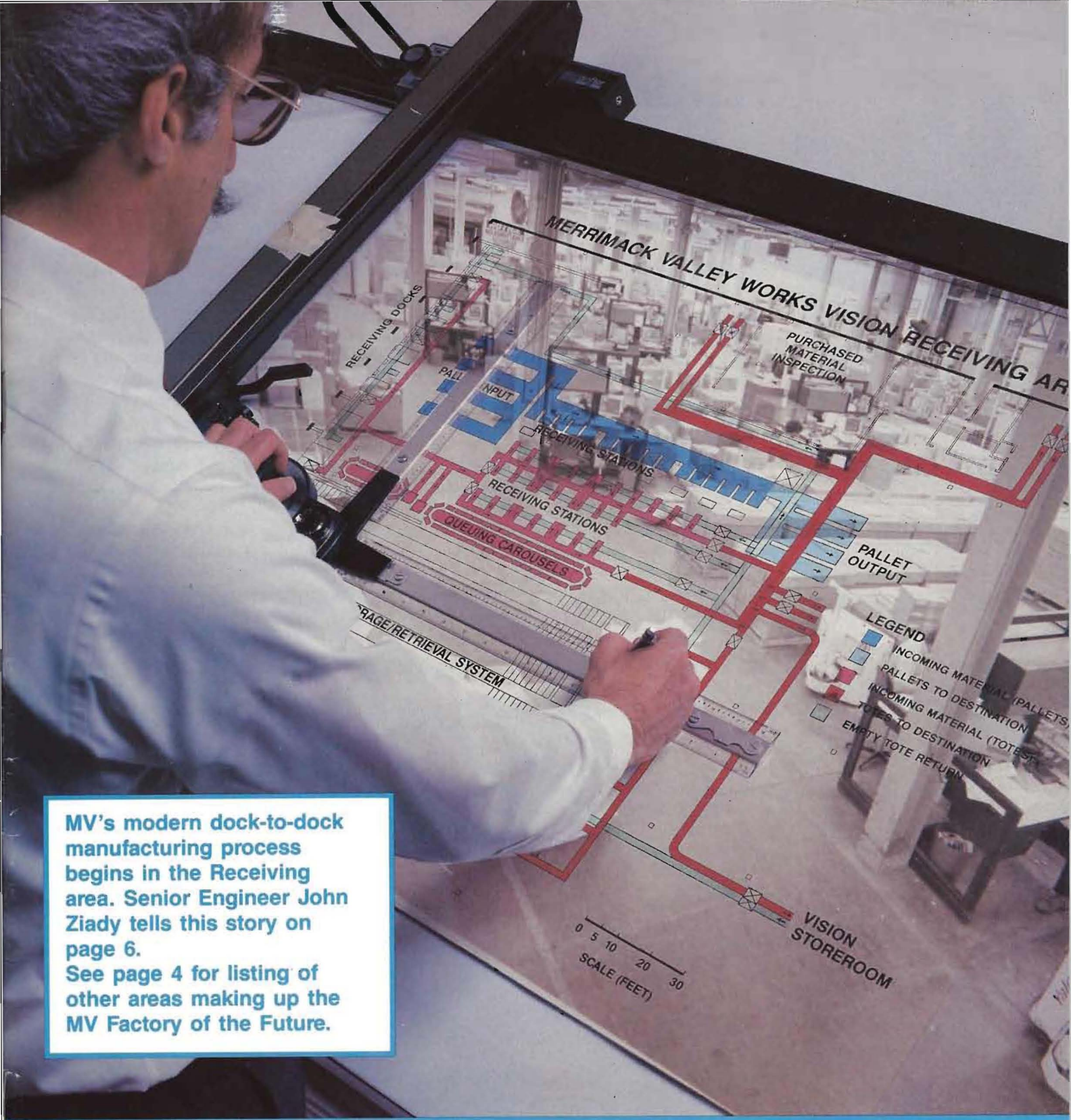


MV's modern dock-to-dock manufacturing process begins in the Receiving area. Senior Engineer John Ziady tells this story on page 6.
See page 4 for listing of other areas making up the MV Factory of the Future.

AT&T

Valley Voice

July 1988 — SPECIAL ISSUE — VISION

VISION . . . World Class

. . . taking a closer look

Allan E. (Al) Dugan
Manufacturing
Vice President
Merrimack Valley

VISION . . . WORLD CLASS . . . words we hear a lot about. Do we really understand their meanings?

VISION is Merrimack Valley — every employee — working together as a team to produce products of the very highest quality, on time, and at a cost that allows for a profit. The leader of the Merrimack Valley team is the manufacturing vice president.

VISION is the equipment factory, under the leadership of Jim Styring, director of engineering — equipment, and Ray DeMatteo, director of resource planning and manufacturing.

VISION is the components factory, under the leadership of Alan Moline, director of engineering & manufacture — components.

But most of all, VISION is each and every one of us doing our jobs every day with pride and accomplishment.

World Class — that should be an easier word to define. Is it simply the best? How about better than the best? That sounds nice but is grammatically impossible. Why don't we say World Class is a great feeling. The feeling of knowing that MV makes telecommunications equipment needed for all sorts of individuals, businesses and governments to communicate words, pictures, data. The great feeling of knowing that MV cares about its employees. The great feeling of

J. W. (Jim) Styring
Director of
Engineering —
Equipment

Employees listen attentively as Jack Heck explains the VISION process. The occasion was a ribbon-cutting ceremony held April 1 to commemorate the beginning of the VISION line.

Roger Cullifford

knowing that MV has a leadership team committed to steering this great company in the proper direction so that it remains competitive in today's rapidly changing marketplace.

Maybe that's where we can connect VISION and World Class. We all know that any company is in business for the sole purpose of making money, both now and in the future. We all know that you can't make money if your prices are higher than and your product isn't better than your competitor's. We all know that MV has a *lot* of competitors eager to redirect a marketshare to their own companies.

So to be a World Class factory and experience the feeling of being a winner, we must understand the VISION and how this VISION is making Merrimack Valley World Class.

And that is what this special *Valley Voice* issue is all about — explaining VISION and how it is making Merrimack Valley a World Class factory.

Let's get down to the very basics and take a good look at VISION.

What is it? Where is it? What does it look like? What will it do? What will it change? What will it do to MY job? What will it do for MY company? Who are the team leaders? Who are the team players? What can I do?

Let's start with the team leaders.

Jack Heck, former MV manufacturing vice president, had been leading MV towards VISION since his arrival in August of 1985. When Jack left on July 1, 1988, to accept an international assignment, Al Dugan took over as manufacturing vice president of Merrimack Valley. Al indicates that he is impressed with the direction the current management team has provided Merrimack Valley and that he will continue working towards realization of the Factory of the Future.

In the late fall of 1985, a department was set up to outline the early vision of the Factory of the Future. Greg Hughes, now manufacturing vice president of the Richmond Works, worked with a team of over 150 people from Merrimack Valley and other AT&T locations to detail a roadmap of action items for building the foundation of the Factory of the Future. In July of 1987 the *Valley Voice* published a special issue containing reprints of VISION articles appearing throughout those early planning stages.

When Greg left in July of 1987 to become the leader of the Richmond Works, Jim Styring left his post as director of division staff, Network Systems Division, Southgate, to take over as director of engineering at MV.

Under Jim's able leadership the VISION project has moved from the planning to the implementation stage smoothly and with renewed enthusiasm.

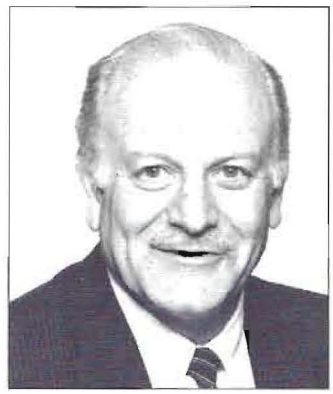
Ray DeMatteo joined the Equipment Factory staff in February of 1988 as director of resource planning and manufacturing. Ray is directly responsible for getting the right material to the factory, on time, and manufacturing our transmission equipment products for our customers.

Merrimack Valley is both an equipment factory and a components factory, an operation that produces the finest transmission and switching components in the world.

The components factory, under the leadership of Alan Moline, is an integral part of the overall MV operation.

We are one AT&T. We are one Merrimack Valley.

We are witnessing the implementation of the Factory of the Future — today. ■



R. E. (Ray) DeMatteo Director of Resource Planning and Manufacturing

R. A. (Alan) Moline Director, Engineering & Manufacture — Components

J. A. (Jack) Heck Former Manufacturing Vice President

July 1988
Special Issue
VALLEY VOICE

A publication for active and retired AT&T Network Systems and AT&T Bell Laboratories employees of Merrimack Valley
1600 Osgood Street
North Andover, MA 01845

Allan E. (Al) Dugan
Manufacturing Vice President

Valley Voice office
(617) 681-2302
Editorial staff:
Irene Dumas, x2377
Dianne Coppola, x3553
Photography:
Roger Culliford, x2597

On the cover ...

John Ziady, a senior engineer in the receiving/stores/kitting area, sees the Merrimack Valley VISION of the Future reflected in a drafting table. Cover photo and all additional photos by Roger Culliford.

What's inside

. . . Merrimack Valley's VISION at a glance

Quality Architecture

. . . building a proper foundation

Editor's note: Before we can begin the story of dock-to-dock manufacturing processes now in place at Merrimack Valley, we really should take one more look at the philosophy known as Quality Architecture.

Back issues of the Valley Voice *are filled with references to Quality Architecture as we tried to keep you informed about what Quality Architecture would do. Now it is time to report that some of the things you were told were* ***going*** *to happen actually* ***have*** *happened. The results are in — Quality Architecture has provided a sound foundation upon which to build Merrimack Valley's Factory of the Future.*

Teamwork makes the difference. As you turn the pages of this Valley Voice *you will see the results of this teamwork in reports of improved processes throughout the dock-to-dock manufacturing plan, beginning with material coming from the outside world through the rceiving organization and ending with product packed and shipped to customers, all under the watchful eye of the customer service organization. Then, only with the total satisfaction of our customers can the Factory of the Future story properly end.*

FROM QUALITY ENGINEERING'S point of view, the Quality Architecture is the best thing to happen in the history of Merrimack Valley. No longer is it acceptable to point fingers when finding a quality problem.

Basically, Quality Architecture as a philosophy looked at the manufacturing processes and saw each process as an individual event, simultaneously receiving a product from an earlier process (being a customer) and supplying a product to another later process (being a supplier).

