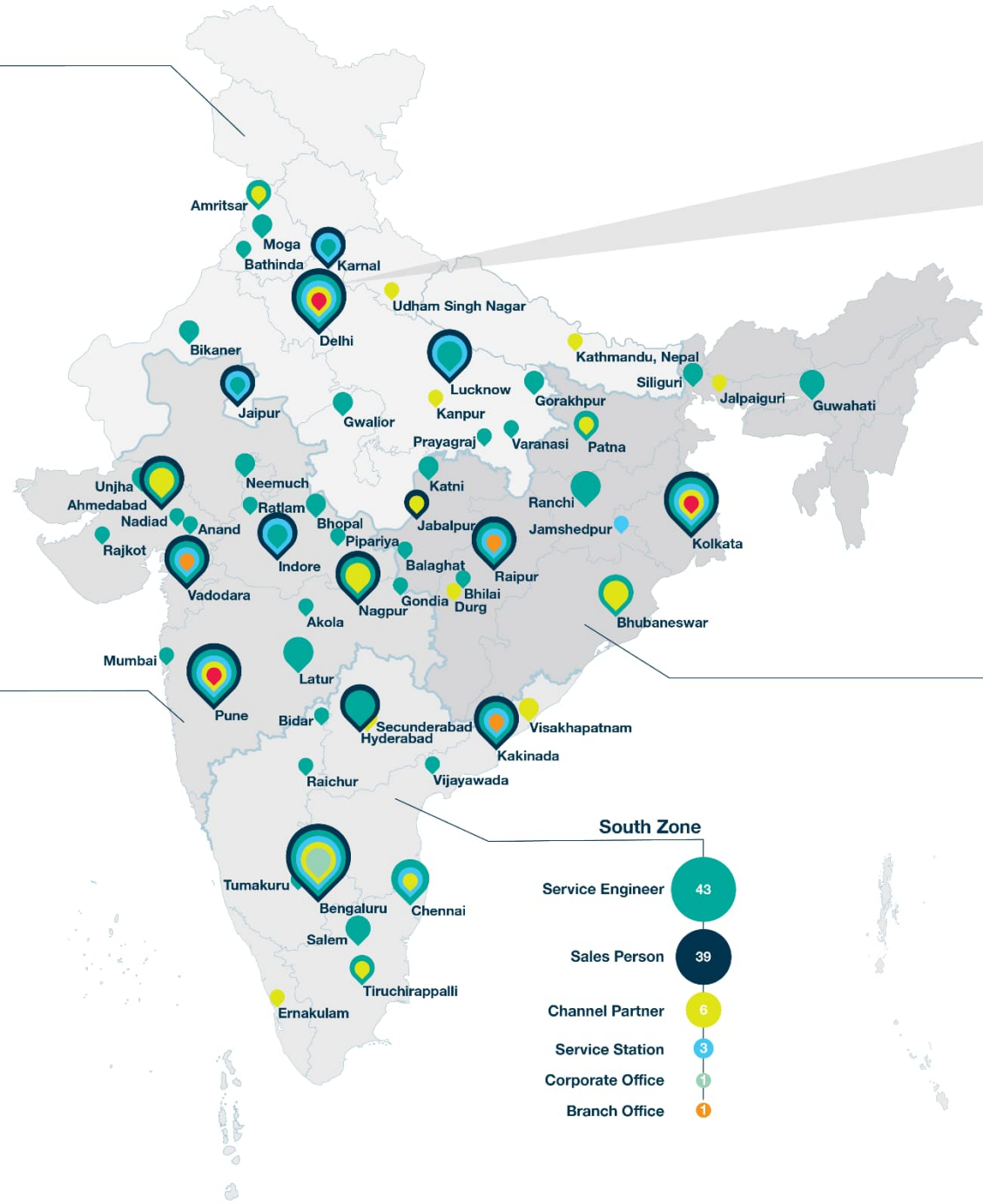


5%
of turnover for innovation



49.8%
Equity ratio

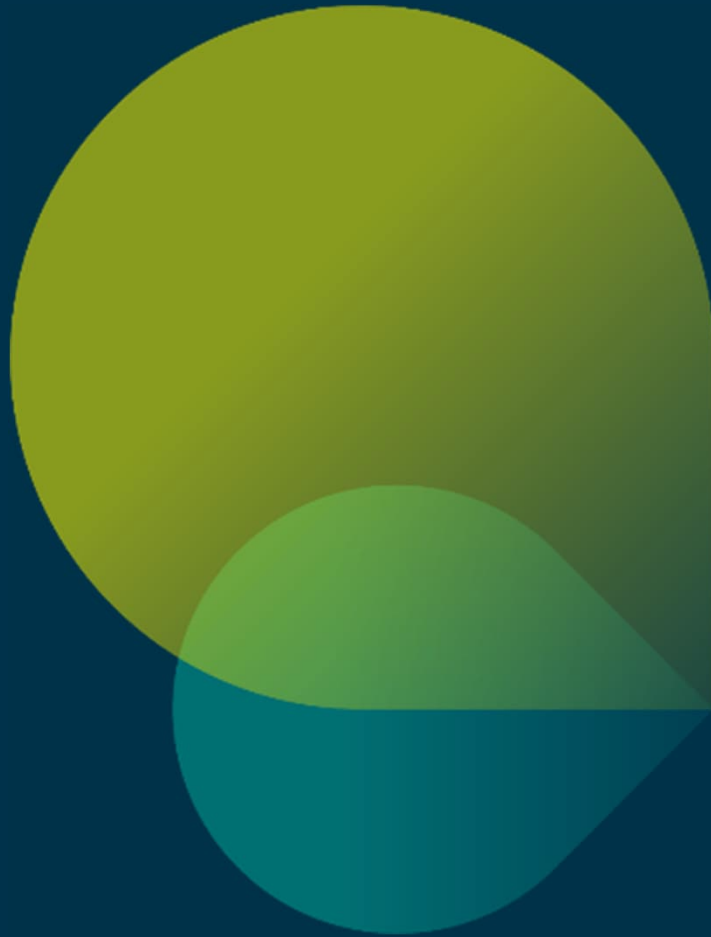
- North Zone**
- 49 Service Engineer
 - 11 Sales Person
 - 8 Channel Partner
 - 4 Service Station
 - 1 Zonal Office



- West Zone**
- 40 Service Engineer
 - 7 Sales Person
 - 4 Channel Partner
 - 3 Service Station
 - 1 Zonal Office
 - 1 Branch Office

- South Zone**
- 43 Service Engineer
 - 39 Sales Person
 - 6 Channel Partner
 - 3 Service Station
 - 1 Corporate Office
 - 1 Branch Office

- East Zone**
- 27 Service Engineer
 - 6 Sales Person
 - 6 Channel Partner
 - 3 Service Station
 - 1 Zonal Office
 - 1 Branch Office

