



ANDRITZ GROUP

BIOMASS PELLETING SAFETY

PREVENTING, DETECTING, AND MANAGING SELF-HEATING INCIDENTS

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BY LARS T. BLOCH

ANDRITZ

ENGINEERED SUCCESS

Ørsted



FutureMetrics™ LLC
The Leading Consultancy in the Wood Pellet Sector



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



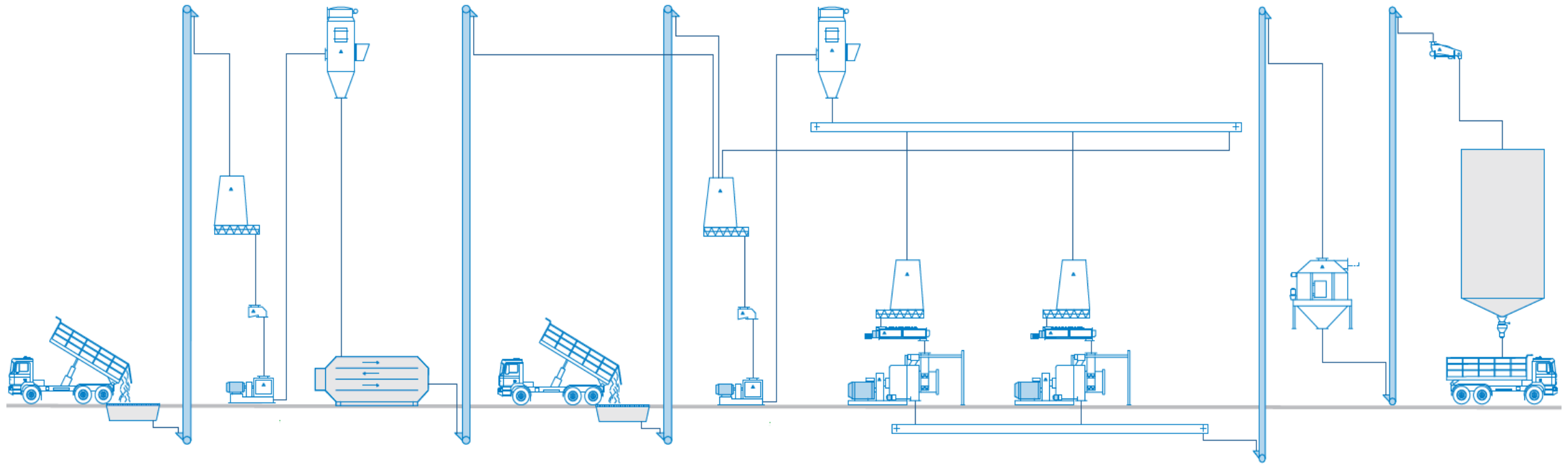
Headlines

-  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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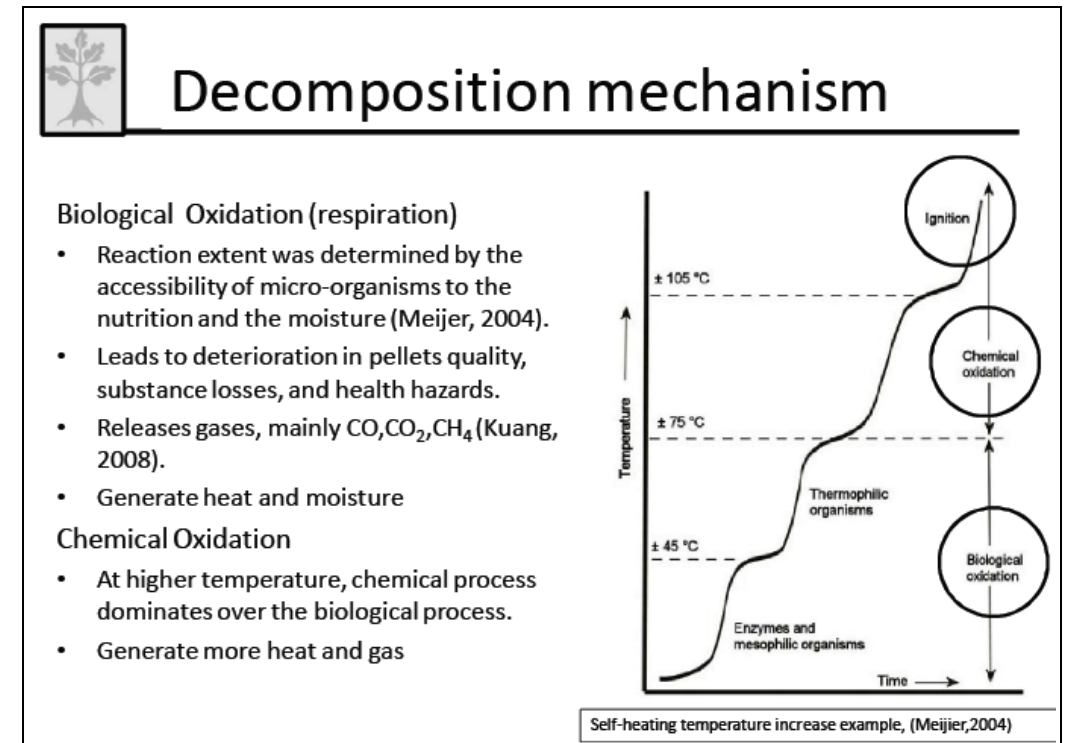
