

# Computer Advances

September/October 1986



**SwRI tunes its automotive testing**

**Southwest Research  
Institute has relied  
on HP computers for  
15 years to monitor  
lubricant tests around  
the clock.**

**HP Computer Museum**  
**[www.hpmuseum.net](http://www.hpmuseum.net)**

**For research and education purposes only.**

# Computer-integrated manufacturing: A competitive tool

by Lew Platt

**T**echnology is a tool that manufacturing companies must learn to use more effectively to gain and maintain competitive positions in the world's marketplaces. Manufacturers are finding that they must dramatically improve product quality, plant productivity, and asset management.

In our view, to get these vital improvements, manufacturers need better information about materials and processes, while getting it to the people who need it faster. They need to automate to a greater degree, and to gain better control of their manufacturing processes.

**CIM Realities.** Computer-integrated manufacturing (CIM), particularly in the guise of the "factory of the future," has been touted as salvation for the

manufacturing community and some managers had hoped for a quick fix to their problems. During the past year, however, we've seen a healthy resetting of expectations. The lack of vigorous growth in manufacturing in many countries, some disenchantment with return on investment on computer expenditures, and problems with hardware, software, and network compatibility have had a sobering effect on the growth of CIM.

The factory of the future still beckons from around the corner, but manufacturers are now more pragmatic.

The fundamental driving forces behind CIM have not changed. It is still the primary tool to gain manufacturing competitiveness.

Managers today view CIM as one vital piece of a total strategic or tactical

plan. Few companies have achieved total factory automation, but many are benefiting from the programs already undertaken. We've heard many success stories—including some startling ones here at HP—that make it easier for us to recommend CIM as a solution in good faith.

We see a solid, continuing demand for CIM and its benefits as more companies begin new programs every day. Our idea of CIM has always been to plan with an eye to future cohesiveness and to implement the plan step by step. This approach promises a long-range payout for manufacturers. Islands of automation that will eventually be linked into larger systems are the basic blocks of today's CIM installation.

**HP supplies integrated manufacturing solutions.** Hewlett-Packard got into the computer and desktop calculator business in the late 1960s with products designed for scientific and engineering applications—at the time, the bread and butter of the company's test-and-measurement instrumentation business.


The HP computing product line has since broadened to include other business areas, while the ties between the company's computers and instruments have become ever stronger. HP has grown into a major manufac-

turer itself, with a deep understanding of the needs of manufacturers of all kinds and an unsurpassed understanding of and commitment to quality.

HP currently supplies products and services that address four major areas of the CIM spectrum: manufacturing resources planning, area management and work-cell control, manufacturing process monitoring and control, and automated test equipment. Other HP products address engineering automation, as well as management and control systems that link the factory floor and the front office.

The company supplies computers, peripherals, workstations, instrumentation, and applications software, all linkable by industry-standard networks. HP has supported the Manufacturing Automation Protocol (MAP) since its inception in 1980, and is developing standard products that will use MAP.

HP works regularly with third-party software developers, systems integrators, and other value-added resellers—the people intimately familiar with your industry who will deliver the bulk of CIM solutions.

**It works.** As we've seen, then, CIM really does work. Vendors and customers alike have developed a more fundamental approach to its implementation. It remains the most effective tool in a manufacturer's competitive kit. And HP is equipped to bring you the most effective solutions to your factory automation problems. 

Lew Platt  
Senior Vice President  
Manufacturing, Medical and  
Analytical Sector  
Hewlett-Packard Company



# Jet Propulsion Lab: Powered by information



various electronic mail systems," Zadeh admits.

The problem stemmed from the variety of computer terminals spread throughout the organization. Project teams work independently at JPL. While certain guidelines must be followed, each team can evaluate available computer equipment and make its own buying decision. In order for an electronic mail system to fit JPL's needs, it had to be accessible from the organization's diverse collection of terminals and personal computers. And it had to be compatible with JPL's com-

panywide local-area network, which incorporates an IBM 3038, three UNIVAC 1100s, and a general-purpose DEC VAX system.

"Most of the systems we looked at just didn't meet our requirements," says Zadeh, "because they could only be accessed through specific kinds of terminals. When we finally saw the HP 3000 and HP DeskManager demonstrated, we knew we had our answer." Because the HP system could be accessed from all of the organization's different devices, JPL was spared the expense of buying thousands of new terminals.

