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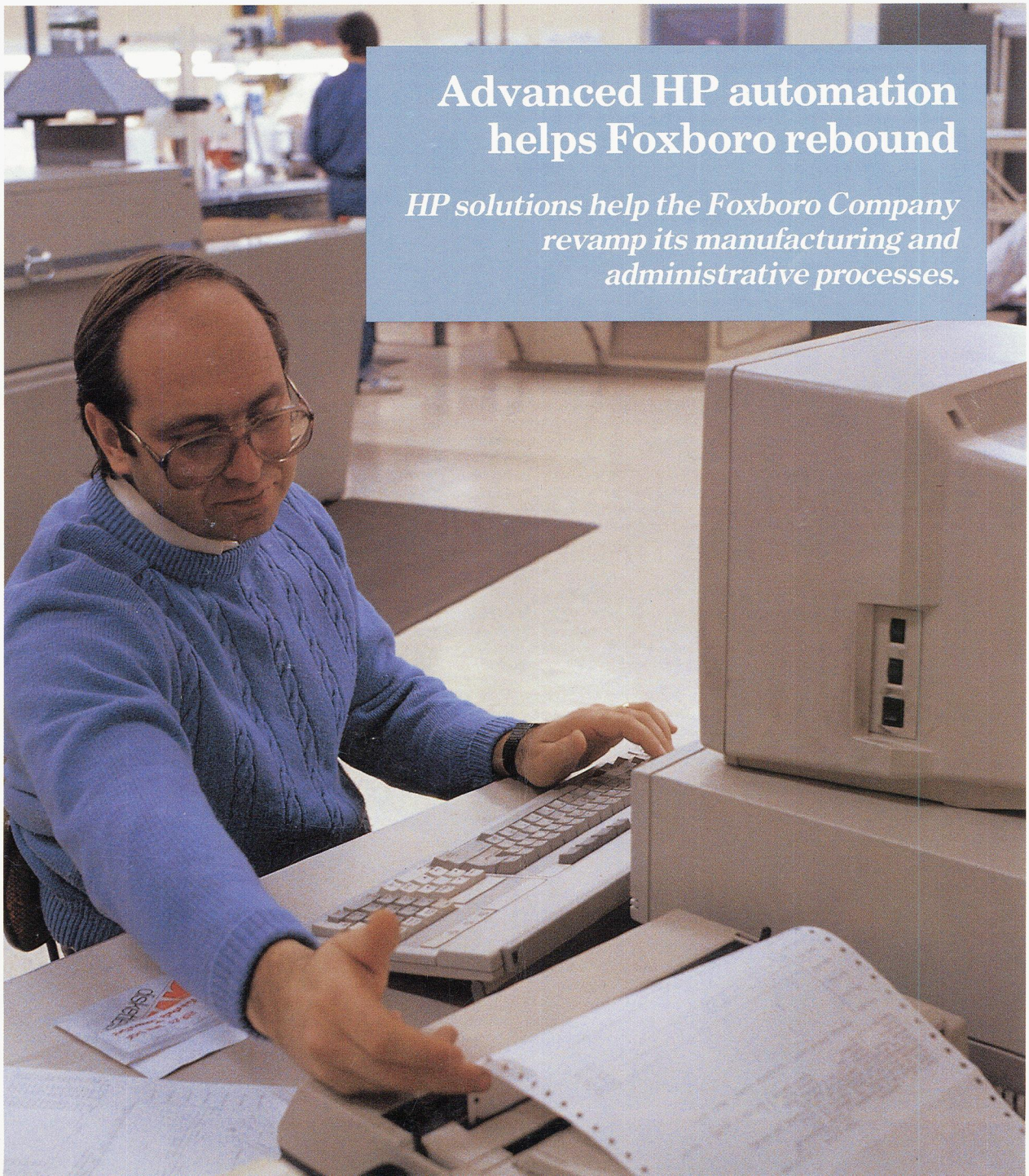


Advanced HP automation helps Foxboro rebound

HP solutions help the Foxboro Company revamp its manufacturing and administrative processes.

