Griffin Wheel Case History

Instrumentation & Control Systems  April 1997  by Brian Van Laar, Project Engineer, Griffin Wheel Co.

Griffin Wheel Company (Chicago, IL) manufactures steel wheels for freight cars and diesel locomotives. To help our five manufacturing plants in the U.S. and Canada keep pace with the railroad industry's ever-increasing demand for wheels, while at the same time maintaining our competitive edge in the marketplace, the company is continually looking for more cost-effective production and process monitoring techniques. Currently, we are introducing personal computer technology into our operations to handle a variety of applications.

We already use a networked, PC-based production database that records the number of poured wheels and their respective quality disposition. The database is linked to sixteen areas throughout the manufacturing process by fiber optic Ethernet, and is interfaced via Windows for Workgroups™. We also have several highly automated PC-based control systems that either control machining or analyze the quality of each railroad wheel produced.

Each time we introduce a PC-based system into a new application on the factory floor, careful consideration must be given to the obstacles that can get in the way of this type of technology. One of the obvious obstacles that must be overcome is the dust that's inescapable in a foundry environment. Dust can find its way into the PC and jeopardize the operation of device ports, hard drives, monitors, backplanes, and peripherals such as keyboards and mice.

Factory floor real estate is a second obstacle. Our manufacturing plants simply do not offer enough room for standard PC enclosures offering an acceptable ergonomic design.

A related third obstacle is the constant attention and visibility from various operator locations that certain of our machining operations require. Many standard PC enclosures don't allow the operator to maintain full visibility of the system while performing the online program or parameter changes.

A fourth obstacle has to do with flexibility. Our company needs to be able to add multiple data entry stations for our production database, and multiple remote operator stations for machining purposes, without having to add extra network drops or personal computers.

The size and weight of our products can also pose problems. The movement of hefty railroad wheels inevitably causes shock and vibration in our production areas. Standard PCs can't survive for very long in this environment without some added protection.

Finally, particularly threatening to standard PCs are the frequent power surges that we experience in our manufacturing environment. If not suppressed, these surges can
easily damage PCs and monitors.

We asked industrial PC hardware manufacturer Daisy Data, Inc. to custom design enclosures that would help us overcome the above obstacles, yet not cost more than our budget allowed. Building from past projects, Daisy Data's engineering team focused on the additional custom design changes that would be needed to meet our specs.

The solution they came up with was industrial PCs housed in Daisy Data's workstation enclosures. Barrel fans were added to circulate air within the enclosure and maintain the proper operating temperature around the PC and monitor. The enclosures are also prefabricated to accept vortex cooling units.

Because the accompanying peripherals required the same protection as that specified for the PCs, Daisy Data embedded its NEMA 4X series 6800 full travel keyboards and pointing devices directly into some of the enclosures. For applications in which this approach was not the best solution, it used specially designed keyboard trays that could be raised or lowered without affecting the integrity of the enclosure. This option also allowed easier access to the peripherals, greatly reducing operator fatigue.

The enclosures designed for this application also permit the operator to sit or stand comfortably when making machine program or parameter changes via the keyboard, and to maintain good machine visibility. They accomplish all of this by allowing a 360-degree rotation and 45-degree tilt.

In areas with limited floor space, such as the melting department, wall mount units were used. These were mounted using industrial-strength brackets that allow the operator to make height adjustments.

Where remote operator interface locations were required, but additional network drops or PCs could not be justified, Daisy Data used its series 5400 video/keyboard/pointing device extender kits to allow the operator to view and control a single process from multiple locations, thus reducing cost and simplifying the overall system.

Daisy Data then designed and incorporated special helical mounts into the enclosure to dampen the effects of shock and/or vibration. In addition, to combat the inevitable power surges, the decision was made to add industrial surge suppressors.

The proper design of system enclosures for environmental and ergonomic considerations was critical to the successful operation of PC-based systems on the plant floors of Griffin Wheel Company's five manufacturing facilities. PC component failures in demanding production operations are unacceptable to Griffin Wheel, which is why we needed a solution that addressed all of the environmental factors discussed in this article. The solution just outlined continues to meet this challenge.