**Streamlining communications.** Using HP DeskManager, JPL workers can create messages, then edit and distribute them — worldwide, if necessary. They can receive, file, forward, reply to, or track mail once it's enroute. The system also offers basic word processing, a time management feature designed to replace pocket diaries or calendars, and an electronic "filing cabinet" used to file messages.

"This system has all the features we need, and it's got a proven track record, which is important to us," says Zadeh. "Before we committed to the equipment, we spoke with a number of HP customers, and we came away convinced that this was the best choice we could have made.

"Electronic mail communications among various NASA centers around the country have benefited the entire organization," Zadeh concludes. "In the time that we've had the HP system, we've seen a significant improvement in the way we communicate information among various groups. When we compare this to the way things were done before, we see substantial benefits. We've all gotten the proof first hand."

**F**or the more than 5,000 employees of Jet Propulsion Laboratory (JPL), success depends on sharing information and communicating ideas — quickly. To ensure rapid, effective communications throughout the organization, JPL recently installed a highly flexible electronic mail system based on the HP 3000 Series 68 business computer with HP DeskManager software.

JPL, which has been involved in rocket research since 1936, kicked off the American space age in 1958 with the launching of Explorer I, the first US satellite. Funded through NASA and administered through the California Institute of Technology, JPL has remained at the forefront of space exploration: the Ranger and Surveyor lunar missions; the Mariner missions to Mars, Venus, and Mercury; the Viking mission to Mars; and the exploration of Jupiter and Saturn by Voyagers 1 and 2.

"What we do here is so far reaching and so multifaceted," says Janet Zadeh, JPL's manager of office system development, "it's really imperative that all of the various groups communicate clearly with one another. If they don't, our work is seriously affected. People here are spread out in different locations and, on top of that, the nature of the work we do is such that people tend to work strange hours and are away from their desks a lot."

**Adaptable system saves time and money.** In 1980, JPL studied various ways to improve overall communications within the organization and subsequently tested a pilot electronic mail system. "Having the pilot system made us realize how valuable a tool like electronic mail could be to our work, but we ran into a bit of difficulty when we started evaluating

# SwRI tunes its automotive testing

*A major division of Southwest Research Institute has enhanced its engines, fuels, and lubricants testing programs with a network of HP computers. They provide round-the-clock reliability and make it possible to perform tests that couldn't be done any other way.*

**F**ifteen years ago, when the flood of data generated in the course of testing engines, fuels, and lubricants was becoming too much to log and analyze by hand, Southwest Research Institute (SwRI) turned to Hewlett-Packard for help.

SwRI was one of the first independent testing laboratories to try automation and has remained in the forefront of computerized testing, according to John Seifert, manager of data systems for SwRI's Engines, Fuels, and Lubricants Division. "These HP systems help us keep our competitive edge," he claims. "Surprisingly, some companies still use hand-logging methods because some standard tests may only call for a minimum of data collection and reduction."

SwRI is an independent, not-for-profit, applied-engineering research organiza-

tion, founded in 1947. Its more than 2,000 employees are involved in research and development for industry, business, and the U.S. government.

One of ten major operating units of SwRI, the Engines, Fuels and Lubricants Division (Division 08) runs tests, evaluates product performance, and conducts development programs for refiners of fuels and lubricants; and for automobile, truck, and boat engines, drive trains, tires, and components. One arm of Division 08 designs and builds lubricant

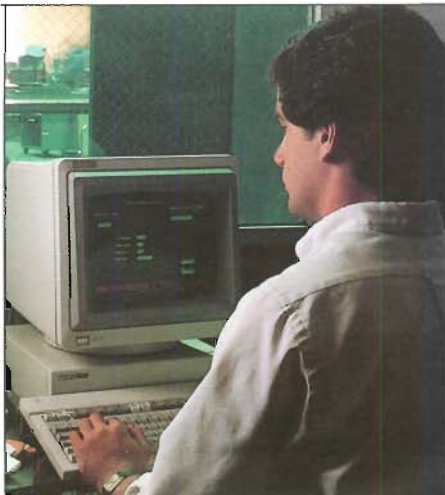
test installations for use by other research labs throughout the world, and often recommends HP computers to these customers.

Since its initial investment in one of Hewlett-Packard's first HP 1000 computers, over the years the division has acquired eight more HP computer systems and a total of 13 HP Touchscreen and Vectra personal computers.

