

MANAGING automation™

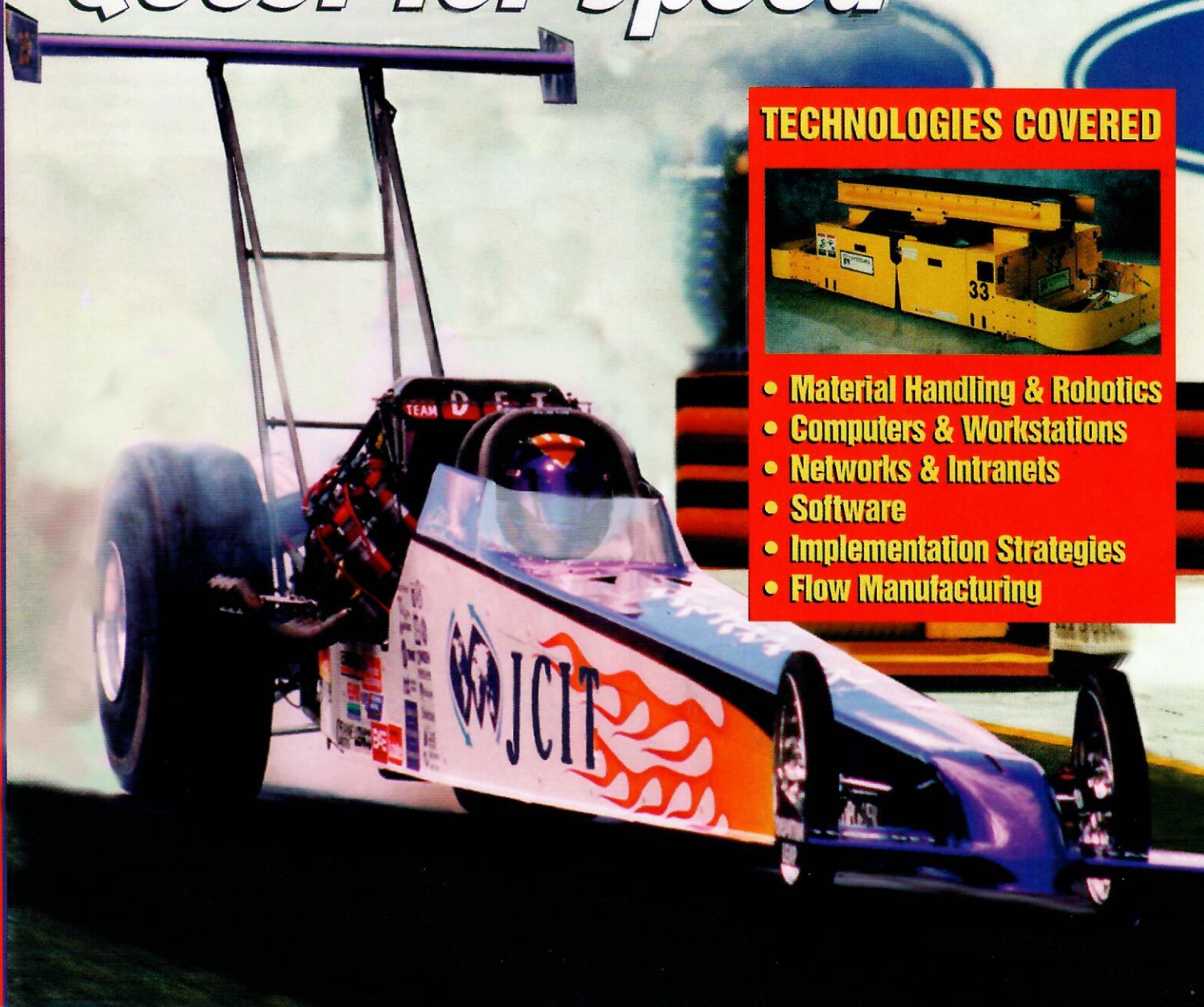
SOLUTIONS FOR INTEGRATED MANUFACTURING

Manufacturing's Quest for Speed

TECHNOLOGIES COVERED



- Material Handling & Robotics
- Computers & Workstations
- Networks & Intranets
- Software
- Implementation Strategies
- Flow Manufacturing