Self-Heating of Wood Pellets during Storage

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 !

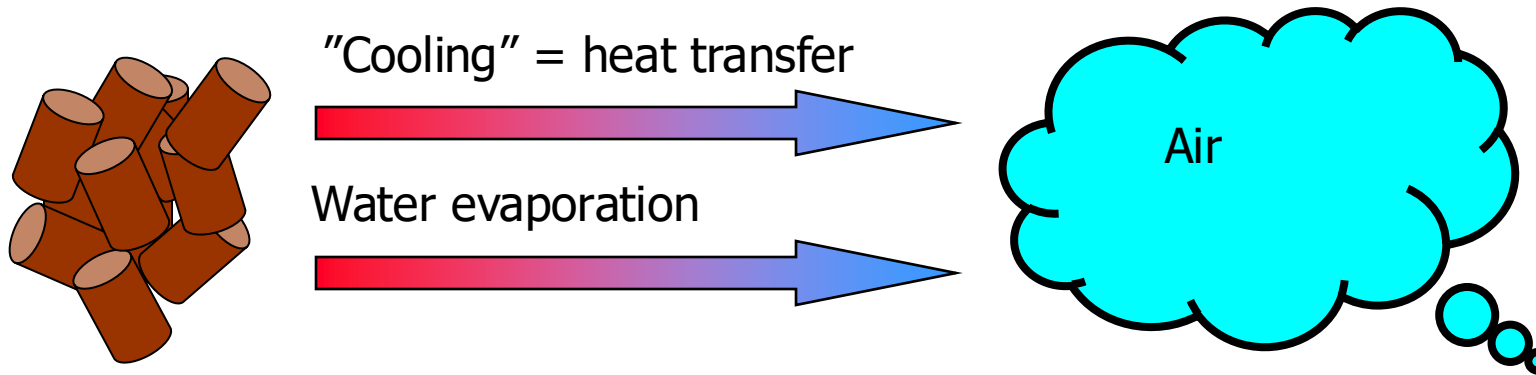


Source: The University of British Columbia

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Importance of Pellet Cooling / Screening



✓ Safety Guidelines

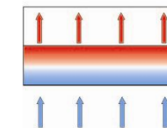
- Pellets < 50°C before storage
- Fines < 1% to minimize heat buildup
- Uniform drying prevents condensation and hot spots