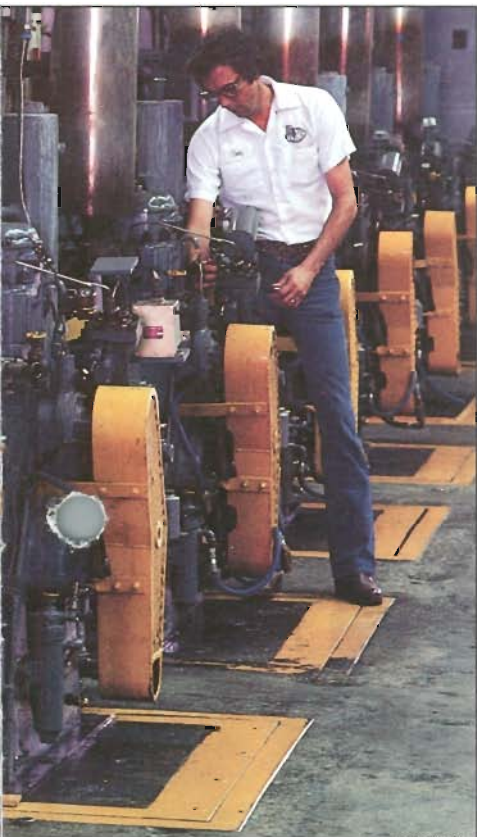
**Reliability.** Why HP? "We originally picked the HP system," Seifert says, "because we felt that it was the only com-



HP computers collect data on fuels or lubricants from a number of engines on dynamometer test stands.



HP real-time computers have the power and flexibility to collect up-to-the-second information on a number of processes.



plete system with a real-time executive operating system and hardware and software that could do what we needed. HP's background in test and measurement instrumentation was a definite plus. It helped that their sales engineers understood what we were trying to do with the computer.

"We've continued to add HP equipment to our network because it does the job for us," Seifert adds. "The reliability of the equipment is impressive. Our computers are expected to operate 24 hours

a day, seven days a week, with only a two-day shut down over Christmas and some preventive maintenance time. They just keep running for us. In fact the first machine we installed is still going."

**Versatility.** Of this division's eleven computerized operations, spread over seven buildings, six are tied directly to Division 08's central computer system (an HP 1000) through high-speed HP data communications or distributed systems network communications lines. Those not directly connected often supply data on disk or magnetic tape or through modems.

"The central computer system (CCS)," Seifert says, "is used to generate final reports, acquire and store data generated at the remote systems, and to produce plots and graphics for analysis and reporting. It also handles word processing tasks."


Division 08's computer roster includes six systems devoted to data acquisition and alarm functions, one that serves the petroleum chemistry lab, and one for software development. All but one are HP 1000 computers. Two HP Touchscreen personal computers in a separate facility in San Angelo, Texas, handle tire wear testing duties. As tests are completed, one of the computers automatically dials the CCS and forwards its information for later processing and analysis.

The other HP personal computers are used for administrative tasks in various departments.

**Productivity.** "A data acquisition system typically is linked to a number of stands on which gasoline or diesel engines are used as test beds for the evaluation of fuels or lubricants," Seifert says. SwRI started with five dynamometer test stands in 1949, and to accommodate growth, now has more than 200 in operation. "A computer may not only control the performance of the engine during testing, by changing speed or other operating conditions when necessary," Seifert continues, "it may also be responsible for monitoring hundreds of channels of information simultaneously and logging millions of pieces of data in the course of each test.

"The computers also must be powerful enough to reduce the data into meaningful reports," Seifert says. Each SwRI test must meet or exceed industry- or customer-specified standards for reliability and reproducibility.

"These computers have enabled us to increase the quality of our tests and to gather data that we couldn't get any other way. If you really want to know what's happening in a test, you have to use computers. Humans just cannot take measurements fast enough or with enough accuracy to satisfy the needs of our sponsors."

"Over the years, we've continued to add Hewlett-Packard products—computers, multi-programmers, analog/digital converters, multiplexers, disk drives, and other peripherals—because the products have done the job for us," Seifert concludes. "HP has strong local support, and that has been important, too. We contract with them to do all our hardware maintenance." 



