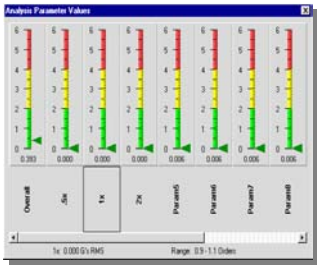
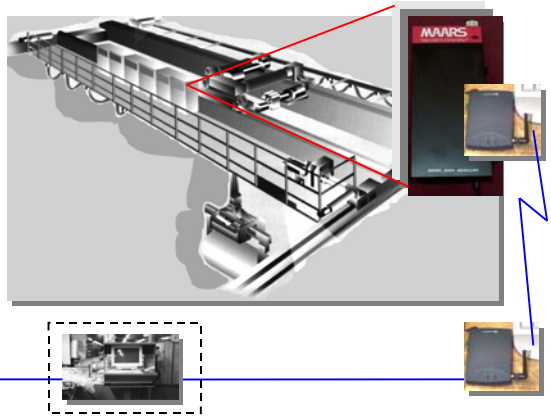
MAARS Application Note

Overhead Crane Wireless Monitoring Application

Vibration analysis of production cranes has proved to be very successful in reducing the number of unplanned crane outages at an aluminum production facility. The concept of using vibration analysis was begun at the facility using a portable data collector, but the cranes could not be monitored on an ongoing basis due to personnel safety concerns.



A sample monitoring screen and tachometer display is shown above. Since the crane is a variable speed machine, only data taken within the green arc's RPM range is stored. This helps eliminate false alarming by the system.

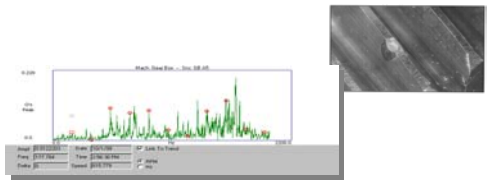


A wireless ethernet system is used to transmit data to the maintenance office computer. Spread-Spectrum technology assures fast data transmission (1.6 Megabits) and a very low probability of interference from outside sources (plant radios, for example).

Crane Monitoring System Design Guidelines

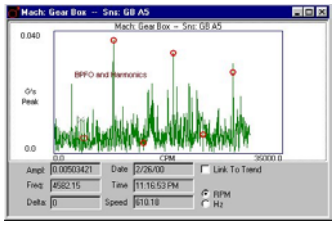
- The data must be transmitted wirelessly to the Ethernet network connection of the PC server.
- The Master database, which stores configurations, alarms and statistics, is maintained on the server (optional).
- The crane-monitoring unit should be capable of continued operation if disconnected from the network.
- All data from the crane (spectra, waveforms, and analysis parameters) to be saved in the Microsoft Access® database.
- Full compliment of vibration analysis capabilities including order tracking, waveform parameters, spectral bands, etc.
- The Monitoring system must be able to withstand a full speed run into the crane stops, which generates several g's of force.

Three Vibration Analysis Cases

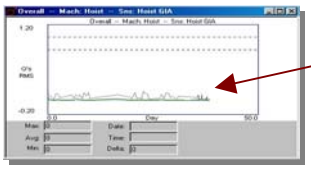


1. Gear defects in the crane hoist gearbox proved one of the most easily identifiable defects. One can see from the photograph and data at left that this defect is easily identifiable through spectral analysis.

2. Another easily identifiable defect is bearing anomalies. A sample bearing defect on the outer race of the gearbox bearing is shown at the right.



3. Comparison to other cranes can be helpful in determining normal vs. abnormal operation condition. Shown below are two trend plots and a spectral plot. The first trend plot is a normal operating trend on the gearbox axial position of the bridge drive. The second trend shows another crane with an abnormal operating condition on the gearbox axial position. A spectral plot of the data collected during the higher trend shows a single peak dominating the spectrum at 14 X the motor running speed.



Normal Trend

Abnormal Trend

Abnormal Spectral Peak at 14 X RPM

Professional Installation and Applications

MAARS personnel perform professional crane monitoring system installations. Shown at right is one of seven crane monitoring systems that were installed at a Midwestern manufacturing facility. The Model 3000 Monitoring Unit rides with the crane, and accelerometer sensors are hardwired to the Model 3000 unit. Three installed accelerometers are shown mounted to the crane bridge drive motor in the far right picture. Typical applications are the hoist motor and gearbox and the bridge drive motors and gearboxes.

Contact Information

If you are using critical cranes in your manufacturing plant, please call MAARS, Inc. at (865) 927-6626 or email us at sales@maars.com.