In order to improve the quality of the finished product that actually is shipped out the door to a traditional (paying) customer, every single process from beginning to end must be analyzed and improved. Processes are organized into "cells." with each cell having as its goal the improvement of its product to its customer. Teams of people are being asked to do this seemingly monumental task. However, these teams are comprised of people already working the different processes — people like you and me. Together with engineers, supervisors and managers, ***we*** discuss what we see on our jobs, both in the shops and in the offices, and ***we*** conclude that we can do things better and faster.

Eleven teams of experts consisting of engineers, supervisors, process checkers and other shop personnel have been assembled to manage cell operations and continuously improve our processes. Upstream (supplier) cells are in place to receive feedback information from other cells experiencing quality problems that have been passed along. Line and executive teams exist to assist cell teams having difficulty resolving issues beyond their control.

For realization of the Factory of the Future, this disciplined approach to problem solving couldn't have occurred at a more opportune time. In fact, in order to performing process capability studies the Vision Line's process controls have been designed around the Quality Architecture format in order to take full advantage of the cell team structure.

Quality Architecture cells were identified and staffed in the following areas: dispatching, serialization, surface mount, through-hole auto insertion, hand assembly, wave solder, shear/connector/assembly/solder/clean, miscellaneous assembly, in-circuit test, functional test, and systems test.

The cell team involvement is invaluable since every member has the experience and knowledge to solve problems quickly.

Teamwork will not end with the initial capability studies. The process will be repeated — because continuous process improvement is never-ending. ■

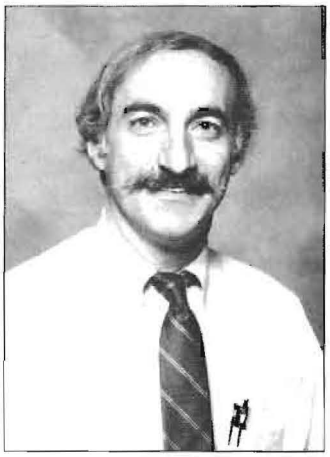
Contributing author:

Dale Bates
Quality Control Engineer

Receiving

. . . where the VISION process begins

Contributing author:



John Ziady
Senior Engineer
Receiving/Stores/
Kitting

BOXES — LARGE, SMALL — MV gets them all. The timely delivery of incoming material is the focus of the 29 employees working in the receiving organization. How do they handle the more than 5,000 daily pieces of incoming material — material ranging from a tiny envelope to a 50-foot soldering machine?

The receiving organization functions under the control of the MOVES-RC (Materials Operation Velocity System - Receiving). This computerized system, developed by Bell Laboratories in Columbus, works in conjunction with the Corporate receiving system. The system allows incoming material to move quickly through the receival process, with the receiving operator entering "first stage" information into the computer. A system generated, barcoded receival label is immediately applied to the incoming carton, which can now be transported to its destination without delay.

After a carton is identified with the barcoded label and placed into a barcoded tote, the tote is placed on an outflow conveyor spur. When the tote reaches a decision point along the conveyor, a scanner reads the totes barcode, asks MOVES-RC what the next destination is and activates a diverter which routes the tote to that location. The feedback loop is closed when MTS reports the current receival location and a receival carrier ID back to MOVES-RC.

It is the responsibility of the receiving organization to deliver incoming material to the storerooms, test set construction areas, three floors of the office building, plus the trailers, chemical storage areas, and Bell Laboratories. The MOVES-RC system easily controls all this movement and tracks the status of incoming material.

. . . storeroom updated to keep pace with VISION

The timely selection of proper materials to support manufacturing at MV is the focus of the 177 storeroom employees.

The MOVES-RC barcoded cartons of material arrive at the appropriate aisle of the mini-load Automatic Storage/Receival System (AS/RS) or to the VISION store/kitting area. Other material destined for pallet or conventional shelf storage is transported by automatic guided vehicle or standard forklift truck.

Along the overhead conveyor to the AS/RS, sensors scan the barcode on the tote, diverting it to one of the six mini-load aisles, and then notifies the Kenway Control System of the part to be stored. The system retrieves the appropriate bin for material storage.

When the material planning system has a requirement for material, it performs a material check to ascertain the availability of the parts needed by the shop. The requirements, which could be for an entire shift's parts, are then downloaded into the storeroom operating system. The Kenway System instructs the storage/retrieval cranes to retrieve those bins containing the required parts. The material is selected and packaged individually for each job requiring that part. The packages are placed on a material handling device for transport to a sort station, where an operator sorts the picks into "jobs" with the help of barcode scanners and lights identifying the proper "job tote."

After a quality check, the totes are consolidated by job and destination on pallets. Automated guided vehicles then deliver the material to the manufacturing shops.

The receiving and storeroom areas are the beginnings of the VISION process, two of the many facets of Merrimack Valley focused through Quality Architecture and leading to the Factory of the Future — today. ■

Facility network cable management system

. . . *providing flexibility to the factory*

MV'S VISION CIRCUIT PACK assembly and test process has the first fully prewired "FNCMS" installed in the world — and it's an AT&T product.

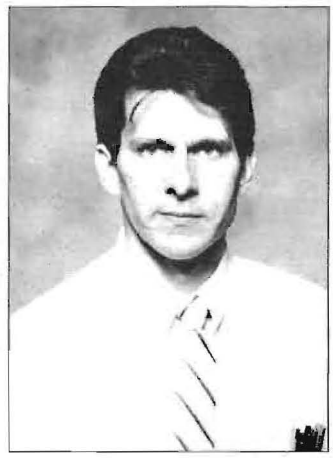
The FNCMS has been designed and developed by Network Systems Engineering Center, with considerable input from Merrimack Valley, for the industrial market. The system provides the capability to network large amounts of voice and data cabling from point to point in a factory environment. AC electrical and compressed air (CA) piping distribution systems have been incorporated into the factory to provide the requirements for both general and regulated electrical services of various standard voltages as well as for compressed air for the installation of most equipment.

To support the cable rack, AC raceway, piping, lighting and various ducts, an elaborate steel channel grid is used. This grid is supported from the ceiling by the building steel, providing a permanent support for this system and future suspensions.

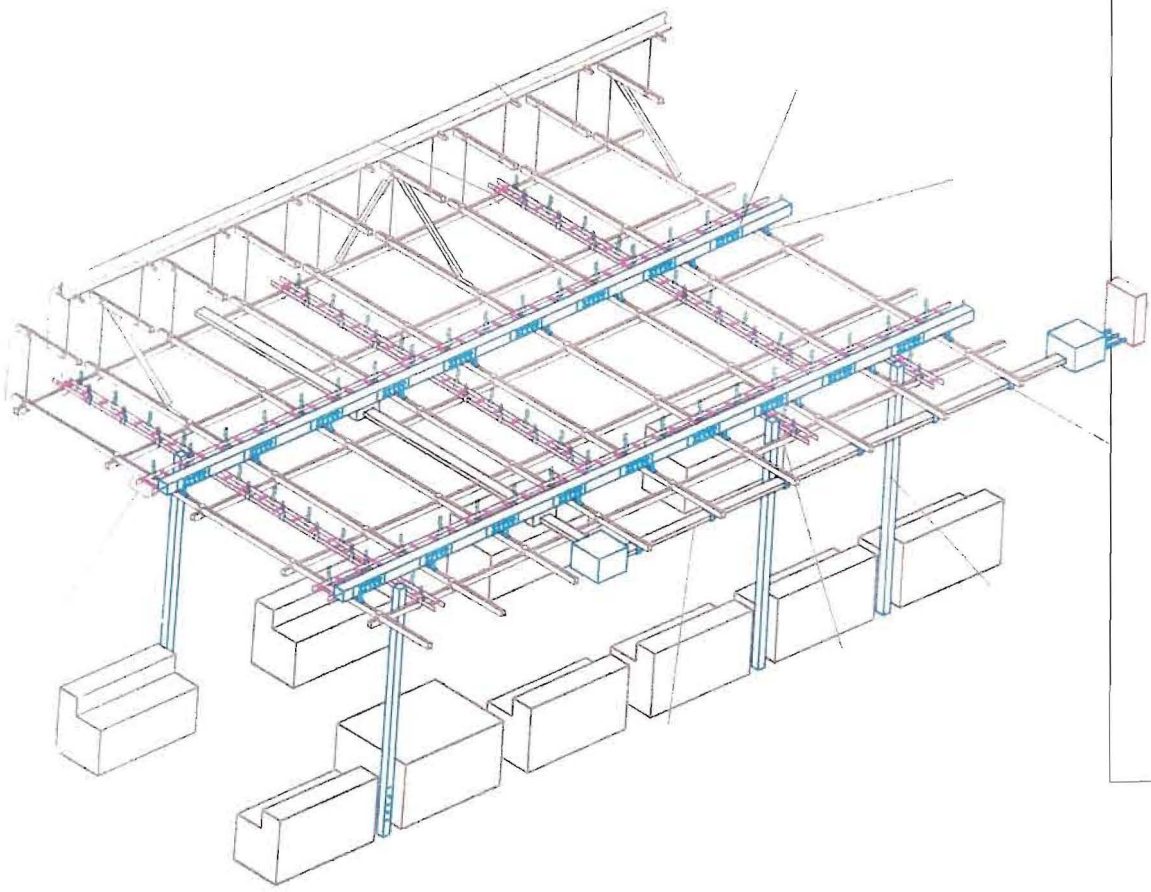
To provide the service drops to the factory floor, a telepole is used. This drop pole can be located where needed because service connections at the grid will never be more than five feet away. The telepoles can be uniquely equipped, prewired, and connectorized for AC, CA, voice, and data — all in one drop pole. If a service must be moved, it can be unplugged at the grid and reinstalled where needed, with no hard connections.

By July 88, Merrimack Valley VISION teams will have installed approximately 74,000 square feet of the FNCMS. This system will provide the VISION assembly shops with the service and flexibility needed for a flexible factory of the future. ■

Contributing author:



Terry Rankle
Engineering Associate
Material Handling
Engineering



Research & Development

. . . doing everything right, right from the start

ENGINEERS FROM THE Research & Development (R&D) community have been working with their Merrimack Valley manufacturing partners right from the start of the VISION project in 1986. Most have participated through the corporate-sponsored Bold Initiatives program, emphasizing the formation of R&D/factory partnerships with the goal of accelerating improvements in key AT&T manufacturing facilities.

Expertise in manufacturing systems engineering is particularly applicable to VISION because the magnitude and complexity of the project require a rigorous approach to ensure smooth integration of the many operations and the best possible overall performance.

A formal project structure has been set up to ensure integration, creating implementation teams to address all the factory operations from receiving to shipping. In addition to these two teams (receiving and shipping), others include kitting, circuit pack assembly, circuit pack test, equipment assembly and test, and system assembly and test.

