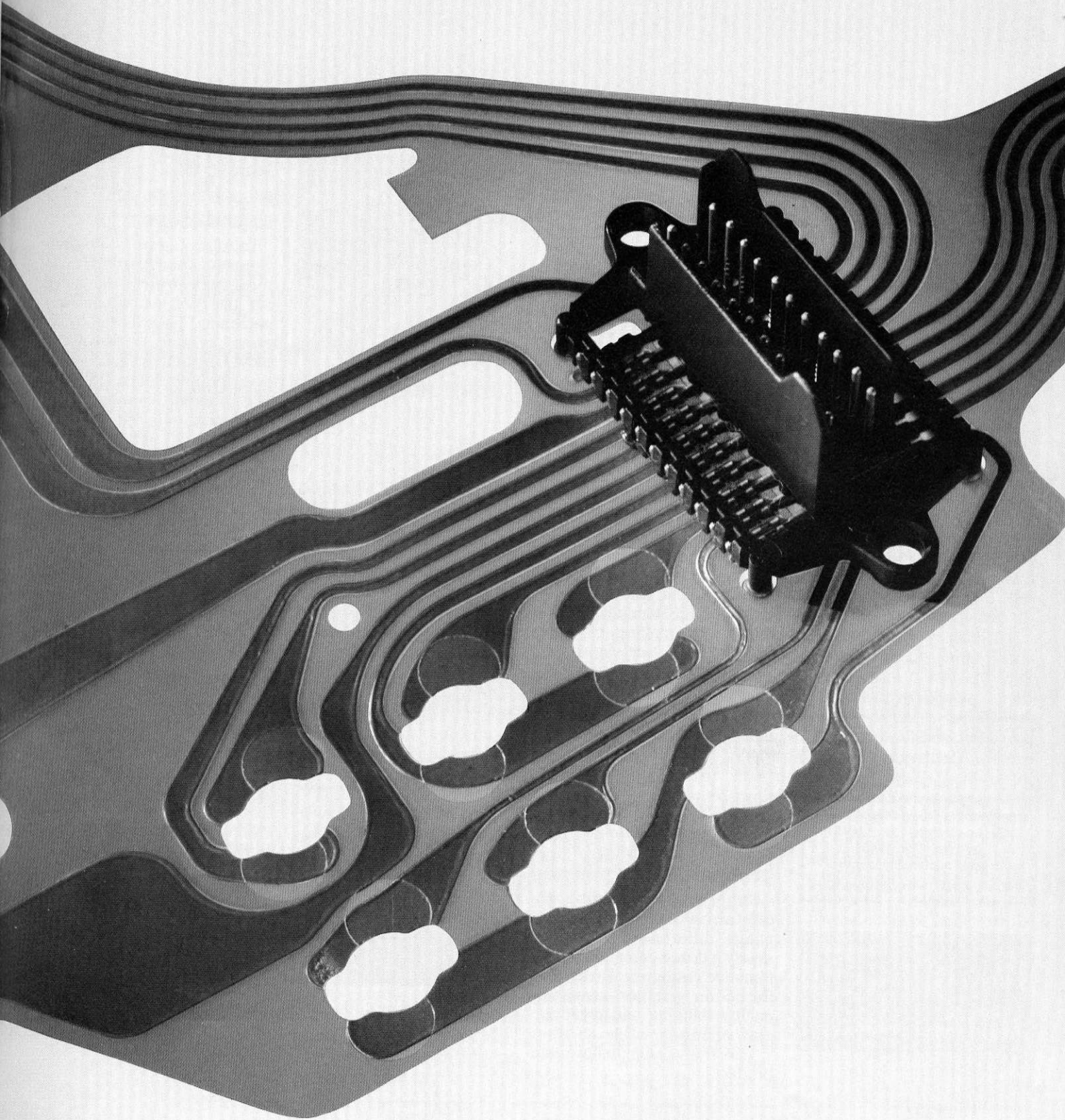
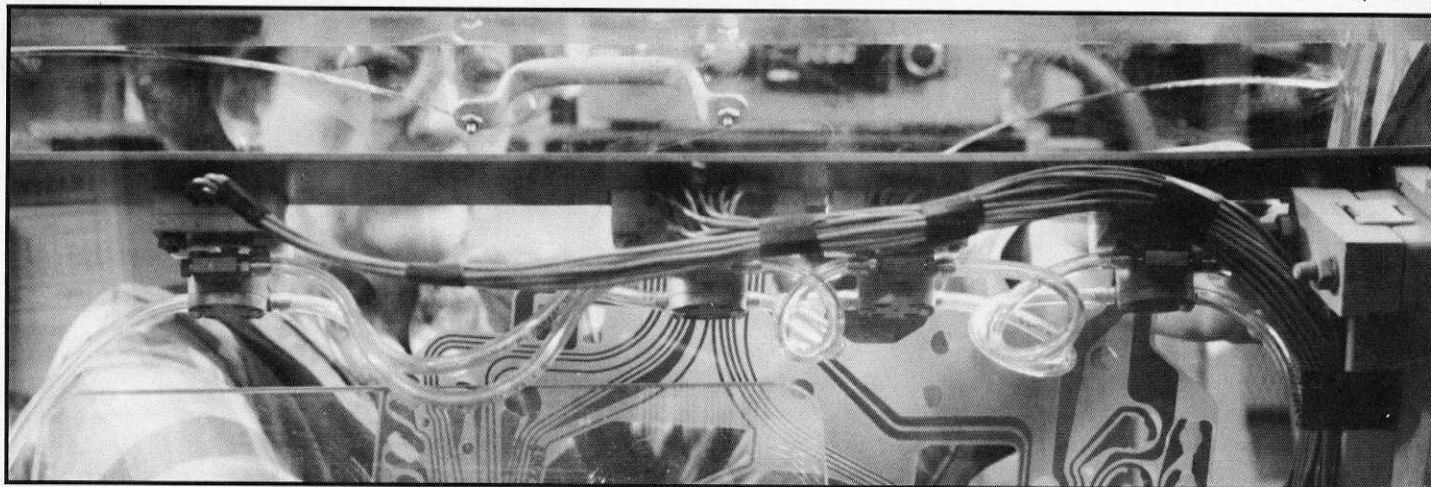