Consolidate, converge, leverage—keys to manufacturing success in the 1990s

by Brian Moore

A decade ago, successful businesses entered the 1980s by adopting total quality control techniques to improve their products and their production and administrative processes. Today, those lessons learned, most companies are looking at new ways to meet the challenge of the 1990s.

We believe manufacturing will be the focus of much attention and change, particularly for large companies, as we enter the new decade. Until recently, manufacturing organizations often viewed themselves, and were viewed, as tactical units which provided passive support for the business plan. For the 1990s, however, this approach won't be enough.

In the future, manufacturing organizations of successful companies must take an active role in building a competitive advantage. To excel, companies must reduce manufacturing costs while improving responsiveness to customers.

Growing commodity view. Increasingly, technology-based products are being viewed as commodities by customers, competing more on price, quality, and availability than on technological features. As a result, manufacturing competitiveness becomes paramount. Consolidation, convergence, and leverage—these are the tools to make manufacturing a competitive advantage.

- Consolidation means concentrating enough resources in one plant, or very few plants, to reach critical mass and achieve economies of scale.
- Convergence is the attainment of a high degree of uniformity in design and manufacturing processes.
- Leverage involves using these large consolidated plants, with their critical mass, to develop processes with common systems and procedures.

Implementing these strategic tools can be challenging for companies with fairly autonomous divisions, each accustomed to managing its own design, manufacturing, and marketing operations. But the long-term benefits can be significant.

Better market responsiveness, lower costs. By consolidating manufacturing operations, companies can make the investment to build dynamic systems that integrate cost-effective real-time quality monitoring, tracking, and control systems.

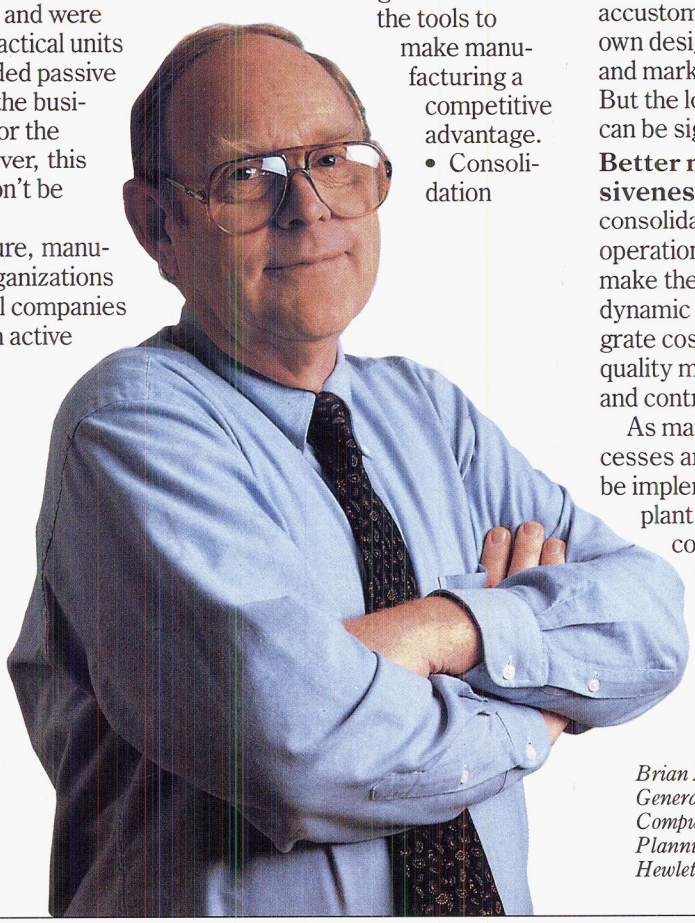
As manufacturing processes are refined, they can be implemented in every plant. The expense and confusion of competing systems in different plants is eliminated, because all products are made the same way in each plant. And with fewer manufacturing sites, making changes in response to market demand becomes faster and less expensive.