It was recognized in the early phases of VISION that success on the factory floor would not be enough. Getting excellent designs and efficiently transferring them to the factory floor are also crucial to the project's success. Design transfer is the responsibility of one of the implementation teams. Besides the specific short-term activities of this team, however, a dedicated effort to simplify and improve

Roger Cullifford

Engineers from the Research & Development group gather to discuss their latest project.

Shown are, left to right, David St. Clair; Dan La Perriere, VISION R&D coordinator; David Chen; Arvind Ballakur; Bruce Yuan-Chou; Javier Gurrola-Gal and S. Suresh. Unavailable for the photo were R&D members Ken Venner and Arvind Rajan.

the processes involved in new and changed designs is covered in a related but separate project.

What have been the contributions of R&D to the VISION project? In a true partnership, it's not appropriate to draw a distinction between the accomplishments of the participants. However, significant results of the partnership include working out the VISION operating strategy — how all the parts have to fit together to make VISION work; the development of computer models to analyze how the line would run under different assumptions of loading, machine assignments, and scheduling; the design and operation of the first JIT line in the wired equipment shop; and the implementation of a JIT approach to operating a circuit pack assembly and test facility. ■

DFM/DFT requirements

. . . designing with a purpose

THE "MERRIMACK VALLEY Works DFM/DFT Requirements" document has been issued to formalize the manufacturing requirements for circuit pack and equipment designs manufactured at Merrimack Valley.

Part I of the document provides circuit pack requirements and replaces the "PWB Design Guidelines." The requirements were compiled by a steering committee comprised of product engineers from MV and design engineers from MV and Holmdel Bell Laboratories. The requirements were generated by engineering champion groups which are responsible for the various aspects of manufacture.

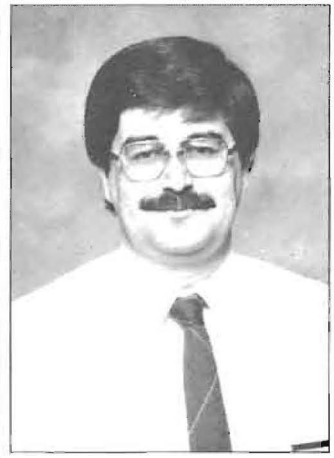
These requirements are based on automatic insertion capability. Although some differences in requirements exist between shops, we hope to minimize these differences by the use of this document.

Part II presents design guidelines for the Merrimack Valley wired equipment products. Mutual collaboration between design and manufacturing engineers will be necessary so that optimum DFX (Design for Assembly, Simplicity, Manufacture, Test, etc.) can become a reality. The guidelines encourage the use of high technology, such as multi-layer backplanes, to allow design simplicity from a manufacturing viewpoint. The challenge for AT&T and each of us is to surpass our competition by bringing to the marketplace forward-looking DFX'ed designs.

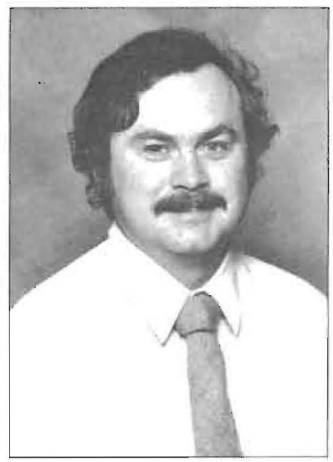
Part III contains a "Modification Request" form to allow any concerns, corrections or deviations to be fed back to Merrimack Valley champion groups for evaluation.

By documenting our manufacturing and test needs for the design engineering groups, we assure a quality product which is easy to manufacture the first time through. Quality provides a product the customer wants. Ease of manufacture provides the product at the right time and at the right cost. ■

Contributing authors:



Dan La Perriere
VISION R&D
Coordinator

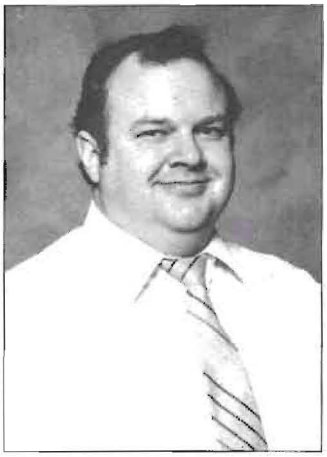


John Miller
Senior Engineer
DACS IV Product
Engineering

Patriot Shop

. . . producing low volume/high mix products

Contributing author:



Randy Townshend
Engineering Associate
Digital Radio
Product Engineering

Patriot — *Noun...One who loves his country and stands behind it, ready to defend it.*

THE PATRIOT SHOP, LIKE the colonial era patriots, stands for strong tradition and a philosophy of loyalty. These traits manifest themselves in the harmony of the work environment, the quality and pride of accomplishment, and the dedication it takes to be and continue to be the best.

The function of the Patriot shop is to manufacture all products that are inappropriate to manufacture on the Vision or Aim lines. In order for the new concept of VISION manufacturing to materialize, a solid base of manufacturing fundamentals must remain in place for continued manufacture of products not suited to a high speed, fully automated system. Unlike the Vision and Aim lines, whose achievements come from low mix/high volume and high mix/medium volume manufacturing, the Patriot shop builds low volume product with very high mix.

This new Patriot shop requires unparalleled flexibility, a proven track record for shipping, and a team with a "can-do" attitude. The logical choice for this assignment was the microwave radio complex. However, that shop had just been adjusted to facilitate the growing VISION floor space requirements. At the same time, its current advanced digital radio program has doubled, and it is experiencing a resurgence in its international radio market product. A managerial assessment was made, and the choice remained the same — the new Patriot shop will have its roots in this radio complex. Here is a team of people already in tune with swings in customer demands and a group of workers with expertise and pride in producing a wide variety of codes.

The Patriot shop is not a shop dedicated to maintaining old technology, but rather a shop where more hand effort is integrated with automated facilities. Regardless of the requirements, the migrating codes have to be produced qualitatively, shipped on time and priced to realize a profit.

The Patriot shop — a production team and an engineering team forming a strong partnership — together realizing a smooth transition-to-manufacture of those special codes. ■

VISION storeroom and kitting

. . . not an experiment, it's a philosophy

MATERIALS MANAGEMENT and shop provisioning have taken on new meaning with the VISION process.

Some basic principles remain from the traditional storeroom approach. We continue to need a system to receive incoming freight from trucks, send it through inspection and into storeroom trays and know precisely what is on hand at all times. Only now we want to do it faster.

From that point on, little remains the same. VISION provisioning requires a self contained storeroom with only those components used by the VISION shop. The customer is the driving force. The traditional approach of weekly deliveries of material supplies is eliminated; and this storeroom, under the control of IMPAC operating system, delivers material virtually constantly, in small lot sizes, readily usable by the shop. In a break from tradition, components may be prepped, sequenced or otherwise prepared so that they are delivered to the shop "ready to use," sorted into tote trays and delivered to specific locations consistent with point of use. The shop actually pulls completed kits into the manufacturing process from a completed kit buffer.

Remember that this is not an experiment, it's a philosophy. We'll have adjustments to make. But we have a strong management commitment to succeed. We added people to the VISION stores early, had good training and lots of hands-on experience. We have fine people associated with this store. In short, we're ready to go and ready to grow. ■

. . . *kits with no shortages 'pulled' to shops as required*

A KIT CAN BE DEFINED AS A set of parts required to build a small lot size quantity of a circuit pack. A subkit is a subset of a kit and contains all the parts required to be assembled to a circuit pack at a specified work center on the manufacturing line. These parts can be prepped, assembled and wired, etc.

Before material to build a given product is requested from the storeroom, a material check is run to verify that all the parts required to make the product are available in the storeroom. If any parts are short, the kit is not built until the shortage clears.

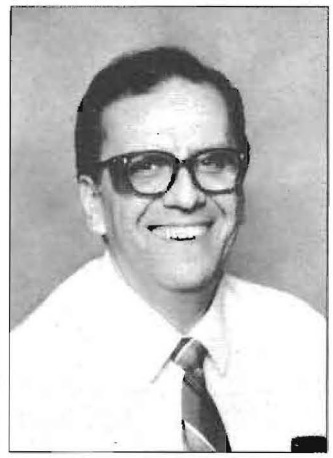
The most radical change in the kitting process is in the discipline for releasing material to the shop. In the new scenario, the shop decides which kits to pull to the shop. These kits will be for a small lot size, will have no shortages, will have all prepping and subassembly work performed, and will be pulled only as required. At any one time, only the kits for a small manufacturing duration, such as a day's worth, are requested from the storeroom.

The VISION manufacturing line is composed of many work centers, each receiving only its required material. To accomplish this, all parts to build a circuit pack are assigned to specific work centers. This process creates a number of subkits which will be built by the stores/kitting area.

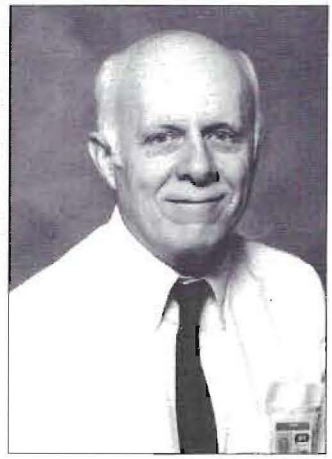
Kitting is new to Merrimack Valley. So new that Quality Architecture cell teams are still being organized. These cell teams will have an opportunity to view the entire process, making sure that all functions operate smoothly and efficiently.

In the ultimate scenario, the storeroom itself disappears. Parts are delivered directly to the shop floor by the vendor in small quantities and are in a ready-to-assemble condition. The consolidation of the stores/kitting functions into a compact and efficient operational unit is the first step in that direction. ■

Contributing authors:



Al Zaccardi
Supervisor,
VISION Stores
& Kitting



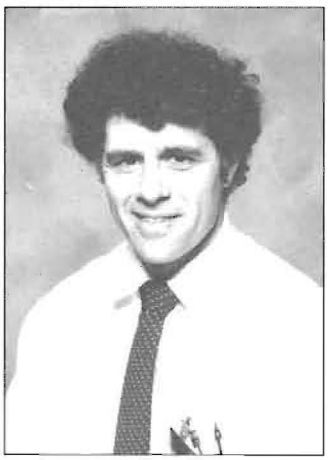
Charlie O'Connor
Senior Engineer,
Receiving/Stores/
Kitting

Information automation engineers

. . . helping VISION happen

Contributing authors:

Mirga Girnius
Information Systems
Staff Senior Member



Joe Massa
Supervisor
MRP II Implementation

DID YOU EVER NOTICE PILES of circuit packs and panels on the shop floor? Did you wonder if they were just lost in the shuffle, like Indiana Jones' ark which was put away in a box, stored with other boxes in some warehouse, and probably lost forever?