# CABLEGRAM

PACKARD ELECTRIC





**On the cover:** This flexible printed circuit with a 22-way header connector is part of a Buick Somerset (N-car). The printed circuit is assembled in Dept. 336.

Cover photo by Richard Clapp,  
Richard Clapp Photographic, Inc.

## Survival of the fittest

4

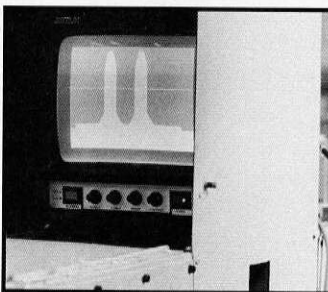
Packard has the lion's share of the North American market for instrument panel flexible printed circuits. With competitors nipping at the division's heels, Packard will have to prove its expertise is more than an empty roar. Superior technology, experience and design can help the division survive in the competitive jungle.



## Packard looks to the future

6

Being the best means going that extra mile. Machine vision can help Packard go the distance by making certain only top quality parts leave its doors.



## Making a second language second nature

8

Packard Electric's Mexican Operations want Spanish to be more than a second language for the U.S. technical assist personnel. They want it to become second nature. Employees are taking advantage of a variety of language instruction programs to gain fluency in Spanish.

## Coming back from the brink

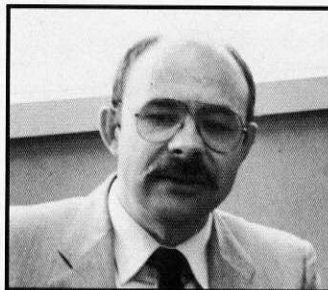
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Through its business with New United Motor, Packard has learned a lot about pleasing the customer — and pleasing itself. Bill Wehmer, Packard's director of Reliability and Quality Control, and Bill Collins, manager of Sales and Marketing, discuss how the division proved its worth to one of its toughest customers.

## It's totally tubular

12

Packard-Brookhaven's new pneumatic tube system is helping reduce downtime for cutter operators with the push of a button. With the carrier dispatching order cards and parts at speeds equivalent to 238 miles per hour, Brookhaven is looking at future applications for the system.



## In any language, "der Kunde ist immer noch Koenig" (the customer is the boss)

8

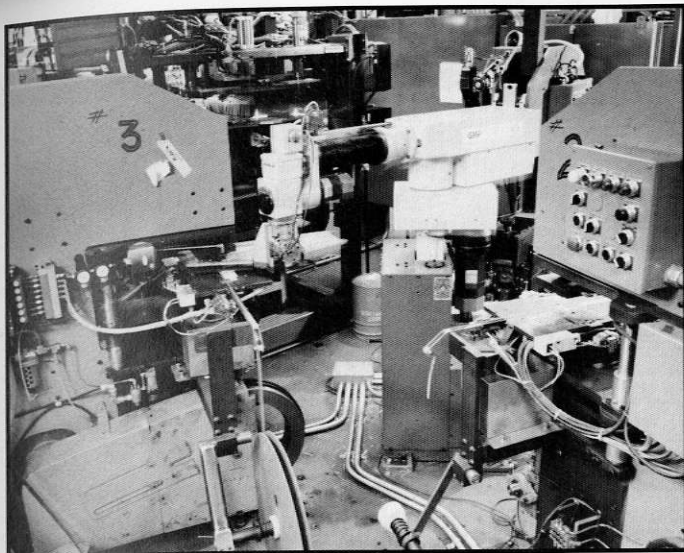
Kabelwerke Reinshagen cuts across cultural and language differences to serve nearly a dozen demanding automotive customers. Packard's European partner stresses quality thinking and creative engineering to satisfy its customers from design to finished product.

### Packard Electric Cablegram

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A robotic operation (above) attaches components to a flexible printed circuit. In the photo at right, Marian Shea (left), Dept. 336, Dianne Keller (center) production foreman, and Jan Nobles, Dept. 336, check the alignment of pins to the copper on an S-truck flexible printed circuit.

## Calling the Shots

### The restructuring of the Printed Circuits area shows the division means business

When Dan Lazor was appointed business manager of Packard Electric's Printed Circuit operation, he became more than the administrative head of the area. He also became, he cheerfully admits, a team member, coach and head cheerleader for the group.

In September, the Printed Circuits area will officially be designated Plant 4, with its physical location remaining inside Plant 3. This organizational restructuring means the Printed Circuits area will be run as its own business — with one eye trained on the bottom line, according to Lazor.

"It's my job to determine how competitive we are in the flexible printed circuit marketplace," he said. "We're operating as a business within a business. We call the shots, and we take the heat."