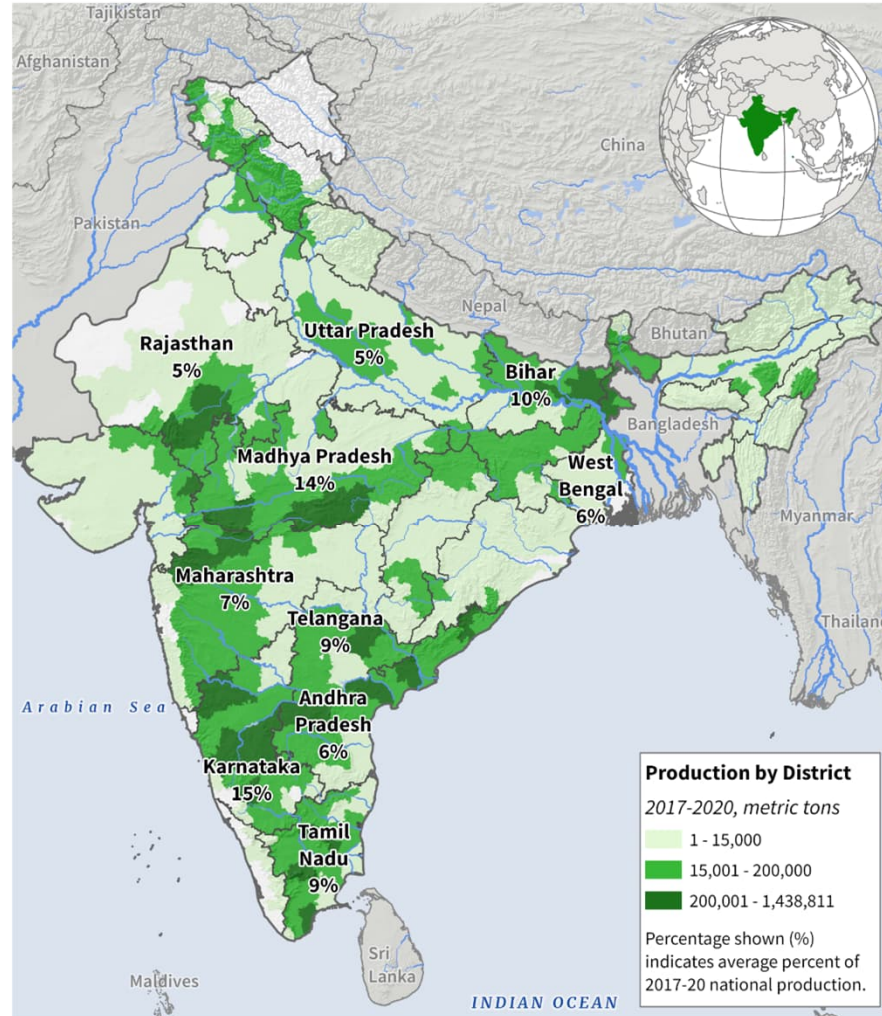


01

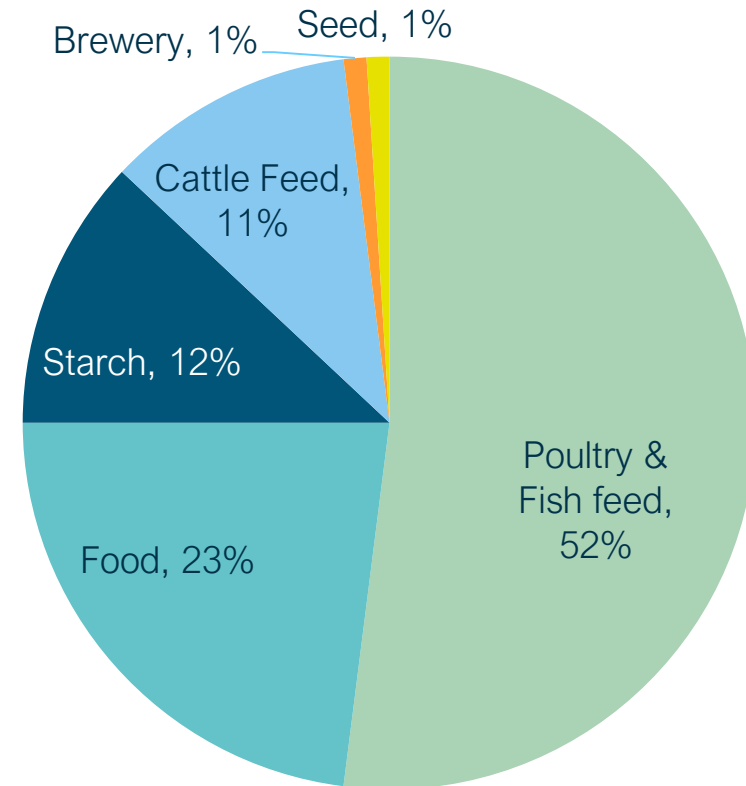
Maize milling and Buhler

Maize production and utilisation in India

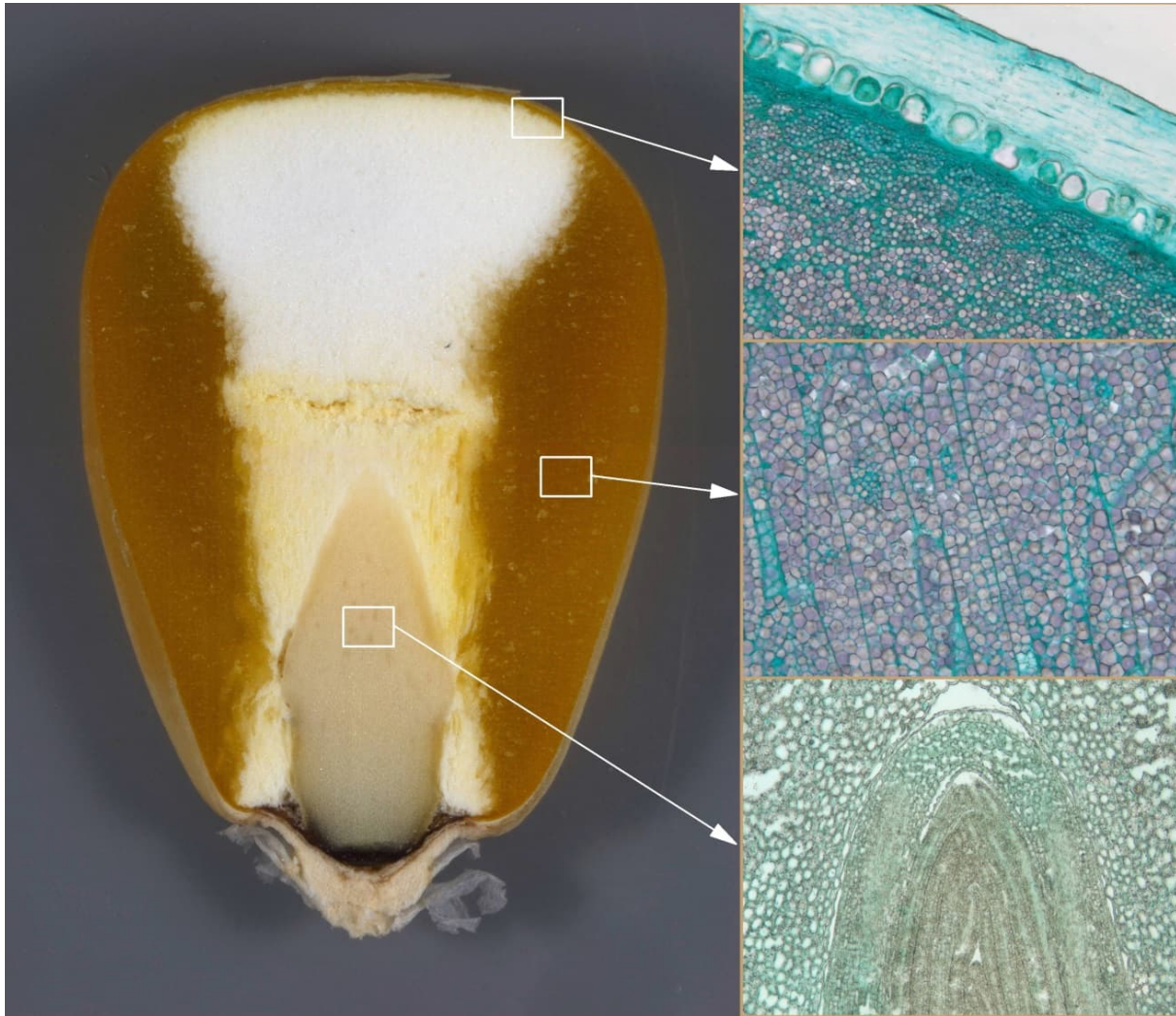
India: Corn Production



%Utilisation of Maize in India



Fraction of maize kernel.



