Tektronix plans for the future with Clark County plant

By Frank Catalano
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With its new production facility in Clark County, Wash., Tektronix, Inc., is out to increase profits from its oscilloscope product line by cutting manufacturing costs. Although companies constantly strive to cut costs, few in the electronics or computer industry have taken an approach that's as ambitious as Tektronix's.

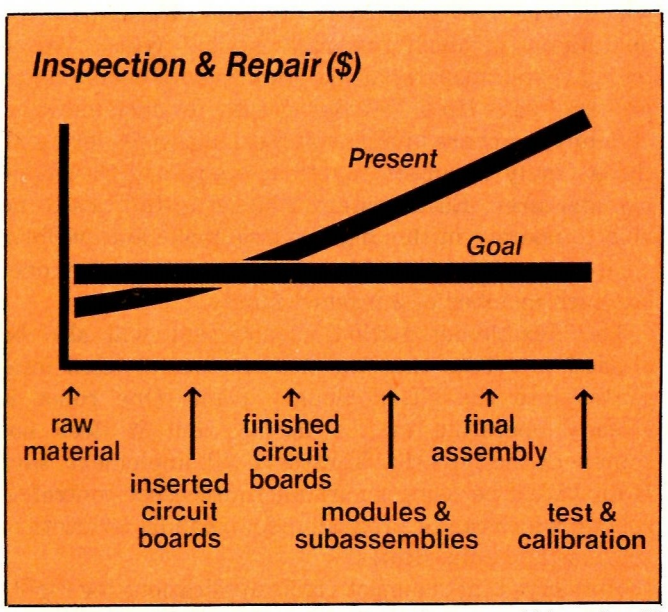
Company officials regard the new facility as one element in an effort to recapture and maintain its share of the oscilloscope market. A study by Dataquest, Inc., a Cupertino, Calif., market-research firm, says that although Tektronix controled 67 percent of the oscilloscope market in 1979, that share has been eroded over the past two years by U.S. and Japanese companies coming out with low-priced, general-purpose products on a commodity basis. In response, Will Hott, operations and planning manager of the company's Instruments Division, says that Tektronix, traditionally known as a technology-driven manufacturer of high-priced products, is now striving to reposture itself in the changing instrumentation market.

"In looking at our new products and some of those that we haven't announced yet, the fundamental goal of the company is to provide increased price/performance," says Hott. "Parallel to that objective, however, the company is also trying to provide the highest quality product money can buy. To balance the two, we'll have to raise profit margins by cutting manufacturing costs." He says that by doing so, Tektronix will be able to lower prices and become more competitive.

Evidence of that effort is the 500,000-sq.-ft. Clark County plant, which is being outfitted with state-of-the-art production equipment for the assembly of the company's newest and lowest priced line of oscilloscopes, the 2200 series, as well as the 460 series. Besides manufacturing activities, the plant will also house the business and engineering offices of Tektronix's Instrument Division. Much of the equipment will be computer-controlled and will tie into a central system so that shop-floor data can be processed for business planning. The plant will also include a new material-handling system, an automated storage-and-retrieval system and automated test equipment.

Shop-floor systems, most of which are still in the development stages, will report to Tektronix's Beaverton, Ore., headquarters through a hierarchy of installed systems. An IBM Corp. 3038, which performs processing and business-data storage for the company's four divisions, heads the hierarchy. The 3038 links to an IBM 4341 in Clark County over HYPER channels—used by engineering—and a microwave link—used by production. The 4341 performs central data storage and processing for the division and also contains a Manufacturing Resource Planning package (MRP II) supplied by Martin-Marietta. Two Digital Equipment Corp. VAX 11/750s—the only computers of their kind in the Pacific Northwest, says Hott—and a VAX 11/780 are linked off the 4341 via a Tektronix-developed communication package. The 11/780 controls engineering systems, and the 11/750s, one of which is for backup, control production systems. A range of computer systems on the shop floor, including DEC PDP 11/34s and LSI 11/23s, control production processes. Those systems will tie into the 11/750s via DECnet.

Lionel Kreps, manager of engineering services at Tektronix, notes the company's central organization allowed each of the divisions to decide what systems to link onto the IBM computers. The only constraint was that any implemented system ultimately had to report to the central computer. "As part of the divisionalization process," says Kreps, the central organization basically said 'OK, you guys have a business to run; go



As part of its effort to reduce manufacturing costs, Tektronix will carry out inspection activities *throughout the assembly process. In doing so, the company hopes to reduce the cost of repairing a finished product.*

off and run it. Just be aware that you have to furnish us with certain data."