COOLING

Cooler scenarios (Counter flow cooling)

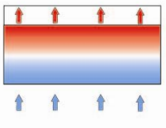
Normal distribution and level:

- Temperature product out is not more than 5-8 deg. C higher than cooling air coming into the cooler.
- No risk of "over"cooling



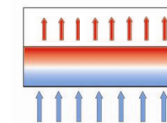
Longer retention time:

- More evaporation
- Higher pressure drop
- Normally better cooling



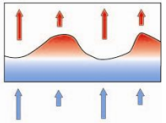
More air:

- More cooling by heat transfer
- Less cooling by evaporation
- Higher pressure drop
- Risk of sucking pellets into exhaust



Uneven distribution:

- More air volume in lower parts
- More retention time in higher parts



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

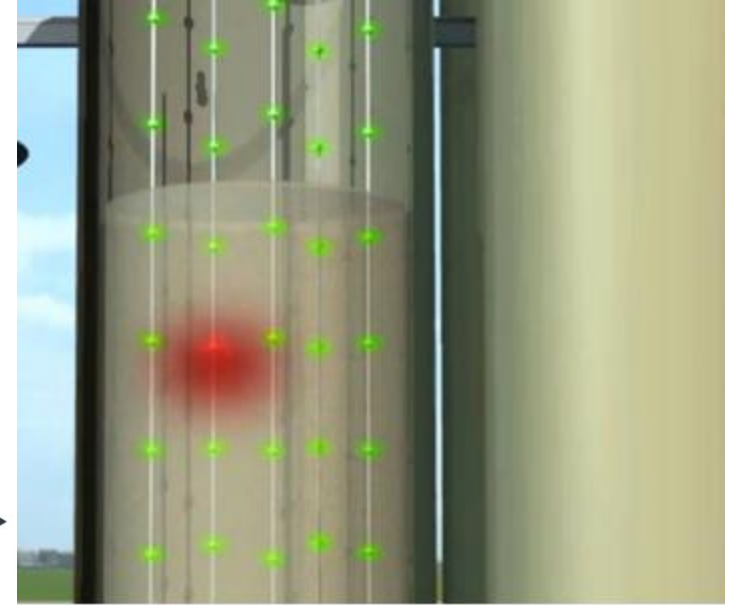
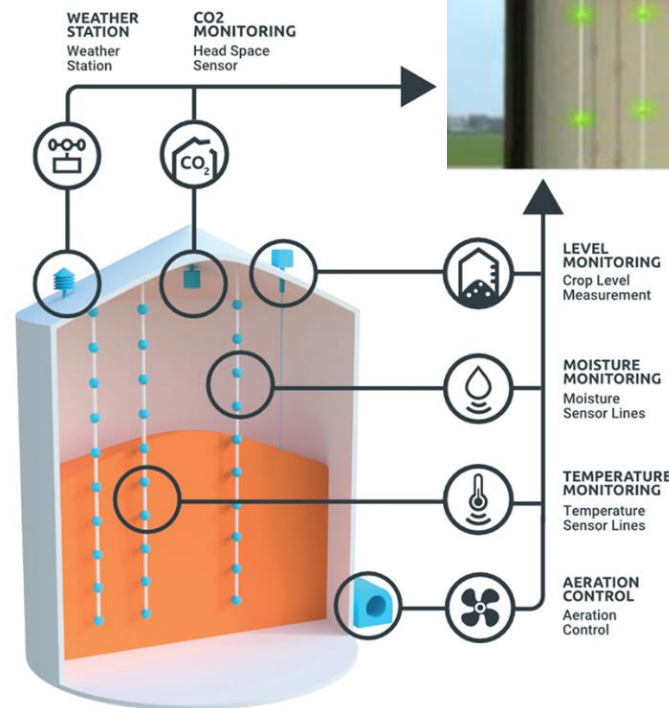


Monitoring of Pellet Storages

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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