In HP's computer manufacturing organization, a specific entity is charged with developing each process improvement. This guarantees common processes, and helps forge important links among process and manufacturing engineers and product engineers, who often work at different sites.

In the area of materials, designers can be encouraged to select from a minimum set of preferred parts from a small group of preferred vendors by giving them a centralized parts information system. Also, up-to-date cost data helps designers make better-informed decisions when choosing parts.

Fostering continual improvement. By using fewer suppliers, each with larger contracts, a manufacturer gains the leverage to help its parts vendors improve their own products and processes and reduce costs, to everyone's benefit. At HP, we are working to expand our vision of continuous process improvement throughout the vendor chain.

Consolidation, convergence, leverage—we believe these are essential for developing a uniform, integrated, and dynamic worldwide manufacturing strategy to compete in the 1990s.



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The Foxboro Company, a Massachusetts-based manufacturer of industrial automation products, powered its way out of a serious mid-1980s recession by adopting a number of strategic and technological initiatives, including the introduction of advanced Hewlett-Packard technology into its U.S. production lines.

Founded in 1908, the Foxboro Company designs, manufactures, and markets a wide range of industrial automation products and services primarily aimed at the chemical, pulp/paper processing, and energy industries. The Foxboro line includes process computer systems, such as its Intelligent Automation series, and instruments, which measure and control such industrial variables as the chemical composition, flow, temperature, pressure, and liquid level of materials processed.

"Foxboro always had a reputation for innovative products," says Peter Burrows, Foxboro's director of corporate information services, "but administratively, we were falling behind. We had become reactive, rather than proactive, in our approach to an extremely complex global marketplace."

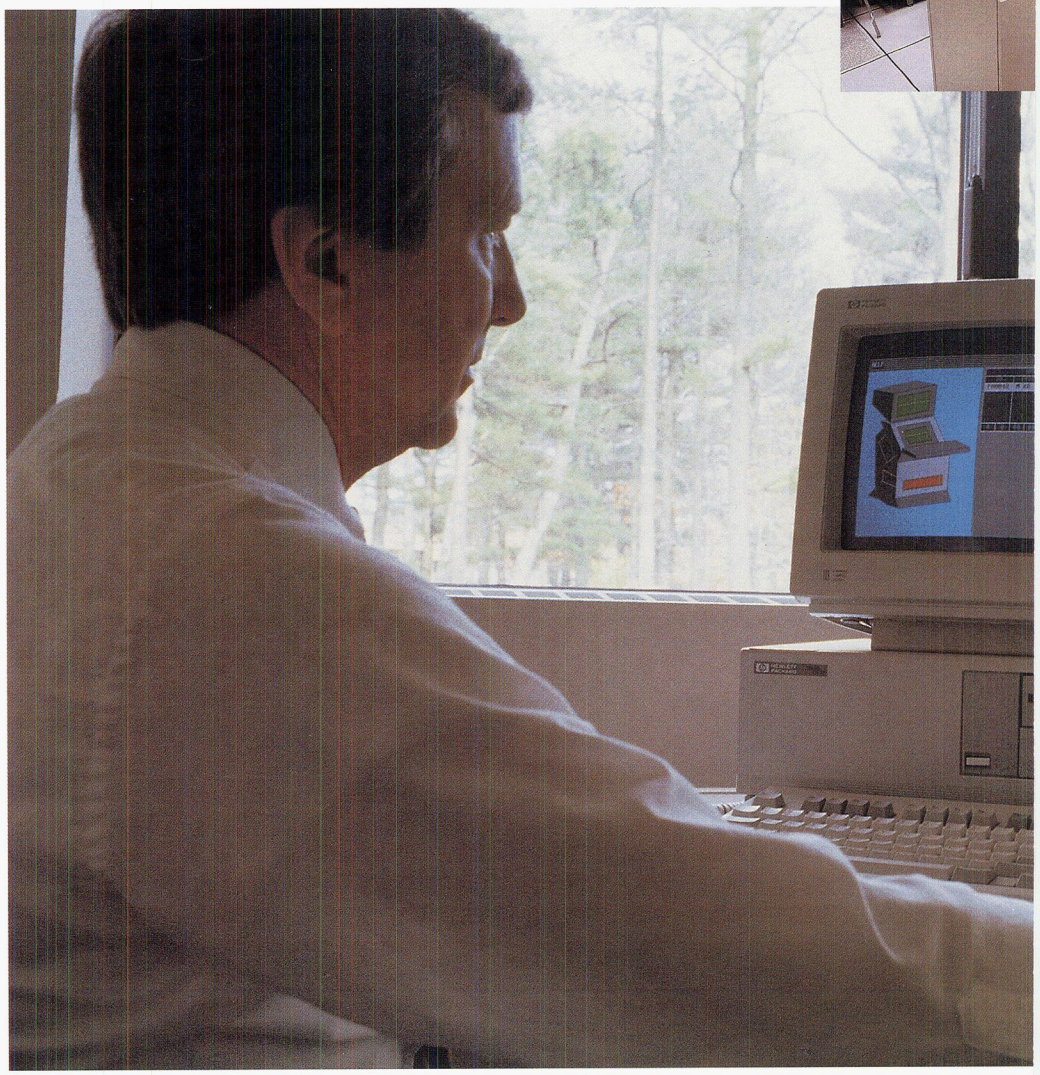
Foxboro president Gary Willis directed Burrows and Henry Metcalf, director of systems manufacturing, to implement a fundamental change. The strategy—remake Foxboro's dormant Cocasett plant in Foxboro, Massachusetts, into the high-volume, low-cost factory needed to compete in the fast-changing, technologically driven process-control industry.