At the Clark County plant, the Instruments Division employs an overall test in choosing equipment: each system must be flexible and responsive to changes—not only in product lines over time, but also in component and subassembly types moving through assembly.

Although the plant will handle assembly activites for only a few product lines during its first two years of operation, Hott says, each of those lines has many options. Each member of the 2200 family of oscilloscopes, for instance, contains the same basic circuit board, but components in those boards are subtly different. Rather than set up a separate circuit-board assembly system for each family member, the Instruments Division is developing a random-board-insertion system that automatically adjusts itself to accommodate options.

"We don't want to be running one type of board through the equipment, break down the system, set it up again and then run another type," says Kreps. "We'd like to run boards through randomly, regardless of whether they're for the 2200, 2300 or whatever."

Ultimately, he says, as a board runs through the insertion system, the equipment will be able to insert a diode, for instance, into a specific location on the board. If the next board on the line requires a different type of diode, however, or a diode of the same type inserted into a different location, the equipment will be programmed to automatically adjust itself to accommodate the necessary changes.

Kreps says that the random-board insertion system, which will be controlled by LSI 11/23s, will be operational in about one and one-half years. "We're trying to automate what has traditionally been a batch process," says Hott. "We don't really produce individual family members in high volumes, but, considering all those family members together, we're a high-volume manufacturer. Each system that we install has to be able to operate in this high-volume mode and perform whatever task it is intended to perform on not just one, but each member of a product family."

The flexible-automation requirement will also be applied to robots that the instruments division integrates into the Clark County plant. One robot is already operating at the facility, but it does not represent the type that Tektronix will implement, says Hott. "We'll be using smart microprocessor-controlled robots, which can be programmed to handle a variety of routines and subroutines."

Hott says that the most viable applications for robots include storage, in which robots can take components and subassemblies in or out of storage bins, and assembly, in which robots can replace shop-floor personnel doing repetitive, mundane or hazardous tasks.

Tektronix's new 500,000-sq.-ft. Clark County, Wash., plant *is being outfitted with state-of-the-art production equipment for the assembly of the company's general-purpose oscilloscopes.*

The Instruments Division also plans to automate activities other than assembly, including inspection, storage and retrieval and materials handling. As a means of reducing repair costs of assembled products, the division will inspect the parts as they come in for assembly. Although equipment to test incoming parts has not been decided upon, Hott says, those that are put in place will tie into the VAX 11/750, enabling failure rates of parts to be monitored and recorded. If a part develops a history of failure, its vendors will be notified to take corrective action. Subassemblies will also be tested as they move from process to process, and those test results will also be recorded in the 11/750.

In the final inspection area, where finished boards will be tested before assembly into oscilloscopes, two GenRad systems are in place, and a third is scheduled to be operating within the next few months. Kreps says that the division hopes to automate the board-testing procedure to the point at which boards designed for any product family will move through the test system on a conveyer belt, and the system will automatically perform required tests.

As components, subassemblies and finished oscilloscopes continue through the plant, they must be stored between processes. Hott says the division will probably use revolving computer-controlled carousels. He says that a DEC PDP 11/34 will control the system, moving a carousel to a designated location so that a user or a robot can insert or remove parts. The 11/34 will also report stock status of parts and subassemblies to the 11/750s as parts enter or leave storage.

Various material-handling systems to transport parts and subassemblies through the plant are being evaluated, and Hott says the strongest contender so far is an

overhead monorail system. The system includes a carrier, or arm, which is suspended from a track and holds three or four bar-coded totes. Each tote stops at a location if its bar code matches a bar-code reader at that

AUTOMATED WAREHOUSE: THE BUILDING THAT ISN'T

It looks an awful lot like a building—four walls, a floor and a ceiling—but it's a machine. And besides being a subject for an argument in semantics, it's a great tax write-off.

Tektronix's two-year-old, $21-million automated warehouse has not only improved the efficiencies of storage-and-retrieval activities in the company and provided better record-keeping and inventory control, but also has helped improve cash flow. Roughly 40 percent of the structure is taxed as captial equipment because three of the warehouse walls are supported by frames on which storage bins are located. Rather than the 30- to 40-year depreciation allowance of typical buildings, that 40 percent of space is depreciated over 10 years. Dick Carnahan, manager of distribution warehousing at Tektronix, says the depreciation rate improves the company's investment capability. "It allows cash to flow back into the company at a faster rate to offset the original investment," he says.