These piles are called inventory, and inventory is bad. It's bad because it costs us a lot of money. If we could get rid of it, we would be making a much larger profit.

MV information engineers are doing something about it. Working together with users as a team, they developed two information systems — IPM (Integrated Pull Manufacture) and MRP II (Manufacturing Resources Planning).

Once IPM and MRP II are in place, customer orders will move much more quickly through the shop. And, as a rule, missing circuit packs won't be stopping equipment from moving right out the door to the customer.

It might be scary at first to see all that shop inventory disappearing. We're accustomed to seeing a lot of inventory when times are good and less inventory when times are bad. But soon we'll learn that less inventory brings more money. And that's what VISION is all about.

Do you fill out bogey sheets or bill of materials update forms or shipping forms in the warehouse? Do you maintain numerical control data or work-in-process data? Do you fill out paperwork on the receiving dock, manufacturing layout input forms, or IRS forms? Have you ever been involved in production problems caused by typos or by out-of-date data?

Unfortunately, Information Engineering can't help on the IRS forms, but we are making improvements in the other areas. Our goal is to replace any manual data entry with barcoding wherever possible. And if the necessary data is already somewhere in the system, our goal is to get access to that data automatically.

In a nutshell, we're streamlining and automating the flow of data wherever possible. This means there will be fewer errors, the data will be more accurate, the shop will experience fewer disruptions, and our customers will be happier.

Speaking of customers, are our customers happy? They will be if we do what we say we will do, if we ship when we say we will... if we have credibility. Information engineers are implementing Commitment with Credibility, an information process which makes serious commitments to our customers and judges us on our performance against those commitments.

The saga of information engineering and the VISION project goes on and on — the key item analysis for material planners, kitting support, improved defect and yield reporting, RS&R scheduling tools, up-to-date graphical shop assembly instructions, improved warranty information eligibility, forecast evaluation information, cost allocation, support for component preferredness, support for improved product change management — these are some of the improvements the information engineering team is implementing as a part of VISION. ■

MRP II

. . . adding to traditional processes

THE ORIGINAL CONCEPT OF VISION included the use of the formal planning system known as Manufacturing Resources Planning (MRP II). The precepts of MRP II are not new to MV, but the advent of VISION presents the opportunity to implement philosophies and disciplines not yet tested in the equipment factory.

The disciplines incorporated in MRP II remain a vital part of the fabric of VISION. The focus that MRP II provides for material provisioning, master scheduling, data accuracy, shop throughput and capacity constraints will help us realize the velocity, quality and output sought from the VISION Line.

In addition to the traditional practices that have proven themselves successful, MRP II is committed to establishing the following unique philosophies for VISION:

- Daily releasing of material to the shop floor.
- Daily scheduling of circuit pack output.
- Material availability checking to ensure complete circuit pack (and other component) availability *before* assembling material for systems test.
- Establishing "pull" signals for movement of material to the production line and the systems test area.

In the spirit of total factory participation, MRP II will marshal MV's resources and merge with the engineering innovations of VISION. ■

MPCS—Lot tracking

. . . the latest in data collection and reporting

THE COMPONENTS FACTORY, under the direction of Alan Moline, director of components engineering and manufacturing, is implementing MPCS-Lot Tracking (Manufacturing Process Control System), a new data collection and reporting system.

MPCS-Lot Tracking is an AT&T corporate software system designed for managing the manufacturing process by monitoring the flow of product; compiling input from operators; providing real-time order, lot, operator and work station status; providing online and hard copy reports; and serving as an automated interface to AMAPS shop floor control.

There are significant advantages to be realized under the MPCS Lot Tracking environment. Operators enter process data via barcode readers directly to the system database. All input transactions are validated in near real-time. Thus, system reports and inquiries will provide a current view of lot and product status.

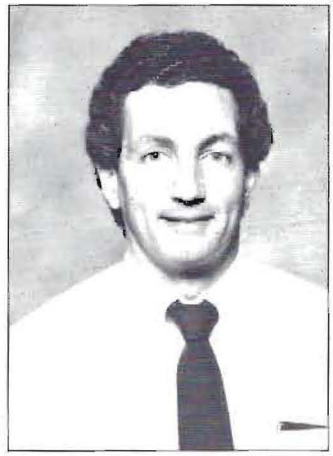
Accuracy of process data being collected and analyzed in the component shops is improved. It will be much easier for production associates to determine if product is not at the correct operation. MPCS-Lot minimizes the time required to correct reporting errors and provides more reliable yield calculations and accurate inventory measurements.

MPCS-Lot tracks repair operations, providing greater failure mode analysis capability for engineers.

As a UNIX-based system, MPCS-Lot Tracking facilitates the introduction of customized features. It utilizes an AT&T hardware configuration including an ISN data network, a cable management system, AT&T terminals and the newest and most powerful AT&T computer, the 3B4000.

A pilot system has been implemented at Merrimack Valley, providing a base for user training and testing of system features and enhancements. The thin film transmission C40 shop will be the first shop to be cut over to MPCS-Lot Tracking, with an anticipated cutover date of April 1989. ■

Contributing author:



Dick LeGrow
Information Systems
Staff Senior Member

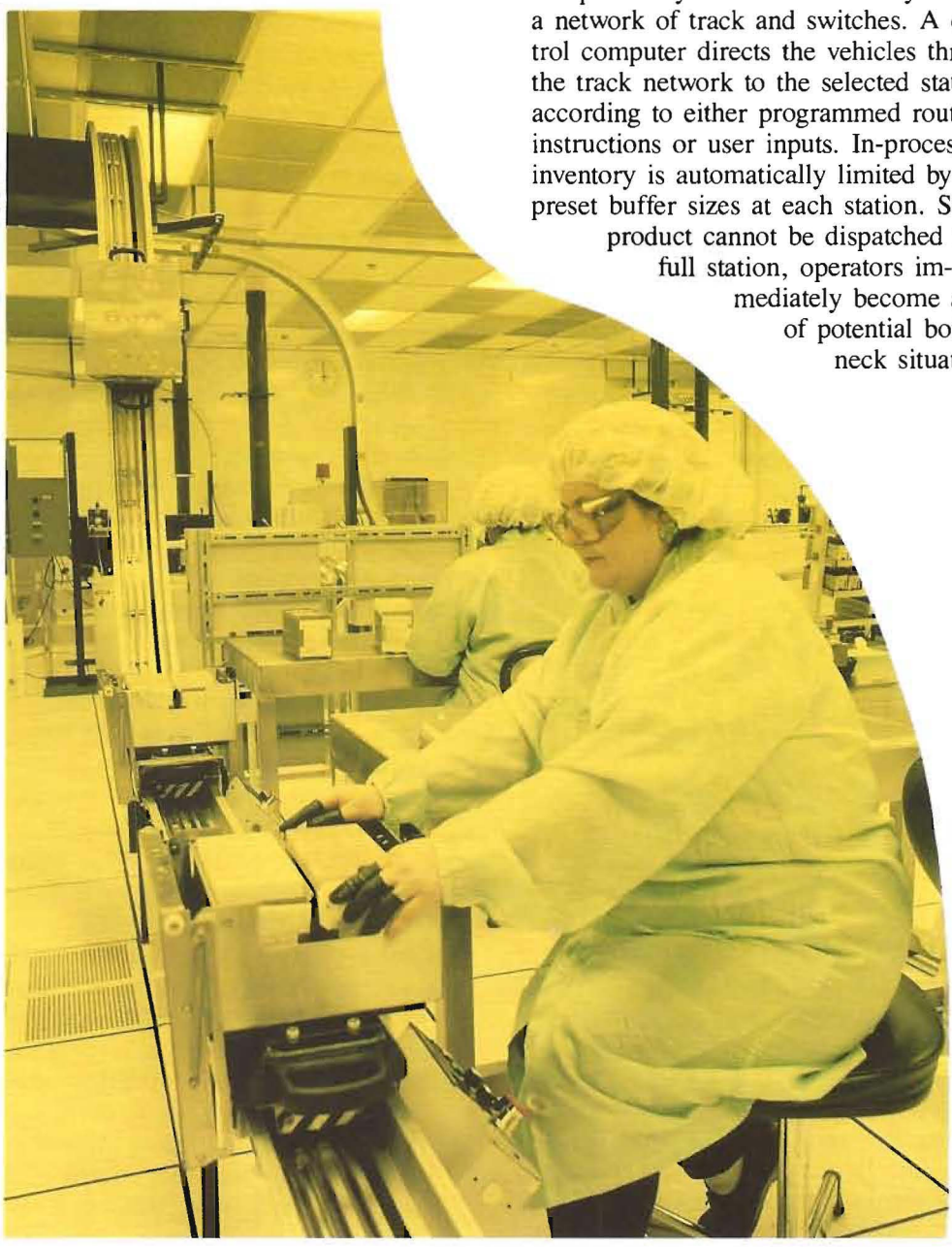
Product transport system

. . . moving product with efficiency

THE VISION OF THE FUTURE is here — today at Merrimack Valley. A computerized product transport system, designed by the Translogic Corporation, was installed recently in the thin film pattern generation transmission shop. When combined with new automatic process equipment, a fully integrated manufacturing facility is created.

The system provides an efficient and organized means of transporting product throughout the shop. The main thrusts behind implementation of the system were reductions in inventory and in manufacturing intervals. These goals are part of a plant-wide philosophy known as pull manufacturing.

The Translogic system consists of self-propelled product transport vehicles which independently and simultaneously traverse a network of track and switches. A control computer directs the vehicles through the track network to the selected station according to either programmed routing instructions or user inputs. In-process inventory is automatically limited by preset buffer sizes at each station. Since product cannot be dispatched to a full station, operators immediately become aware of potential bottleneck situations.



Joyce Daigneault demonstrates the ease with which product is removed from the new product transport system.

Roger Cullifford

Previously, large quantities of product were allowed to accumulate between operations. With the new track system, product is dispatched as soon as it becomes available. The system thus increases product velocity, reduces in-process inventory, and eliminates the need for operators to leave their stations. In the future, a barcode system will be interfaced with the system computer to provide fully automated programmed routing throughout the process. This will eliminate the possibility of routing errors as well as provide a means for product lot tracking.

The Translogic system is just one of the many improvements resulting from the recent modernization project of the pattern generation shop. New automatic process equipment and plant facilities, together with the transport system, have led to a complete automated in-line manufacturing facility. ■

Material transport system

. . . material movement system in conceptual design stage

NO SINGLE ORGANIZATION at Merrimack Valley has the tools or the responsibility to achieve the goal of an integrated factory. Every organization at MV has is the ability to contribute to this goal by following the principles of VISION. For those organizations involved in the physical manufacture of our products, the continuous improvement of the manufacturing processes that result in our finished products is our contribution to the VISION process. By improving all manufacturing processes, from the receiving dock to the shipping dock, the production organizations can do our part to increase material velocity, allowing us to respond to customer orders quickly and with high quality products.

