The Crane Maintenance Station today

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Cranes that are increasingly more technically advanced, perhaps with more automation, require modern maintenance that can provide support from a modern Crane Maintenance Station (CMS). A CMS is not intended to merely create long lists of errors; it should also effectively guide the troubleshooter to the right location in the hardware or software documentation. A CMS is an important tool for reducing crane downtime, and a simple, user-friendly CMS, which is also powerful and intuitive, helps increase productivity. Receiving all information on an onboard CMS from a land station located in an office or vehicle is today more the rule than the exception.

Everybody knows that reliable cranes comprise the best possible base for maximum productivity, but unfortunately there is no 'one-size-fits-all' solution, and no two ports are the same. Consequently, certain circumstances may not allow these 'ideal' factors to work effectively to maintain and/or enhance reliability in every port. The electrical system integrator has a challenge in creating support tools for the maintenance people who work out of more than one port. On the other hand, the system integrator

who works globally has the advantage of being exposed to many different requirements; if he can boil them down into one system, it could become a world-class system.

Preventative maintenance

Even if a system supplier is able to build systems that are technically advanced, easy to maintain, inexpensive, and provide as high availability as possible, they still require maintenance. This maintenance is (or should be) moving increasingly toward working with preventive maintenance rather than making repairs when something fails. An airplane, or even a modern automobile with indicator lights for service, is taken in for maintenance at specific intervals regardless of whether anything is obviously in need of repair. A modern CMS supports this approach and there must be counters, timers, and calendars to indicate when certain service tasks need to be performed. The system generates plans, reports, and history reports that effectively support personnel in conducting maintenance at selected points in time. Proper maintenance results in fewer unscheduled failures for any device

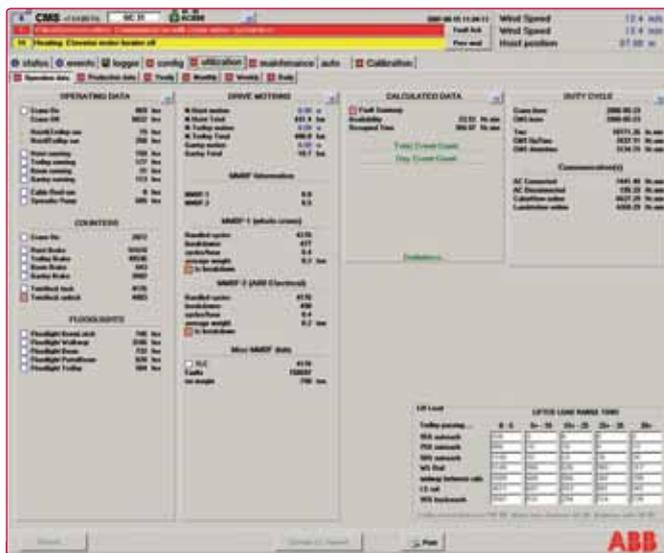Figure 1. The report view and configuration display on a modern CMS.

Figure 2. Operational data on the onboard CMS.

Figure 3. Integrated circuit diagram on board the crane.

and consequently higher productivity. A correctly configured CMS gives cranes higher productivity.

Requirements and functions

A correctly configured CMS must meet a wide range of requirements. If we stay for the moment with the maintenance manager perspective, the CMS is very important. It must be able to create reports aimed at operations (productivity) and the maintenance manager with key performance indicators, such as the top 10 most frequent faults.

Logger function

The logger function is essential. In the logger module all signals displayed on the CMS pages must be recorded and stored in logger files. It should be possible to play back these files later to recall an event or time period. Logged data must be displayed in the same manner as live data. The ability to set desired playback speed, from fast forward/backward to step–by–step, enables a thorough cause and effect analysis where the user can isolate all inputs prior, during, and after an incident. It is possible to select any signal available in the crane controller to be displayed in a graph. These graphs can be run for short periods to catch transient behaviour or used for long–term monitoring to detect trends over time.

It is important not to confuse a full–featured logger with a trending tool. The trending tool needs to be set up and the signals to be tre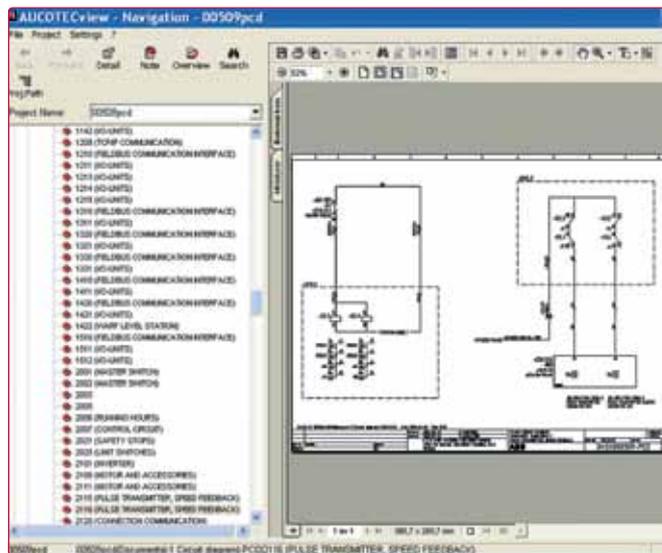nded need to be predefined. A logger stores all signals available in the CMS and does not require setup. With a logger, no time is spent trending the wrong signals. A logger enables maintenance staff to systematically analyse faults and ultimately, increase availability of the machines.

Service and maintenance modules

Furthermore, utilisation modules must contain operational data, mean moves between failures, production data, and historical production data. Operational data and production data show the loading capacity and service life of the crane. Service and maintenance modules contain information for preventive maintenance handling and should be triggered by the equipment and working hours.

In order for the terminal maintenance staff not to suffer due to improper and disorganised as–built drawings and hardware documentation, the systems integrator ensures that all hardware manuals and as–built drawings are provided after commissioning. In a correctly designed CMS, the documentation is stored and available online onboard the crane.

Configuration

A correctly configured CMS allows the maintenance staff to drill down from the event list directly into the documentation. Circuit diagrams and other documentation must be easily available. Having a seamless integration between the event list and the circuit diagram supports the maintenance staff, reduces troubleshooting time, and increases crane uptime.