

Size and density determination of bales received at Biomassefyret Kraftvarmeværk A/S in Lisbjerg

Background

Biomassefyret Kraftvarmeværk in Lisbjerg is the latest of its kind in Denmark. It started production in 2017 and is using 170.000 ton of straw every year. The straw bales Biomassefyret Kraftværk is receiving is a mix of classic Heston bales in format 127 x 120 x 245 cm and 3/4 bales in format 90 x 120 x 245 cm, also called MIDI-bales.

The development of High Density balers in the midi size format during the last 7 – 8 years is a more efficient and environmental way of collecting straw. The bales are getting heavier but smaller making it possible to get more straw on truck-loads thus gaining a cheaper, more efficiently and environmentally transport.



Case description

However, the mix of size and density has proven to be a challenge to moisture determination by microwaves, used in the power plants all over the world. Until May 2019 all moisture meter systems for cranes were set up to use one standard density value for all bales.

When a system is using one standard density for all bale types and receives a mix of bales of different types and density there will be an error in the measurements depending on the deviation from the standard density settings. This can be several % of the readings.

When adjusting the density settings for e.g. High Density Midi bales, this also affects the moisture measurement range and in some cases the maximum measurement range comes below the rejection criteria.

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Case version 1.00.00

In order to make sure a fair settlement is achieved, Biomassefyret Kraftvarmeværk decided to ask DSE to assist them in developing a solution. In May 2019 the solution in form of a software update and a sensor update was installed.

System description

The hardware update of the sensors gave an increase in measurement area of 3% in the low density area (dry density 120kg/m³) and 2,3% increase in density area of 160kg/m³(dry density), measuring up to 26,3% moisture to help ensure moisture can be read up to the rejection criteria.

The DSE moisture control software was extended with an advanced algorithm to calculate the correct dry weight density based on the information from the crane about bale type, length and wet weight of the bales in the yoke, combined with the microwave signal.

The calculated dry weight of the bales in the yoke, is then used to calculate the moisture value for the bales. Thus the moisture values no longer depends on the standard density settings but is dynamically customised to all kinds of bales - ensuring correct moisture measurements.

All data is recorded in the database for trackability and returned to the crane as documentation to the powerplant and its suppliers.



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