SECTION

AUTO ID

A variety of new technologies, like hand-held computers and spread-spectrum wireless communications, are enabling companies to successfully capture real-time data in remote locations. Access to real-time data can provide a competitive advantage by empowering management decision making.

Accessing Remote, Real-Time Data

BY MARTY WEIL

Since man first learned to walk upright, remote data acquisition, in one form or another, has been a common practice. A pre-historic hunter (field technician), for example, would scan the plains (remote job site) for migrating herds, make a mental note, and take the information back to the cave (home office) for dissemination to the rest of the hunters. Unfortunately, by the time the information made it back to the cave, the herd moved, and no one could be certain if the herd was buffalo or elk.

The same is true today of modern information gathered manually in remote locations without the help of real-time data collection techniques, as it is quickly outdated and often inaccurate.

"Manual, remote data acquisition has been going on for some time," says Stuart Itkin, vice president of worldwide marketing for PSC Inc. (Webster, NY). "Currently, there is a trend to bring the process of data collection to the point of data origination. Today, we are using scanners and other data-entry devices in the field to capture data in real time."

For real-time remote data acquisition, what is needed is a computer device or system that is situated at a distance from the central computer and is communicating with it in real time by cable or radio frequency (RF). "One of the benefits of real-time data collection is the automated decision making that it affords," says Itkin, "which enables a manager and worker to make much better decisions about operations they are involved with."

Scott Cardais, president and CEO of Hand Held Products (Charlotte, NC), agrees. "Organizations are beginning to realize that real-time information is absolutely vital, and this is contributing to the growth of the remote data acquisition industry. Unfortunately, most companies are still dealing with out-of-date information. That's why those companies that are capturing information in real-time and whose databases are not out-of-date, have a distinct competitive advantage."

A combination of technique and technology is making real-time remote data collection possible. On the hardware side, advances in remote computing are making field computing effective and affordable, while advances in RF and spread-spectrum technology continue to make wireless communications more viable.

According to J.P. Hornak, senior market manager at Symbol Technologies Inc. (Bohemia, NY), one of most important technical advances in field data acquisition is powerful, hand-held computers. "Most of the data terminals on the market today feature a small screen with little data input power; however, hand-held 486-based PCs will be coming

Throughout a 10-day space shuttle mission, a telemetry downlink from the orbiting shuttle transmitted a constant reading of environmental factors inside the orbiter to Texas Microsystems' FTSA

Photo courtesy: Texas Microsystems Inc.

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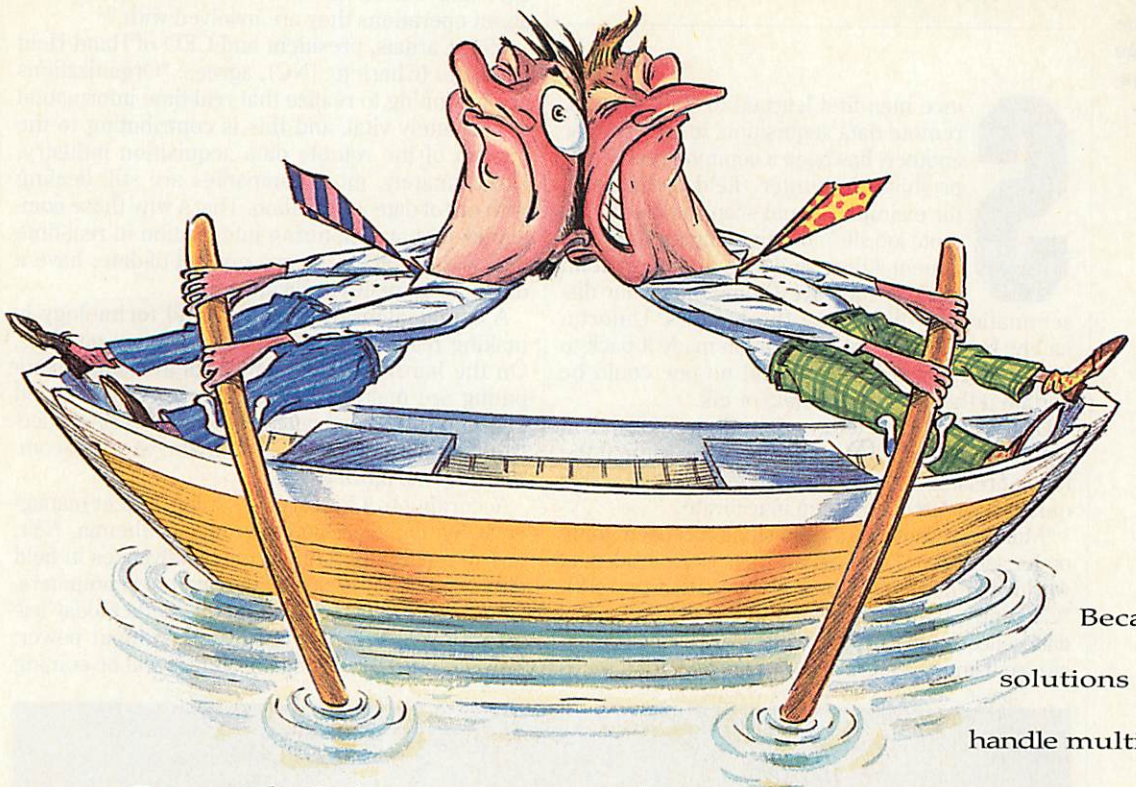