Pericarp / Testa

6.0%

Aleurone

7.0%

Glassy
Endosperm

51.0%

Floury Endosperm

23.0%

Germ

11.5%

Cap

1.5%

Maze milling and grain-based ethanol plants.

Flake grits

5600 - 4000 μ

Fat 0.6 - 0.8 %



Distillers grits

1200 - 300 μ

Fat < 1.0 %



Snack grits

< 800 μ

Fat 1.0 - 1.2 %



Cornmeal

< 400 μ

Fat 1.0 - 2.0 %



Challenges of grinding corn

- Starch content of maize is lower than rice.
- Recovery of ethanol per ton of grain is lower than rice.
- Current availability of maize is lower than rice,
- Maize comes directly from field and has more impurities.
- Moisture content of maize is high during the harvest season and monsoon.
- Current price is higher than other grains

Advantages

- DDGA availability is higher per ton of grain.
- Oil availability from germ.
- Comparatively less human consumption in India.
- Possibility of by-products business.
- Export market for by-products.

Buhler Solution for maize based ethanol industry



Continuous corn dryers

- Continuous high-capacity dryers.
- Can run on steam and gas.
- Installations in India.
- Local technology and service support.
- High drying efficiency.
- Compact footprint



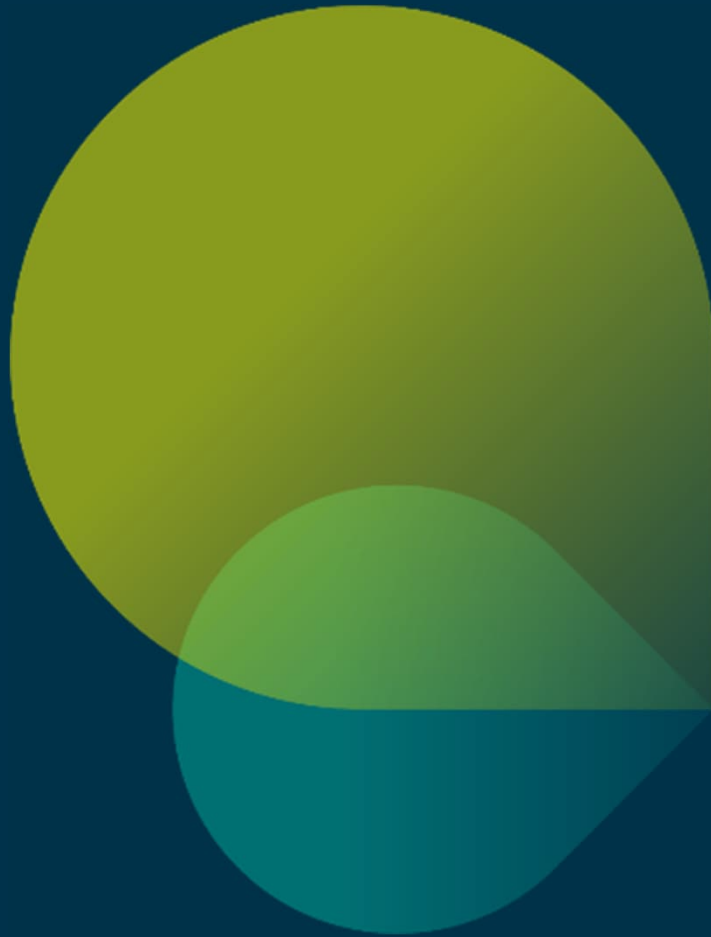
Degerminators

- Takes out fibres and germ at the milling stage.
- Machine is made in India.
- High capacity.
- Proven design, suitable for all variety of Indian and imported maize.



Vertical Hammer Mills

- High availability
- Optimised granulation
- Lower power consumption
- Proven design, suitable for all variety of Indian and imported maize.



02

Maze drying

Product flow separation (patented)

Continuous corn dryers



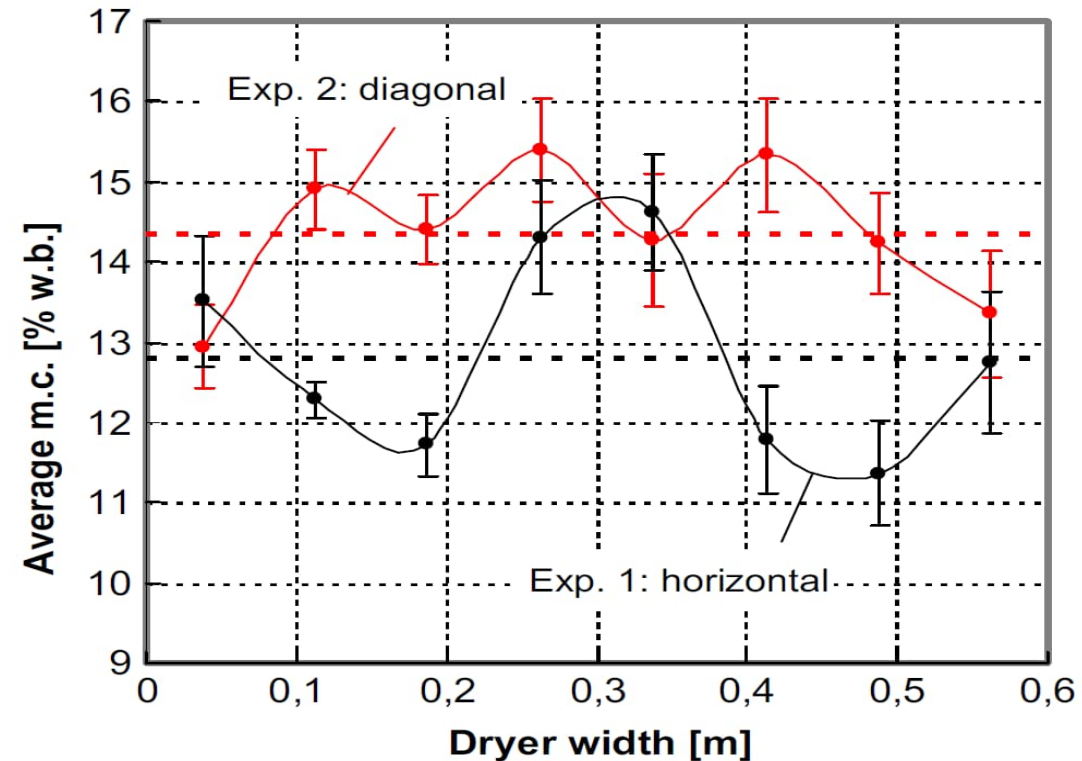
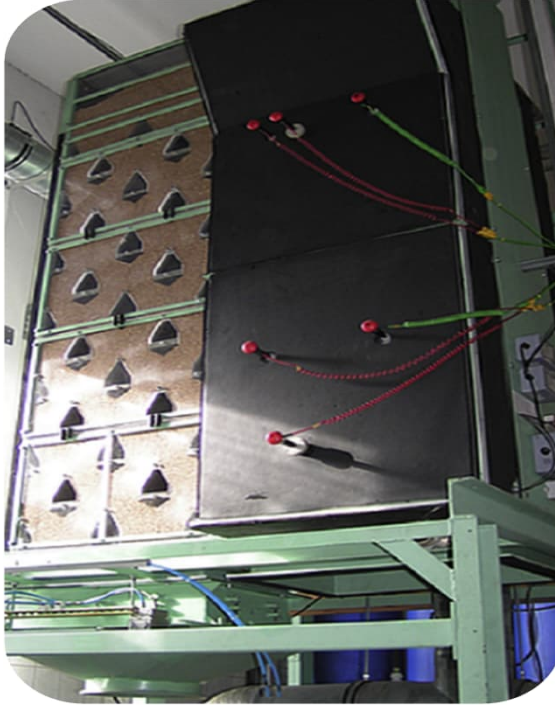
Advantages