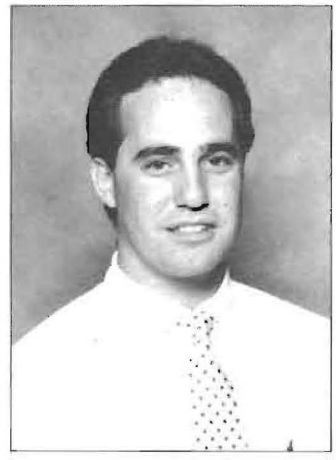
One common operation that occurs in every manufacturing process is the movement of material. Today, material movement is performed both formally and informally, within manufacturing shops and between them. One way that we are looking to improve today's operations is by providing a dock-to-dock material transport system.

This material transport system (MTS), currently in the conceptual design stage, is being designed to have the ability to control all of the material handling functions that are common throughout the factory.

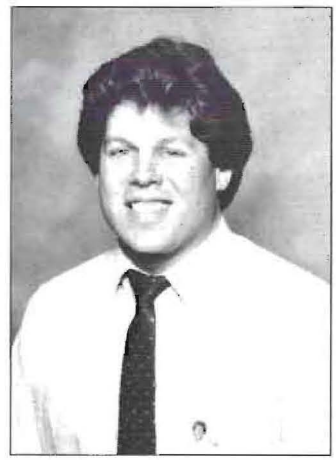
By providing one common system to control the factory's material handling requirements, Merrimack Valley will be gaining total control of all material from the time it hits the receiving dock to the time the final product is shipped. This control will allow us to complete very timely movement of nearly exact quantities of material. This is achieved through an interface with corporate host systems such as MOVES in the receiving and storeroom areas and MPCS in the VISION circuit pack assembly and test areas. Complete visibility of this material is also achieved by the tracking features that MTS provides.

How is material actually moved using the MTS? In some cases the movements are directed to a material handler to pick up material at one location and bring it to another. For example, in the storeroom a fork truck driver could be directed, by a radio terminal in his truck, to pick up a pallet of material at a designated staging location and move it to a designated storage location. In other areas the movement of material could occur automatically, such as a kit tote delivered from a kitting area to an assembly area by overhead conveyor. In both cases the controlled movement of material is achieved. ■

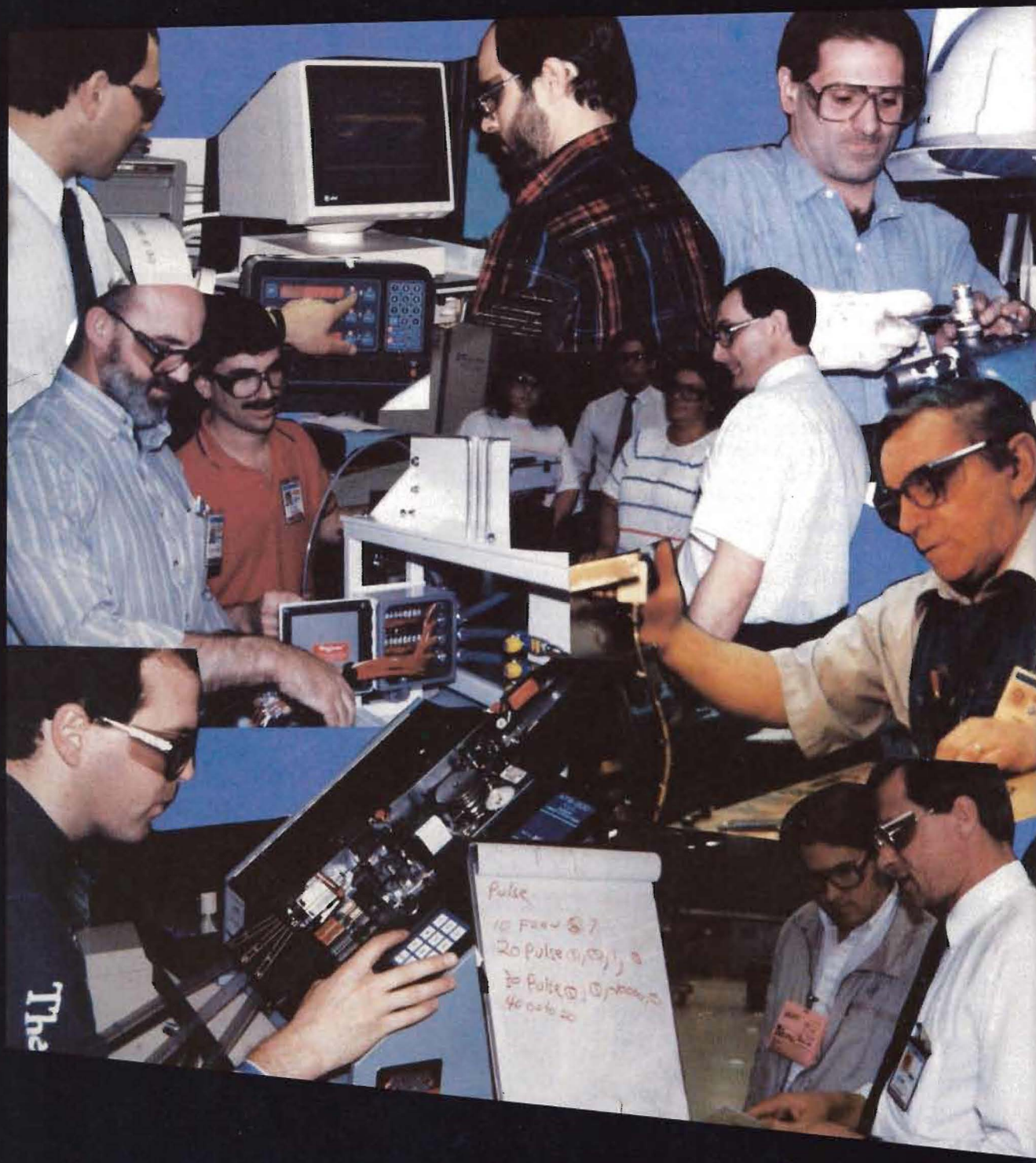
Contributing authors:



Tony DiTroia
Planning Engineer,
Pattern Generation
Process Engineering



Steve Goulding
Planning Engineer,
Material Handling
Engineering


Pulse


VISION LINE COMMENCEMENT
NEW ERA OF MANUFACTURING
MOVES

Surface mount technology

. . . improving performance through technology

SURFACE MOUNT TECHNOLOGY (SMT) is relatively new to Merrimack Valley. Since its introduction in 1984 in the DACS/SRDC and D5 product lines, SMT has been incorporated into more than a dozen of our products. By the end of 1986, the surface mount process center was implemented and in full operation, and in 1987 production commenced on the AIM surface mount line. It was also in 1986 that planning for the VISION surface mount assembly line began.

Surface mount technology allows a single circuit pack to perform the same functions as two to four similarly sized circuit packs manufactured with conventional through hole technology (THT). SMT uses miniaturized components called surface mount devices (SMDs) which are soldered directly to the top surface of the circuit board. The types of SMDs include resistors, capacitors, transistors, ICs, diodes, and even inductors. These SMDs, while performing the same functions, are from two to ten times smaller than their THT counterparts. This reduces the cost of materials required to manufacture a product and ultimately helps make our products more competitive in the marketplace. Surface mount technology, which is being incorporated into virtually all of the new products being designed by Bell Laboratories, will play a very important role in the VISION line.

Roger Cullifford

Dick Leduc, machine setter, inspects the setup of the Panasonic high-speed pick & place machine in the VISION surface mount area.

Because of the small size of the components and the delicacy required in their handling, surface mount product requires specialized automated equipment for each process step in its assembly. The operators who run the equipment and monitor the process are key to the success of the line. As the delicacy of surface mount requires automation, so does automation require operators to continually ensure that the equipment is running properly and the process is in control.

Already part of the weekly routine are meetings between operating and engineering personnel. At these meetings all team members identify process-related problems and barriers to successful shop operations. This drive for quality is not limited to processes within Merrimack Valley. Vendors of both the assembly equipment and the incoming materials have already been notified of potential quality problems.

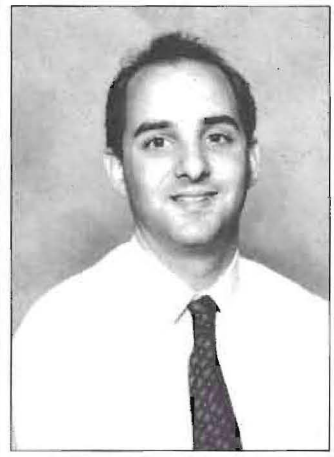
The move towards 100 percent yields has begun!

Future Capabilities

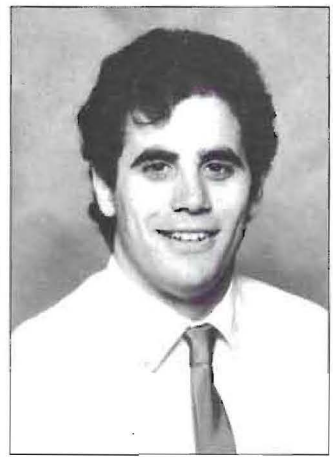
Even though the VISION surface mount line is just starting, plans for enhanced capabilities and expansion are already underway. These enhancements will incorporate new technologies and processes into the line, ultimately providing greater process control, increased product quality and reliability, and increased manufacturing capabilities, all of which will help reduce the manufacturing costs of our products.

One new technology to be introduced in 1988 will be a state-of-the-art vision inspection system which will inspect for defects when they are easiest to repair — before the components are soldered on the board. Another vision inspection system will inspect the solder paste before the components are placed on the board. In addition, an in-line circuit pack cleaning system which uses the environmentally safe Bioact EC-7 compound (see the April *Valley Voice*) will be installed to help increase the overall reliability of the circuit packs. Other enhancements will include a "paperless" repair and data collection system, computer controlled product tracking, expanded capabilities in the area of robotic chip carrier placement (to include ultra high I/O devices), and the ability to mount surface mount components on both top and bottom sides of the circuit board. ■

Contributing authors:



Howie Cyker
Planning Engineer,
VISION Circuit Pack
Assembly Process
Engineering



Dave Angelini
Planning Engineer,
VISION Circuit Pack
Assembly Process
Engineering

Equipment teams

. . . Wired equipment operating team uses Just-in-Time philosophy.