When the reorganization began this spring, Lazor made streamlining the organization one of his top priorities. They accomplished this by consolidating certain job functions and utilizing people to do more with less.

Decisions which used to take days are now made in minutes, as the new streamlined structure hurdles red tape

and points people to the right sources of information. From the customer's standpoint, the organization resolves their problems more quickly because one person takes responsibility for them.

"Now that people know about our organizational structure, they find it's easier to get what they need," Lazor pointed out. "If something goes wrong, I usually get the phone call. I can then contact the right people to help solve the problem. Everyone here is as accountable as I am."

Currently the Printed Circuit organization is setting direction and revamping procedures. Now that they have put a management structure in place, they will be depending more heavily on the area's hourly employees. Lazor said these employees will help determine what practices and policies need to change in order to reduce costs and remain competitive.

Employee involvement and participation groups will provide crucial feedback necessary for success. That success will not materialize until some longstanding practices are exchanged for more competitive ones, and em-

ployees realize the organization depends on each of them.

"We have a unique opportunity to experiment with business concepts and designs to see what works best," Lazor said. "We all have a stake in this business. Everyone needs to know and understand the challenges we face."

To help meet this challenge Lazor has decided to place a resident engineer with the customer. Having an engineer at the customer's facility will enhance immediate feedback on current production problems, and will provide opportunity for Packard to be involved in simultaneous engineering with the customer on future design concepts.

With other firms bidding for Packard Electric's GM business, the division must find the best way to satisfy the customer. The success or failure of the effort will be based on the division's quality performance, product costs and on-time delivery.

"As a business manager I can focus all the pieces of the organization to tackle any problems," Lazor said. "That's the only way to really satisfy the customer."



photo: Reilly

*In the competitive jungle of the North American automotive flexible printed circuit market, it's*

## **Survival of the fittest**



Wilma Heater, emboss operator, Dept. 334, strips excess copper from the mylar substrate.

"When push comes to shove, we want to be ready," said Dan Lazor, business manager, Printed Circuits.

Firms which manufacture instrument panel flexible printed circuits have been jostling each other for market share in North America. The shoving began during the past year, according to Packard Electric's Detroit Sales organization.

Packard currently has a majority of the North American automotive market for flexible printed circuits, however increasing pressure relating to costs, quality and technology could leave the division hard-pressed to maintain that share without making significant changes.

AC Spark Plug has been Packard Electric's biggest customer for flexible printed circuits. The business unit containing AC's instrument cluster operations was recently reorganized into the Delco Electronics Corporation subsidiary of General Motors-Hughes Electronics.

"The business is attractive to us because we have quite a bit of experience in producing printed circuits, and we can continue to do so while making significant improvements along the way," said Lazor. "Also we're looking at different applications for our printed circuit technology."

### **The competitive picture**

Top competitors for the North American automotive flexible printed circuit business include Sheldahl, Nippondenso, Pressac and GTI. Sheldahl has the next largest market share, with Ford and Texas Instruments as its major customers.

Nippondenso supplies primarily Japanese automakers. Pressac sells its products to Ford, Chrysler, Vauxhall and British Leyland. Pressac will also be supplying flexible printed circuits to AC Spark Plug for the GM-25 program for the 1987 model year. GTI's customers include Chrysler and Ford.

With the exception of Nippondenso, most of these competitors are smaller operations with lower costs. In many cases this gives them a cost advantage over Packard Electric, although technology and quality advantages vary depending on what method is used to manufacture the printed circuits.

"We use the die cut or stamp



method to make our circuits," Lazor said. "The others, with the exception of Pressac, use an etch process."

With the die cut method a press stamps copper onto a mylar substrate. The copper laminate is used to carry the electric signal to its destination in the car. The mylar substrate allows the circuit to be flexible so that it can fit easily behind the dashboard.

With the etch process a resistant material is applied to certain areas on a piece of copper foil. A chemical is then used to "eat away" the unwanted copper, leaving only the copper coated with the resistant material. This is a more expensive process but etching is able to create smaller circuits with finer lines.

#### **Hardboard vs flexible circuits**

Some vehicles don't use flexible printed circuits at all — they may use hardboard circuits, or a combination of the two. The decision of which type of circuit to use depends on the styling of the car, the amount of room behind the instrument panel cluster and the amount of current intended for electrical transmission. Certain new electronic designs require integrated circuits which can't be economically mounted to the flexible printed circuit.

"It's a technology issue," Lazor explained. "What kind of printed circuit a car needs depends on what kind of electrical content the car has, among other things. We're only competing for the flexible printed circuit business."

He went on to note, "We're competitive on price with the etch houses on basic circuits, but not with all the die cut houses."

#### **CAD/CAM**

Use of Computer Aided Design/Computer Aided Manufacture (CAD/CAM) gives Packard Electric an edge in the design of flexible printed circuits. A superior design can provide a price advantage, as it can result in a lower cost circuit.

"We receive a lot of business due to our designs," Lazor said. "CAD/CAM allows us to respond quickly to any changes, and we can easily compare new designs to old ones. Once we have the part design in the computer, CAD/CAM can also design our tooling requirements."

Even a superior design system will

not allay the competitive threat, however. For example, even as cars are further downsized, their electrical content will continue to grow. This challenges producers to make ever-smaller circuits for use behind the dash.

Use of the die cut process places limitations on Packard Electric that competitors using the etch process don't have. The division is currently investigating a process which may create finer lines on the printed circuit using the die cut process. The die cut process is best for low-cost, high-volume production.