(Above) Foxboro technician uses an HP Vectra personal computer to track inventory. (Inset) Foxboro's Intelligent Automation series manufacturing facility in Foxboro, Massachusetts.

Putting customers first. "We asked our best customers what administrative procedures they wanted to accompany our new distributive control system," says Burrows. "Their wish list started with how they ordered the product."

Two years ago, Foxboro sales engineers typically placed orders by writing specifications for new process-control systems on yellow legal pads. Upon returning to the office, they wrote up complex orders which were mailed to the Foxboro factory.

Once the purchase order arrived at the factory, other engineers spent weeks reworking it into a detailed configuration. Then, Foxboro's manufacturing staff



(Above) Foxboro salesperson uses an HP Vectra PC to configure a customized Foxboro Intelligent Automation system. (Inset, top left) Computer operator checks requests from Foxboro's sales force for the day's production. Incoming orders are acknowledged using an HP 3000 Series 70 computer and recorded on an HP 3970E tape drive. (Inset, top center) Intelligent Automation series demonstration center at Foxboro headquarters in Bristol Park, Massachusetts. (Inset, top right) Foxboro technician tracks circuit board inventory using an HP 2392 terminal and HP Materials Management software.

fashioned the purchase order/proposal into a complicated work order.

"It took us too long to determine what type of control system our customer could use," says Burrows. "We needed to find a way to reduce the amount of time required by our engineers to translate requirements into product specs without introducing errors or proliferating them by passing a lot of paper back and forth."

A long-time customer of the Hewlett-Packard Company, Foxboro asked HP to help them find a solution.

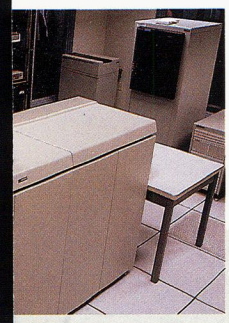
Streamlining order processing. Foxboro upgraded its ordering system with Hewlett-Packard Vectra personal computers and expert system software. The HP Vectra PC allows the sales engineer to call up a graphic representation of the process-control system on the CRT. Once the sales engineer enters the specifications, the HP Vectra PC creates a proposal which it sends to the customer, or an electronic order which it transfers to the factory.