Prototype workstations such as those pictured below are currently being evaluated in the JIT area of the Fastech panel shop. Team members shown demonstrating the product flow through the workstations are, left to right, Jose Colon, Linda Magnusson, Jerry Berrios and Al Daigle.

THE MV WIRED EQUIPMENT operating department plans to implement the VISION philosophies in the local cable, panel and bay shops. Over the past year, all products in the panel shop have been identified and tracked using a formal computer system (FAST). Another system (MPCS-EQ) has been initiated in the F80 cable shop to identify and track all cables.

The shops soon will be using daily, instead of weekly, load sheets. These daily schedules reflect customer requirements and are dynamic to reflect disruptions in any of the feeder shops.

Just-in-Time (JIT) philosophies are being implemented in the Fastech panel shop. Currently one code of FT Series G is being made on a progressive wiring line that includes all operations from assembly to test. Forty people are assigned to this line, covering both first and second shifts.

Roger Cullifford

The JIT line encourages teamwork, controlled inventory, and cross training. Immediate feedback of problems to operators has resulted in improved yield and communications. By the fourth quarter of 1988, a consolidated FT Series G shop will be set up that will include bay, panel and cable operations for all FT Series G codes.

The wired equipment shops have established quality architecture cell teams and will continue working towards increased customer satisfaction and reduced work-in-process, along with a higher turn-over ratio, improved quality and continuous process improvements. ■

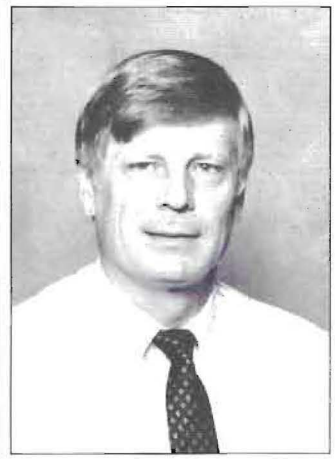
. . . *Wired equipment engineering team focuses on VISION concepts*

THE VISION EQUIPMENT TEAM plans to be very busy for the next two years. In July of 1988, the D4 and D5 bay shop will be moving to Salem I to join the D4 and D5 panels. By October of 1988, a consolidated FT Series G bay, panel and cable shop will be in place on the first floor of the MV production building. Placing the panel and bay production adjacent to each other will provide the communication loop necessary to reduce the manufacturing interval. Our goal is to produce a shipable panel or bay from raw material in less than one shift. Work-in-Process (WIP), material handling, and storage facilities will be reduced by "pulling" what is needed directly from the feeder cell. Miscellaneous low volume codes of bays, panels, and cables will each have their own shop. By October of 1989, Salem I will return to MV as a consolidated bay, panel and cable shop for D4, D5, and DDM-1000.

Simultaneously, Just-In-Time principles will be implemented in each shop to reduce the total floorspace by 35 percent. In-line assembly, daily build sequences, and work-in-process reduction will be methods of accomplishing this lofty goal. Quality Architecture is being implemented now by six cell teams, with working action registers, complete process characterization data, and extensive quality data. Four more cell teams, scheduled to start in the summer of 1988, will complete the equipment cell team structure. Continuous improvement and quality feedback to the shop employees will be stressed by each team.

Cable manufacturing plans include kitting a large variety of cables for specific projects and increasing the number of codes that are formed on the automatic cable machine. Process plans for the panel shop include automating panel assembly with two workcells featuring robotic insertion and robotic screwdriving. The panel shop is also evaluating two types of ergonomic workstations for manual assembly and wire. These modern workbenches feature an adjustable work surface and will be set up in a progressive process line. Bay process improvements include portable horizontal bay dollies and a portable bay upender for additional flexibility. Computer tracking will be initiated in each shop to better control WIP and output. ■

Contributing authors:



Andy Abrahamson
Fastech Bay, Panel & Local Cable Manager

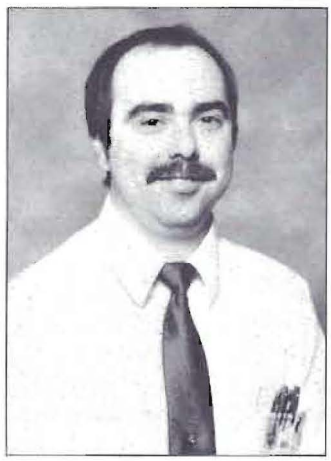
Beverly Ruel
Planning Engineer, VISION Equipment Process Engineering

Circuit pack test

. . . ensuring total quality control

Contributing authors:

Schuble Cook
Senior Engineer, VISION Circuit Pack Test Process Engineering



Bill Guest
Development Engineer, VISION System Test Process Engineering

THE TEST PHILOSOPHY OF the VISION project is the total quality control (TQC) philosophy of testing and controlling the process. It is a shifting from product-oriented testing and repair in the circuit pack test area to process-oriented monitoring, analysis and control. This requires the use of quality-improvement technologies and methods over the entire product realization process. The goal is to continually improve the process. To accomplish this goal, engineering and operating have to:

- Understand all aspects of the process that affect yield.
- Collect meaningful data on all parts of the process.
- Analyze the data and reduce it to information that can be used to control the process.
- Implement fixes to eliminate identified problems in the process.
- Monitor the process to maintain control.

The circuit pack test area will become the key monitoring point for controlling the overall process. The VISION line test process attempts to provide 100 percent coverage of assembly induced defects and to provide high confidence that processes external to the VISION line do not have a detrimental impact on the quality or performance of the product. In-circuit test will be the vehicle used for process monitoring because of its high visibility of process induced defects and because of the speed and ease of fault isolation. The primary function of these test sets is the indictment of process induced faults. But, where possible with a minimum of throughput penalty, the tests will be designed and/or modified to obtain coverage of pre-VISION line induced faults. As a philosophy in-line functional testing between process test and system test will be limited to those cases where designs on the leading edge of technology create unique requirements for functional test.

The most important part of the circuit pack test plan is the plan for test process engineers to work the overall process and for trained operating opersonnel to implement the plan and control the total process. If Merrimack Valley is to be World Class, the total process must be controlled, and that requires dedicated test process engineers — engineers who are never happy with less than the highest yields on the line — and and motivated operating personnel — associates always seeking the route cause of problems. ■

System test

. . . testing fully loaded systems

THE VISION LINE IS DESIGNED to manufacture all panels, bays and circuit packs whose products have a systems test as a part of their manufacturing process.

What is systems test and why does it have such an important effect on the process at Merrimack Valley? The systems test integrates circuit packs (CPs) with a panel or bay to test a fully loaded system for expected performance. All CPs associated with system tested product are submitted to this kind of test, lasting from several hours to several weeks, depending upon the product.

In order to complete a systems test, the manufacture of the circuit packs, bays, shelves and other equipment must be synchronized so that the component parts meet simultaneously at the systems test area. Since it is not economically feasible to manufacture all CPs to arrive at the

systems test area "just in time," a buffer is necessary to hold CPs waiting for system test. Enter the VISION Control Point.

The VISION Control Point (VCP) is a buffer, positioned before system test, in which all VISION line CPs, as well as some equipment (panels and bays) and other items needed to assemble a system, are stored. The VCP provides the system test area with a fully loaded, testable system. It is also the driving force in signaling when replenishment items are to be "pulled" through the CP and equipment assembly processes. When the VCP reaches a minimum inventory level of a CP, replenishment signals "pull" CPs through the VISION line to meet subsequent requirements. The equipment lines, in turn, work together with the VCP personnel to build the product needed.

What is being done within the VISION Control Point/VISION System Test to make this a smoother process? The VCP uses IMPAC, used for MRP-II, to control and keep track of material within the VCP, making it possible to check and plan for all material required to test a system. Heat tested CPs will also be stored in the VCP for use for CP failures and to bring systems to minimum testing levels.

Within the system test area, facilities are being provided to enable testing of a system and to expose the system to operating environments which reach 120 degrees Fahrenheit. This is done to simulate operation of the system in a central office during an air conditioning failure. Data will be collected during system test whenever any failure occurs. This data will allow engineers to perform Failure Mode Analysis (FMA). The purpose of FMA is to determine the cause of the problem, such as marginal design or components, and then eliminate the cause to prevent future failures. This will allow us to ship a better quality product to the customer at a lower cost.

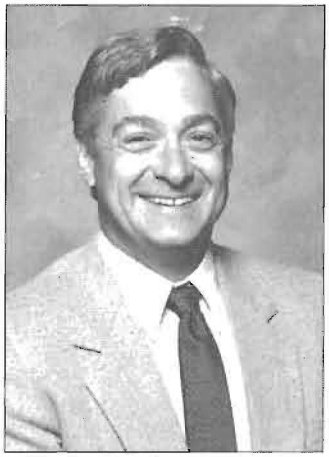
Quality functions (Quality Control, Quality Assurance and Bellcore) have always interacted with the system test process and will continue to do so in the future. By coordinating efforts with the quality organizations, we have been designing a smooth product flow through the system test process. In addition, in order to provide the best quality possible, a quality cell team, composed of process and product engineers and testers, will be formed. The purpose of this cell team will be to identify areas in the process which can be improved. This team will work closely with the product testing cell teams now being formed on each product line.

In summary, the VISION system test area ties together several manufacturing processes to ensure that the final product is of high quality when delivered to the customer. ■

Works Service

. . . constructing the new environment

Contributing author:



Les Shattler
Plant Construction Manager

THE VISION PROJECT presented a wide variety of challenging opportunities to our entire staff. This staff includes machine design, tool design, facilities engineering, plant design, test facility design, environmental engineering, plant construction, plant and machine maintenance, test set construction, tool and machine construction, and tool maintenance.

The environmental engineering personnel have worked very closely with factory engineers, product engineers and construction personnel in the removal of hazardous materials and installation of new facilities using hazardous material.

The ergonomics group, which is responsible for designing processes with people in mind, has provided engineers with valuable information regarding ergonomically designed work areas and tools.

Our tool and machine design groups have designed and purchased equipment that combines state-of-the-art technology and versatility to manufacture our products here at MV.

Our job doesn't end with the design or procurement of tools and machines, however. A rough layout of the area is provided to the plant design group, where detailed orders and drawings are issued to the construction department providing for the removal of old equipment and installation of the new services and equipment.

The orders are prioritized and scheduled through the facilities design department. This process is tracked on the FEJR data base, allowing project managers and interested parties to track the progress of each request.