#### **Fighting for business**

"Until last year AC Spark had not challenged us competitively in the flexible printed circuit business," said Bill Fisher, account manager, Detroit Sales staff. "However, mounting pressure on AC Spark to reduce the price of their cluster required them to take a second look at the sourcing of cluster-related components. Our circuits fall in this category. As a result, AC Spark began asking for competitive quotes from other suppliers."

Pressac has succeeded in gaining the flexible printed circuit business for the GM-25 program for the 1987 model year.

Currently, the demand to reduce product cost while at the same time generating new, innovative circuit designs has created a fiercely competitive environment. Manufacturers of flexible printed circuits sense an opportunity to penetrate the automotive market segment and are aggressively pursuing it.

"We've responded to our customer's need for downsizing to the extent we could, in-house," explained Scott Yoder, coordinator, Wire and Cable Strategic Business Unit. "We've also utilized technology at Reinshagen and GTI to supply some of the smaller circuits."

#### **Future challenges**

Future challenges include accommodating the growth of the car's electrical content, reducing scrap, controlling costs and coping with the possible loss of business due to GM's eroding share of the U.S. car market.

"We've got an obligation to do our share to reduce the cost disadvantage of the car divisions against their Japanese competitors," Yoder said. "We can only do that by being competitive ourselves."

## **Competitor Profile**

### **SHELDAHL**

- 1985 sales totaled \$59.4 million, approximately 37 percent over 1984 sales figures
- Major customer: Ford Motor Co.
- Headquartered in Northfield, Minnesota
- Has manufacturing locations in Northfield, Minn., and Irvine, Calif.

Sheldahl produces electronic components, flexible printed circuits, circuit boards and switches, together making up 90 percent of its business. Its customers include communications, photographic and computer firms, in addition to the automotive industry.

Sheldahl, the largest independent producer of these circuits, began manufacturing flexible printed circuits in 1963, utilizing the etch process.

One strength of the firm is its production of circuit materials, making it vertically-integrated. Sheldahl also has a broad market base, with broad product and process capabilities for hardboard and flexible circuits.

High cost and high price are Sheldahl's competitive disadvantages. They plan to concentrate on the military market segment, and to continue aggressive product and process development.

Ford recently gave Sheldahl a quality rating that allows the firm to ship its product directly to the assembly floor. Sheldahl uses Statistical Process Control (SPC) and Computer Aided Design with its manufacturing processes.

# Machine Vision:

**by Patti Reilly**

Suppose you were sorting black pingpong balls from white ones as they were being produced. How accurate do you think your sorting would be? Ninety-nine percent or better?

Wrong.

According to a University of Iowa study, the average person will successfully sort only 87 out of every 100 pingpong balls. Add a second sorter and that figure will rise to 95 percent.

At Packard Electric, a 95 percent-correct visual inspection system isn't good enough. Not when operators must look at thousands of parts on a daily basis.

That's why Packard has introduced the use of automated visual inspection systems to help boost operator inspection accuracy. It also relieves operators of looking for defects which are now appearing less and less frequently.

## **Needle in a haystack**

"As our quality becomes better and better, the defect becomes rarer and rarer," pointed out Jack Sill, superintendent, Manufacturing Development. "Practically speaking, this lessens the operator's chances of finding these defects. It's like looking for a needle in a haystack. Machine vision helps the operator by calling attention to deviations in the process, so the operator can then make a correction."

On a basic level, a working machine vision unit requires a camera, a light source and an information processor. The system uses the light source to view the image and send information about it to the processor for analysis. On the basis of this information, some machines can automatically regulate the process. Others require an operator's assistance.

Controlled lighting allows the system to obtain the desired information by providing backlighting for a silhouette, frontlighting for feature analysis, or

structured lighting for high-precision applications, according to Sill.

## **Future needs**

"Machine vision systems give us data which allows us to learn more about our processes," he explained. "Our engineers are now researching Packard's future needs for machine vision. They are also looking at additional areas of development in terms of lighting, lensing and optical processing."

Continued development is paramount in order to achieve full utilization of the emerging technology. For example, advanced optical systems are being developed which can make calculations in microseconds. Advanced optical processing operates at a speed that currently could only be duplicated by a much larger computer system costing \$100,000 or more. Through continued development Packard Electric has the opportunity to maximize the benefits of these new technologies at a significantly lower cost.

"The level of technology we're working with is equal to the most advanced 'Star Wars' technology in our defense system," said George Mansfield, superintendent, Quality Control, formerly in Manufacturing Development. "A system that works at the speed of light will allow us to apply vision systems to processes that we otherwise could not have considered because the calculations were too cumbersome."

Industry has seen rapid growth in machine vision technology. Coupled with falling costs, these systems may have a great impact on Packard Electric's manufacturing operations. A machine vision unit costs approximately 25 percent of what it did only two years ago, and takes up only 25 percent as much space.

The division undertook its first machine vision project in the Printed Circuits area in 1983. General Motors



# Packard looks to the future

Technical Center built a custom system for Packard, with installation completed in 1984. This served as the foundation for the division's introduction into machine vision on a larger scale.

"We've been applying machine vision technology as the need for machine vision systems arises," explained Mansfield. "These applications became more feasible with falling costs and the need to achieve world-class quality."

