

MillScan Dual

Using vibrations to measure mill fill level

MillScan Dual is a field instrument that uses the vibrations measured in the bearing housing of ball mills to calculate the fill level of material inside it.

MillScan Dual technology is unlike any other fill level instrument existent in the market. Developed by Digital Control Lab (Texas Instruments partners since 1990), the instrument uses the latest Digital Signal Processing technology to bring a real-time and highly accurate fill level signal.

With MillScan Dual technology is possible to monitor independently the fill level of the first and second chamber. With this information it possible know exactly the mill working condition and optimize the whole system.

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: MillScan DSP main unit.



Benefits:

- More precision than similar equipments;
- Zero cross talk (interference) from adjacent mills or equipment;
- Useful way of increasing production and lowering operational costs;
- Greatly assist the automated control loops for mill control;
- Increase ROI, ball and liners operation time;
- Eliminate Mill output obstructions;
- Increase quality from reductions in Blaine standard deviation;
- More efficient production control.

Features:

- Precise and instantaneous mill fill level measurement;
- Fast and easy installation and calibration (Installation is done with mill running);
- 3 times more resolution than traditional sound based equipments;
- All digital system, no component drift;
- Communicates with existent PLC's with a 4-20mA output;
- Up to 5 different types of products calibration allowed for the same unit.



Figure 2: MillScan DSP typical installation.

System Description:

The MillScan Dual system is comprised of two major components: two high resolution vibration sensor (magnetic mounted in the mill bearing housing) and the main unit where the signal is processed and two 4-20mA signals are generated (see figure 3).

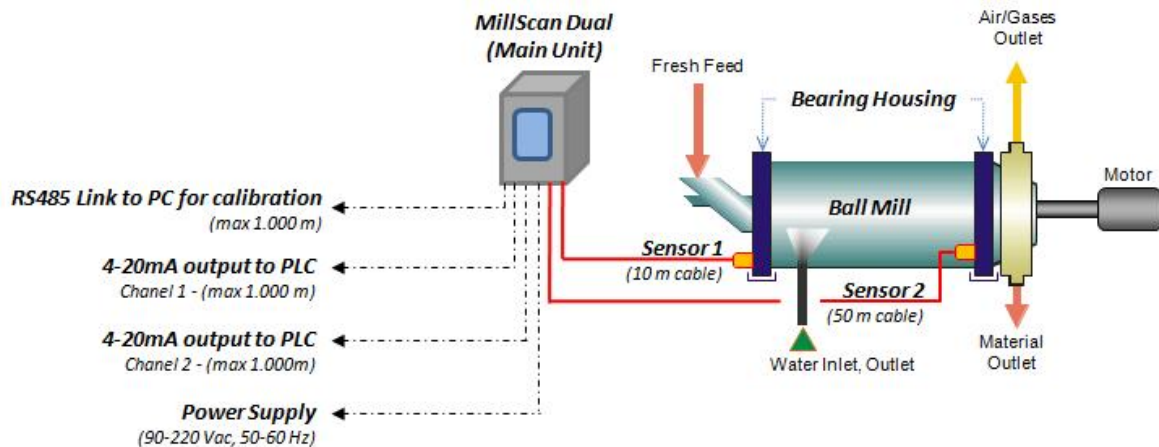


Figure 3: MillScan DSP, typical installation lay-out

Principle of operation:

Studies show that the vibrations measured in ball mills bearing housing correlate with the fill level of material inside it. For example: less material causes more vibrations (balls strike into the wall instead of crushing the material).

Vibration signals from the sensor are converted to digital values in the main unit. MillScan DSP measures the vibration in a frequency from 1 to 12.000Hz and generates a 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.

Technical details:

Main Unit: General dimensions: 420mm (16,5") high x 400mm (15,7") wide x 122mm (4,7") deep4).
Bracket and 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: General dimensions: cylindrical body, diameter 76,2 mm (3") height 76,2 mm (3").
Magnetic mount.
Connection cables: Sensor 01: 10 meters cable long;
Sensor 02: 50 meters cable long.

Contact Information

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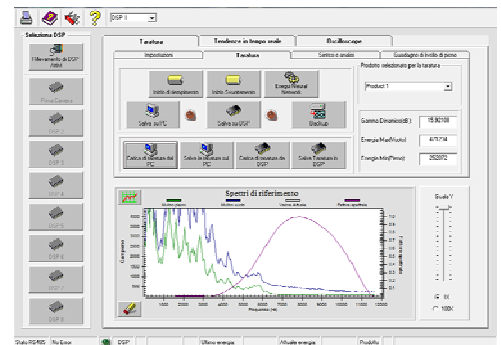


Figure 4: Example of a full and empty Mill spectrum and the filter automatic created by the software.