- Higher energy efficiency through displacement of the moister grains from the middle of the product flow to the edge (and vice versa) and therefore less energy needed to release the moisture from the grains
- This results an absolutely uniform final moisture level
- Displacement of the grains coming into contact with the duct to the middle of the product flow cuts the thermal load on the product in half

Improved moisture distribution with diagonal arrangement

Scientific proof

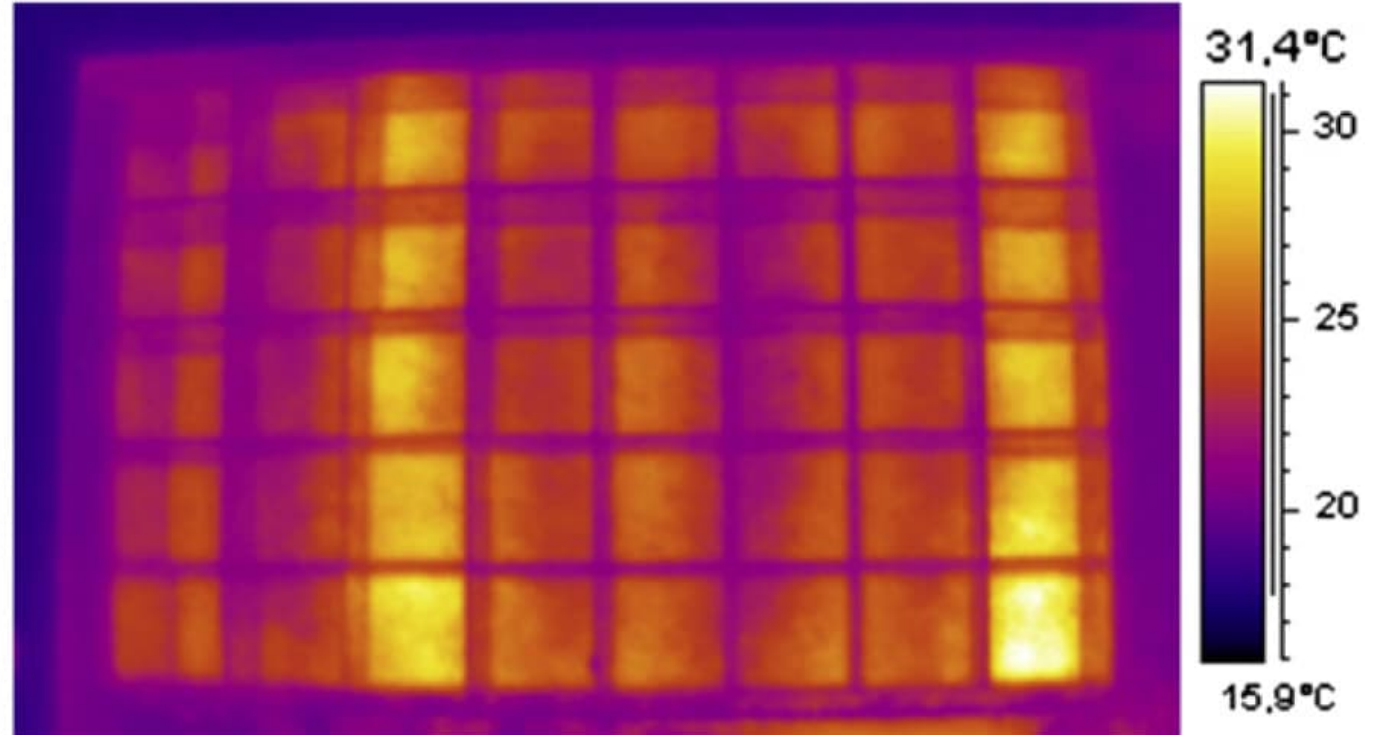


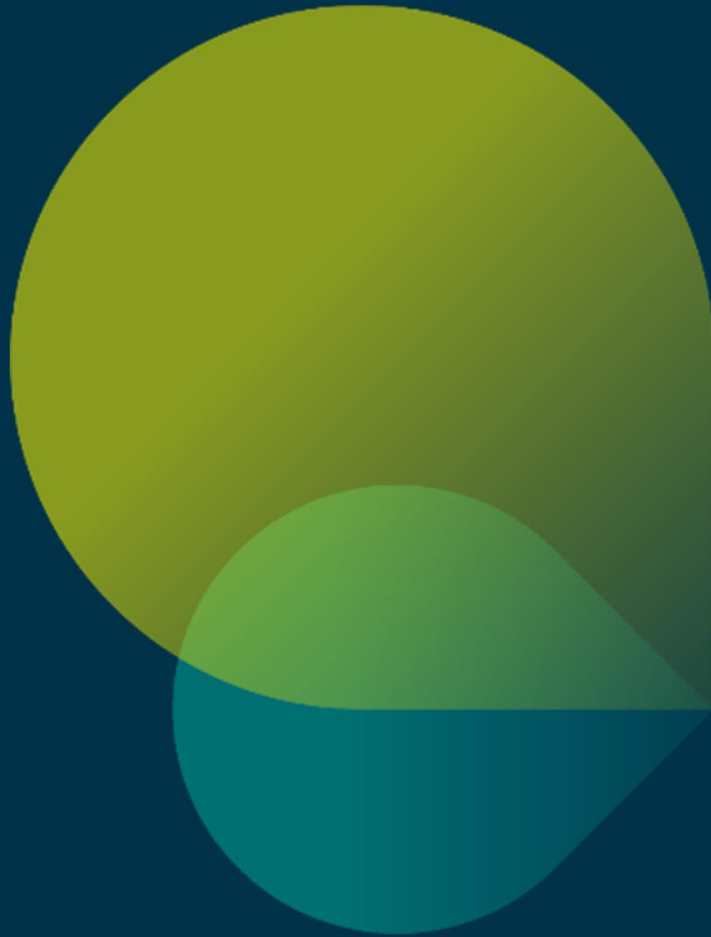
Experiments were carried out by the Leibniz Institute for Agricultural Engineering and Bioeconomy (ATB) in cooperation with Neuero, Germany using a small scale dryer