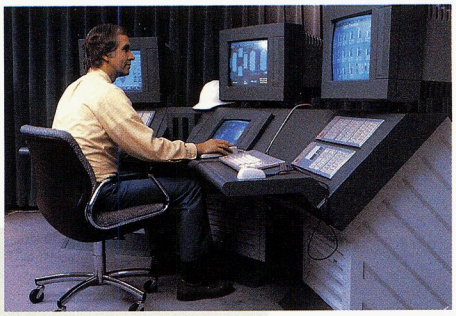
"We increased the accuracy of the order processing while reducing its cost," Burrows says. "We've reduced the amount of time it takes to place an order at the factory from several months to overnight."

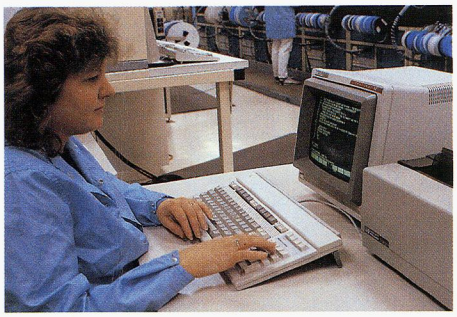
Improved sales support. In addition to a more efficient method for ordering products, Foxboro customers want strong technical and sales support. Foxboro engineers improved their capabilities in these areas by employing an HP 3000 Series 70 computer to dispatch field engineers to hot sites, manage a preventive maintenance program, and keep track of spare parts.

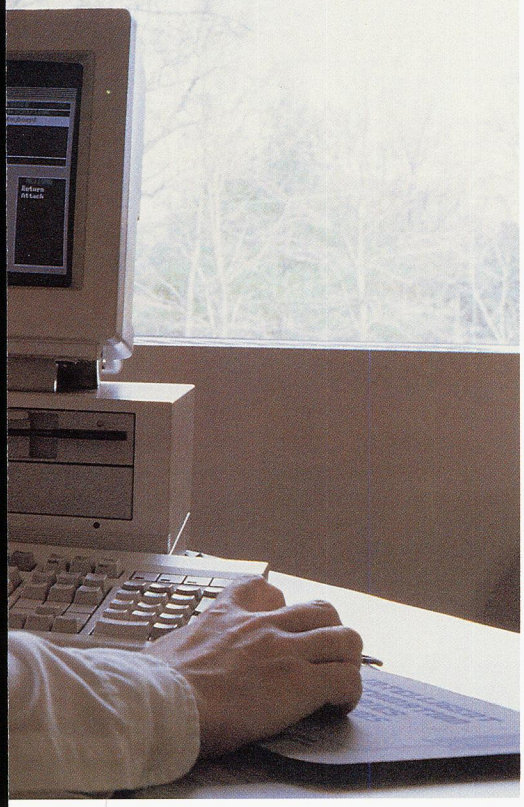
Using an HP MICRO 3000 computer and Response Center software, Foxboro's sales response center now allows sales engineers to offer fast answers to customer inquiries, as well as providing detailed information for preparing quotations.

New products, new production methods. Perhaps the most critical item on the customer wish list was a product that didn't yet exist—a control system that reflected recent advances in digital technology. To meet this customer need, Foxboro moved beyond its









SPECTRUM product line to create a new generation of products. The result—Foxboro's Intelligent Automation (I/A) series, which distributes electronic intelligence throughout the process-control plant.

To manufacture the I/A series products with greater speed, accuracy, and efficiency, Foxboro initiated new production methods. Each customer order is managed on an HP 3000 Series 950 computer linked to an HP Series 70 on the factory floor. A Foxboro technician takes an order-generated pick slip and selects parts from four work areas (modules, enclosures, peripherals, and cables), then assembles them into a process-control system tailor-made to meet precise customer requirements. It is this depletion of finished goods that provides a signal to replenish the "demand pull" manufacturing system.

Inventory status in this "just in time" environment is tracked on HP 2392A terminals. Circuit board design specifications are maintained by Foxboro's R&D staff. Engineers download customized specifications for each board to a high-speed line of "pick and place" machines located at the company's Cocasett plant.