But taxes are only part of the overall savings Tektronix has derived from its warehouse. Carnahan estimates that, by providing better control of inventories, the facility is saving the company approximately $2 million a year.

The 193,000-sq.-ft. building/machine stores about 130,000 part lines used in the assembly of Tektronix's products. Approximately 45 percent of those parts are from outside vendors, and the remaining are company-made. On an average day, about 2000 part lines enter the facility, and 15,000 leave. Each part line can consist of just one item or as many as 150,000 items.

Between the time they are received and when they are shipped, parts are inspected, packaged, counted and stored. About 65 percent of parts received are small, such as circuit-board components. Such parts are stored in the "mini-load" system, consisting of 24 50-ft.-long aisles of 29½-in.-high shelves. A conveyer belt moves the parts through those aisles, and a stacker crane sets them into storage on the shelves. Larger items, called pallet items, are stored in 11 325-ft.-long aisles of 49½-ft.-high shelves. Forklift-like storage/retrieval trucks move materials through that area and into designated locations.

Hardware for the automated storage-and-retrieval system was supplied by Eaton-Kenway, Salt Lake City, Utah.

As parts move through the warehouse, they are tracked by an on-line computer system—two DEC PDP 11/70s. Data, such as part number, vendor identification, quantity, due date and purchase-order number, are fed into the system via Tektronix 4025 terminals in work areas throughout the facility. Personnel can locate a part almost instataneously at any stage of the storage process. The 11/70s also control the material-handling systems and determine where parts will be stored.

Software was designed by Eaton-Kenway and modified by Tektronix. Each night, warehouse activity data are shipped to the corporate IBM 3038 system via paper tape. The information is fed through Tektronix's MRP system and processed for business use in billing, scheduling and inventory control.

The 3038 processes weekly part orders from the Tektronix divisions and sends the orders to the 11/70s in the warehouse. The 11/70s sort the orders according to due dates and generate a pick list to plan weekly shipments to the assembly area.

Carnahan says that, over two years of operation, the system has reduced delivery times by 75 percent, compared to the previous system. "Our goal is to be not more than three days early now," he says, "but never late." So far that goal has been met. Carnahan says that studies of the system show that 99.7 percent of all items ordered are delivered on time.

Approximately 65 percent of the 130,000-part lines stored in the automated Tektronix warehouse *are housed in the miniload section. Two DEC PDP 11/70 computers keep track of where each part is in the storage process.*

location. The bar-code system also allows the VAX 11/750 to track the parts as they move through the plant.

The Martin Marietta MRP II software package, which runs on the IBM 4341 computer, ultimately receives data from the systems on the plant floor and converts that data for use in running the business activities of the Instruments Division. Each Tektronix division will have its own MRP II system, but data from the divisions still must be reported daily to the IBM 3038 in Beaverton for storage in a central database.

Hott notes that the MRP II package is available in modules and, therefore, need not be implemented all at once. Thus far, the Instruments Division has purchased and is testing and debugging, the inventory-control, business-planning and production-control modules. The division is also considering purchasing and costing modules.

"Our goal is to become a Class-A MRP company," says Hott. "I don't think any other $1-billion company has ever attempted that."

Although Hott says the purpose of implementing all this automation into the Clark County facility is to "take labor out of products and thereby lower manufacturing costs," he adds that "Tektronix is not going to fire all of its people and hire a bunch of robots." He says manual labor will be used in facets of the production process in which it is not "technologically or economically feasible to employ machines." People will also be used on the shop floor to operate equipment and to input production data into the computer system.

Although the plant personnel will perform blue-collar tasks, they'll work in a white-collar environment. The manual-assembly area is carpeted, and workers sit at desk-like work stations. But the work area was designed not only with aesthetic considerations, but also with functional considerations in mind. The modular work stations, for instance, can be disassembled and reconfigured as production processes change. Furthermore, the carpet in the work area dissipates static electricity better than vinyl asbestos tile, which is normally used in such areas.

Tektronix spokespersons are quick to point out that much of what is planned for the Clark County plant is still in the design stage, and many plans may change. But Charles Taylor, a senior Dataquest analyst, notes that the mere fact that the company is taking a stab at improving manufacturing-cost efficiencies is significant. "A lot of companies are fighting Japanese attacks by going to Singapore and Hong Kong for their manufacturing tasks," says Taylor. "Tektronix is planning with the future in mind, and, in the long run, it will be to their benefit." ■