Homogeneous drying translates into energy savings

No energy waste
due to overdrying

Less energy
=
Lower costs



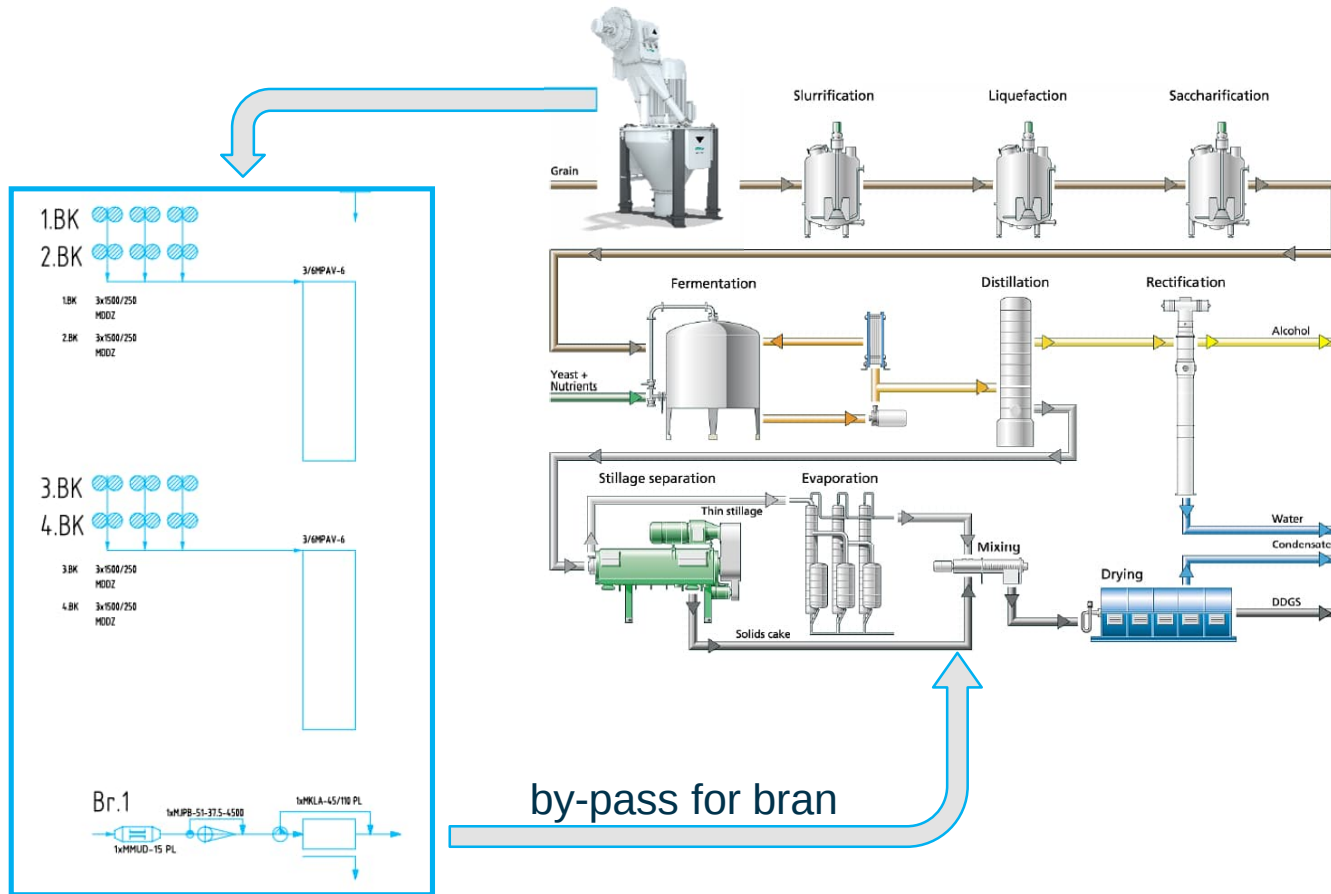


02

Maze degermination

Ethanol: Fiber Reduction Process in the Mill

Increase efficiency and boost capacity



Situation:

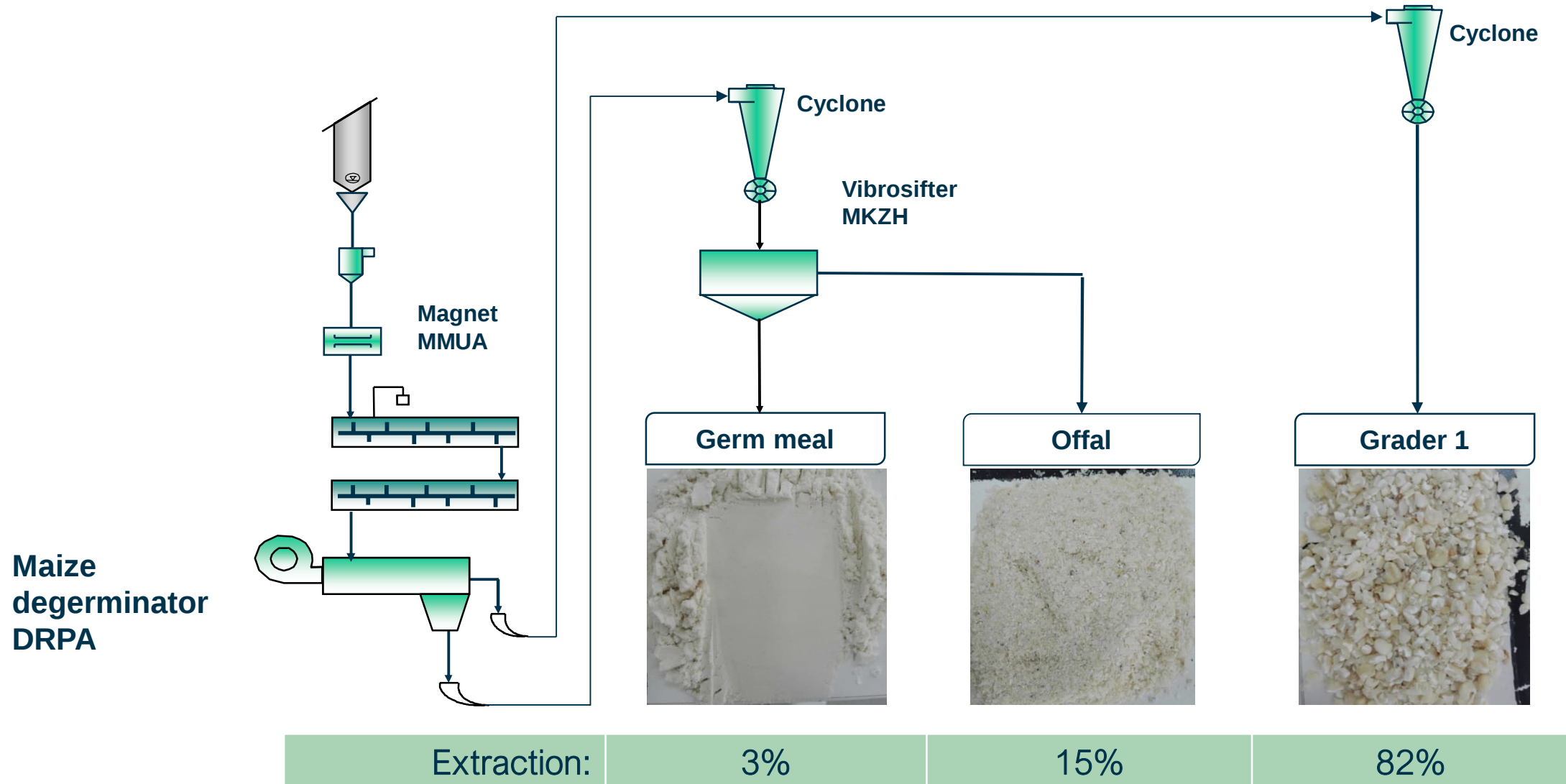
- Bran is not being converted to Ethanol (only starch)
- Processing whole grain, means loading the Ethanol process unnecessarily
- High energy cost for drying of bran in the DDGS dryer

The Solution:

Separation of bran in the mill. By-passing of the Ethanol process with the bran.

- Capacity Booster (existing plants)
- Improved DDGS quality.
- Reduction of decanter and DDGS dryer load.
- Energy Saving.
- More grinding capacity.
- High value by-products

Maize de-germination process



Maize de-germinator DRPA-M.

