INRAY OY LTD

Online wood chip quality measurements at Torrec Oy's bio-coal pilot plant

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1. BACKGROUND

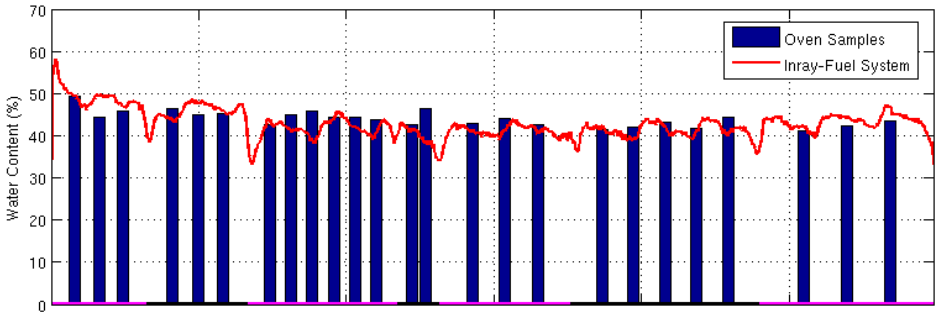
The target was to measure moisture and foreign matter content of wood chips before drying and torrefaction process using online Inray Fuel x-ray measurement system. Tested biomass was stem wood chips imported from Western Russia and those were screened before process to get even particle distribution. Manual sampling and standard oven moisture analysing was made parallel with x-ray scanning. Testing site location was Torrec Oy biocoal pilot plant in Mikkeli, Finland.

Picture 1 Inray Fuel x-ray scanner installed in belt conveyor in Torrec Oy's biocoal plant

2. TEST PROCEDURE AND RESULTS

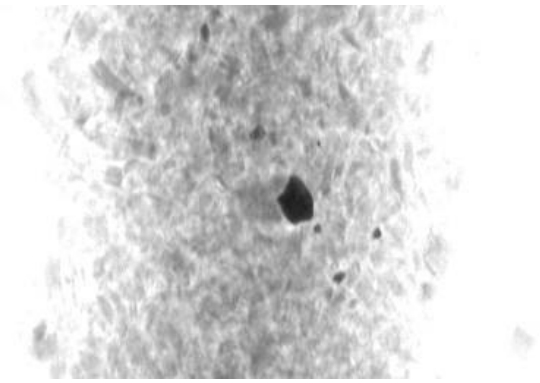
Seven big bags (~1 m^3) of screened wood chips were fed to the belt conveyor and x-ray scanned by InrayFuel. Total weight of batch was 2660 kg and volume through the x-ray scanner was measured to be 6.5 m^3. Total number of manual reference samples was 27.

Following graph shows the moisture variation inside wet wood chips. Blue bars represent manual reference samples and one sample represents one minute. Average moisture measured by Inray Fuel was 43.0 % and average of oven samples 44.1 %. Standard deviation of different testing methods were 4 % for InrayFuel and 1.4 % for standard method.



Picture 2 Moisture variation of the wet wood chips within the whole test batch

Based on x-ray scanning calculation stone content of the test batch was 2.7 kg that represents 0.1 % of the mass of whole batch. Biggest stone found from x-ray images was approximately size of 31 x 35 mm.



Picture 3 X-ray picture of scanned wood chips containing stones

3. DISCUSSION

Moisture variation between x-ray data and oven test results were noticed to be very small. But for comparison, if average of six driest oven samples would have been used for calculation of whole batch moisture average would have been 41.8% and if six most wet samples the average would have been 46.6%. This has to be remembered when tuning process according to manual sampling.

Stem wood chips contained a lot of small stones although wood chips were screened before the testing. Stones and other foreign matter may cause safety risk and increase operation and maintenance costs of the plant. In commercial biocoal production plant it would be important minimize the amount of foreign matter to the process.