

VertScan

Measuring Vertical Mill Fill Level trough vibrations

VertScan DSP is the world's first vertical mill fill level measurement system based upon table/roller vibration.

Developed by Digital Control Lab, **VertScan** uses the latest Digital Signal Processing (DSP) technology to bring you real-time results.

VertScan DSP yields a highly accurate vertical mill fill level signal that can be used to run a vertical mill under automated loop control or greatly assist control room operators under manual control .

Knowing the instantaneous fill level allows a plant to increase material throughput at traditional power levels. Thus a plant can produce more material for the same amount of power or the same material for less power, thereby reducing production costs.



Figure 1: VertScan, Main Unit.



Benefits

- Direct measure of the fill level;
- Do not suffer interference from other mills or equipments in the area;
- More efficient production control;
- Lower production costs;
- Reduce or eliminate unstable operation;
- Increased quality from reductions in Blaine standard deviation;
- Increase ROI (return on investment) of your existing mills.

Features:

- The only existing system for measuring fill level on vertical mills;
- Precise and instantaneous measurements;
- Fast & easy installation and calibration (NO mill stops are required);
- Equipment 100% digital;
- Easy communication with existent PLC's through a 4-20mA output;
- Internal memory with enough space for up to 4 different product calibrations allowed.



Figure 2: Typical installation in one roller vertical mill.

System components and installation:

VertScan system is comprised of a Main Unit and a custom high sensitivity vibration sensor (see Figure 2).

The vibration sensor is magnetically mounted to the vertical mill table support column. The connection cable between sensor and main unit is 10 meters long.

The main unit, that shall be assembled near the mill, process the signal receive from the sensor and generates a 4-20mA signal proportional to the fill level.

Principle of operation:

Studies show that in the normal operational range, the vibrations measured in the vertical mill table can correlate to the fill level. Outside the normal operation range the vibrations always have the tendencies to increase and no correlation is possible.

Vibration signals from the sensor are converted to digital values at the DSP. VertScan system is capable to measure vibration from 1Hz till 12.000Hz and so generate a complete frequency spectrum of the mill.

With the calibration process the system will automatically recognize which vibrations are related with the fill level and which vibrations are noise caused by other vibration sources. After calibration the system will create a filter that will automatically disregard this external vibrations and will only take into account the parts of the spectrum that have a perfect correlation between vibration and fill level.

After passing to the filters the frequency bands are classified by a neural net that produces a fill level reading from 0-100% and outputs this on a 4-20mA signal.

Calibration is performed remotely with a computer connected to DSP by an USB adapter (include in the supply). Calibration consists in a 3 steps procedure that takes no more tan 15 minutes.

Technical details:

Main Unit: General dimensions: 280mm (11.7") high x 250mm (9.9") wide x 122mm (4.7") deep (NEMA 4).
bracket & screw mounted
Power supply: 90-220 Vac, 50-60Hz, 0,5A.
4-20mA communication: 2 wire connection, 24Vdc external supply.
PC Connection for calibration: 4 conductors cable, 0,5-1,5mm diameter

Vibration Sensor: Cylindrical body, diameter 76,2 mm (3") height 76,2 mm (3").
Magnetic mount.
Connection cable: 10 meters.

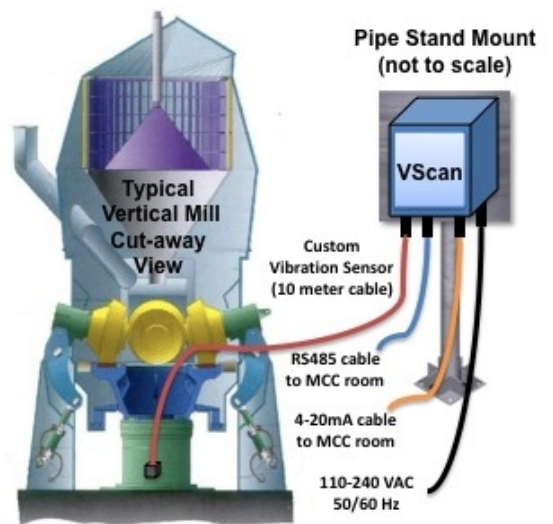


Figure 3: VertScan, installation diagram.

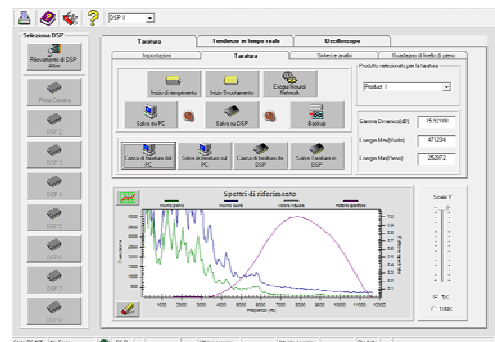


Figure 4: Example of the vibration spectrum in a full and empty mill situation.

For more information:



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