Boards completing this process are tracked electronically using HP's Materials Management software as they move through module manufacture to finished goods. "What we're trying to do here," says Cocasett plant manager Metcalf, "is create a factory that schedules itself."

Less inventory, people, space. Today, nearly a year after it began production, Foxboro's Cocasett plant runs around the clock using hardware and software developed by HP. Some notable benefits:

- Inventory for Foxboro's I/A series is 50 percent of what it was for their SPECTRUM products. Return on inventory is five times greater.
- The I/A series requires 66 percent fewer people to build the same amount of product. Foxboro has eliminated the need for material handlers, schedulers, labor reporters and quality inspectors. Workers now inspect their own work.
- The I/A series requires 75 percent less space to manufacture. The 100,000-square-foot Cocasett plant replaces several plants and warehouses formerly used by Foxboro to build its SPECTRUM products.
- Inventory turnarounds have increased, allowing lead times measured in days instead of weeks. Foxboro has dropped production time from 39 weeks to 15 weeks for its I/A series, and soon will be shipping all orders from finished goods.

Taking a successful solution overseas. Foxboro has started producing its I/A series at its plant in Redhill in the United Kingdom. The company has also reached an agreement in principle to manufacture and sell the line in Japan.

Foxboro's total offshore sales are expected to increase in the next decade. "About 50 percent of our orders came from overseas this year," says Burrows. "We expect that to grow significantly in the coming year."

The bottom line—a series of bold initiatives, including the incorporation of advanced HP automation, have put the Foxboro Company on a profitable global path into the final decade of the 20th century.

HP's Manufacturing Management II fits the bill for process manufacturers

New Backflush feature improves inventory control in dynamic process manufacturing environments.

Process and repetitive manufacturing environments pose unique system problems. You need the capability to make quick changes and maintain tight control over your manufacturing processes to compete effectively in today's marketplace.

How do you pull it all together? HP Manufacturing Management II, also known as MMII, is Hewlett-Packard's newly enhanced proprietary software solution.

You're in control. A new advanced version of HP Materials Management, the central module of Manufacturing Management II, gives manufacturers more flexibility and control than ever before. HP Materials Management/Advanced Version (MM/AV), developed in response to user group requests and changing market needs, includes new features such as:

- Backflush by bill or allocation.
- Backflush alternate bill.
- Byproduct planning and recording.
- Selective material requirements planning (MRP).
- Screen level security.
- Optional left/right justification of numeric fields.
- Support of 19.2KByte baud rate for user terminals.

Backflush saves time, guesswork. HP MM/AV's new Backflush feature lets you easily record the actual consumption of raw materials and the production of goods after making a product batch. Backflush works with or without work orders, and gives you a high degree of flexibility in the allocation, release, and issue of materials.

More features, more flexibility. The Backflush Alternate Bill feature lets you specify alternate recipes or ingredients. This is useful in the food industry, for example, where current market price often determines which commodity ingredients are selected. Plus, you can use this feature to record production of items which must be tested or graded before you are certain of the end result.

HP MM/AV also lets you plan for the production of byproducts by defining the byproducts on the bill of material or formula and recording their receipt.

Changes taken in stride. The Selective MRP Planning feature lets you anticipate the impact of changes to orders or requirements by defining a particular group of parts or byproducts.

Easily adapted to your application. HP's proprietary Customizer technology lets you modify MMII modules to fit your unique environment without changing the application source code or jeopardizing ongoing HP support.

HP MM/AV boosts efficiency, quality. Boyd Coffee, an Oregon food-processing company, has eliminated many allocation, release, and issue steps with HP Manufacturing Management II.

"Before we had the HP MM system, it was a manual nightmare," says Doug McKay, Boyd Coffee vice president. "Every transaction was jotted down, calculated, and completed manually. Today, we've absorbed well over 200 percent growth in the company with the same size staff. And we're doing a better job."

Gaining control of manufacturing processes has never been more essential for business survival, given today's increasing competitive pressures. HP's new MMII with Materials Management /Advanced Version could be just the competitive advantage you've been looking for.

