

Online Measurement of Moisture in Nickel Ore

The Company



Nickel Ore is refined at QNI

Queensland Nickel Industries (QNI) is a major nickel refinery located in Queensland; Australia. The refinery processes nickel and cobalt-bearing laterite ores from 25 different mines purchased from third party suppliers in New Caledonia, Indonesia and the Philippines.

The ores are blended together on stockpiles before being fed to the processing plant as a mix.

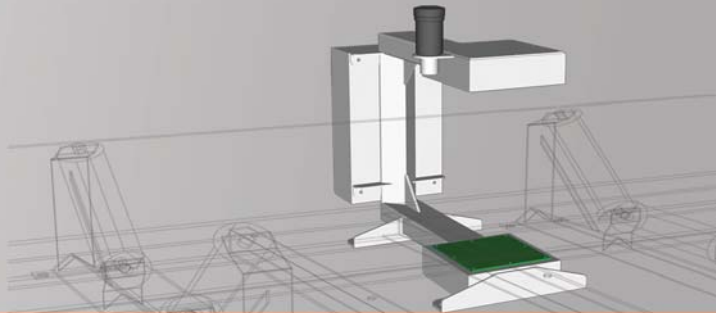
In the plant, the nickel ore is dried, ground and roasted before being leached in an ammonia solution to extract the nickel and cobalt. Nickel and cobalt are separated and further refined in the metal refining area to produce products for sale in the global market.

The Application

The ore first enters a rotary kiln drier before being fed to the ball mills and then to the roasters. A MoistScan[®] MA-500HD is installed on the feed conveyor to the processing plant alongside a belt weigher.

The moisture output from the MoistScan[®] is combined with the tonnage signal from a belt weigher to derive an accurate measure of dry tonnes feed to the processing plant.

Knowing the mass balance (dry tonnes feed) to the plant is very important for QNI. The primary function of the MoistScan[®] is to provide plant operators with critical information on which to make process decisions. With a continuous read-out of dry tonnage feed to the processing plant and real time moisture, plant operators manually adjust the operation of the drier, ball mills and roasters. This results in a better quality product and reduced processing costs as over or under drying, balling and roasting the material is substantially reduced.



