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Laboratory Evaluation of the Clean Process Technologies Online Slurry Particle Density Meter (OSPDM)

Clean Process Technologies

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Aim

This laboratory trial will analyse the provided coal samples using the CleanProTech Online Slurry Particle Density Meter (OSPDM) and examine its applicability for use within the existing CHPP. From results obtained, benefits of online monitoring will be shown for actual streams within your plant. From this, estimates can be made relating to coal loss minimisation, potential product increases and equipment payback periods.

Samples

Samples from your operating CHPP can be sent to CleanProTech for analysis using the OSPDM. They can be provided in slurry form, as collected from the plant, or as dried solids.

Streams which can be analysed in this trial include;

- Flotation Feed, Product and Tailings
- Spirals/TBS/RC Feed, Product and Reject
- Spirals Middlings
- Thickener Feed
- Classifying Cyclone Feed, Underflow and Overflow
- Or any other stream of interest…

This will enable testing of each stream individually at varying solids concentrations and also combining streams to make a composite sample. This can emulate situations which may occur in a processing plant, for example, when product coal is being lost to reject or a varying spirals middling stream.

The samples provided will be subdivided using a rotary sample divider to ensure each fraction is representative of the original sample.

Test Procedure

The following diagram shows the basic equipment setup used during the test program.

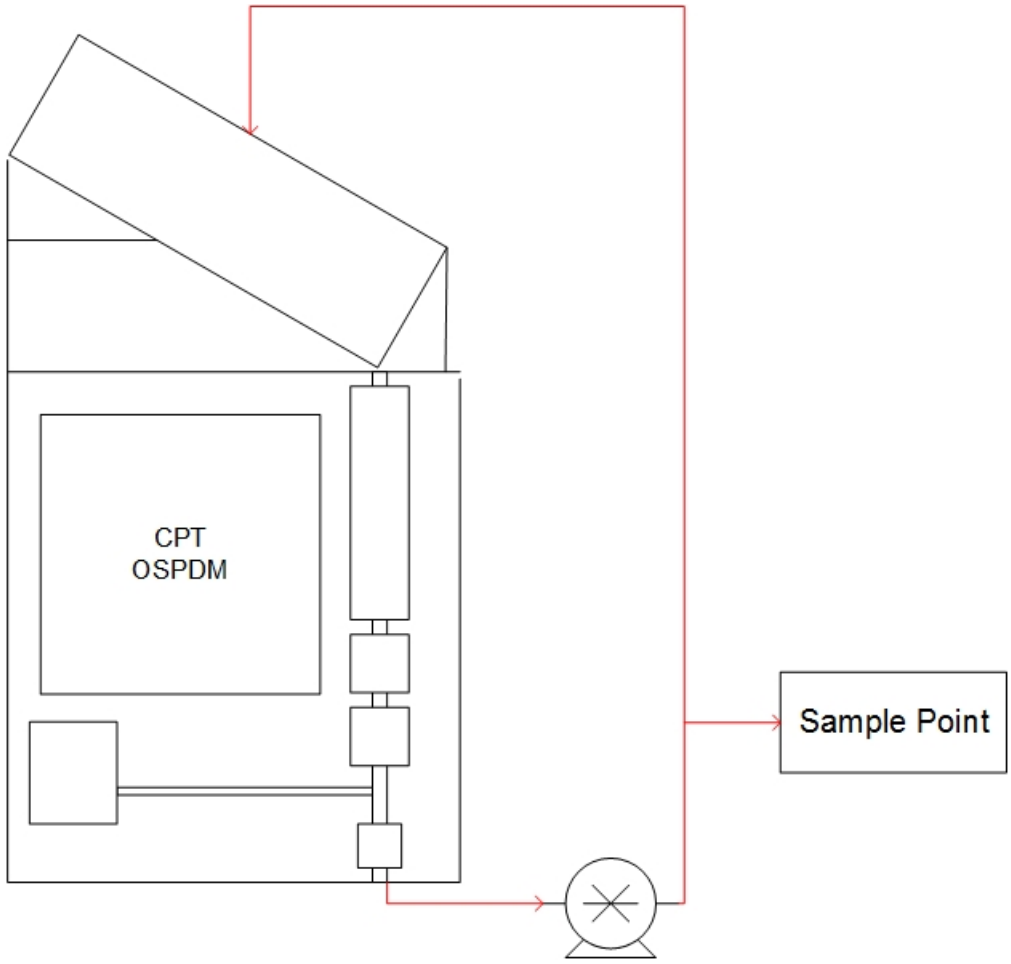

Figure 1 - Equipment setup for test work.

A pump is installed on the outflow of the OSPDM to recirculate the sample through the device. A sample can be collected from this feed line by diversion of the entire stream. The slurry is fed into the OSPDM head tank, where any entrained air is removed before flowing into the measuring tube section of the device. Slurry then exists the measuring tube and back into the pump. This allows us to lengthen the analysis time by recirculating the slurry around the system. It also allows us to easily add different material to make composite streams (e.g. adding product to a reject stream) and note changes over time. Water can also be easily added to the system to vary the solids concentration.

Each sample is tested through the OSPDM at varying solids concentrations and the outputs recorded. All samples are then analysed by the CleanProTech laboratory for slurry density, solids concentrations on both a mass and volumetric basis, conductivity and particle density.

Data collected from the test procedure is then plotted against the laboratory data and results investigated. A simple calibration is then developed, similar to what would occur during installation of an OSPDM on site. This gives an idea of expected equipment performance once installed.

Expected Outcomes

Although the absolute values are quite accurate and important, the trending aspect of the OSPDM is the most valuable tool for a CHPP operator. This allows changes to be made to the circuit and the response monitored online in a visual manner.

A calibration curve will be developed using the samples provided. A greater number of calibration samples will increase the accuracy of the calibration curve, but it gives an indication of what sort of 'real-world' results are possible from the OSPDM, even using a very basic dataset for calibration.

(At the Bloomfield installation, there have been well over 100 individual samples taken throughout the operational period of over 2 years, which all form part of the calibration equation. Each sampling campaign adds new data to this calibration set and minor adjustments are made to continually improve the equipment's accuracy.)

Graphs will be constructed for each test condition, showing the online OSPDM values for each sample. Absolute values, along with laboratory results (solids concentration, slurry density and particle density) will also be provided for each sample condition. This will provide a good representation of what types of trends could be seen when using the OSPDM within an operating CHPP.

'Real World' Example – Coal Losses to Flotation Reject

During the OSPDM test work program, a trial which shows the 'real world' advantages of monitoring online with the OSPDM is also performed.

Generally, a reject stream is taken and monitored online by the OSPDM. To this stream, product material is added in stages to simulate coal being lost to the reject stream. This is a common occurrence on the majority of plants and often goes unnoticed, as reject is not monitored online, or generally at all. This shows the OSPDMs ability to track coal losses online and can provide data for use in equipment payback calculations.

Cost

The cost for an OSPDM laboratory evaluation and associated report is $3,000 (ex GST).
(This cost is fully refundable on purchase of an OSPDM).

This price includes;

- OSPDM analysis of the provided samples.
- 'Coal loss' simulated example using the CleanProTech OSPDM.
- Laboratory analysis of samples. Includes ash, particle density and solids concentration.
- If samples are representative, a mini plant audit may be possible, including yield calculations and sample error analysis. (CleanProTech can also aid in sample collection if required. Please contact for more information).
- Production of an evaluation report, outlining the effectiveness of OSPDM on plant streams, online trending graphs, estimated cost savings and payback calculations.