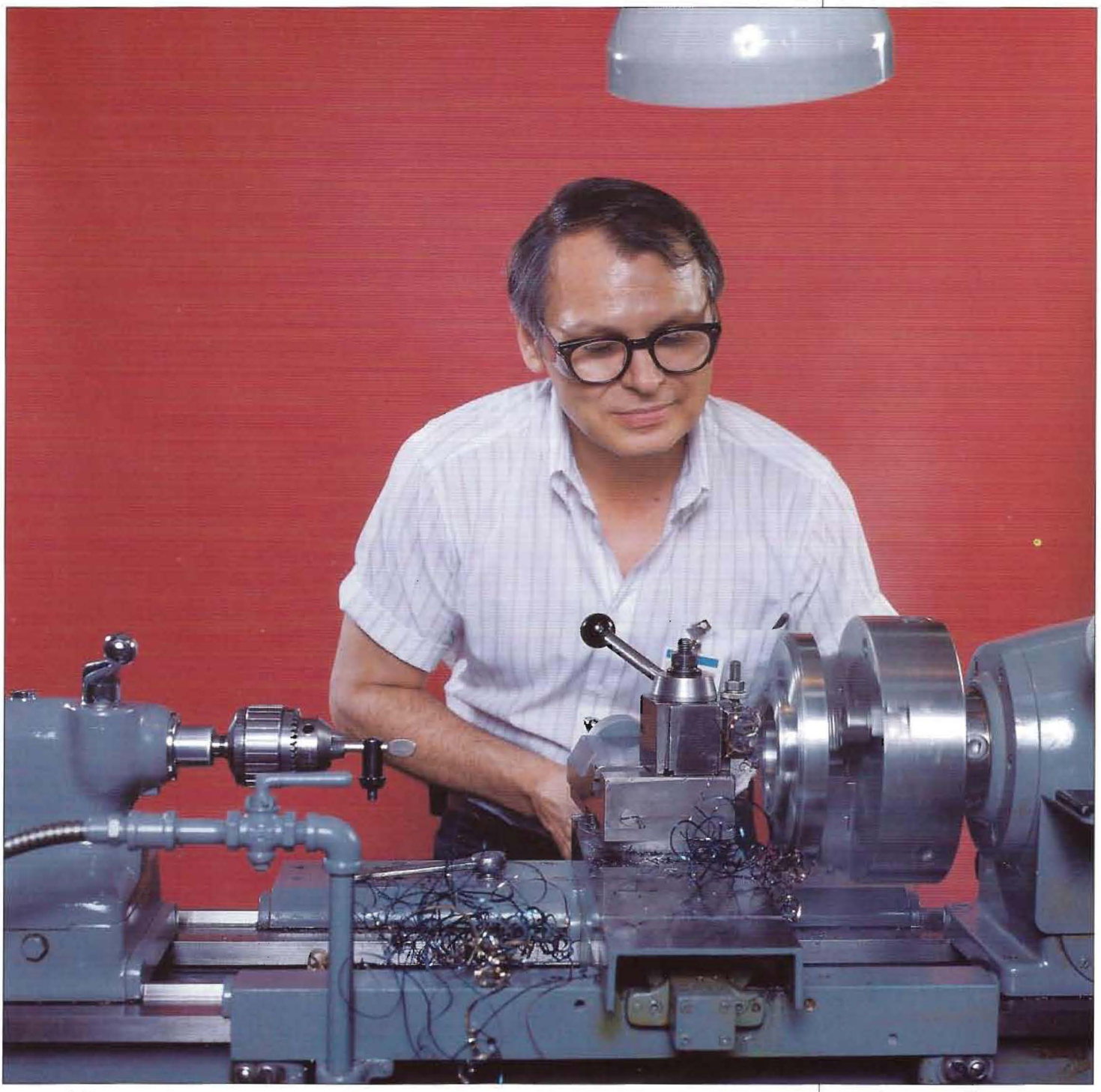
The test facility design department is very busy designing and procuring test equipment capable of meeting the long term flexible requirements of the VISION project.

Once the final designs for tools, machines and test sets have been completed, the drawings or specs are sent either to purchasing for procurement or to either the tool and machine construction or the test set construction departments. There the material is ordered and the machines and test sets built and delivered to the shop on schedule.

The plant and machine maintenance department, as well as the test set maintenance department, have been working very closely with the various engineering groups to provide adequate training to the responsible operating and maintenance personnel. This training is being done on an ongoing basis to ensure that, once the new equipment is installed and in use, we will be ready to maintain it.

The VISION project has involved all areas of works service and plant & factory, tool, and machine engineering. We in works service pledge to continue meeting the challanges of the VISION project. ■

Walter Meuse, toolmaker, mills a part to be used in the VISION process.



Roger Cullifford

VISION circuit pack assembly

. . . new ways of handling information

Contributing author:

Paula Fines
Circuit Pack Process Engineering, Manager

IF YOU WALK BY THE NEW VISION line circuit pack assembly area, or come to work there, you'll see a lot of machines that look familiar. Much of what's different about VISION can't readily be seen (though you might notice less work sitting around). The big differences lie in the way the shop will run, the way material is moved, the way information is handled.

Though much of the shop is similar to others at Merrimack Valley, there are some parts of the process that are new and different. I'd like to tell you about some of the new things.

. . . Laser serialization

All of our products today need serial numbers. These unique numbers help our customers track what they buy from us and know what repairs are our responsibility. These numbers also are used during manufacture.

By giving each printed wiring board its own serial number in a barcode format, it becomes possible to verify work that has been accomplished, collect data, decide where to go next, provide timely information and interface with work station computers. Barcoding is also a very useful tool to monitor processes, identify and correct problems, improve quality and lower costs. The assembly machines will be able to read the barcode, and shop operators can read the number and code.

The location of a readable barcode must be constant so that the assembly equipment can read it. The only area common to all printed wiring boards is on the track edge of the board (where they slide into the bays). This space is only about 1/8" wide, and a printed label can't be applied properly. Also, such a narrow label cannot be printed on demand, so we needed to do something new for VISION.

The VISION line will use a method new to the circuit pack manufacturing world. An ink is applied through a stencil printing operation, and then a laser marks the ink with the barcode numbers and letters. An operator puts a stack of bare pwb's in one end of the serialization machine, where they get screened, cured, positioned, marked by the laser, read for errors, and loaded into a magazine when complete. Since the machine reads its own mark, it can't put out bad work.

. . . Hand assembly

The VISION line is planned to handle many different product lines and many different circuit packs. There are still over 400 parts that require hand insertion. A new work station will be used to progressively insert parts. Up to ten parts will be inserted by one operator; and if more parts are required, the circuit pack will be passed along a conveyor to the

next workstation. Only the correct part will be presented to hand insert, and the operator will be guided by lights. The part will then be cut and clinched. After completing four stations on the line, the pack will be inspected and repaired automatically on line if necesssary. The hand insert stations and the inspection and repair station all will be tied into a local computer controlling the entire workcell. This computer will communicate with a central computer to provide information (via the barcodes) about the status of the circuit packs.

. . . Mass soldering

Mass soldering on the VISION line will be quite similar to what's being done now at Merrimack Valley. The machine being installed on the line does have a few differences, however. It's MV's first completely computer-controlled soldering machine, with all critical settings being controlled automatically. The machine signals an operator when input does not match what has been preprogrammed.

The fixtures will remain on the machine and be adjusted automatically for the two different size panels. The fixtures also will be cleaned right on the machine, allowing it to run continuously.

Another important difference you'll see in the soldering area is that there will be no containers of chemicals stored or being moved in and out of the shop. A separate room has been built to centralize all chemical handling. Mixing, distilling and delivery all will occur in the chemical farm, with everything then being distributed as needed. This important improvement will make the shop a more pleasant and safer place in which to work. ■

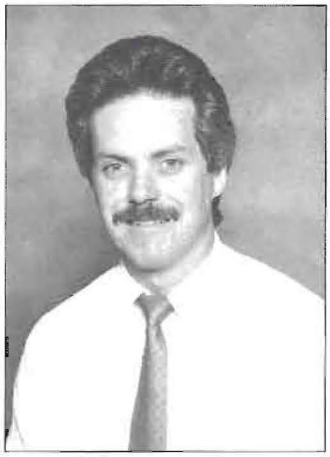
Roger Culliford

Shown at left is a total view of the laser serialization facility. A magazine for completed boards is shown on the extreme right. In the blow-up picture can be seen a circuit pack just after marking. The machine is verifying the second mark.

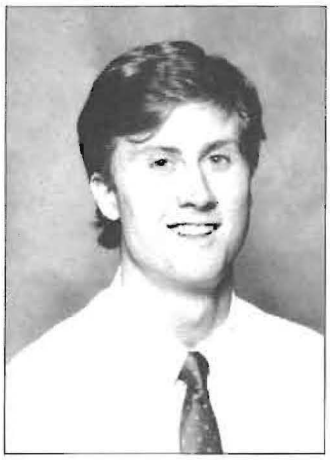
Circuit pack assembly & test and system test operating teams

. . . achieving success through Quality Architecture

Contributing authors:



Brian Fallon
VISION Operating Supervisor



Tim Wright
Supervisor
VISION Circuit Pack Assembly

QUALITY ARCHITECTURE — a team approach to solving problems in all facets of the manufacturing process. Quality improvement is the primary objective, yet significant additional benefits also can be realized, benefits such as improved customer service and reduced costs. For these reasons, Quality Architecture has been very well accepted in the manufacturing shops.

The VISION Quality Architecture line team encompasses a variety of organizations from receiving to shipping. Within that line time is the VISION operations shop which includes many Quality Architecture cell teams. Each cell represents one or more of the processes in circuit pack assembly & test and systems test. Each cell is a customer to the previous cell and a supplier to the subsequent cell. The main focus of the cell team members is to supply the cell customer with the high quality product they require in the shortest possible interval.

The cell team structure draws together all the manufacturing experts: process/product engineering, quality engineering, shop management and production associates. The team members make decisions about the quality of their process, identify problems and develop action registers. The purpose of an action register is to assign responsibility for resolving a problem to an individual within that cell or a feeder cell.

The team members focus on identifying the root causes of problems, resulting in permanent resolutions rather than temporary measures. This approach eliminates the present problem and reduces the likelihood of a future recurrence.

Those of us involved with the VISION manufacturing line are excited about the challenges ahead, and we look forward to celebrating the successes achieved through Quality Architecture. ■

. . . getting ready for first production

MUCH PLANNING FOR THE VISION line has taken place over the past two years. One of the final phases of implementation was the addition of personnel needed to operate the line. This function began in the fall of 1987, and today there are over twenty people on roll in the VISION circuit pack assembly and test and the VISION system assembly and test areas.

The team is going through VISION training and will continue with more training as the VISION line starts production. The basic idea or philosophy behind the VISION training is to help everyone understand what the VISION concept is and how it differs from the way we do business today. With eight different shops represented by this team, the first and main task is to get everyone thinking the same way.