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to market later this year and will revolutionize remote data acquisition. This new breed of hand-held computers will be pen-based and feature larger screens. With higher data rates on the way, the technology is moving rapidly toward the use of hand-held PCs," he says.

For example, Symbol's new PPT4100, a hand-held computer with an integrated bar code scanner, incorporates pen input (on a 5.5-in. x 3.0-in. screen), a graphical user interface, an integrated bar code laser scanner, and radio-frequency wireless LAN technology via the Symbol Spectrum One PCMCIA radio card. The unit is no larger than a video cassette and weighs about one pound. "The PPT4100 was developed in response to customers' need to access and input information as diverse as inventory and sales data, site layouts, and product locator maps from any location throughout a facility," says Hornak.

Another example of a portable computer that integrates data capture, processing, and RF communications in a single unit is the Telxon Corp. (Akron, OH) PTC-960RF bar code scanning microcomputer. Telxon's Core Module Design facilitates application-specific component integration and includes Flash EPROMs that enable immediate modifications to both the operating system and application programs while resident in the unit. This architecture also provides RAM expansion up to more than one megabyte.

"Remote and mobile computers are exposed to very tough operating conditions in many mission-critical field applications," says Al Kygeris, product marketing manager for mobile products at Texas Microsystems Inc. (Houston, TX). "The new breed of mobile units allows companies to link field operations directly to enterprise data, even in the harshest setting."

NEW WAVE. Depending on how remote the remote application is, the link between the field and the factory is often a radio wave. "Today, there are basically two types of wireless data collection technologies—RFDC and spread spectrum—and both rely on radio frequency," says Hornak.

"RFDC is a point-to-point connection," he continues. "In a spread-spectrum network, the transmission is spread over a number of frequencies. This provides high data throughput, sophisticated fault tolerance, and advanced scalability for future system expansion."

RF itself is defined as the transmission of data over the air using radio waves rather than wire (*Managing Automation*, May 1994, page 21). RFDC refers to the data terminals that have wireless data communications capabilities. These data terminals have a built-in scanner to read bar codes. A typical terminal has a modem, input/output interface, a radio, and a digital board.

According to Hornak, new forms of radio-frequency communications are taking shape and are expected to be on the market later this year. The stage is set for higher data rates and larger data packages. New RF systems will have data rates of 1 MB/sec., which is about eight times faster than what is currently on the market. "Right now, radio-frequency systems are not geared to handle large data packages. However, the new technology will be close to Ethernet capacity. It will be an open standard, and it will be possible to run both Ethernet and the radio communications on the same system," Hornak explains.

How remote can remote data acquisition get? Well, this past October, Texas Micro's fault-tolerant FTSA PC helped run NASA's space shuttle experiments in order to determine whether astronauts could grow their own food crops in space during extended space voyages in the future.

The Texas Micro FTSA computer was used to control an environmental chamber at the Kennedy Space Center, duplicating atmospheric condition (except low gravity) as they occurred inside the shuttle. The plants on the ground constituted a control group, a benchmark that is essential to the validity of the entire study. After the shuttle returned to earth, the plants that flew on board were compared with the plants that remained in the chamber on the ground, and the differences between them illustrate the effects of gravity loss. Compared to the ground-controlled crops, space-grown plants exhibited 38% greater root length and 12% greater root fresh weight, according to Bionetics Corp. (Kennedy Space Center, FL), which provides support services to NASA's biological experiments.

Throughout the 10-day mission, the telemetry downlink from the orbiting space shuttle transmitted a constant reading of environmental factors inside the orbiter to the FTSA, including temperature, relative humidity, and carbon dioxide levels. The FTSA computer recorded the readings and activated analog and digital devices to control these environmental factors in the chamber on earth, thereby insuring that the plants on the ground experienced the same conditions.

"This was truly a mission-critical operation," says Don Wiegrefe, payload design engineer for Bionetics Corp. "What we needed here, and what we found, was a fault-tolerant system that guaranteed the integrity of our data and operated reliably during continual operation." MA

PRODUCT

FIELD-READY PCs

Photo courtesy: Texas Microsystems Inc.

The Texas Micro 7108 Mobile Field Computer System is a ruggedized, water-resistant unit designed to operate with standard software and plug-in cards while exposed to temperature fluctuations, vibration, and other environmental conditions that would defeat an ordinary PC.