## More applications

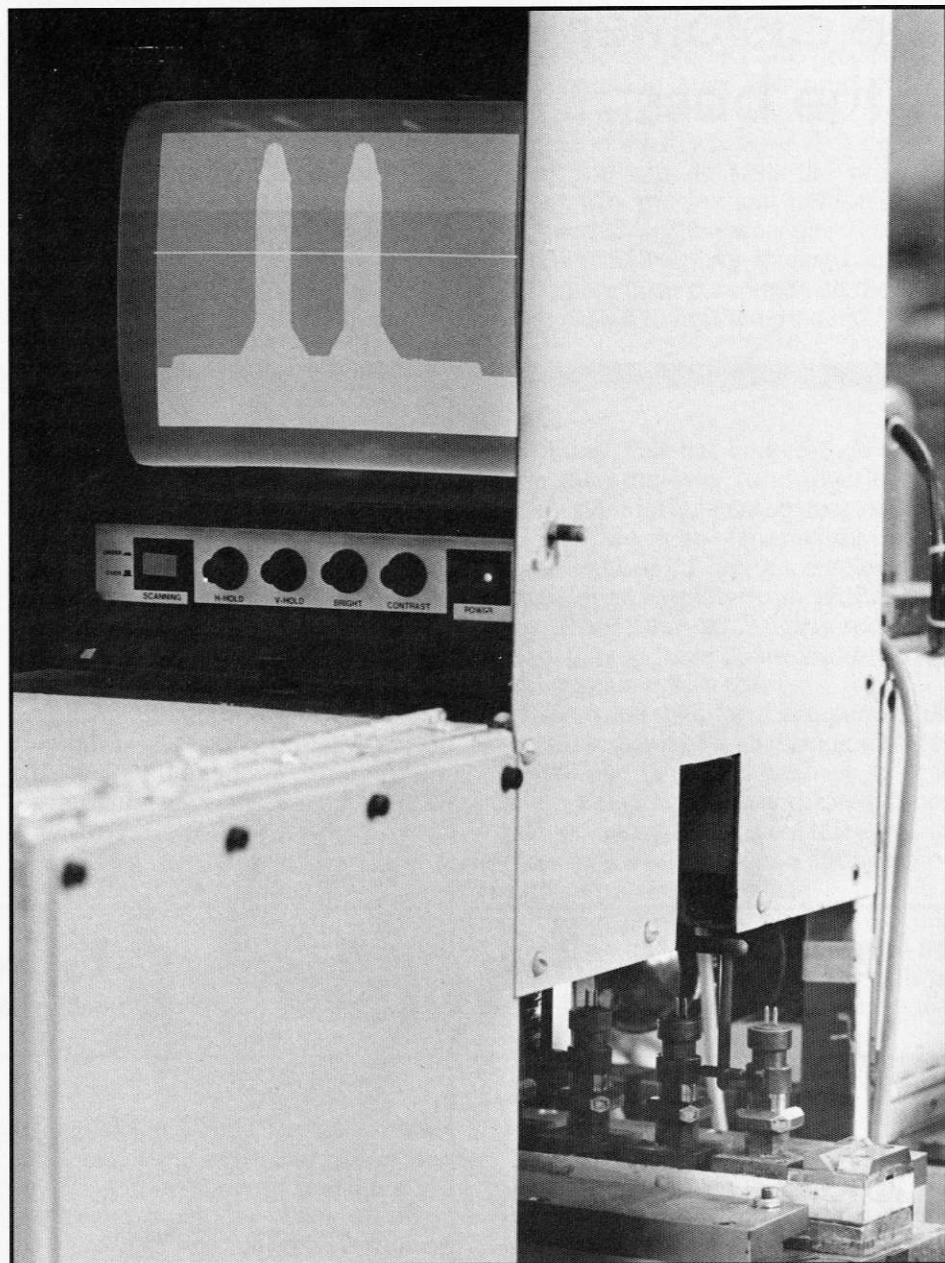
GM intends to accelerate the implementation of machine vision technologies throughout the corporation. Packard Electric has successfully installed machine vision systems in areas such as Printed Circuits, Component Assembly, Brookhaven Cutter Bank, Pull-to-Seat, Automated Insert Molding and the Clinton Common Sense module.

The division expects to expand applications in cutting, component assembly and component make areas. While the use of machine vision depends on the number of engineers who understand and have worked with machine vision systems, there are more and more engineers throughout the division who are gaining experience with this technology. Packard is by no means lagging behind the rest of General Motors' divisions.

"We're a lead division in the application of machine vision technology," said Sill. "We have hundreds of units either on order or installed. We rank second in the corporation in the application of vision technology to our processes."

## A GM investment

GM indicated its feeling about the future importance of machine vision technology when it acquired minority interest in five machine vision firms in 1984. Packard Electric is active in a corporate group studying the uses of machine vision and other artificial intelligence systems. Machine vision



Packard Electric uses machine vision systems to assist operators in finding defective parts. As defects become rarer, machine vision plays an increasingly important role in making sure the customer receives only good parts.

companies are using information provided by this group to determine what GM will need in its next generation of machine vision products.

"It's an emerging technology," Sill concluded. "As more and more people become familiar with it here at Packard Electric, the more it will evolve."

In any language, "der Kunde ist immer noch Koenig" — the customer is the boss

by Michael Hissam

Kabelwerke Reinshagen's engineering group faces multiple challenges in its quest for customer satisfaction. Packard's European subsidiary deals with nearly a dozen auto producers in about a half dozen languages and cultures. National pride — a tradition — is ever present.

Dr. Ulrich Konzelmann, Reinshagen's director of engineering, knows customers want more than just wiring harnesses. "They're demanding increasingly complex electronic systems, along with state-of-the-art connector products and applications."

