ANDRITZ GROUP

BIOMASS PELLETING SAFETY

PREVENTING, DETECTING, AND MANAGING SELF-HEATING INCIDENTS

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ANDRITZ

ENGINEERED SUCCESS

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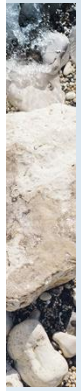
FutureMetrics™ LLC
The Leading Consultancy in the Wood Pellet Sector

WOOD PELLET ASSOCIATION OF CANADA

THE ANDRITZ GROUP



KEY FINANCIAL FIGURES 2024

ORDER INTAKE
8.3 billion EUR
(2023: 8.6 billion EUR / -3%)

REVENUE
8.3 billion EUR
(2023: 8.7 billion EUR / -4%)

ORDER BACKLOG
9.7 billion EUR
(2023: 9.9 billion EUR / -1%)

EBITA
713 MEUR
(2023: 742 MEUR / -4%)

EBITA MARGIN
8.6%
(2023: 8.6%)

NET INCOME
(incl. non-controlling interests)
497 MEUR
(2023: 504 MEUR / -2%)

AROUND 30,000
EMPLOYEES WORLDWIDE

OVER 280
LOCATIONS

OVER 80
COUNTRIES

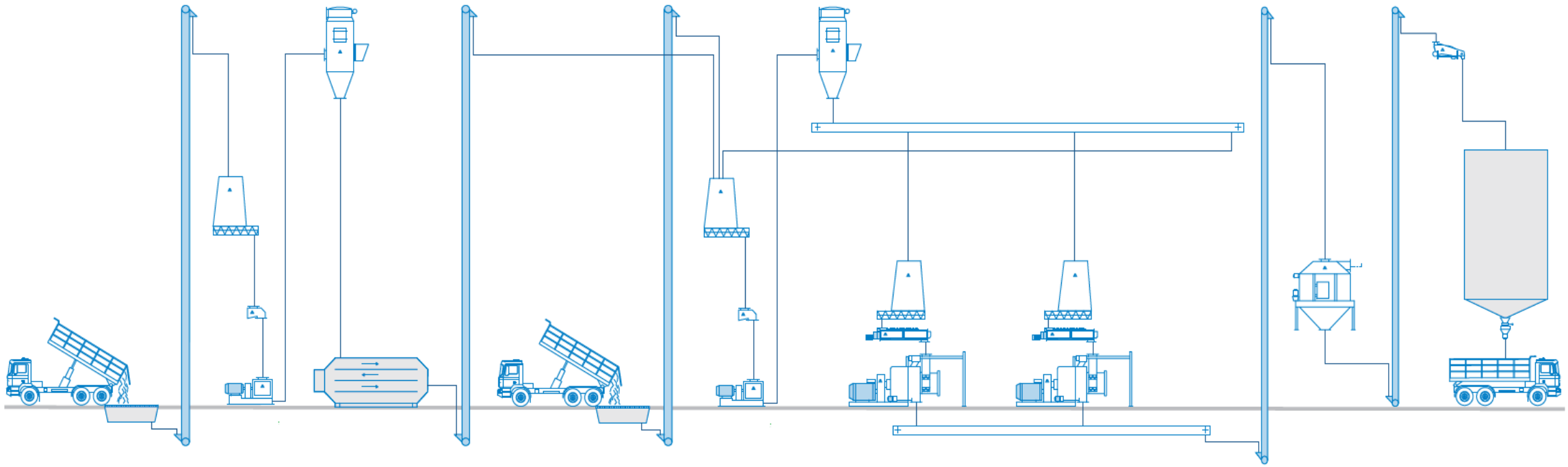
BIOMASS PELLETING - SAFETY

Headlines

- Definition of Fire and Explosion
- Mitigation Methods
  - Fire Mitigation
  - Explosion Mitigation
  - Potential precautions to consider
- Examples from the Pelleting Process
- **Why Uniform Moisture Content Matters**
  - Self-Heating of Wood Pellets during Storage
- **Importance of Pellet Cooling / Screening**
- **Monitoring of Pellet Storages**
- Examples for Shipping, Storage, and End-User Handling

