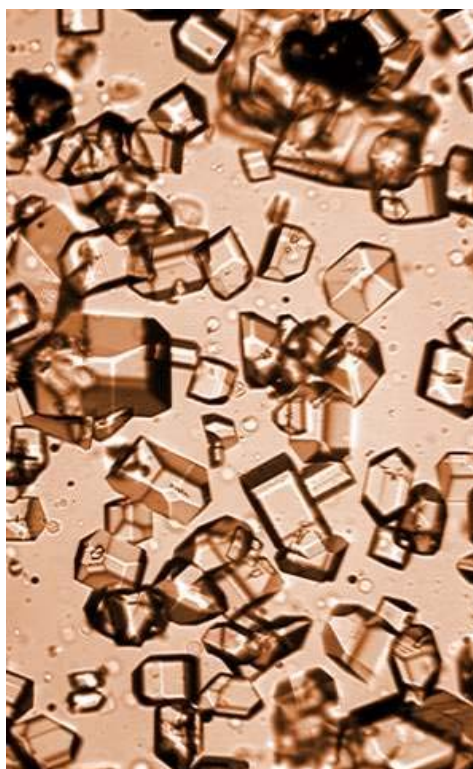


AN 5426**Rev. 2****NIRS™ DS2500****Seed Magma**

The C-massecuite sugar is of low grade and cannot be mixed into the raw sugar. The crystals are too small and the sugar content is too low. Often these crystals are dissolved and recycled to the B-massecuite feedstock. However, it can be used as a seed magma for the B-massecuities. Similarly, the B-crystals can be used as seeds for the A-massecuite. Unless it is recycled it needs to be considered in mass balance calculations to determine where the sugar is going.

This application is suitable to both conventional- and diffuser mills. Dilution of the sample is not necessary and chemicals like dry lead or Octapol are not required. After inserting a juice sample into an NIRS™ DS2500, Pol, Brix, and Purity are all analysed simultaneously in less than a minute.

