Machine Diagnostics

Metso Paper, the world’s leading supplier of technology, systems and equipment for the pulp, paper and converting industries, selected Data Physics to supply the next generation of dynamic signal analyzers to support its customer service organization.

Customer Challenge - Machine Press Section Vibration Sources

A paper machine is a continuous process line converting a slurry of water and solids into finished paper. The machine uses rolls of various sizes to support and transfer the web of paper down the line. The varying physical characteristics of the rolls create a variety of vibration sources across the machine. These include roll geometry, unbalance, misalignment, bearing and gear defects, as well as the excitation of natural frequencies by the various forcing frequencies.

The rich variety of shaft speeds and vibration sources offers a wealth of opportunities for trouble, and the complex vibration signals that are found in the plant make it an interesting challenge to diagnose the precise nature of the problem. As a result, Metso field engineers routinely visit customer installations to troubleshoot paper machine malfunctions such as poor runability, sheet breaks, and limited machine speed.
Typical troubleshooting involves vibration analysis on a subset of the machine, synchronizing the analysis to a number of different shafts in turn in order to isolate the vibration components associated with each. The graphs below, for instance, show results of tests on a press section.

Initial power spectrum measurements were inconclusive, so the collected data was re-analyzed synchronous to tachometers for nearby shafts. The polar runout format provides a powerful tool to display the results of a synchronous average analysis. The plot illustrates deviation of the surface of the roll from a circle, providing insight into either the actual shape of the roll or the roll movement during each revolution. In this case, the four-lobed shape suggested a problem with the drive input shaft coupling, occurring four times per revolution. Inspection of the coupling revealed a poorly aligned coupling with excessive clearances.

SignalCalc dynamic signal analyzers from Data Physics are modular, allowing users to choose the number of channels for their application. The built-in DSPs in each module provide processing power for realtime multichannel measurements. Realtime recording to disk of all input channels during measurements adds invaluable, unlimited re-analysis capability and reduces field measurement time. Metso found their employees’ efficiency was enhanced by multiple tachometer channels that enabled simultaneous measurements with respect to up to eight independent shaft speeds. Metso also were pleased with the productivity improvements resulting from the well-organized, intuitive user interface and superior graphics. The portability and ruggedness of the SignalCalc Mobilyzer on the new Abacus signal analysis engine added to a winning argument for choosing Data Physics over three potential suppliers.

**A family of Solutions...**

The SignalCalc Dynamic Signal Analysis family includes ACE, an ultra-portable two channel analyzer, Mobilyzer, configurable as an 8 to 32 channel analyzer, and Savant, network-connected to allow unlimited input channels. Now available on Data Physics’ new Abacus hardware, the analyzers are becoming even faster and more flexible. All analyzers provide a consistent user interface with comprehensive measurement functions including spectrum, transfer function and coherence measurements, correlation, histogram and probability density analysis with optional extensions to order track analysis, sine data reduction, stepped sine analysis, demodulation and Hilbert transform analysis and realtime acoustic measurements. Highly developed graphic displays include realtime waterfall displays and cursor based analysis. Flexible report writing that can also be automated adds to productivity.