BellHawk® Systems Corporation
Affordable Technology Solutions to Operational Problems
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Case Study
Tracking the Manufacture of Oil Pipe

The purpose of this project was to track the manufacture of sections of oil pipe in Saudi Arabia. It was undertaken as a subcontractor to a Canadian engineering company that provided all the manufacturing and test equipment for a new state-of-the-art manufacturing plant.

Our role was to provide the tracking of each section of pipe as it passed through each of its manufacturing and test steps. In this role, the BellHawk software captured all the traceability data and warned operators if a section of pipe had not passed the previously required inspection step.

BellHawk also captured process parameters and the test data for each section of pipe, from the process and test systems. Then, at the end of the manufacturing and testing process, printed out a certificate of compliance with the American Petroleum Institute specification for each section of pipe along with supporting data.

The warehouse for the raw materials pipe sections, as well as for intermediate and finished pipe, was about a square mile of desert. Each section of pipe was identified by a tracking barcode and the pipe racks were identified by a location barcode. Rugged wireless mobile computers were used to record the drop-off and pick-up locations of pipe from these pipe racks.

As there was no wireless coverage in the desert, the BellHawk store and forward (BSAF) technology was used to record pipe drop-off locations and to direct pipe pickup locations. The BSAF technology enabled the mobile computers to work autonomously until they come back within one of the manufacturing buildings, where there is wireless LAN coverage. Once in communications range, the mobile computers then synchronized their local databases with the main BellHawk tracking database.

One interesting problem that had to be solved was that the sections of raw “green” pipe had to be heated to a high temperature in an annealing process as part of being converted into high-pressure oil pipe. License-plate tracking barcodes were applied to each section of raw pipe as it was received at the facility but these were destroyed during the annealing process by the heat, which meant that the pipe sections lost their unique identification.

The solution to this was to paint the last 4 digits of the tracking number on the pipe in heat resistant paint, while each section of pipe still had its original tracking barcode attached. After the annealing process, a new tracking barcode was applied and the 4 digit tracking number associated with a new tracking barcode, which was attached to the pipe, for the rest of its manufacturing and testing process.

As each section of pipe was loaded on a truck for shipment to a customer, the tracking barcode on the section of pipe was scanned to record which pipe sections are being shipped. The system also checked that each section of pipe has passed the API requirements. Then paper certificates for each section of pipe were shipped with the pipe or sent electronically to the customer.

The BellHawk system tracks scrap and rework and only allows each section of pipe to be reworked a specified number of times at a manufacturing operation before the system tells the operator to scrap the pipe.

The BellHawk system also allows factory managers to see the status of each section of pipe being processed in real time. They can see what operation it is at, whether it is passing its tests, and by how much. They can also see the inventory of raw pipe and where it is located in the desert as well as the quantities of finished pipe available to immediately fulfill customer orders.

The real-time interface to the test and process control equipment was implemented using the BellHawk SDK, which is now part of the Bell-Connector software package. Through this interface BellHawk was able to pass processing and testing requirements to the industrial PCs that controlled the manufacturing and test systems. The same interface was used to retrieve process and test data to be used in evaluating whether the pipe passed inspection and to be part of the materials traceability for that section of pipe.

Special Ruggedized UV Resistant Barcode Labels were used for the pipe racks so they would stand up to the harsh desert environment. Sun shades were constructed for each pipe rack label so as to minimize glare when scanning in bright sunlight.

The mobile computers and their barcode scanners functioned very well despite the high ambient temperatures in the manufacturing plant and in the desert in the heat of summer.

For more information, please contact info@BellHawk.com or call (508)-865-8070 and press “1” for expert assistance. Please also see www.BellHawk.com for details of BellHawk Systems technology and supporting services.