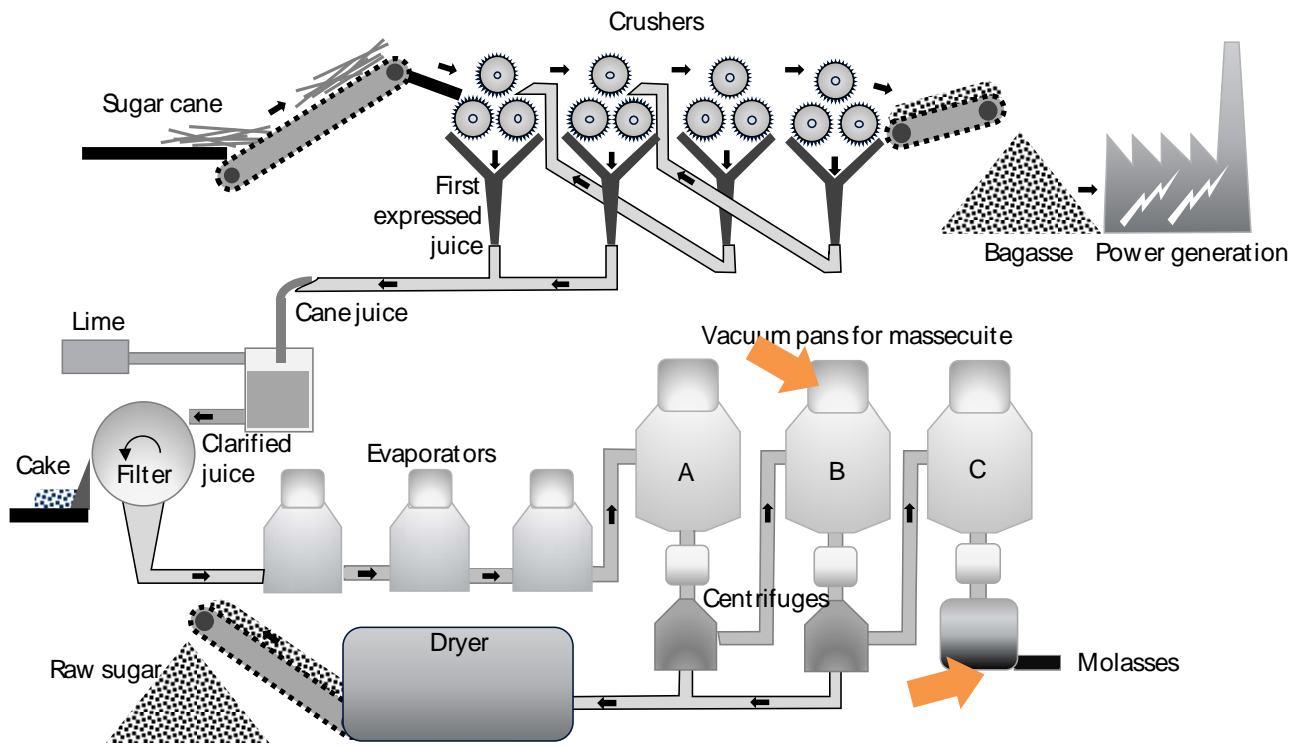


Fig. 1 Conventional mill, measurement points

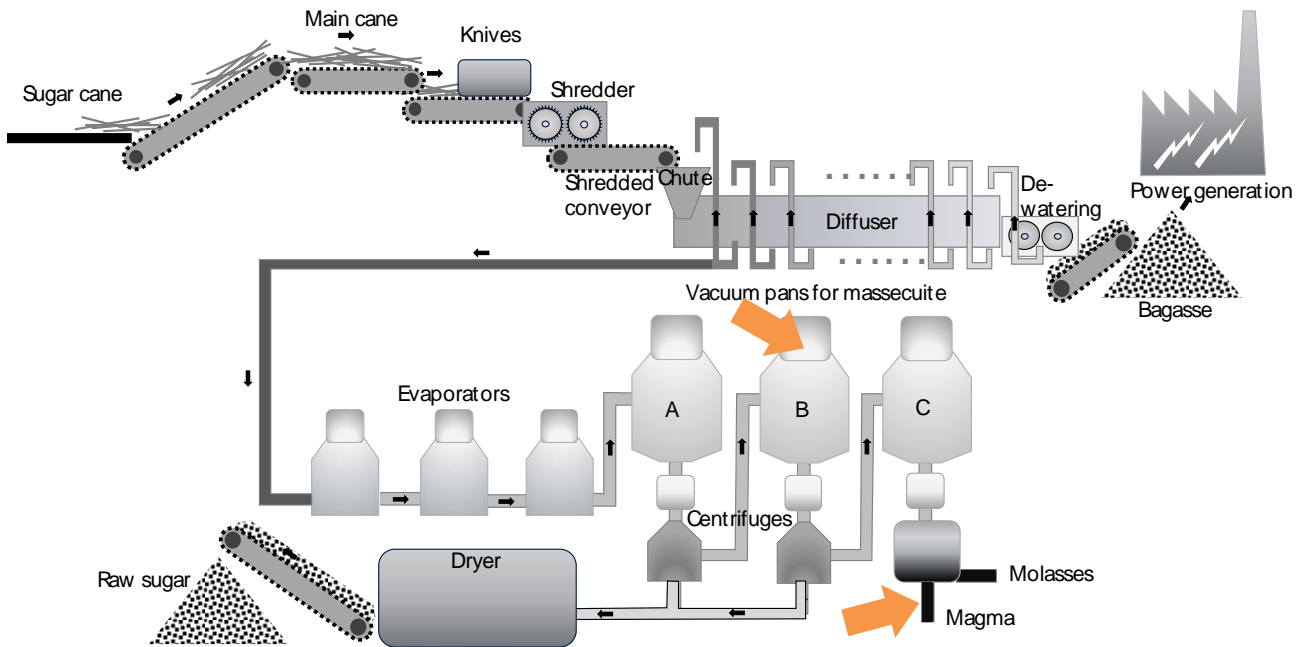


Fig. 2 Diffuser mill, measurement points.



Fig. 3 NIR5 DS2500

Sample Description

Reference samples have been collected and analysed over several crushing seasons.

Parameter	Version	Min	Max	N	Model type
Brix	2.0.0.0	80.8	92.3	317	MPLS
Pol	2.0.0.0	50.9	93.3	314	MPLS

Table 1 Calibration data.

Performance

Validation statistics is based on samples that were not in the calibration set.

Parameter	Min	Max	N	SEP	RSQ
Brix	85.0	92.3	76	0.62	0.824
Pol	53.6	86.4	75	1.58	0.978

Min.: Minimum reference value in test set.
 Max.: Maximum reference value in test set.
 N: Number of samples in the test set.
 SEP.: Accuracy of test set expressed as Standard Error of Prediction (SEP).
 RSQ: Linear correlation between NIR5 DS2500 result and reference result.

Table 2 Validation data.