Top-of-the-line desktop PC

The most powerful desktop member of the HP Vectra PC family—the new HP Vectra QS/20 personal computer—combines the electronics of the award-winning HP Vectra RS/20 PC* with the HP Vectra PC desktop package.

The HP Vectra QS/20 PC is ideal for complex business applications such as large spreadsheets, databases or presentation graphics, for desktop publishing, and for entry-level CAD/CAE applications. With its 20-MHz 80386 processor, the HP Vectra QS/20 PC has the power to speed through sophisticated personal-computer applications.

Both the hardware and the system software reflect the HP Vectra QS/20 PC's use of state-of-the-art technology.

Proven compatibility. With the HP Vectra QS/20 PC, you can use any of the thousands of applications and accessory cards available for the IBM PC/AT industry-standard architecture. Fully compatible operating systems include MS-DOS 3.3, SCO XENIX, Microsoft OS/2 1.0 Version A, and Microsoft Windows/386.

With its large memory capacity and built-in support for LIM EMS 4.0 expanded memory, the HP Vectra QS/20 PC is a superb platform for MS Windows, MS Excel, and all the feature-rich MS Windows-compatible applications.

When coupled with the HP ScanJet scanner and HP LaserJet Series II printer, the HP Vectra QS/20 provides the engine for a high-throughput desktop publishing solution. And when combined with an HP plotter and HP graphics tablet, the HP Vectra QS/20 PC can boost the productivity of engineering workgroups.

*The HP Vectra RS/20 PC was named "Editor's Choice" in the June 28, 1988 issue of *PC* magazine.

MS-DOS is a U.S. registered trademark of Microsoft Corporation.

With its 20-MHz 80386 processor, the HP Vectra QS/20 PC is ideal for complex business applications, desktop publishing, and entry-level CAD/CAE projects.

New 8-bit scanner offers price/performance breakthrough

The new HP ScanJet Plus scanner gives you improved image quality, easy-to-use software, and a modest price tag.

A high-quality 8-bit flatbed scanner at an affordable price? That's right—introducing Hewlett-Packard's new ScanJet Plus scanner.

The easy-to-use HP ScanJet Plus scanner produces high-quality reproductions of photographs, line art, or illustrations, which can be incorporated into desktop publishing and sophisticated word-processing packages.

In addition to final documents, the HP ScanJet Plus scanner can also be used to develop proofs for professionally printed literature.

The HP ScanJet Plus scanner is designed to offer flexibility and control for the experienced user combined with ease of use for the novice or occasional user.

Providing improved image enhancement, the HP ScanJet Plus scanner gives you 256 levels of grayscale information to let you take full advantage of imaging software applications. You can also sharpen or soften images and compensate for light or dark images with a wide range of contrast and intensity controls.

Output resolution, variable from 12 to 1,500 dots per inch and selectable in one-dot increments, lets you match the high-resolution capabilities of laser printers and phototypesetting equipment.

The HP ScanJet Plus scanner connects to the HP Vectra PC, IBM PC and compatibles, IBM PS/2 systems, and the Macintosh Plus, SE, and II.

■ **HP Europhysics Prize.** Three European scientists who have independently done pioneering research work in heavy fermion metals share the 1989 Hewlett-Packard Europhysics Prize. Honorees are Prof. Frank Steglich of the Technische Hochschule in Darmstadt, West Germany; Dr. Gilbert G. Lonzarich of the University of Cambridge in England; and Hans-Rudolph Ott of Eidgenossisch Technische Hochschule in Zurich, Switzerland. Recipients of the HP Europhysics Prize in 1981, 1984, and 1988 later received the Nobel Prize in physics.

■ **New science centers.** Hewlett-Packard Laboratories will establish three science centers during the next two years. Stanford University will be the site of the first center; research will focus initially on artificial intelligence, database technology, and neural networks. Sites for two other centers in the Pacific Rim and Europe will be chosen later. Faculty and HP scientists, as well as scientists from other corporations affiliated with HP, will work together on projects of mutual interest. All research findings will be made public.

