

FRONTLINE CASE STUDY

Systematic Problem Solving Techniques using Data Capture

The Setup

A pulp and finished paper mill uses a barcode system to track the finished product through packaging and shipping. The system matches each roll of paper to the appropriate customer order, then wraps, labels, and then bands them for shipping. The success of this process depends on the timely and accurate operation of the barcode scanning system which is controlled by data from the motor control center. In the motor control center, the serial communication line runs from a Rockwell Automation ASCII module to the barcode scanner and uses an RS485 network that has no EIA standard pin-outs.

The Challenge

Problems appeared when the barcode scanner was unable to scan the code and process the roll. When this happened, the roll passed to a holding area and required manual handling to reintroduce the roll to the system. During this time, some machinery sat idle until the next roll was processed. Though the downtime was generally short, the mishandled roll caused as much as an entire day's shipping delay. Plant personnel investigated the problem but could not pinpoint the cause(s).

THE FTE Solution

A solution to the problem came from a bit of luck and **Frontline's FTS4Control software**.

Frontline was in the mill conducting a training class on serial asynchronous communications using Frontline's **FTS4Control** software: byte timing, hardware handshaking, RS232 and RS485 electrical signaling, data packaging, etc. The trainer inserted a custom-made cable into the motor control center and began capturing the communication traffic to demonstrate how to analyze byte timing and hardware handshaking signals from the event display and the control signals display of the analyzer. During the data capture a roll was missed by the barcode scanner and the training exercise quickly turned into a real world, trouble-shooting opportunity.

The consultant paused the data capture and looked at the details of the message and to no one's surprise, the message was corrupted. Based on an analysis of the captured data, the consultant and the mill technicians concluded that there were three possible sources of the problem: the barcode scanner, the cabling, and the ASCII module. The training/investigation continued.

First, the barcode scanner was disconnected and the communication signals were looped back to the analyzer and ASCII module. They disconnected the serial communications cable at the barcode scanner and installed jumpers between the transmit pin and the receive pin. Then, the known data was transmitted at regular intervals; the return data pattern was checked and found to match the transmitted pattern. This proved that the cabling was good. Next, the consultant sent the data pattern to the ASCII module to make sure that it was receiving the correct information. A positive test proved that the ASCII module was able to receive and understand the messages. That only left the barcode scanner. The Frontline consultant then opened up the barcode scanner case and found a ribbon cable pinched against the case. An intermittent short on the ribbon cable caused the corrupted data transmissions. Plant support personnel repaired the problem and returned the system to peak operating efficiency.

This case illustrates that Frontline's FTS4Control protocol analyzer and decoder not only are used to identify problems in industrial communications networks, but they also aid in the troubleshooting and repair process by testing network components in isolation. The analyzer can monitor network communication during normal operation and display the decoded data to determine the overall health of the network. The analyzer also warns of potential problems before they occur and allows support to maintain a proactive posture rather than a reactive one.

Frontline's FTS4Control software is uniquely positioned to help solve industrial communications problems before they affect plant operations and minimize downtime after problems arise.