BIOMASS PELLETING - SAFETY

Wood Pelleting Process line



CHIP INTAKE	CHIP GRINDING	DRYING	SAWDUST INTAKE	FINE GRINDING	PELLETING	COOLING	SILO / OUTLOADING

BIOMASS PELLETING - SAFETY

Why Uniform Moisture Content Matters

Particle size matters on Dryer Behavior

- Fine particles dry too fast, may overheat → increased risk of ignition inside the dryer.
- Coarse particles remain under-dried → contain moisture pockets carry excess moisture into pelletizing.

Residual moisture is a known driver for:

- Microbial activity (generating heat).
- Exothermic oxidation reactions.

These mechanisms can lead to self-heating and off-gassing in pellet storages and silos.

✅ Conclusion:

Uniform particle size enhances drying efficiency and reduces the risk of spontaneous ignition in pellet storage.

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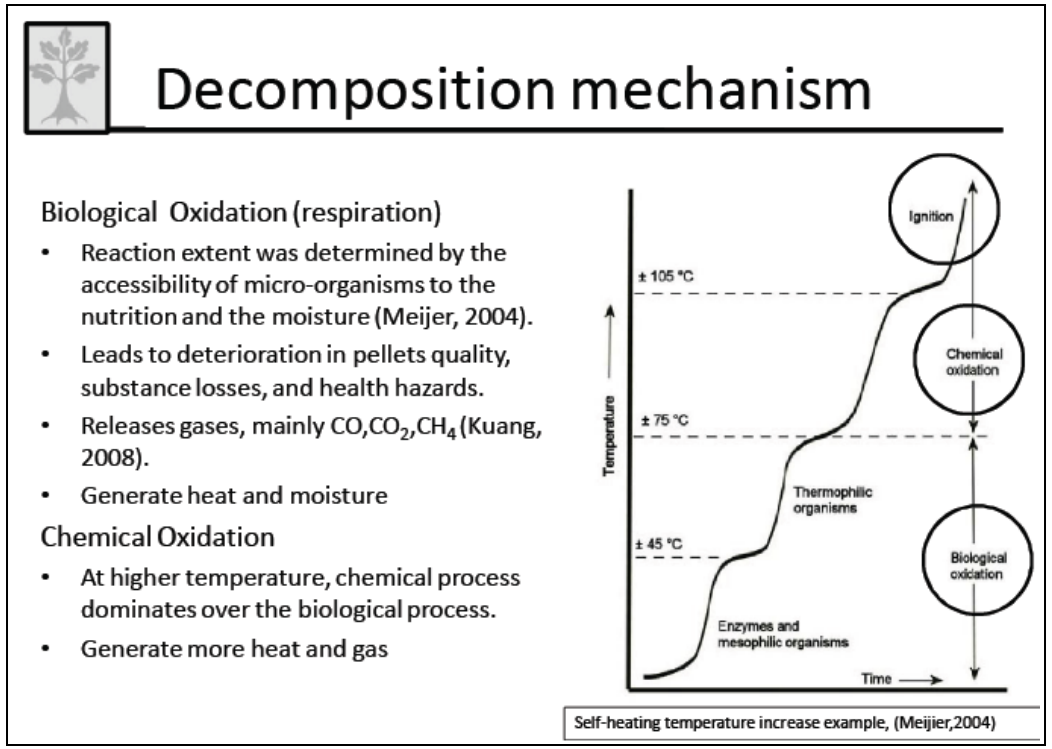
Self-Heating of Wood Pellets during Storage

Self-heating of biomass can occur either by chemical oxidation reactions and/or microbiological decay.

The fresher the biomass and the higher the moisture content the greater is the risk for self-heating and potential self-ignition. Self-heating of biomass is a serious problem and has been cause of several incidents.