■ **Nikkei Award.** The HP 82000 IC evaluation system from Hewlett-Packard's Böblingen Instrument Division in West Germany is one of 16 items receiving the highest honor—"most excellent"—in Japan's 1988 Nikkei Awards for Creative Excellence in Products and Services. The selection committee chose from among 20,000 new items covered last year in four Nikkei newspapers, which shared sponsorship of the awards. The HP 82000 received its award from Japan's best-known economic newspaper, the Nihon Keizai Shinbun.

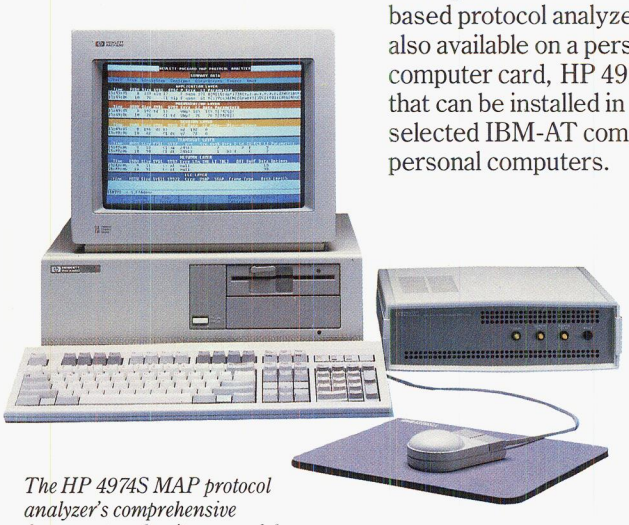
MAP protocol analyzer offers powerful tool for datacom test

The HP 4974S MAP 3.0 protocol analyzer is a powerful solution for MAP developers, managers, and installation and maintenance personnel who need visibility into MAP network communications.

New capabilities. Hewlett-Packard's new MAP protocol analyzer decodes the seven-layer MAP protocol stack. The HP 4974S connects to IEEE 802.4 networks and addresses all layers of the OSI model, formatting data into easy-to-read, high-level information. The HP 4974S provides detail displays from the Logical Link Control through the application layer of the MAP protocol stack. These decodes and displays provide valuable new capabilities to engineers and network managers.

A high-resolution color monitor provides clear displays of protocol information—color-keyed layer by layer for easier reading. And the windowed user interface makes the HP 4974S protocol analyzer easy to learn and use.

PC based. The HP 4974S is a high-level HP Vectra PC-based protocol analyzer. It is also available on a personal-computer card, HP 4974A, that can be installed in selected IBM-AT compatible personal computers.



The HP 4974S MAP protocol analyzer's comprehensive feature set makes it a powerful datacom-test solution.

Business System Plus/XL now available for HP-PA computers

Now you have a complete solution that provides shared HP 3000 resources, information access, information distribution, and personal applications. Business System Plus/XL, Hewlett-Packard's leading LAN-based PC integration offering, integrates personal computers with HP Precision Architecture (HP-PA) computers on MPE XL.

Business System Plus/XL gives you access to some of HP's most popular applications:

- HP DeskManager provides electronic mail communication from local workgroup to worldwide locations.
- AdvanceMail II provides information distribution and messaging from HP Vectra and IBM personal computers.
- Information Access, an information server on the HP 3000, streamlines information gathering and analysis.
- Personal Applications, including Executive MemoMaker, Lotus 1-2-3, Graphics Gallery, AdvanceLink, and Executive Card Manager, are delivered to networked PCs from the HP 3000.
- Resource Sharing offers full PC integration with the HP 3000 and provides access to HP 3000 system shared printers, graphics plotters, and disk drives. Plus, Resource Sharing gives you the capability to back up PC hard disk drives to the HP 3000 tape system automatically.
- Business SystemPlus/XL utilities provide simpler network setup and software distribution.

Business System Plus/XL combines the functionality of its components with the power of HP-PA computing.

To find out more about Hewlett-Packard or its products and services, please call your local Hewlett-Packard sales or service office. Note: Not all HP computer products are sold and supported in all countries.

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