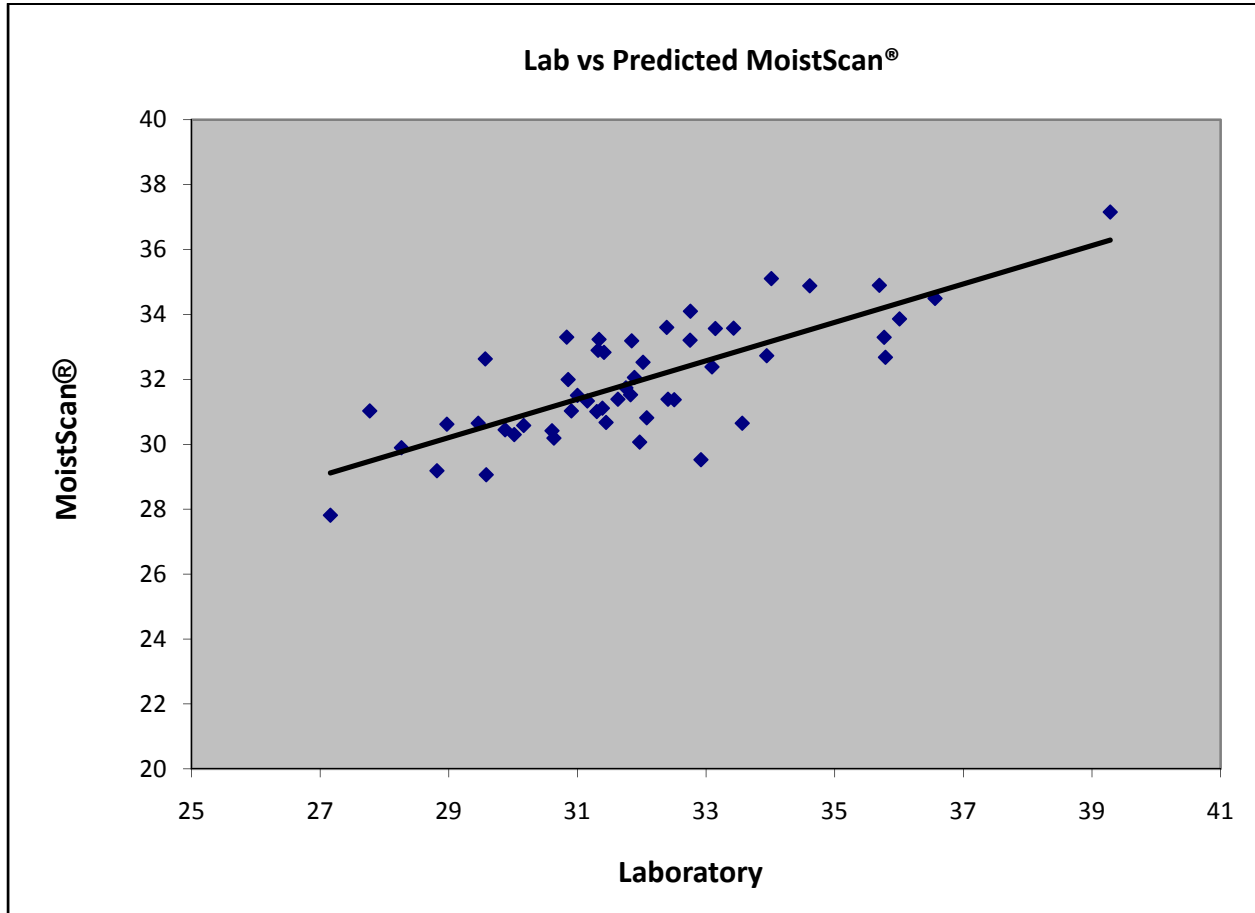
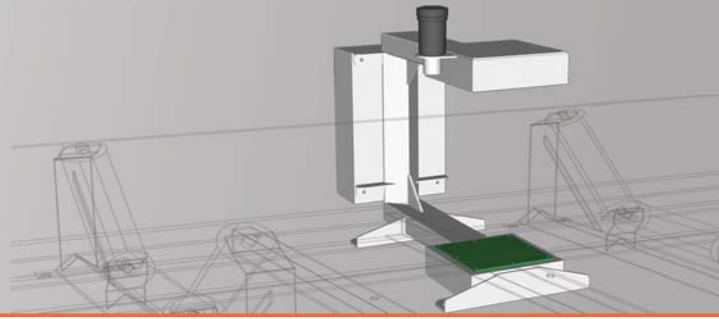
The moisture content of the ore is between 25% and 35% and has highly irregular particle size and shape.

Calibrating the MoistScan[®]

As with all online instrumentation, calibration is critical to performance. To calibrate the MoistScan[®] a technique known as stop belt sampling was employed. In this case, the raw microwave data was logged over a period of time equating to 15 metres of belt travel before stopping the belt. Five samples were then manually taken from the belt at 3-metre intervals and combined to form a composite sample which was subsequently analysed for moisture in the laboratory.

The laboratory technique for moisture analysis was loss of weight by oven-drying. Here, a 5kg aliquot of sample was weighed, dried in an oven for typically 48 hours and then re-weighed. Each sample was analysed three times in the laboratory, and no rocks were discarded from the sample.

The above procedure was repeated 20 times and the laboratory sample analysis results regressed against the raw microwave data to derive the initial calibration.



Calibration results on nickel ore at QNI

Ongoing Performance

Three years since initially installing the MoistScan® MA-500HD, the analyser continues to deliver accurate results.

To ensure that the MoistScan® maintains its accuracy and repeatability, QNI regularly verifies the calibration. Once a week a small number of stop belt samples are taken and analysed for moisture in exactly the same way that the MoistScan® was originally calibrated. From the analysis slight adjustment to the calibration is made if so required.

