A leading producer of custom conveyors and cam-driven parts-handling systems must ensure that these systems meet its customers' specifications. Each parts-handling system has unique mechanical dynamics, which must be properly adjusted at the factory, at customer sites upon installation, and as part of scheduled maintenance. Parts-handling systems that are improperly adjusted produce unwanted mechanical vibration. What's more, excessive mechanical vibration not only damages the parts being handled, it can also damage the parts-handling system and can increase production down time as a result of parts misalignment. Until recently, the parts-handling system manufacturer identified excessive mechanical vibration sources using several instruments. Now, the manufacturer uses just one — a portable, PC-based digitizer.

Application Summary

Conveyors and parts-handling systems are large and complex. Primarily composed of electro-mechanical actuators, hydraulics, and pneumatics, these systems are subject to vibration and resonance from a variety of sources including motors, drive shafts, timing chains, and gear meshing. As parts move through the parts-handling system, loud, erratic, and violent vibration can occur at any point. Vibration affects 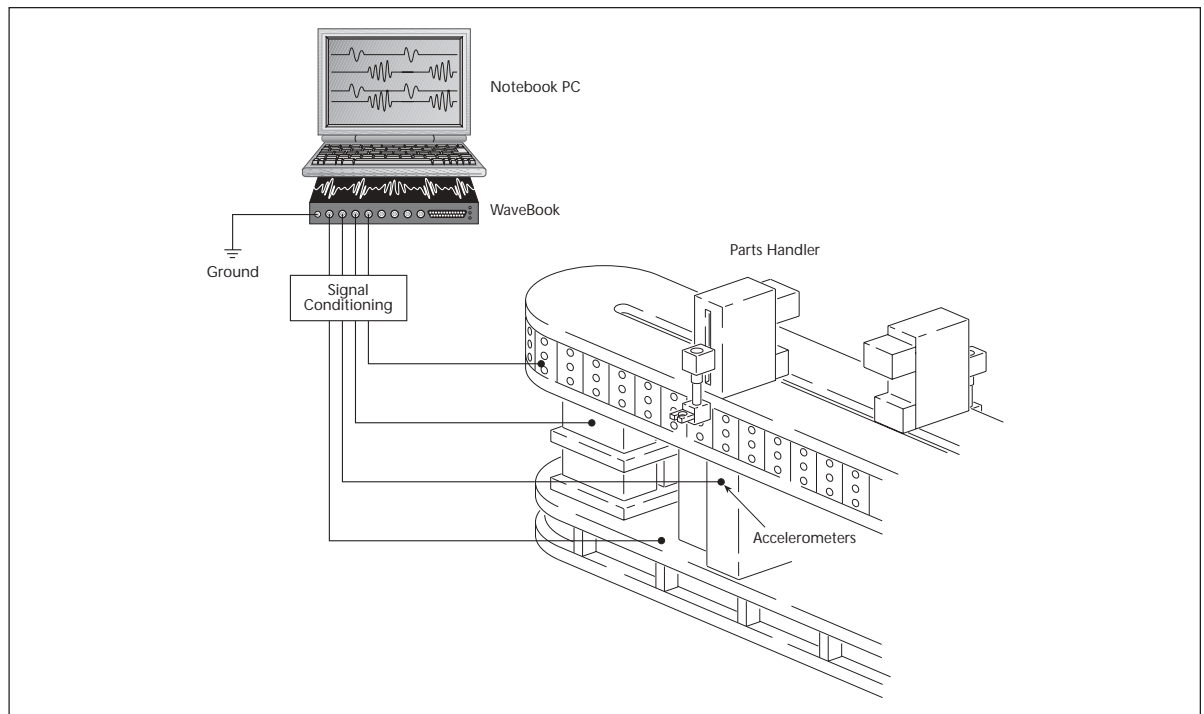product quality and is costly because parts that vibrate out of place can cause the production line to shut down. In addition, excessive vibration increases the main-tenence costs and down time associated with the parts-handling system.