Excellent maize de-germination results.

- High product quality
- High efficiency
- Easy maintenance
- High sanitation standards

The Buhler Maize degerminator DRPA-M is the most efficient degerminator for small capacities <2t/h.



Degerminater output with Indian Maize



Cleaned Maze



Degerminator Overs



Degerminator thros



8.5 to 2.5 mm sieve



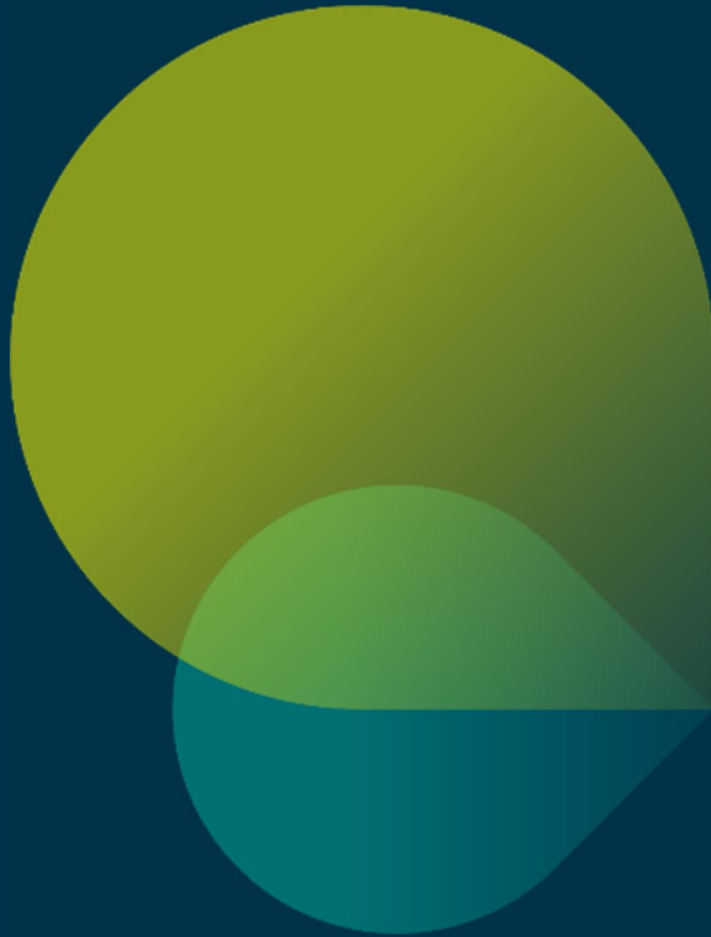
250 micron overs



250 micros thros

Insights

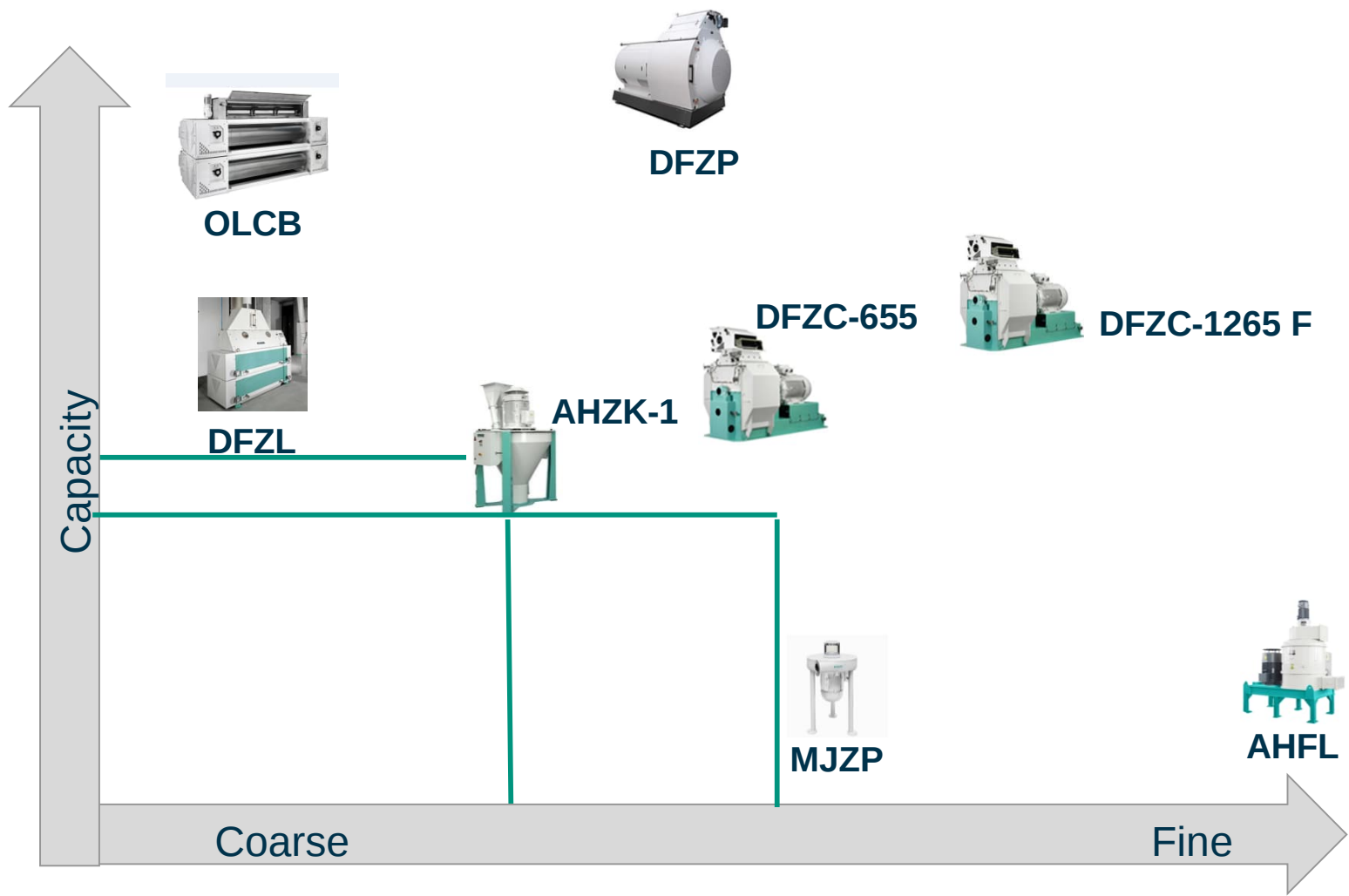
- 14-16% germ + husk+ other fractions
- 80-85% Grit for ethanol
- Grits will go to the hammer mill.