Source: Danish Technological Institute

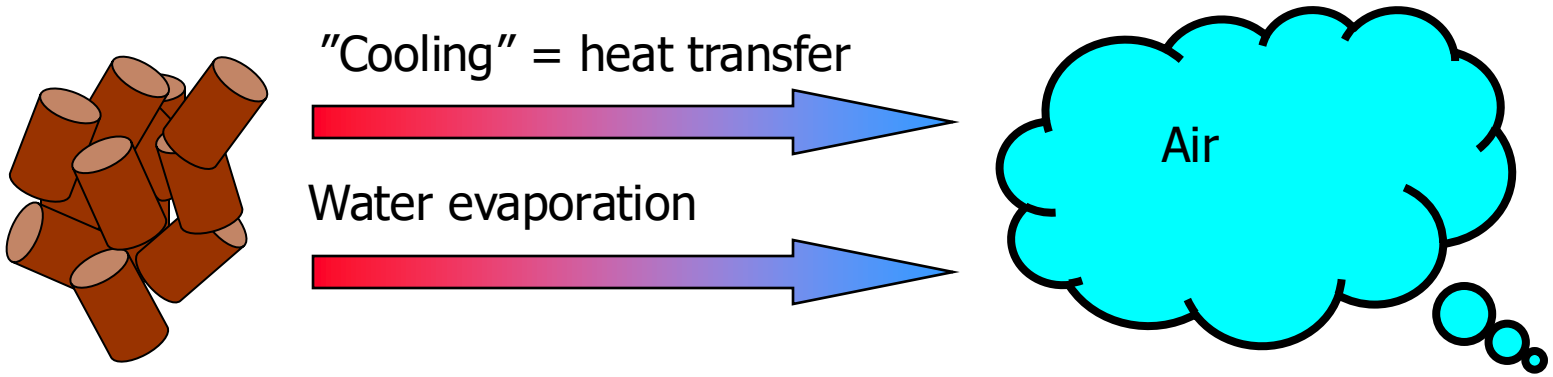
✅ Conclusion:
Water is an enemy !



Source: The University of British Columbia

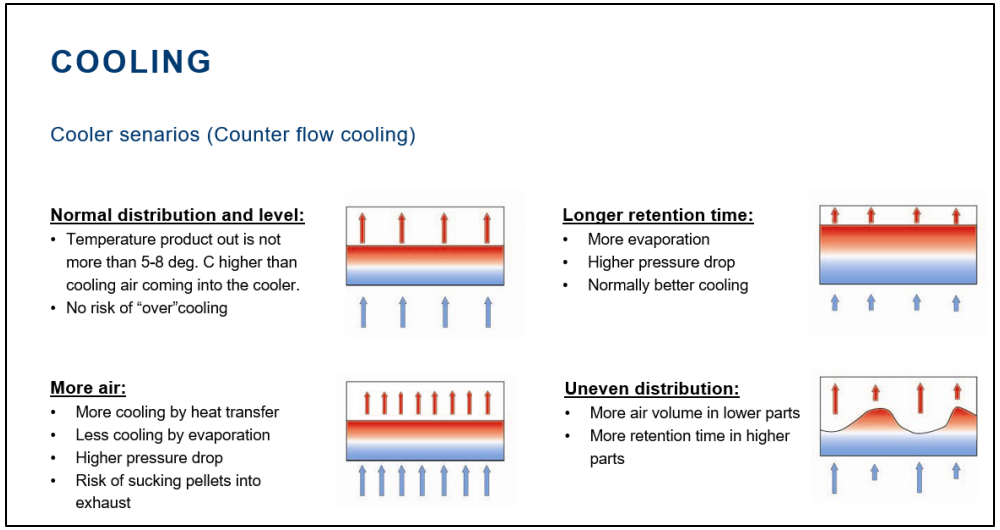
BIOMASS PELLETING - SAFETY

Importance of Pellet Cooling / Screening



✅ Safety Guidelines

- Pellets < 50°C before storage
- Fines < 1% to minimize heat buildup
- Uniform drying prevents condensation and hot spots



BIOMASS PELLETING - SAFETY

Importance of Pellet Cooling / Screening

This step removes fines from pellets after the pelleting and cooling stages, ensuring clean material enters storage.

