

## APPLICATIONS

# CAT ATTAINS WORLD-CLASS MANUFACTURING WITH MES

BY MARTY WEIL

**W**ell into the second year of a vast modernization program that promised to transform Caterpillar's York, PA, oil-cooler manufacturing plant into a domestically based world-class manufacturing facility, the company (which had spent more than \$6 million upgrading machinery and equipment) determined that tighter inventory control and advanced material tracking was crucial to achieve its final goal.

"The question quickly became how to reduce past-due orders, improve throughput, and reduce inventory," says Bruce Hershock, product manager for Caterpillar York's Precision Bar Stock Business Unit, which is part of Caterpillar's Component Product Div. "We had gone as far as we could with a manual system."

By implementing CIMITAR, a manufacturing execution system from British Aerospace Inc.'s BAeCAM subsidiary, Caterpillar gained control of its \$2 million inventory. CIMITAR is distributed exclusively in North America by Harnischfeger Engineers Inc. (Milwaukee, WI) under the PLANTMASTER/CIMITAR name. The valuable inventory data PLANTMASTER/CIMITAR provides is used to generate accurate schedules that satisfy production demand.

Under the old system, inventory records were loaded manually on an independent database. "Before the implementation of the cell control system, we were spending 12 to 16 management labor hours per day tracking inventory," says Hershock. "That time is now being spent managing production, not chasing inventory."

Caterpillar manufactures an oil cooler in two stages. The rough cooler is machined in specific machining work centers and stored for later use in the assembly process. The machined coolers are then combined with purchased, finished material during the assembly process to produce the finished oil cooler.

With PLANTMASTER/CIMITAR, supervisors are involved in productivity-enhanced activities. Cater-



*PLANTMASTER/CIMITAR, a manufacturing execution system for cell control, helps Caterpillar York tightly control its \$2 million oil cooler inventory.*

pillar is now more responsive in its approach to assembly. For example, if the order schedule dictates a change, the supervisor can see quickly the impact of the change in both the inventory and workstation load and react accordingly. In addition to improved inventory control and enabling better factory-floor decision making, PLANTMASTER/CIMITAR helps ensure that Caterpillar operators build to the correct plan with less rework and higher quality. Because the system uses a single database, data inconsistency is eliminated. Furthermore, as PLANTMASTER/CIMITAR tracks part deliveries, data accuracy of part consumption and part shipping is improved. As a result, the once high levels of system maintenance and support are now things of the past.

"PLANTMASTER/CIMITAR enables us to empower the cell operators to run the cell with minimum supervision, says Hershock. "By providing access to data about all the work in the cell, operators can make informed decisions about their work."

PLANTMASTER/CIMITAR is linked to the upstream order release and process planning system by three Factory Adapters. Links to the storage system are achieved using a single Transport Adapter. The interface between operators and the control system is provided by a set of PLANTMASTER/CIMITAR screens that

allow the operator to manipulate work to list entries and deliver or remove material as needed.

BAeCAM began work on the Caterpillar York project by first performing a detailed design study to better understand the complex requirements of the application. From this study, functional specifications were generated for Caterpillar's acceptance. After compiling the software and assembling the module, Caterpillar conducted a series of acceptance tests, including a simulation period which mimicked full production.

According to Hershock, Caterpillar plans to begin work with BAeCAM on the implementation of an integrated finite scheduler. The finite scheduler will further improve efficient plant management by automating production schedules. "We've simplified our process. Wherever production procedures could be changed, eliminated, or consolidated, we've done it," according to Hershock. "We have automated dangerous processes and resolved ergonomic problems. No one wants to return to the old system. We just want to continually improve upon the new one."

## MES: A GOOD DECISION FOR PLANT ONE

BY GREGORY FARNUM

**B**ig. That's a word that comes readily to mind when thinking of the Union Tank Car Co. (Chicago, IL). The company's flagship manufacturing facility, designated Plant One (East Chicago, IN), is a 630,000-sq.-ft. factory that builds standard and customized railroad tank cars. The plant employs an extensive array of equipment and processes to get the job done, including CNC machine tools, robotic welding systems, a 12,000-ton cold forming press, and 110-ft. stress relief furnaces.

Gaining accurate and timely information about this vast and complex production facility was a big job as well—too big, in fact, to be handled successfully, until Plant One installed the Time Critical Manufacturing (TCM) manufacturing execution sys-



*In addition to controlling and tracking its 630,000-sq.-ft. shop floor, managing inventory, and coordinating purchasing, Union Tank Car's Plant One uses the TCM system to closely monitor efficiency and maintenance needs.*

tem (MES) from Effective Management Systems Inc. (Milwaukee, WI).

