AUTOMATIC I.D.NEWS
FOR AUTOMATED DATA CAPTURE SYSTEMS USERS

CASE STUDY OF THE MONTH

Test data ensures brake systems meet standards

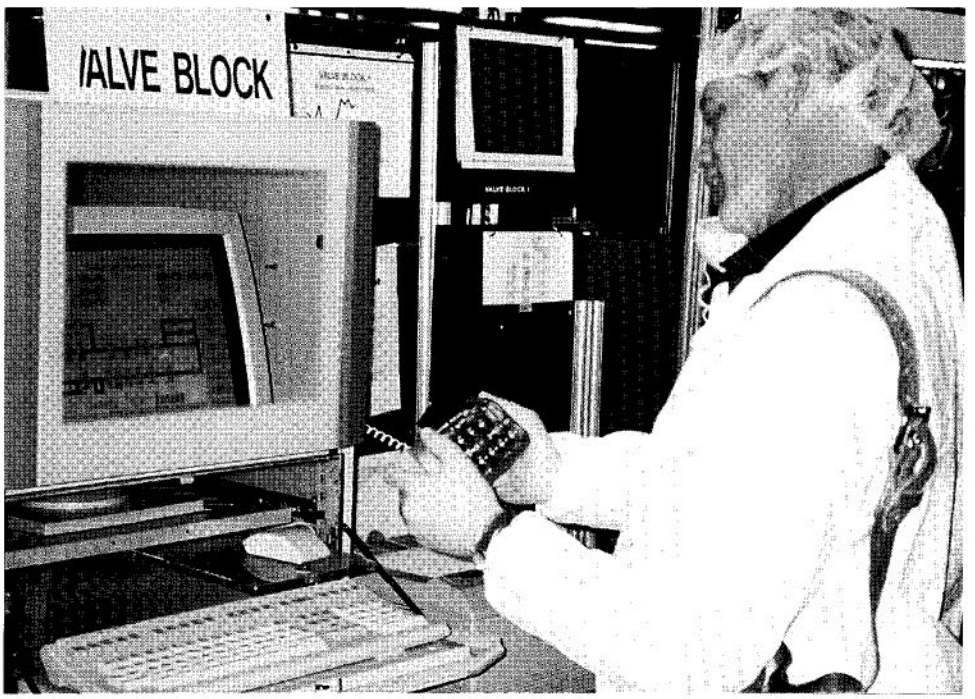
Bar codes pass brake fluid 'acid test,' combine with RF/ID tags to perform quality control, pallet tracking, tool tracking and more

BY MARK DAVID, EDITOR-IN-CHIEF

ABS. The acronym for anti-lock braking systems is emblazoned above the brake lights of autos owned by today's safety-conscious drivers. For manufacturer ITT Automotive, the popularity of ABS means 1,200 employees are working without "a brake." To ensure optimum efficiency, and to capture mandatory safety test data, ITT Automotive depends on Auto. ID and automation.

ITT Automotive in Asheville, NC, is one of three company plants in North America that produces anti-lock brake systems for automobile manufacturers. Because of the intensive amount of component testing and the need to carefully track and archive all test data, ITT Automotive makes use of massive computer power coupled with radio frequency identification (RF/ID) and bar codes.

The company performs numerous tests on each component at each stage of assembly. RF/ID and bar coding are combined with programmable logic controllers tied to a Digital Equipment-host backbone to secure test data that will be archived for many years. The system uses approximately 20 VAX and Alpha processors. With 800 programmable logic controllers (PLCs), ITT Automotive is among Siemens America's largest U.S. installations.



ITT workers scan bar-coded parts at testing stations to build comprehensive test-data records.

ITT AUTOMOTIVE

FACTS AT A SCAN

User:

ITT Automotive

Application:

Production control, quality control, test-data archiving; also, time and attendance, tool tracking

Technologies:

Bar code, RF/ID, RF/DC, EDI

Benefit:

- Automated work cells.
- Accurate collection of test parameters.
- Archiving of test data.
- Tight quality control standards met.
- Cost and labor savings.

On the company's automated production lines, pallets identified by Siemens RF tags travel by conveyor from station to station. At each station, components are added and/or tests are performed. The read/write tag is updated with a pass/fail grade at each testing station. Test data is transferred from the Siemens PLC to the DEC VAX, and the part moves to the next station.

If a part has failed a test, it continues on the line but flows through without stopping at subsequent stations. At non-robotic stations, test results are shown to human workers via a red/green pass/fail signal. "We usually have machines check people and people checking machines," says ITT Automotive's John Kubenka, manufacturing engineer.