Each customer has his own philosophy of how the vehicle should be designed, built and perform in Europe's highly-competitive, multi-national market. Technology is ever advancing; it doesn't recognize territorial or cultural boundaries.

Forces associated with engineering and manufacturing create new chal-

lenges; coordination of process and product achieves success.

Achieving customer satisfaction, Dr. Konzelmann professed, depends on a coordinated effort in product design and manufacturing process. It is also a function of mutual understanding of the limitations manufacturing processes can place on the product.

"My main goal," he declared, "is the design of products that have a very high quality standard. I want each of the engineering people at Reinshagen to be involved in quality thinking. This thinking is not only in design — the first step in quality — but also in manufacturing. It promotes simultaneous product and process development."

Partnership with the customer is critical. "We can offer a wide range of technology; our engineering capability at Reinshagen is very high with very creative people. We want to work with the customer to be a part of their total system."

Six weeks in a Spanish-speaking town in Mexico's interior. Living with a Mexican family. Speaking Spanish by day. Dreaming in Spanish by night. Absorbing Mexican culture in a way no textbook could duplicate.

This is the "Puebla Experience." It is one method used by the Mexican Operations to greatly increase an individual's knowledge and use of Spanish on the job.

"We have a commitment to the whole area of effective communications," said Jeff Kimpan, Personnel di-

The University of Texas at El Paso recently assessed the proficiency levels of Spanish in the written and spoken word of U.S. technical personnel. This has helped the division determine what level of instruction its people need, and what programs and training could best accomplish that.

"Learning and operating in a different language is not easy," Kimpan explained. "We've recently tested ourselves and refocused our instruction."

Serene Bartoletti, manager, Organi-

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# Saying it in Spanish

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Making a second language second nature

rector, Mexican Operations. "We expect all our U.S. personnel to use Spanish in the performance of their jobs. In addition, some of our key Mexican personnel have learned English in order to talk to their customers and suppliers."

The division has encouraged use of the Spanish language since it opened its first Mexican facility in 1979. Its language instruction program has grown, reflecting the expansion of the division's operations in Mexico.

zation Development, Education and Training, Mexican Operations, coordinates the instruction in both English and Spanish. Bartoletti administers programs including one-on-one classroom instruction, small group instruction, or intensive programs such as the Puebla Experience, where the employee is "adopted" by a Mexican family for six weeks. Bartoletti estimates that it generally takes 200 hours of instruction before an individual can communicate in the new language.



Increased use of computer-aided design (CAD) will support Reinshagen's design efforts. "We're looking toward CAD for more than just drawings. We see computers as important for modeling and simulation. Packard engineering has been doing this," he noted.

### Seeking opportunity

More recently, Reinshagen's engineering people have been exploring business and technological opportunities with Hughes Aircraft in Scotland. Dr. Jack Olin, Packard's director of Advanced Engineering, established the contact between Reinshagen and Hughes.

Dr. Konzelmann explained, "Hughes has become interested in our etched flexible printed circuit capability and special connector systems. In our early discussions this year, we learned that both of us have a high degree of expertise in connector technology. Hughes has very sophisticated, reliable connector systems. Packard and Reinshagen produce connectors

as a mass product — but also reliable. Hughes is interested in more reliable high volume production and high pin density connectors. We're interested in learning about Hughes' more sophisticated connector technology.

*"My main goal is the design of products that have a very high quality standard."*  
—Konzelmann



photo: Kearney

"We've only scratched the surface on what we can do together."

### Customers as partners

Reinshagen's design efforts must be harmonious with the direction of the customer's systems. "We don't like to override the customers. We want to be partners with them. It is desirable for

the customer to develop a system that allows our input. We want to coordinate our technological development with the customer's technological advancement, and engineer our sub-systems into the total vehicle."

Pointing to the longer term, Dr. Konzelmann sees additional potential in fiber optics-based data transmission, an area where Packard and Reinshagen have worked closely together.

"But in dealing with the future in any product direction, Reinshagen and Packard have to press for stronger product and process coordination in advanced technology to the point of simultaneous product and process development. In more and more cases, process parameters drive product parameters; it's the process that defines what you can do with the product. That's why process and product must be headed in the same direction. It's also why Reinshagen, Packard and the customers must coordinate all the way from design to finished product."

U.S. personnel can also learn Spanish by participating in a three to six week "immersion" program held in Cincinnati, Ohio. Participants experience complete immersion in Spanish, with one-on-one instruction in the classroom. Spanish is the only language spoken by participant and instructor throughout the program. If a student doesn't know how to say "pass the butter" in Spanish, then that stu-

dent's bread will go unbuttered until he or she learns it.

"We've had pretty good results with the program," Kimpan noted. "Being forced to speak nothing but Spanish removes the intimidation factor rather quickly."

According to Kimpan, other firms establishing operations in Mexico have made the mistake of hiring only bilingual Mexican workers for salaried

positions. This has limited their selection of employees, and overlooked many superiorly talented people.

The Mexican Operations have never refused to hire an employee because of an inability to speak English. It's crucial for its English-speaking managers to learn Spanish in order to communicate with them.

"Knowing their language permits us a greater depth of understanding of the people and the issues we have to deal with," he added. "It has opened doors that we couldn't have gone through any other way. It also makes a strong statement about why we're here."

Use of Spanish has prevented some problems, and has greatly speeded up the solving of others. The division is well-respected for its emphasis on using the language of its employees.