# HP Project Services: Creating custom solutions

*HP Project Services provide the link between Hewlett-Packard's standard products and your particular business needs.*

**T**o get the most out of your computer or electronic instrument investment, your system should reflect the unique needs of your business. Whether you are automating a manufacturing assembly line, an accounting system, a test-and-measurement system, or an office environment, HP Project Services can help you design and implement a complete, integrated custom solution.

**Manage your business while HP manages your custom system solution.** When you purchase HP Project Services, HP takes on the role of prime contractor and project manager to ensure that all of the components of your custom solution are appropriately developed, delivered, implemented, and supported. We take responsibility for the success of the solution from the planning stage to on-going support—which means you can manage your business while HP manages your system implementation.

HP Project Services are a flexible combination of highly effective methodologies for project analysis, design, development, implementation, and management. These services are delivered and managed by experienced HP professionals who develop a close working relationship with your project team. To better understand how HP Project Services can help you, look at some of the components of a typical custom solution project:

**Requirements definition.** So that you know exactly what your solution requires, HP's experts use structured analysis techniques to develop specific requirements definitions, functional specifications, and proposals.

**Software design and development.** HP uses structured design methodology to meet your needs for custom software development. Depending upon your requirements, HP will either create entirely new software for your application, modify your existing software for enhanced performance, or write interfaces between software packages or systems.

**Project management.** HP has developed a project-management methodology specially designed to meet the needs of custom solution projects. HP project managers establish ambitious and attainable implementation objectives and timetables, then manage HP resources in order to meet these objectives in a timely and cost-effective manner. Our project-management services can include the management of all third parties involved.

**Custom training.** HP works with you to develop custom training plans for your staff. We can blend elements of our excellent standard education programs with custom-designed training materials adapted to your particular system.



**Working partnership.** Hewlett-Packard is committed to providing you with integrated solutions by tailoring the best combination of HP resources and third-party expertise to serve your needs.

**Custom support planning.** As an important part of HP Project Services, all of HP's standard hardware and software support programs will be individually tailored to ensure the long-term productivity of your HP-developed solution.

**Partnership for productivity.** During the development and implementation of your system solution, we work hard to understand your organization, objectives, and business requirements. Together with your expertise and knowledge of your particular business needs, HP's products, project-management skills, and system-implementation experience enable us to create a quality custom solution for you.

HP Project Services are available from HP's Application Project Centers in more than 30 locations worldwide. For more information, contact your local HP sales representative.

07

## QuietJet Plus Printer offers quiet, quality printing

The new QuietJet Plus Printer is designed for business professionals who need a quiet, high-quality, wide-carriage printer for word processing, graphics, and spreadsheets. The printer, which works with most computers and software, prints quietly enough to allow you to carry on a conversation on the telephone.



With its wide carriage, the QuietJet Plus handles spreadsheets in addition to word processing and graphics tasks.

Print quality—near letter-quality, draft, or compressed printing—can be selected easily from the front panel. Six different print pitches, underlining, boldface printing, subscripts, and superscripts let you emphasize and clarify. Graphics capability in three resolutions is standard. As you need to expand, memory can be added to accommodate other fonts or custom character sets.

The wide carriage accepts cut sheets or continuous-feed paper up to 15 inches wide. And the combination print-head/ink cartridge is a disposable plastic reservoir of ink that allows for clean, easy replacement.

## New jobshop system can boost productivity and lower costs



Using JOBSCOPE, specialized manufacturers can optimize their use of equipment and employee resources to control costs and ultimately, improve customer service.

HP 3000/JOBSCOPE is an integrated manufacturing management system for engineer- and manufacture-to-order companies. It enables specialized manufacturers to optimize their use of equipment and people—lowering costs and improving customer service.

With JOBSCOPE, you have greater control over the manufacturing process. Bill-of-materials cataloging and standard routings are simplified. Employee data, personnel planning, production management, and labor analysis are readily available. Inventory can be managed by serial, lot, and order number, as well as by raw material and finished products. And you can do progress billing and estimate profit margins by job before completion of an order.

In addition to the standard features offered by this fully integrated manufacturing and financial software package,

JOBSCOPE offers many extras. For example, it offers on-line help for accessing documentation. And it can handle multiple plants, locations, and companies.

## New calculator offers an easier way to solve business problems

The new HP Business Consultant Professional Calculator is the first in a new line of calculators capable of solving specialized equations without programming.

The Business Consultant is ideal for business professionals who need to answer problems fast. It uses softkeys and built-in menus to make business problem solving easy.