The 486-based mobile PC is also built for speed. Designed for moving vehicles such as police, fire, or other public safety vehicles, or for test vehicles like those used by automobile and tire manufacturers, the unit's chassis is connected to the keyboard and video display components by a 30-ft. cable, enabling the chassis to be secured in the vehicle's trunk or in some other storage area, while the display and keyboard remain up front with the driver or crash test dummy. The 7108 runs on a 12-v vehicle battery or on standard ac power.

Another model, the 7010, is a rugged, transportable, dc-powered portable field computer that permits field technicians and engineers to collect, store, and display data when power and access are limited.

See Information Express

Symbol Technologies
PPT4100 hand-held computer.....**RC# 98**
Telxon Corp.
PTC-960RF microcomputer.....**RC# 99**
Texas Microsystems
FTSA, 7108 Mobile Field Computer,
7010 Mobile Field Computer .....**RC# 100**

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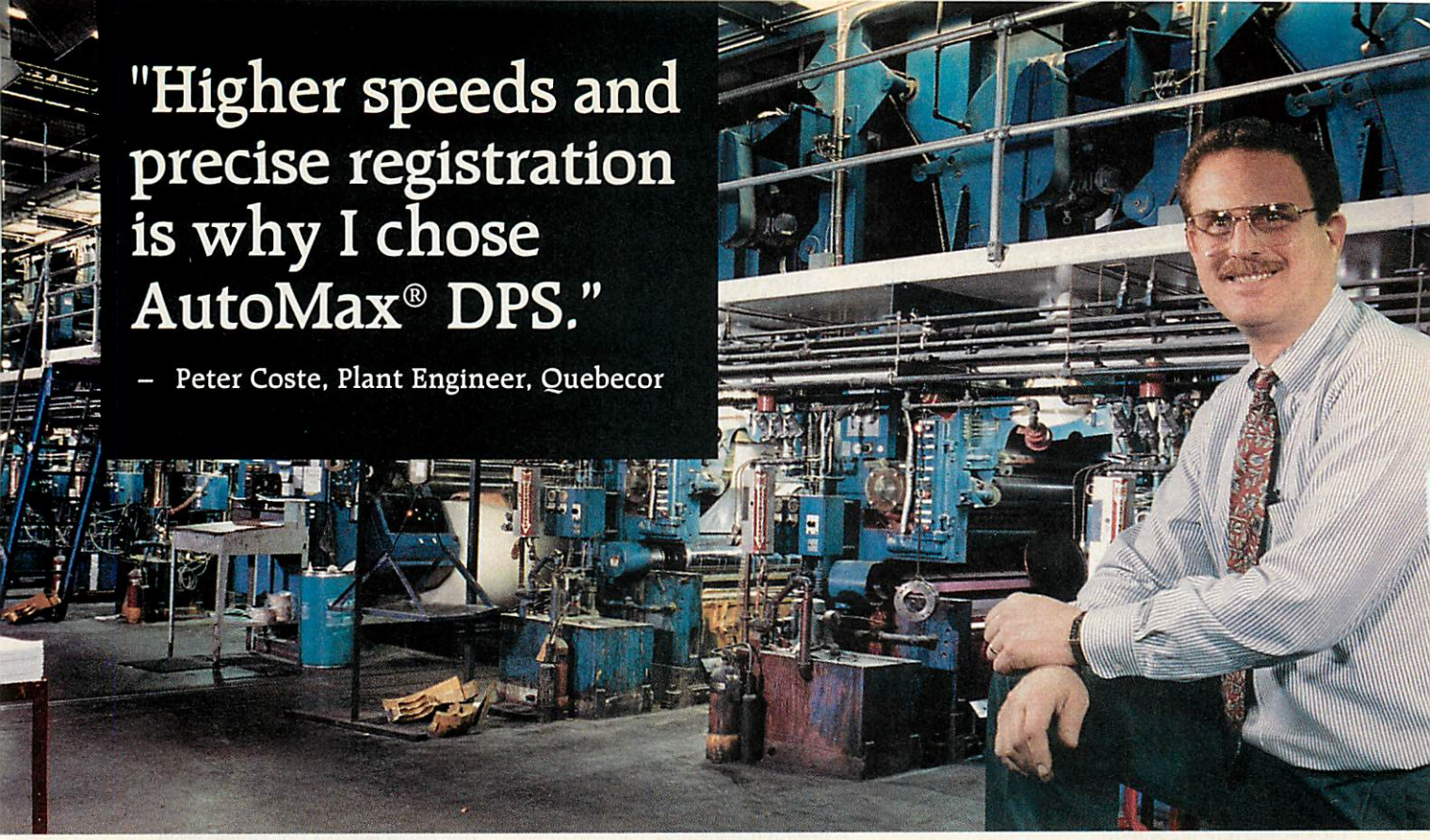

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