Kimpan added, "The Mexican people are very supportive and patient with us."

English-speaking employees who have taken Spanish in high school or elsewhere are at an advantage when trying to learn the language for everyday use. Becoming proficient does require a high degree of individual commitment, because work schedules sometimes interrupt regular instruction.

"We're striving to be a bilingual operation," Kimpan concluded. "That is essential here."

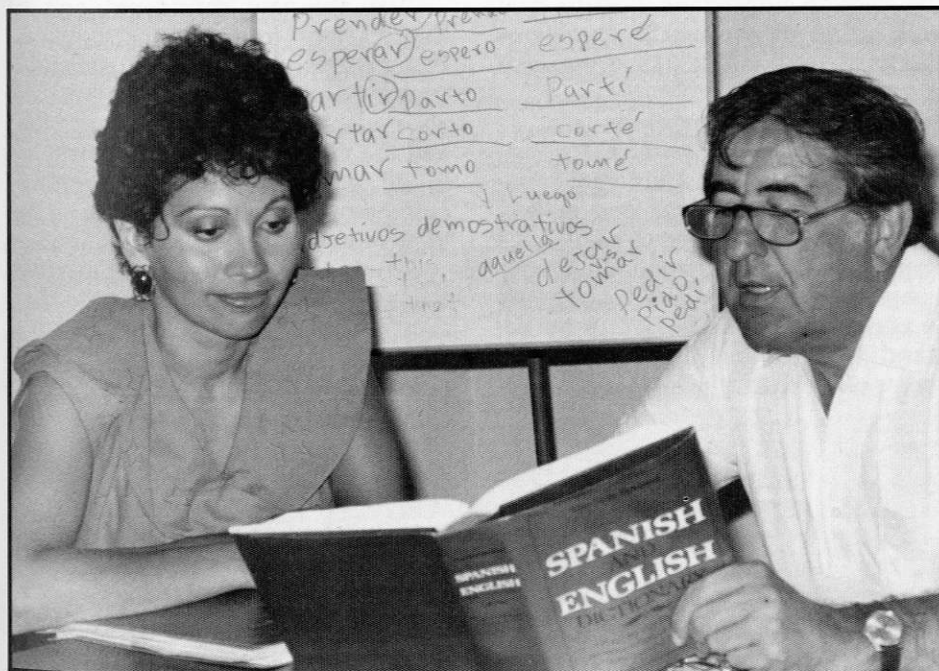


photo: courtesy Mexican Operations

Hilda Delgado reviews conjugations of Spanish verbs with Jim Santilli.

# Coming back from the brink

*(Editor's note: This story is a follow-up to a series of stories in the last edition of the Cablegram on the supplier/customer relationship between Packard Electric and New United Motor Manufacturing, Inc.)*

Packard Electric has always considered itself a good supplier. When New United Motor Manufacturing, Inc. expressed dissatisfaction with the division last year, the division moved swiftly to turn things around.

"The Japanese have set some new global quality standards," said Bill Wehmer, Packard Electric's director of Reliability and Quality Control. "As their supplier, we have to meet their expectations. They want every part to print, and they mean it."

Packard's struggle to meet the requirements of the GM-Toyota joint venture in Fremont, Calif., has not been easy. In fact, New United Motor at first regarded Packard as a supplier in need of much improvement.

To respond to their concern, the division assigned a full-time Cooperative Involvement engineer — Pete Longiotti — to the plant. That resulted in better identification of which problems were Packard's and which were New United Motor's. It was the first step toward finding solutions. It also helped the division understand how to deal with some of the quality problems Packard had with its Japanese component suppliers.

## **Getting the details**

"Assigning a Cooperative Involvement engineer was instrumental in improving communications and getting us the details we needed to turn things around," Wehmer explained. "Pete Longiotti determined the root causes of our problems and helped us understand New United Motor's requirements and expectations."

Packard also sent a group of engineers to the plant to perform a Product Evaluation Program (PEP) study. This group studied the division's product as it related to their processes.

In addition, Packard Electric and New United Motor employees exchanged visits between Juarez, Mex., and Fremont, Calif. New United Motor workers saw how operators assemble the wiring harness; Packard workers saw what problems their employees encountered when installing Packard's product in the car.

"These examples demonstrate our attitude toward improvement," he said. "Our people have discussed quality and design problems with New United Motor's people, and problems were assigned to 'owners' who take responsibility for finding a solution. That's how communication improves and problems are solved."

Initially, the division focused on improving quality in the product it builds for the joint venture. That emphasis has shifted to encompass cost reduction as well. Following the Japanese 'Kaizen' or constant improvement motto, the division is now seeking continuous quality and cost improvements.

## **A positive signal**

"We are now considered one of New United Motor's better suppliers. Being a supplier to the GM-Toyota joint venture is important because it means we understand the Japanese system and are able to apply that knowledge to all of our customers," Wehmer pointed out. "It sends a positive signal to all our customers."