With those on roll now, the VISION line is ready for first production, that being BCMX. Additional people will be added to support DACSII, and soon thereafter a second shift will be added.

As the VISION line begins its production, this team foresees many challenges and much cooperation in solving the anticipated problems. Operating Manager Wayne Barrett says, "We like to think of it as controlled chaos." The VISION line team expects numerous obstacles with this new process, but they will overcome every one — one at a time. ■

Merrimack Valley Works Component Control Committee

. . . formulating lists of 'preferred' components

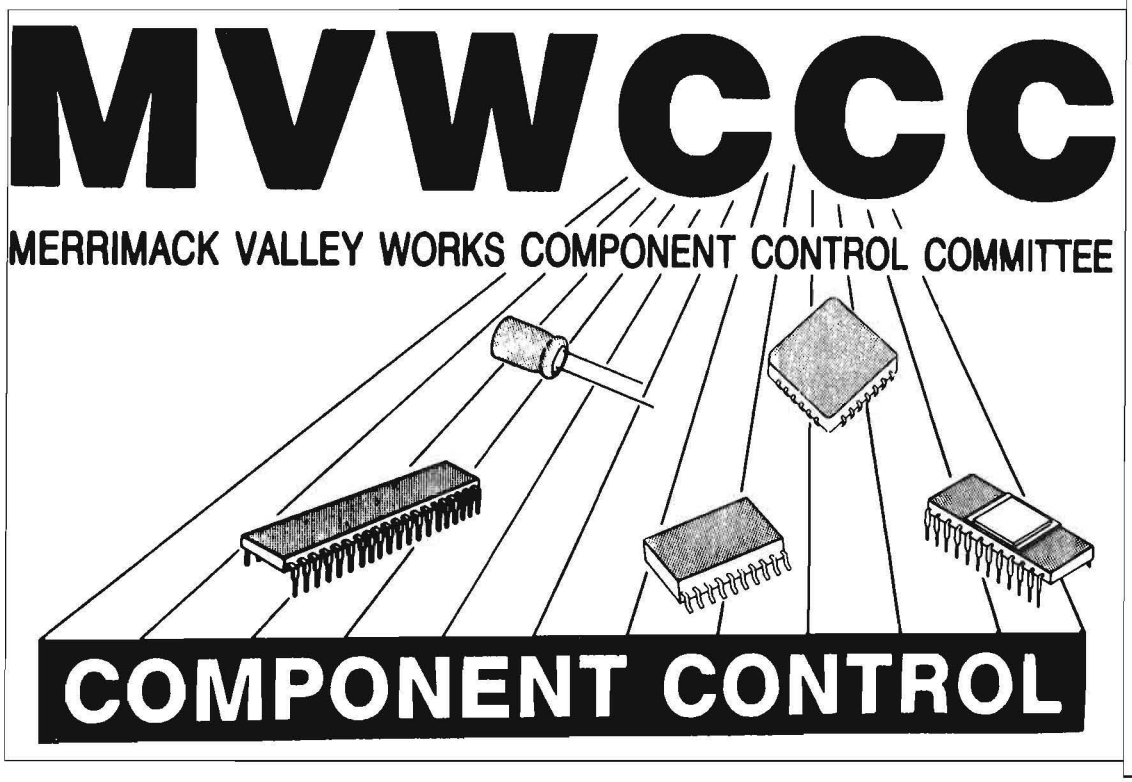
THE MERRIMACK VALLEY Works Component Control Committee (MVWCCC) was chartered in 1987 to control the selection of all components specified for new designs to be manufactured at Merrimack Valley. Component selection is controlled by

- requiring designers to choose only preferred components from the Merrimack Valley component list or use other components approved for project use by the MVWCCC, and
- auditing all new designs and major redesigns prior to transfer of the design to the factory to ensure that only MVWCCC approved components have been selected.

The committee is centrally represented by members of Bell Labs at Holmdel, Bell Labs at Merrimack Valley (including Andover and Ward Hill), and Network Systems at Merrimack Valley. In addition, AT&T Microelectronics, Cost Effective Product Introduction (CEPI), Springfield Operations, and Engineering for Purchased ICs (EPIC) are active members and/or primary resources. To ensure that DFX (Design for Manufacture, Assembly, etc.) requirements are adequately addressed, MVW product and process engineers from component engineering, VISION and AIM are members.

The committee has established procedures for the use of alternate components for those times when a preferred component is unavailable.

Since the MVWCCC ensures the quality and reliability of all preferred components, committee members are represented on and interact closely with the component engineering Quality Architecture core team. ■



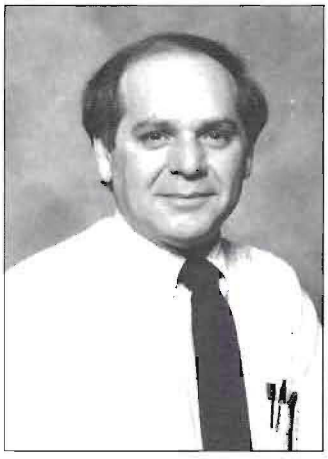
Contributing author:

Wendell Tucker
Senior Engineer,
Component Engineering

Packing & Shipping

. . . where the dock-to-dock process ends

Contributing author:



Tony Mauriello
Senior Engineer
Packing & Shipping
Process Engineering

OUR GOAL IN THE PACKING and shipping area is to evolve a process which allows material to move through the operation in a timely and efficient manner with a minimum of manual paperwork. We envision a process which includes bar-code scanners, automatic label machines, mechanical means of transporting material, and machinery to assist in the actual packing task, all making the job faster, easier, and safer for the employee.

However, first we had to consolidate the various packing and shipping functions previously located throughout the plant. In order to promote logical flow of product and packing materials, just about all the packing and shipping functions have been or will be relocated to fit into the VISION scheme. The concept behind this physical rearrangement is concentration of the major packing functions (bays, panels, circuit packs) close to the shipping docks. In that way product can flow directly from the VISION line, through the packing and shipping areas, and onto the delivery trucks.

The existing internal truck docks were filled in to open up additional floor space. The old chemical and oil storerooms were relocated to another building. Some walls were torn down, and others were put up to create an integrated packing/shipping operation. The area received a good scrubbing and paint job, offices were erected, floors were tiled — and the packing area has a new home by the windows on the sunny side of the plant. A new building was constructed to provide a place where packing materials can be received directly, stored and dispensed to adjacent packing areas.

Later this year, the bay packing operation will be moved to the southwest corner of Building 30, next to the new system test area.

The packing areas on the second floor, which handle the D4, D5, T1, and soon to be acquired DDM-1000 circuit packs, are undergoing alterations to make room for the lightwave product expansion. The result is their consolidation into a central location, close to the source shops and convenient to the elevator needed to get material to and from the area.

With most of the major moves behind us, and working closely with the Quality Architecture cell teams, we can get on with the business of bringing the packing/shipping operations in line with the Factory of the Future being built around us. ■

Customer Service

. . . *preserving a tradition*

THE EXCITING NEW PROCESSES being developed to propel VISION are given added dimension by the activities of the customer service organization. The service sector is evolving to meet more sophisticated and complex customer requirements. Together with the VISION philosophy, the customer service charter recognizes that high quality product, competitively priced, and service supported can assure our leadership in the global marketplace.

Recognized as having a measurable quality aspect, MV customer service moves forward to develop information systems and a wide variety of tools and techniques which will further elevate its activities to meet the quality service goals established in conjunction with the factory VISION goals. Continuing education of customer service personnel and team leaders committed to quality customer service have restructured the basic foundations of this organization and redirected its focus to customer commitment.

Customer support often begins before an order is actually transmitted to Merrimack Valley and can continue as a team with engineering, editing, scheduling, operating, quality assurance, production services, packing, shipping and transportation to assure meeting a customer's schedule. MV's commitment to the quality customer service VISION is reflected in the establishment of customer support services, both material and technical, available 24 hours a day, 7 days a week, 365 days a year.

As the integrated systems of VISION are developed and refined, customer service becomes a vital internal resource for information, direction and remediation, linking together those groups which can enhance processes or resolve problems.

The service tradition begun so many years ago predictably will become a critical factor in keeping our customers with us and bringing new customers to Merrimack Valley.

Creatively, energetically, and enthusiastically, the team members of the customer service organization are preparing for their vital role in the Factory of the Future — beginning to take shape now! ■

Contributing author:

JoAnn Simes
Customer Service
Supervisor

MERRIMACK VALLEY VISION

Merrimack Valley is a Network Systems location with two focused factories — Equipment and Components. Each of the factories is autonomous except for the service it contracts from central organizations; e.g., accounting, human resources, maintenance, etc. Each will be measured separately and collectively to recognize the advantage of vertical integration to the extent that the components factory is the front end of the equipment factory's process.

The business enterprise will be managed by Strategic Business Units (SBUs). An example of an SBU is lightwave products. The SBUs will be identified by the product management organization and managed with an operational plan including a marketing plan, development plan, sales plan, manufacturing plan and distribution plan. The heads of the organizations responsible for each of the plans will be the directors of the SBU with their staffs responsible for operations.

Our objective is to make money now and in the future. Our manufacturing vision will provide us with our competitive edge from our people, our products and our processes to achieve an undisputed world leadership position in quality, service and cost.

The vision of the future requires continuing improvement in all aspects of the management process, the design process, the manufacturing process, the physical automation and the information systems. The management process first and foremost requires an unrelenting passion and commitment to the continuing improvement in the quality of everything we do and believe. This pursuit is our passion and our pride for ourselves and our colleagues to achieve our potential and the potential of the enterprise. We recognize that leaders are judged by their actions rather than by their words and demonstrate their quality commitment through their behavior. The management process is the foundation upon which all else is built and is being implemented first with discipline and completeness.

The structure that will guide us is a quality architecture that provides a disciplined system for achieving continuous improvement in the quality of the process for achieving excellence. The architecture recognizes principles of operation of the factory using the Business Resource Planning System, the materials engineering objectives, and the product realization process to achieve commitment with credibility.

In all cases, we will take a total systems approach to recognize the full stream of issues and opportunities. The process will be engineered and characterized for quality control, reliability, and quality management, using process capability studies and product capability studies. Process improvements will be made with designed experiments. These principles will apply to software as well as hardware, and from design to customer acceptance.

We will continually strive to educate and communicate with every employee to more fully understand our business, the objectives and how they fit into the architecture with upstream and downstream views. We shall recognize team performance as well as individuals who demonstrate continuing improvement in our pursuit of the vision. In this unrelenting pursuit of excellence, we will satisfy our customers, the enterprise, our co-workers and ourselves in order to achieve our maximum potential. ■

1600 Osgood Street
North Andover, MA 01845