- Fines are usually recycled, ideally via the hammermill, for effective regrinding and blending.
- In certain cases, oversized materials must also be removed.

✅ Safety Guidelines

- Pellets < 50°C before storage
- Fines < 1% to minimize heat buildup
- Uniform drying prevents condensation and hot spots

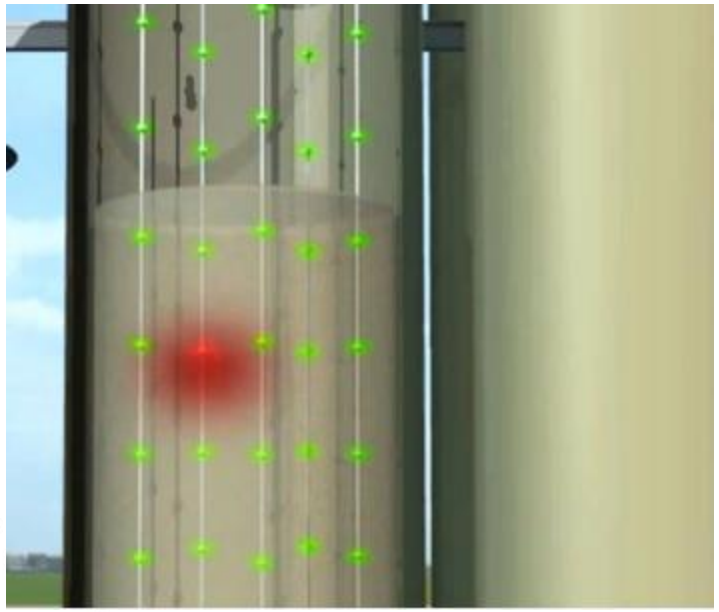
BIOMASS PELLETING - SAFETY

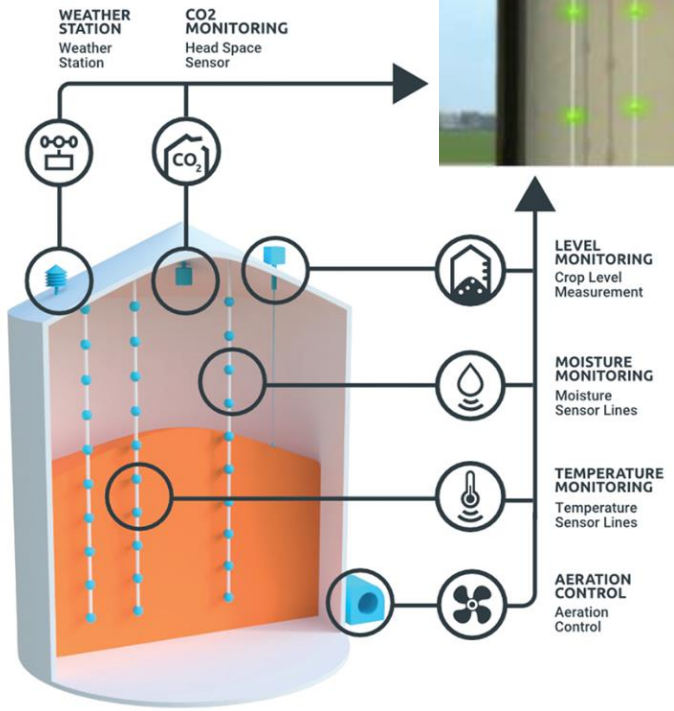
Monitoring of Pellet Storages

Online temperature monitored by means of several sensors which are fitted in carrying cables.

Additional options:

- CO2 monitoring
- Moisture monitoring
- Level monitoring
- Weather station
- Aspiration
- Data collection system



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