In 1987, plant managers determined that their existing information system lacked the power that Plant One required in a number of areas, including shop floor control, data collection, labor reporting, purchasing, routing, bills of materials, and inventory management. It needed to be replaced. Driving this decision were some business concerns. John Sainato, director of materials for Plant One, gives an example. "We build a lot of specialty tank cars to fulfill specific customer requirements and with the capabilities of our old system, we couldn't be sure what our real costs were on these orders. We realized that we had to start accumulating cost data by workcenter, by operation, and by other factors in order to compare actual costs with estimated costs and adjust prices accordingly."

EMS worked with one of its data collection partners, Epic Data (Richmond, B.C., Canada), as well as with Digital Equipment Corp. (Maynard, MA), to design a system that would meet the plant's technical needs and business goals. An EMS team, led by senior manufacturing consultant Jeff Martocci, then worked closely with Plant One to ensure that the system was up and running by the deadline.

"Our goal was to have the EMS system installed and operational by the time of our annual two-week shutdown in July of 1989," notes Elipani. Since then, Plant One has been using TCM, operating on a DEC MicroVAX 3900 networked with an Epic bar code data collection system operating on a MicroVAX 3100, for shop floor control, inventory management, and pur-

chasing. "We use basically the entire EMS TCM system," says Elipani. "It gives us much tighter control over our operations, and it clearly depicts the efficiency by order so that we can know if we overran the estimate on a given job and didn't make the level of profit that was projected."

"It's important to note," adds Sainato, "that the system has also provided us with a great deal of flexibility. It can be modified and expanded quite easily, and we've used this flexibility to design a machine maintenance system for our specific needs. We are able to monitor all of our machine breakdowns now, and all of the material issued to repair those machines. We know how long a machine has been down, who is working on it, and

what the material and labor charges are. We have had this system in place for approximately a year and a half, and we anticipate that the data it compiles will be very helpful in making evaluations as to whether equipment should be repaired or replaced. It should also prove helpful in evaluating competing types of new equipment, once sufficient information has been accumulated."

EMS TCM has lowered the plant's computer use fees as well. "In the past, we were charged an information-systems fee by the corporate office for computer services rendered to the plant," Sainato explains. "The EMS system largely eliminated those charges, and netted a big savings for Plant One."

## MES ON A FAST TRACK AT CIRCUIT CENTER

BY GREGORY FARNUM

**R**esponsiveness to customer needs. Many companies talk about it; Circuit Center Inc. (Dayton, OH) lives it. This 106-employee firm specializes in fabricating prototype printed-circuit-board substrates in small lot sizes and delivering them quickly, often in 8 to 72 hours from receipt of order. To prosper under these demanding conditions, Circuit Center has had to employ the best people and production equipment it could obtain. In recent years, it has reinforced those strengths with a new element: Shop Floor Data Manager (SFDM), a manufacturing execution system (MES) from Industrial Computer Corp. (Atlanta, GA).

The decision to implement an MES arose from a number of factors, explains Lins Alt, systems manager for Circuit Center. "We have approximately 300 active orders at any one time, and we have to turn those orders quickly," he says. "We were looking for a way to accurately track the status of all of those orders and guide their sequencing through the right processing steps. We needed a system that would let our operators rapidly verify that the operation they were about to perform was the right one for that particular order."

Additional goals were to gain

more complete historical data for quality and maintenance purposes, and to provide more accurate job status reporting to customers—a major plus in a business where customer needs can change in the middle of an order.

After evaluating numerous solutions, Circuit Center chose SFDM, a package designed specifically for managing discrete shop floor operations. It offered Circuit Center the process validation; complete material, lot, and finished product tracking; and equipment status and quality reporting that it was looking for. "In terms of tracking," says Alt, "some of the systems we looked at merely provided a historical record of what had been done. With SFDM the operator can check his intentions beforehand."

Another plus was Capture, SFDM's embedded application enabler and language. Capture's flexibility allows users to customize the interface to suit their requirements, reconfigure the system as needs change, and integrate SFDM with the database of choice, as well as with a wide variety of devices and software systems.

Circuit Center integrated SFDM with its existing MOOPI finite scheduling package from Berclair Group Inc. (Dorval, Quebec, Canada). SFDM feeds the plant's demand and equipment status information to MOOPI,