Once a component has moved through the production cell, test statistics are crunched and compared against standards by the DEC VAX. (Each line has a VAX Station 400 communicating to the Siemens PLCs for that line.) If the part passes the test and is declared a good part, a bar code label is printed from the VAX, applied and scanned. The RF/ID-tagged pallet is re-used with variable data erased. Bad parts are pulled and sent to failure analysis with a printout of corresponding test results.

The system assigns each good subcomponent (valve block, pump unit, actuation unit, etc.) a unique serial ID number. The 16-digit number is assigned by the VAX. The first digit identifies the production line, the next two the plant, the next two the product type, four for the part number, and seven digits are

incrementing serial numbers.

Bar code labels are printed by Imtec thermal-transfer printers (one printer for each line, controlled by the VAX for that line) using Interleaved 2 of 5 symbology. The label stock provided by Imtec has a laminate and a specialized, aggressive adhesive to hold up well in a brake fluid-drenched environment.

"We ship about 5,000 units a day, and there are as many as six bar code labels on each unit," says Kubenka.

Component identity

The bar-coded sub-assembly now moves on to part assembly and additional testing stations. The parts are tested for torque measurements, distance measurements, pressure and vacuum tests, among others. In the Wet Test, pumps are tested under 3,500 pounds-per-square-inch pressure for flow rate and leakage.

At each station, the bar code is read and more test data is collected. The bar code number will tie all the test data associated with that part to the test history which will be archived in the DEC host network. The individual part numbers are eventually linked together with a master number that is assigned to the final ABS assembly. Test data is periodically off-loaded from the work-cell VAX to the manufacturing host (VMS Cluster) where files are continuously archived to laser disk.

"In case of customer problems, we can pull test results on that specific part. Usually, we get the part back and send it through analysis to see any problems. We also keep track of lot numbers and components in a paper system so we can go back and look at a series based on a suspected lot being bad," explains Kubenka, adding that work is being done to automate lot tracking.

Bar code data is collected by PSC scanners (either hand-held or fixed-position, depending on the workstation and position of the bar code on that particular part) linked to Linx data collection terminals. The Linx terminals communicate with the Siemens PLCs via a BCC (block code check) protocol that checks fields for the proper number of characters. "We like the 3964 communications protocol (offered by the Siemens PLCs) because it has error checking. This data is crucial. We chose the Linx terminal because it could directly support the Siemens protocol—and was the only U.S.-made terminal I could find that would do so," says Kubenka.

The system assigns each good sub-component an individual ID number which identifies the production line, the plant, the product type and the part number, and includes a serial number.

An acid test for the terminals was their ability to stand up to brake fluid—the lifeblood of the testing facilities. "Linx did testing of their product with brake fluid and provided a full warranty in our application," he says.

The brake fluid has also proved hazardous to the health of bar code scanners. "It is actually corrosive to the plastic handles, so we are often replacing them," he says, noting that PSC has outfitted ITT Automotive to do these repairs in house. Scanner lenses were also degraded by the brake fluid, so Kubenka worked with a local optics shop to come up with plastic lenses that would better withstand the brake fluid. "PSC has a new industrial-grade gun, and we are evaluating that now. It should address the lens problem," he says.

Software for the bar code data collection was written by Linx for ITT Automotive. "We have the source code and have been able to change it as our needs change. The program is written in Linx Basic and is very easy to work with," says Kubenka.

EDI and more

The receiving parts inventory storage system uses LXE's radio frequency data communications system with Symbol Technologies' hand-held scanners. Viaware warehouse control software comes from Haushahn Systems and Engineering (HSE).

Outgoing materials are labeled with AIAG-standard labels printed on Intermec 440 thermal-transfer printers driven by a second HSE

Viaware system. The receiving and shipping systems run in the open systems environment on a DEC RISC/UNIX computer. Orders and shipping data are communicated via electronic data interchange (EDI) advanced shipping notices (ASNs) sent over phone lines to customers via the CMI Trans4M MRP system. Back-up options, include satellite link. The EDI translation software is from Trinary Systems and CMI.

ITT Automotive is also working toward 100% ANSI EDI and AIAG labeling compliance from its suppliers. Currently, compliance is at 70% to 80%. "We have problems with some of our off-shore suppliers that don't comply to AIAG standards," Kubenka says.

> *"We usually have machines check people and people checking machines."*
> John Kubenka—ITT Automotive

A place for every tool

Another innovative application for the tool room uses bar codes on all tools and drawers. Every item is located within a numbered cabinet and a numbered drawer, and each location is bar coded. Each line item has a bar code printed on a menu sheet on the cabinet door. As parts are checked out, the label is scanned and quantity key entered. This system allows for cycle counting and physical inventory in the tool room. Previously, tool check-out was manually logged with manual data entry. "There are fewer things to straighten out after the fact," says Tooling Technician Terry McLaughlin. ■