The field service engineers for the parts-handling systems locate excessive vibration using either individual accelerometers or a tri-axial accelerometer. By measuring vibration at various points, field service engineers can identify vibration sources and quickly rectify problems.

Until recently, field service engineers located vibration sources via a digital storage oscilloscope (DSO) and an FFT analyzer. However, because so many mechanical sub-assemblies can contribute to a particular problem, using these diagnostic tools is a time-consuming, iterative process. This is in part due to the fact that these diagnostic instruments provide only limited channel count and recording time. Also, these instruments are expensive, bulky, and difficult to transport to customer locations.

Potential Solution

The field engineers considered replacing their DSO and FFT analyzer instruments with newer models, which offered more memory in a compact form-factor.

Field service set-up

However, they rejected this approach because it would have been approximately five times the cost of the WaveBook data acquisition system.

IOtech's Solution

The field service engineers selected the WaveBook™ as their replacement tool primarily because it enables them to identify vibration sources much more quickly than the DSO and FFT analyzer solution. With the WaveBook, they were able to replace both instruments. The 8-channel WaveBook system offers four times the amount of channels that the typical DSO or FFT analyzer does, allowing the engineers to increase the number of sensors per acquisition and collect more data per event. This lessens the number of acquisitions that must be performed to locate a particular vibration source. They like being able to use third-party PC-based data acquisition software packages, such as DASYLab®, which offer a diverse selection of data acquisition, analysis, FFT and report-generation functions.

The engineers were pleased by the WaveBook's ability to record files greater than 2 Msamples. Vibrations are often sporadic, occurring at various points in the process. The DSO's limited memory prevented the engineers from capturing an entire process cycle. This limitation forced them to take multiple captures, making it extremely difficult to correlate events. Because the WaveBook uses the PC's memory and disk for storage, it is able to capture a high number of samples over the entire length of a process cycle. With the WaveBook, the engineers are now able to visually scroll through an entire process cycle, identifying vibration sources for removal.

Conclusion

The WaveBook simplifies testing and eliminates the need for multiple instruments. Its high-speed acquisition and fast transfers to the PC make it an ideal DSO and FFT analyzer replacement in vibration test diagnostics.

WaveBook Series

The WaveBook™ series of portable and desktop digitizers offer multi-channel waveform acquisition and analysis for portable or laboratory applications. All WaveBook models include 8 built-in channels expandable up to 72 channels of voltage, accelerometer, microphone, strain gage, thermocouple, position encoder, frequency, high voltage, and other signal types. For applications beyond 72 channels, up to four WaveBooks can be combined within one measurement system, for a total capacity of 288 channels. WaveBooks are available with either an Ethernet or parallel connection to a PC.

Features

- PC connection via Ethernet, parallel, PC-Card, or PCI card
- 1 µs/channel scanning of any combination of channels
- Expandable up to 288 high-speed channels
- SYNC connection allows multiple units to measure synchronously
- Add up to 224 lower-speed thermocouple channels
- DSP-based design provides real-time digital calibration on all channels
- Single and multichannel analog triggering with programmable level and slope
- Digital TTL-level and pattern triggering
- Pulse trigger and external clock
- Programmable pre- and post-trigger sampling rates
- Sixteen 1-MHz digital inputs
- Operable from AC line, a 10 to 30 VDC source, such as a car battery, or optional compact rechargeable battery module

Using WaveView software's spreadsheet-style interface, you can easily set up your application and begin taking data within minutes of connecting your hardware, with no programming required.

Included Software

- WaveView™ for *Out-of-the-Box*™ setup, acquisition, and real-time display:
  - Scope mode for real-time waveform display
  - Logger mode for continuous streaming to disk
- eZ-Analyst™ for real-time spectrum analysis
- Export data in third-party formats
- Includes drivers for Visual Basic®, Delphi™, C++ for Windows®; DASYLab®, and LabVIEW®
- ActiveX/COM development tools

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