Application report

Moisture measurement of sugar beet pulp

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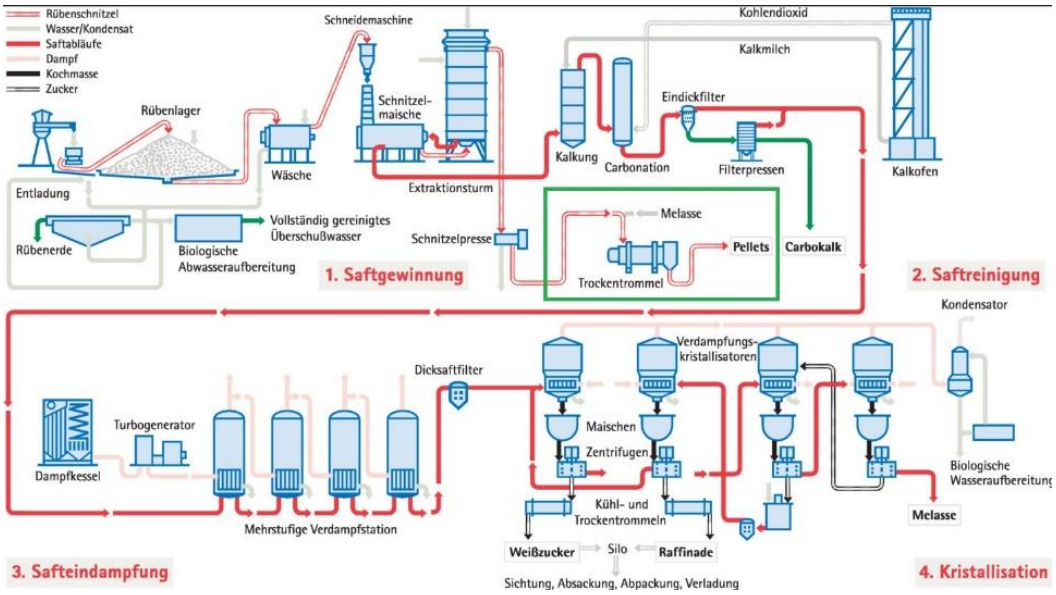
1. What is the initial situation?

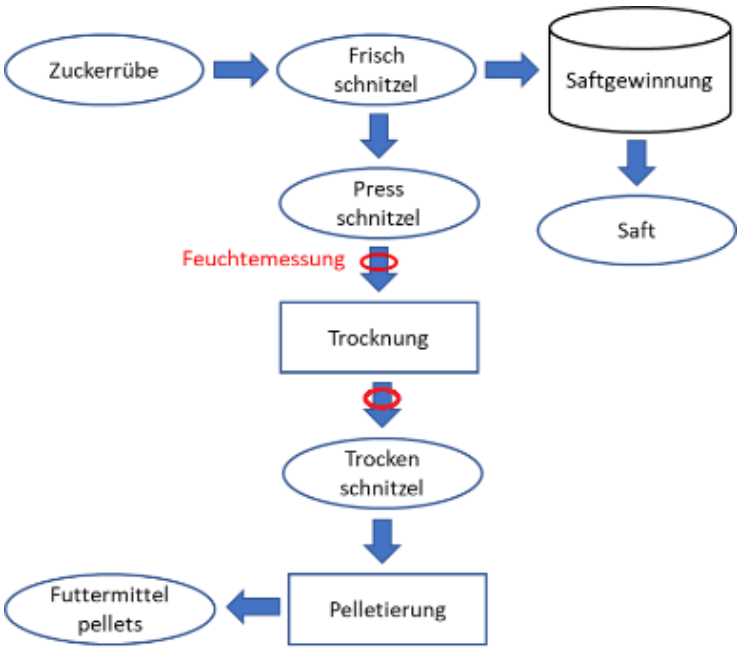
- In addition to the juice, large quantities of beet pulp are left over from industrial beet sugar processing. This beet pulp is processed into animal feed in the form of pellets. For this purpose, the material is dried after sugar extraction. It must have the right moisture content in order to be processed into pellets.
- If the beet pulp is too wet, it can clump together. If they are too dry, they can break or set the dryer on fire.
- Overdrying should be avoided, as dryers require a lot of energy and are therefore a cost driver.
- Many factories determine the moisture content of the beet pulp using laboratory samples. As a result, the measurement results are only available very late, the drying process then runs for hours with too strong or too weak temperature setting, the quality of the material suffers and the energy consumption is unnecessarily high.



Process diagram of a sugar factory

2. Solution

- Inline moisture measurement is an alternative. This means that the measurement results are available immediately, the dryer can be readjusted directly and the moisture content of the beet pulp can be kept constant.
- This reduces energy consumption and ensures optimum conditions for the pelleting process.
- The capacitive moisture measurement system from Mütec is easy to install on conveyor belts, screw conveyors, pipes or chutes.
- The sensor can be installed at various points in the drying process
- The results are transferred to the PLC and used to control or regulate the dryer



Process diagram of the sugar factory and
Typical installation location for inline moisture measurement

- Parameters behind the pulp press:
  - O Humidity range: 27% - 34%
  - O Achievable measuring accuracy: ± 0.5% residual moisture
  - O Material temperature : approx. 20°C

- Parameters behind the dryer:
  - O Moisture range : 6% - 8%
  - O Achievable measuring accuracy: ± 0.1% residual moisture
  - O Material temperature : approx. 80°C

3. What needs to be considered during planning and implementation?

- Use process questionnaire
- If possible, take a photo or video of the measuring point and send it in with the questionnaire for clarification
- Plan the application precisely and discuss it with the customer.
- Selecting the correct measuring point is very important. It should be selected so that the sensor is evenly covered and the material height and speed are constant.
- Recalibration may be necessary if the bulk density changes
- Clarify where and how calibration can be carried out (is sampling possible near the sensor? Calibration with at least two different moisture values possible? Calibration of the sensor at the same time as sampling, at least three

  Evaluate laboratory samples per measuring point)

a) Measurement on a slide

- The sensor should ideally be installed in the center.
- The material height should be constant.
- The product flow should be as even as possible

b) **Measurement in a screw conveyor**:

- The sensor is installed in a screw conveyor by approx. 20° in the direction of rotation
- Installation at the bottom of the screw conveyor should be avoided, as the screw helix is approx. 2 cm away from the bottom, the material does not move there or is not constant
- Ensure sufficient loading of the screw conveyor and thus constant material coverage of the moisture sensor
- Calibration time should be 30-60 seconds
- Filter time for measured value output at least 30 seconds

c) **Further information**:

- It is recommended to use a 4-wire cable (shielded) from the RS485 interface of the Humy transmitter to the control room or laboratory (where samples are taken or measured value is displayed)
- A laptop or PC can then be used via RS485 - USB converters to configure the sensor and measured value storage (Humy 301 only) can be connected
- The sensor must always be calibrated in the process (no static calibration on samples outside the measuring point)

4. Customer benefits:

- Consistently high product quality, greater process stability during peletizing
- Scrap is reduced
- Energy savings during drying
- Dryer fire is avoided

- Permanent monitoring of the process, fluctuations in the process can be analyzed in real time

5. What restrictions exist:

- Low loading of the screw or low feed of material via chute lead to inaccurate measurements

6. Why our solution is the best:

- Robust measuring system with few failures
- Sufficiently high accuracy at high measuring speed

7. References

- Nordzucker, Germany
- Südzucker, Germany
- Pfeifer & Langen, Germany

If you have any questions or concerns, please do not hesitate to contact us!

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