Calibration Performance Graphs

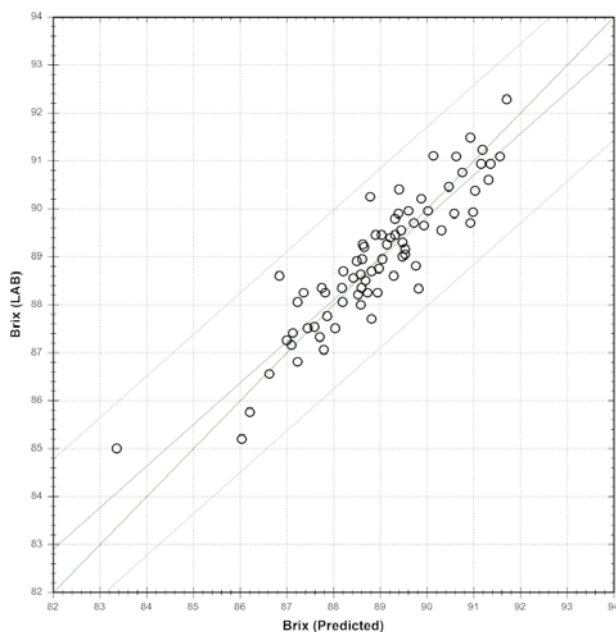


Fig. 4 Brix

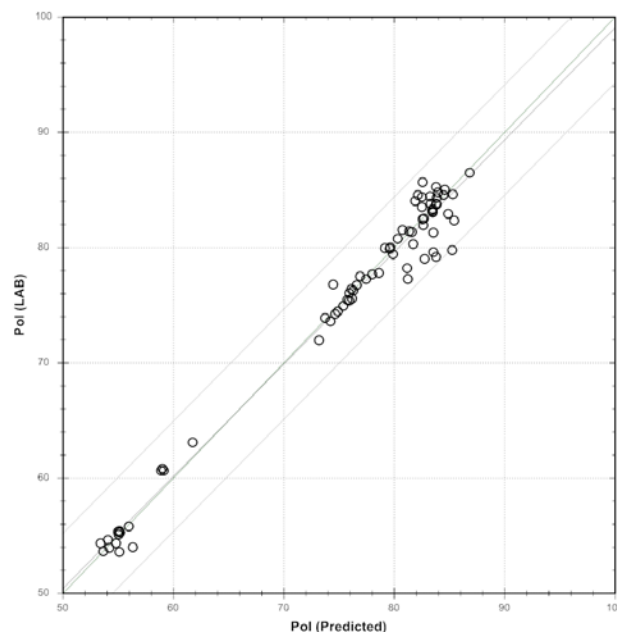


Fig. 5 Pol

In the sugar industry, “Pol” is synonymous with sucrose, and “Brix” is synonymous with Total Dissolved Solids. Purity is a key for process optimisations, and we strongly recommend to add it as a calculated parameter:

$$\text{Purity} = \text{Pol}/\text{Brix} * 100 \%$$

Pol (in Seed Magma) and Brix (in Seed Magma) provide good accuracy across a wide range of sample concentrations.

Note:

The performance example outlined in this note should only be regarded as a guideline for the expected performance of new installations. The performance of new installations will always depend on the uniformity of the sample preparation and the homogeneity of the product, as well as the accuracy of the reference method used and the range for the test samples. An indication of the obtainable performance can be found as approximately 1.5 to 2 times the reproducibility of the reference method. If the samples you are measuring exceed the stated calibration ranges, or have non-common variations of other components, this might also influence the performance of the calibrations.

Each sample will be analysed and compared to the calibration database. Three key values will be given as an indicator to how well the unknown sample fit the calibration samples:

- Global H value (GH) - measures how far the spectrum is from the centre of the database. A high GH value corresponds to a sample far from the calibration database, meaning a sample different from the calibration samples. If the GH value exceeds a certain limit, the sample is suspected to be out of the calibration working range.
- Neighbourhood H value (NH) - measures how close the sample is to the nearest sample in the database. A high NH value corresponds to a sample far from the nearest neighbouring sample in the calibration database, meaning a sample different from the calibration samples. If the NH value exceeds a certain limit, the sample is suspected to be out of the calibration working range.
- T-statistics - measures the predicted parameter compared to its calibration range in the database counted as number of standard deviations. A value of zero corresponds to the average of the parameter in the database. A high positive value of more than 3 standard deviations indicates that the predicted value is at the high end or outside the range of the database. A negative value of less than -3 standard deviations indicates that the predicted value being at the low end or outside of what is in database.

Default Warning and Action limits for GH, NH, and T-statistics are set for each prediction model in the software.

Sample Preparation

We recommend to the slurry cup with a 0.5 mm gold reflector for seed magma analysis. No special temperature stabilisation has been made so it is recommended to analyse at room temperature.



Fig. 6 Seed magma sample in slurry cup

Ordering and Further Information

Please contact Henrik Hansen, Head of Market Innovation, hha@foss.dk.

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