Meeting New United Motor's expectations on quality has helped the division reduce the cost of its products, according to Bill Collins, Packard Electric's manager of Sales and Mark-

# Packard proves itself as a



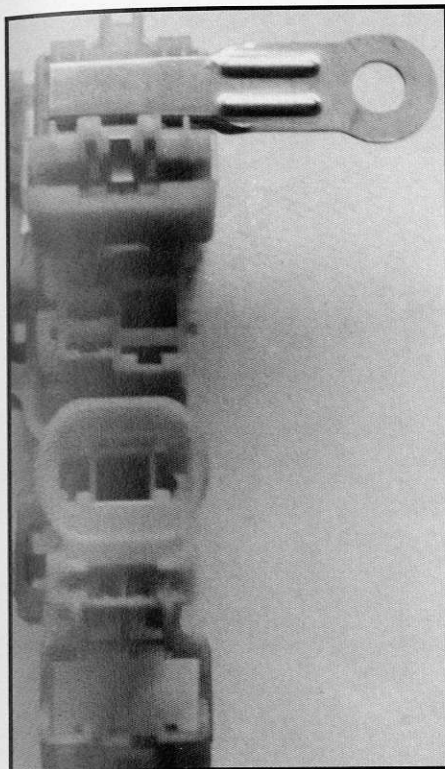


photo: Kearney

Application Engineering has submitted a design proposal suggesting the Japanese-designed injector connector (left) be replaced with a Reinshagen-designed injector connector with crimp-on seals. (design proposal below) The proposal would improve quality and serviceability, and reduce piece costs and labor.

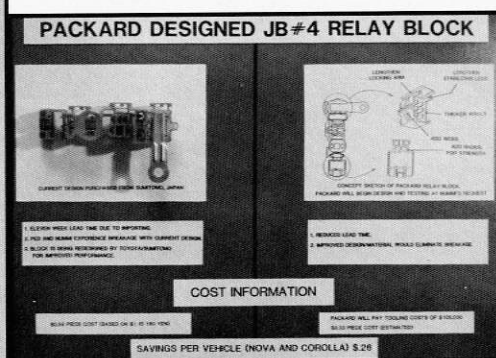


photo: courtesy Application Engineering

eting. Making the part the way the customer wants it the first time has proven less costly than having to scrap or rework defective parts.

Collins emphasized that quality has always been the most important issue. While cost is important, it remains an academic question unless quality exists first.

"Now that we've proven to New United Motor and ourselves that we can meet our customer's expectations on quality, we have to show we can do it on a sustained basis," Collins pointed out. "The emphasis is still on quality, although we are continuing to fine-tune our costs."

### Trimming costs

One cost saving consideration is to minimize or even eliminate the use of destructive tests to test leads. If the division must destroy a finished cut lead to determine a good product, then unnecessary scrap or waste is generated. Rio Bravo IV is investigating the use of non-destructive tests which can do the job as well.

The division is also trimming costs by making improvements in the areas of support, shipping and packaging. Non-allied Application Engineering has been working on several design proposals which will cut costs.

For example, the division has pro-

posed automated splice taping using Japanese tape, which is modeled after a Japanese manufacturing technique, according to Carol Wardrop, Application Engineering. Another proposal involves the elimination of the fan jumper assembly by incorporating it into the engine main wiring assembly.

"The Japanese demand and expect to receive continual cost reductions from their suppliers, with no loss in quality. In fact, quality should also improve," Collins noted. "To them, 'the customer is king,' represents more than words. We've learned to tailor our management style to the customer through working with New United Motor."

Packard Electric has been awarded the wiring business for the 1987 "FX" Toyota vehicle. The division gained that business without submitting a formal quote. According to Collins, when the division inquired as to who else was under consideration for the business, New United Motor's Purchasing Department replied, in effect: "There is no need for quotes. You are our supplier."

The division is working to gain additional component and cable content relating to existing wiring packages it provides for New United Motor. It is a painstaking process because each part must go through extensive approvals.

"We had the opportunity to start out fresh with them. We're finding that it isn't as easy as we expected. They allow no compromises," Collins said. "We struggled to meet their expectations at first — now we're succeeding. We're only beginning to apply what we've learned in this relationship to our relationships with other customers, but we will do it."

# supplier to New United Motor

# It's totally tubular

## Packard-Brookhaven's new pneumatic tube system is helping reduce downtime for cutter operators with the push of a button

by Danny Greene,  
*Personnel,  
Mississippi Operations*

Cutter operators at Packard-Brookhaven are reducing downtime by using a pneumatic tube to order and receive die parts.

Previously, LAT and LFT cutter operators used to walk to the expense crib to get crimp plates, anvils and other parts. Now parts are ordered and sent through 5½-inch diameter PCV pipes that run from the expense crib to three stations in Plant 23.

Operators in Instrument Panel or Forward Lamp Manufacturing areas and personnel in Tool Repair can order parts from the expense crib by filling out an order card and sending it to the crib. A crib attendant fills the order, places the parts in a cannister and sends the materials speeding through vacuum lines at 35 feet per second, according to Chris Duda, formerly general supervisor, Process Engineering and Maintenance.

"The system uses the same principle that moves pneumatic carriers at bank drive-through stations," said Duda, now superintendent of Manufacturing Engineering for the Clinton oper-

ation. "At the push of a button, two blowers go into operation. The first removes air from the tube to reduce resistance, and the second blows the cannister to its destination.

Auburn University co-op student David Krause designed the system at Duda's request. Duda said Brookhaven installed the system at a cost of \$14,000, but that it will save them approximately \$22,000 a year.

"The carrier can dispatch order cards and parts at speeds equivalent to 238 miles per hour — much faster than a person walking could do it," Duda pointed out. "We're also considering other uses for the pneumatic tube system."

Reports regularly sent from the manufacturing floor to external offices could be sent through the pipes, for example. They may also use the tubes to order cable from the cable store.

"Anything that can fit inside the cannister can be sent," Duda said. "We're going to be looking at even more possibilities in the future!"

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