02

Maize milling

Grain grinding mills and granulation



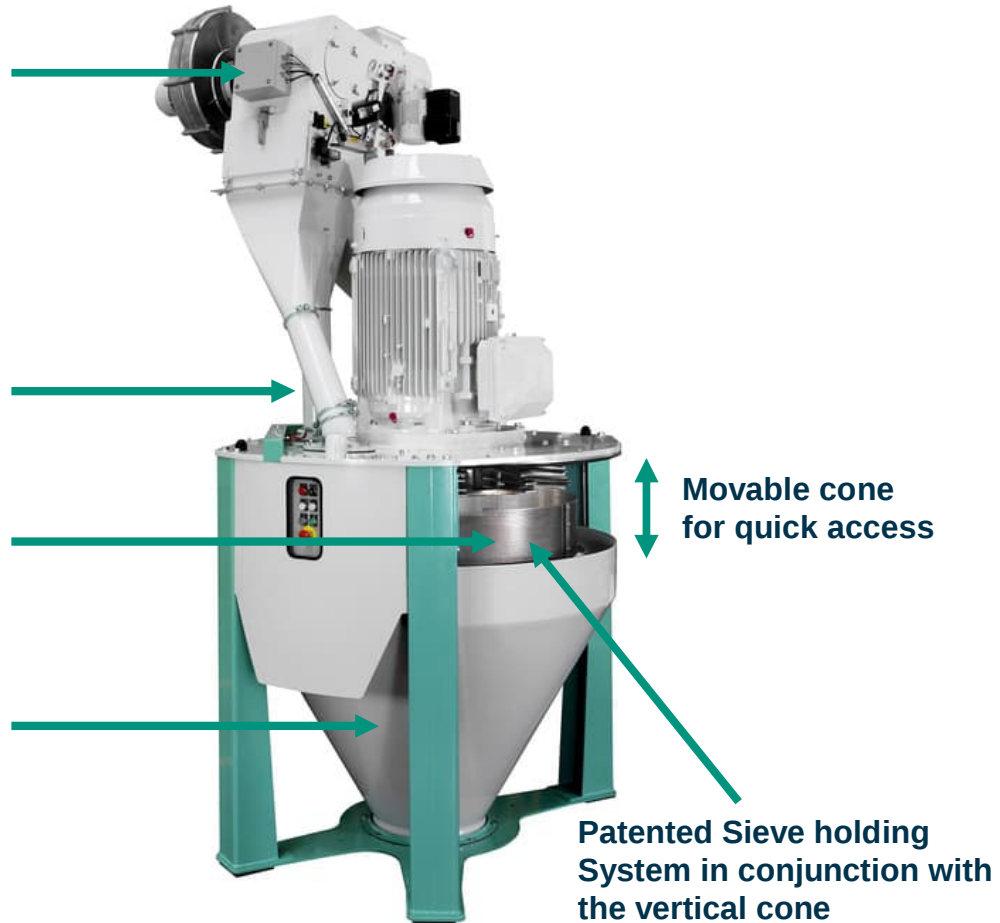
Overview.