A group of built-in functions, which include finance,

general business, summing and number lists, statistics, mathematics, and time and appointments, can help solve routine business problems.

But the Business Consultant provides more than commonly used solutions. A formula solver enables you to solve your own problems defined as ordinary equations. Using the formula solver, specialized equations can be created for individual applications.

A "Consultant Series" of application booklets provides you with solutions for marketing, manufacturing, small business, real estate, banking, personal investment, direct sales, and finance.

The HP Business Consultant offers new advances in ease of use while providing customized solutions for individual applications.



The Business Consultant Professional Calculator introduces a whole new way of calculating business solutions. In addition to softkeys and built-in menus for solving standard problems, it enables you to state and save specialized formulas in your own words.



■ **X/OPEN Group.** Hewlett-Packard has been accepted for membership in the X/OPEN Group, an international organization whose principal aim is to promote portability of computer programs. It was formed in late 1984 by major suppliers of computer systems seeking shared standards so customers can use their software investment across a broad, multi-vendor environment. Other members of X/OPEN include Digital Equipment Corporation, Sperry, Olivetti, Bull, Ericsson, Nixdorf, Phillips, and Siemens.

■ **Ford MAP.** HP's contributions to the Ford Motor Company's installation of Manufacturing Automation Protocol (MAP) standards, a computer-to-computer communication specification, include: MAP Application Interface Package Software; and Programmable Controller Interface (PCIF) MAP handler and MAP Gateway Software. These HP software packages give Ford and American Cimflex programmers easy access to factory-floor data over the MAP network for applications programs such as statistical process control, production reporting, and toolset usage tracking.

■ **Industrial Vectra.** The new Vectra Industrial PC, a ruggedized, rackmountable version of the HP Vectra personal computer is especially designed for use in harsh manufacturing environments. Compatible with the IBM PC/AT, HP's industrially hardened personal computer is intended for factory floor applications such as an intelligent operator interface where the PC could process graphics, perform statistical quality control, and support programmable devices; it can also be used as a dedicated equipment controller and a management workstation.

## Improve your presentations and reports with Graphics Gallery

Graphics Gallery software for the HP Vectra and IBM personal computers lets you produce professional-quality graphics for business presentations and reports. Bold, full-color presentations help your audience understand your message and remember your conclusions.

Graphics Gallery software includes Charting Gallery and Drawing Gallery. You can create a pie or bar chart, add a special font and border, and make a full-color overhead transparency with an HP plotter. Lotus® 1-2-3® worksheet graphs can be easily transferred directly into

## Low-priced plotter for personal-computer-aided design

The HP DraftPro, a new eight-pen plotter for personal-computer-aided design, provides plotter reliability for designers in small architectural and engineering firms and educational institutions. The plotter creates high-quality, easy-to-produce, multicolor drawings on architectural and engineering size paper and film.

Both first-time and experienced plotter users can produce technical drawings with DraftPro, a personal computer, and any of the widely used CAD software packages. The DraftPro is compatible with most personal computers including the IBM PC, HP Vectra PC, and Apple Macintosh. It is supported by CAD packages like AutoCAD®, Anvil 1000MD®, and VersaCAD®.

With its pen-sorting feature, the DraftPro plotter can draw a full buffer of vectors for one color before proceeding to another color. This reduces plot time by minimizing the number of pen changes.

An eight-pen carousel that holds and automatically caps

pens also saves you time. And the plotter has a simple paper-loading procedure and front-panel controls that can be mastered in minutes.



HP's new low-cost plotter produces high-quality drawings for budget-minded architectural and engineering firms.

*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.*

AutoCAD® is a registered trademark of Autodesk, Inc.  
Anvil 1000MD® is a registered trademark of MCS, Inc.  
VersaCAD® is a registered trademark of T & W Systems, Inc.

Lotus® and 1-2-3® are U.S. trademarks of Lotus Development Corporation.



Graphics Gallery software makes it easy to produce professional-quality graphics.

Advanced graphics techniques are used in Graphics Gallery. For example, bold character fonts make the text look practically typeset. In addition to cross-hatch patterns for plotters, it even creates patterned shades of grey for black-and-white printers and photocopiers.

Charting Gallery. Or you can use Drawing Gallery by itself to create graphics like text charts, organization charts, and process-flow diagrams. And any graphics you produce can be merged with HP Executive MemoMaker documents.