Feeder AHAV
incl. heavy
particle separator

3 feeding spouts

Grinding chamber
and sieves

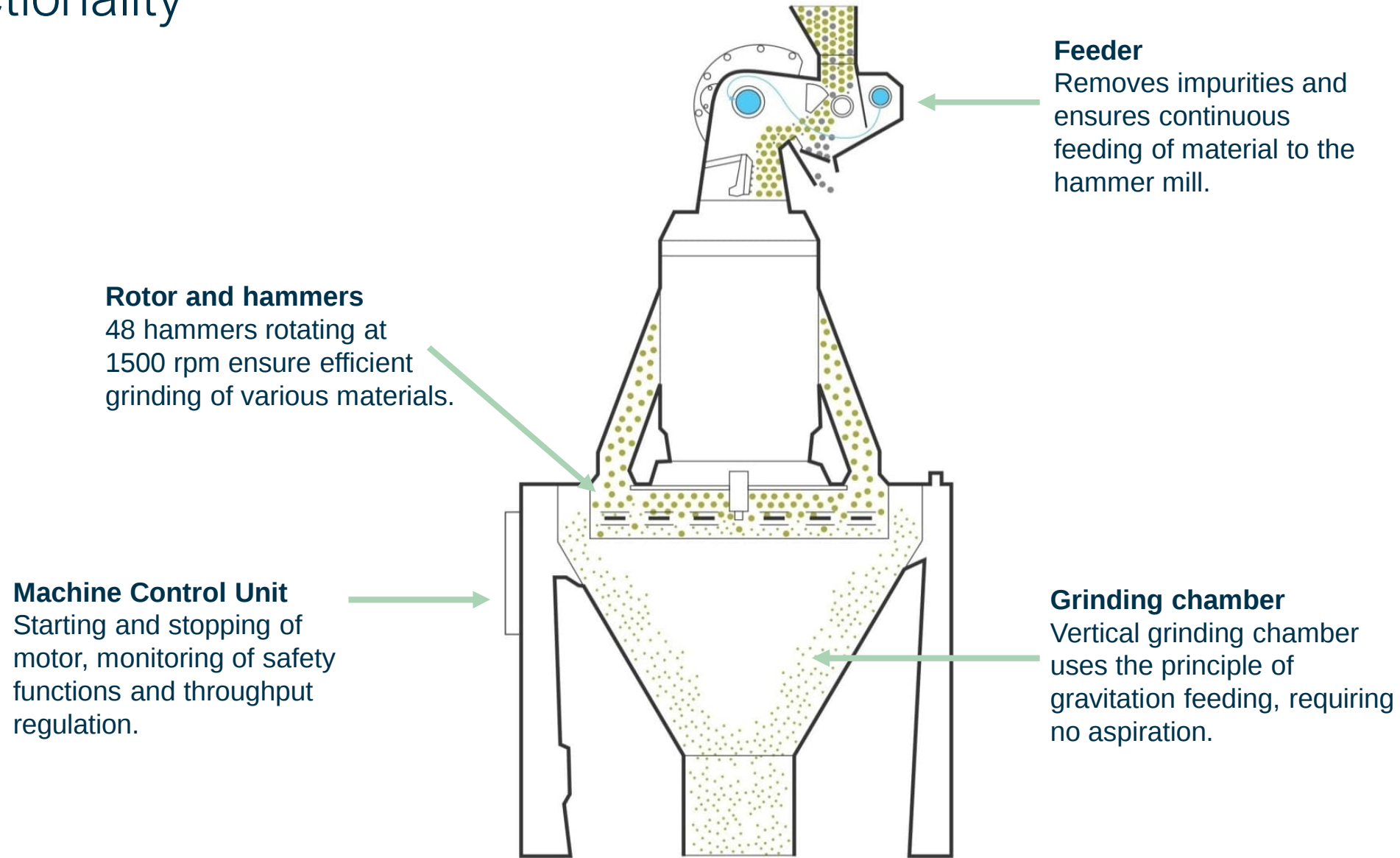
Discharge hopper



AHZK 2

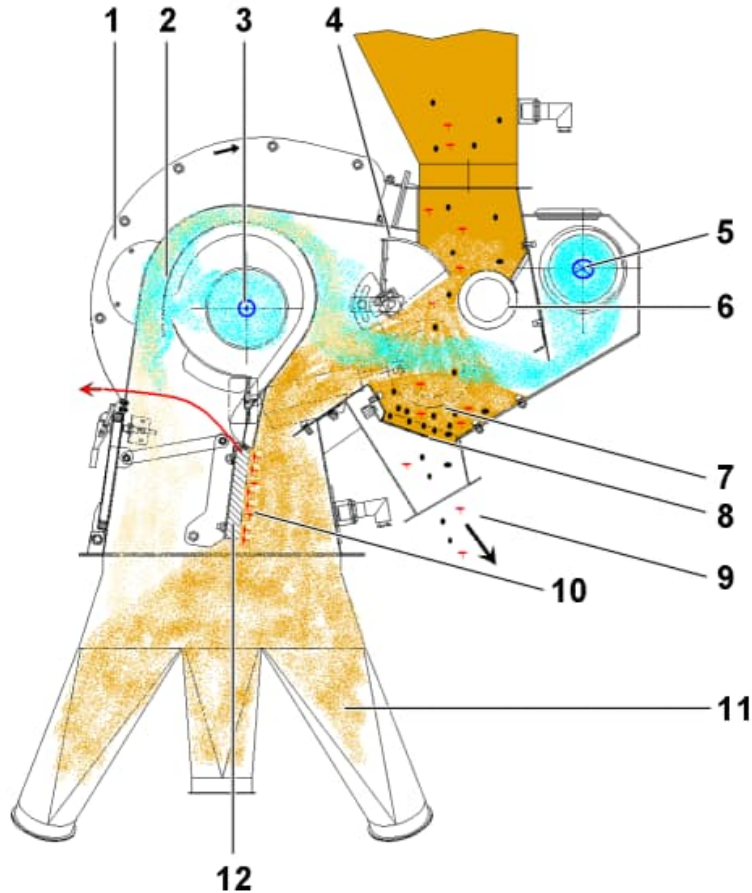


Functionality



Joint feeding and gravity separation

Patented system for high reliability



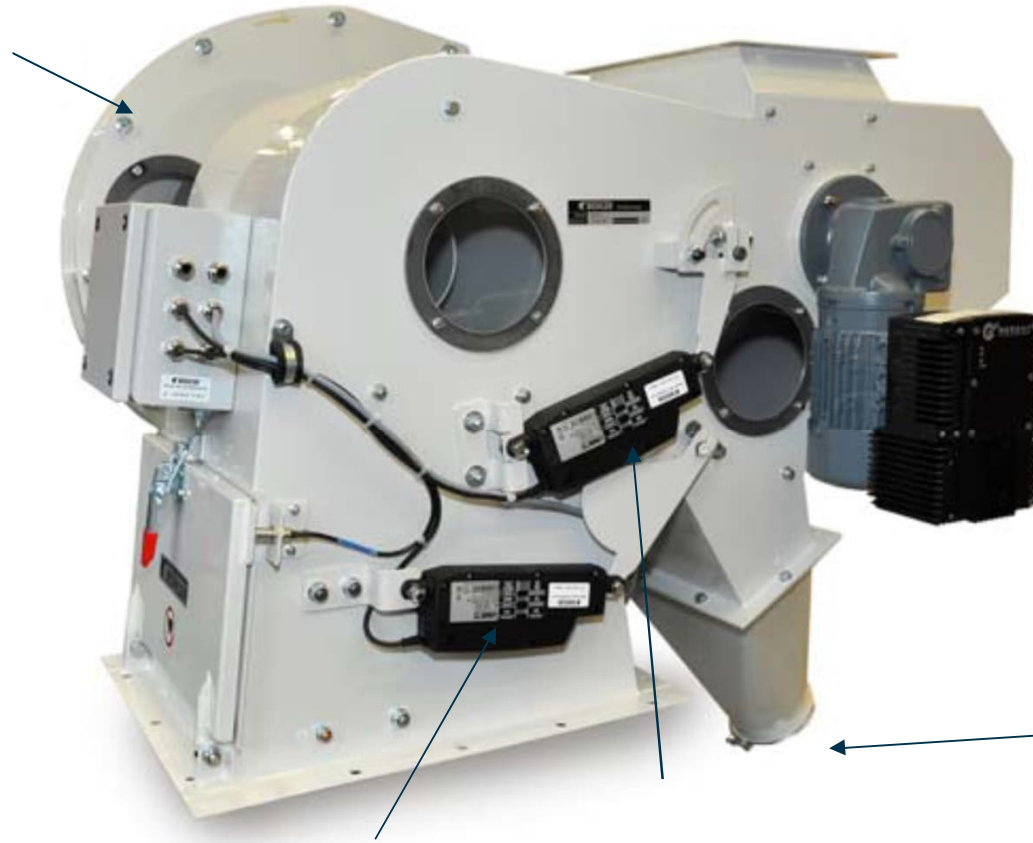
Mode of operation.

- removes impurities
- ensures continuous feeding of material into the grinding chamber.

- 1 Fan
- 2 Separator for fines
- 3 Air exhaust
- 4 Segment slide gate
- 5 Air intake
- 6 Feed roll
- 7 Collecting zone for heavy particles
- 8 Gate for heavy particles
- 9 Outlet for heavy particles
- 10 Collecting zone for iron particles
- 11 Product discharge
- 12 Magnet

Feeder DFAV on top of hammermill

100% Air
circulation



← Gear motor with
inverter for feeder roll

← discharge for heavy
particles

Servo motor for
discharge flap

Servo motor for
segment gate

Vertica™ Hammer Mill (AHZK)

Low energy requirement.

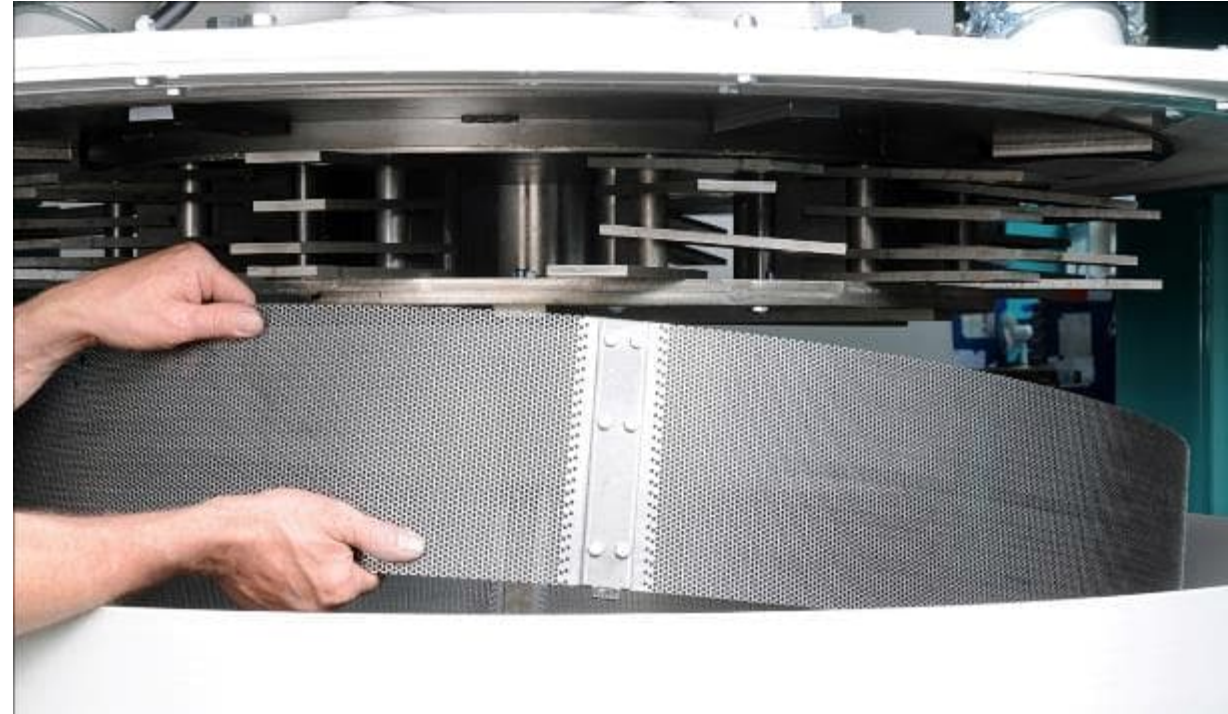
- Thanks to the closed milling chamber no aspiration required for the grinding process.
- In comparison with standard horizontal hammer mills, there is energy saving of at least 30 percent.



Vertica™ Hammer Mill (AHZK)

Simple maintenance and long service life.

- There is simple access to sieves and beaters thanks to the cone, which can be lowered automatically, as well as the quick changing of inserted or screwed in wearing parts, resulting in minimal operational interruptions.
- Maintenance requirements are reduced by reinforced sieves with up to four times the service life and tempered beaters with up to double the service life.





INNOVATIONS FOR A BETTER WORLD