Manufacturing's Quest for Speed Means Business

COVER THEME

The quickening pace of manufacturing is set by customer demands. Technology is helping by increasing manufacturer's ability to respond faster—slashing time to market, reducing process time, and overhauling traditional planning and scheduling practices.

BY BILL McILVANE

Manufacturing is living life in the fast lane. What company today is not feeling the pressure to speed up its manufacturing operations, its product-development cycle, its ability to respond to new or changing customer orders, its return on software investment—perhaps all of the above?

Manufacturers have been on a quest for speed almost since they began manufacturing. After all, it was in Adam Smith's famous 18th century pin factory that the division of labor first allowed each worker to perform just one part of the process, thus speeding up the production of pins. Since then, though, the concept

of speed has changed. In the 1970's and 1980's, speed in manufacturing meant automation: robotics, automated material handling, computer-aided design (CAD). These advances sped the completion of tasks—moving and inserting parts, producing engineering drawings—but did little to increase the overall speed of manufacturing because they were not integrated with related operations and business processes.

In the 1990s, speed has become a business issue. What matters now is time-to-market, rapid implementation of automation, and quick response to change. That requires speed *plus* synchronization.

"Customers demand response," says Bill Swisher, vice-president of the John Costanza Institute of Technology (Englewood, CO), an educator in demand-flow manufacturing methodology. "And not just response, but flexibility and more options—their unique product." Brand loyalty? Forget it. "If it's not on the shelves—or if it's not cheaper—they'll go elsewhere," he says.

"Much of the focus on response to date has been on the product-development cycle," says Joseph Campbell, vice-president of marketing at Adept Technology, Inc. (San Jose, CA), a maker of industrial robots and vision systems. "But the clock keeps ticking until you're in full production. For that reason, we're seeing more interest in tools to collapse the integration cycle to the shortest time possible."

Competition is driving manufacturers to plan,

Demand Flow Technology, JCIT's flow-manufacturing methodology, fuels the company-sponsored drag-racing team.



build, and deliver products faster than ever. "Anheuser-Busch's 'born-on' date speaks to the fact that they can deliver faster than ever," says Glen Davis, executive vice-president of HK Systems (Milwaukee, WI), a supplier of warehouse management and plant floor control systems.

Thus, it's time to think of rapid manufacturing not just in terms of raw speed but also as a business issue. "We're going to see companies judged on speed," says John Costanza, CEO of JCIT. "It's not how big you are, it's how fast you are."

TECHNOLOGIES FOR SPEED. Today, the quest for speed in manufacturing takes many forms:

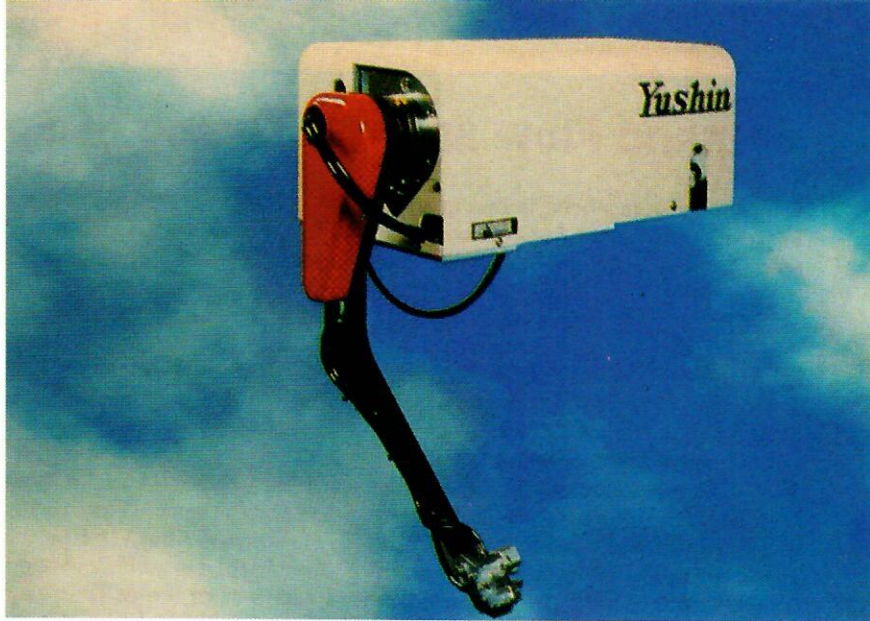
Computers and Workstations: As the backbone of automation, computers are providing more raw power and more speed than ever before, seemingly on a daily basis. Although benchmarks do not prove ultimately whose workstation is fastest, there is no question that graphics processing is increasingly at a remarkable rapid rate.

"In the design process, the quicker the response, the more efficient the designer is in getting the job done," says Denis Bournival, product manager for the PC marketing center at Hewlett-Packard Co. (Cupertino, CA.) HP just released the Kayak line of personal workstations, which it claims is the fastest Intel-based graphics workstation on the market.

But Digital Equipment Corp. (Maynard, MA) claims the industry's fastest graphics, thanks to its Alpha processor, which clocks in at up to 500 MHz.

Analysis Research Corp. (Palo Alto, CA) asserts that its high-performance, nonlinear finite-element analysis (FEA) software running on the AlphaServer 8400 is its fastest ever. "As a result, engineers can perform highly accurate analyses of product designs and manufacturing processes in hours, rather than days or weeks," says Louis Crain, CEO of MARC.

Both Intel Corp. (Santa Clara, CA) and IBM Corp. (Armonk, NY) have announced breakthrough microprocessor technologies that will make chips significantly faster than ever. Intel's new flash memory chips double the amount of data each transistor can store, thus increasing the speed at which systems from PCs to cell phones can operate. IBM followed with a chip breakthrough of its own based on copper circuits, which conduct electricity faster than more commonly used aluminum. Although both breakthroughs will take years to make it into products, they



Yushin America claims the world's fastest injection-molding robot, capable of removing parts in 0.15 sec.

were driven by a quest for faster processing.

The workstation was one of the notable advances in speed in the 1980s, offering faster as well as more powerful design and analysis of discrete parts. "If you can try six different versions in the time it took you to do two or three, you're ahead on the development cycle," says Tom Greaves, a senior researcher at Daratech Inc. (Cambridge, MA). The savings means nothing, though, if it does not hasten completion. "Just doing more iterations alone does not save time. You have to manage the engineering cycle to push the designs through faster, as well."

But what good is a faster workstation if you're just creating new designs from scratch that could have been modified from existing drawings? Brian Stolle, CEO of Agile Software Inc. (San Jose, CA), says engineering departments must re-use more designs. "Companies are beginning to realize they are wasting enormous amounts of time creating new designs instead of modifying existing ones. They see managing the engineering change cycle as a strategic weapon."

Even the time needed to get engineers trained on a CAD System is getting shorter. "Unfortunately, most of the systems today still require an inordinate amount of time to master," says David Weisberg, a CAD-industry consultant. Manufacturing and Consulting Services (Scottsdale, AZ) now offers Anvil Express, which offers a highly productive user interface and a new concept in multimedia coaching tools, according to Weisberg. Also, Matra Datavision (Andover, MA) has announced a computer-aided drafting tool, Euclid Drafter, for "incredibly fast, truly professional drafting."

Turn Pages Quickly for More Speed in Manufacturing

The theme of speed and manufacturing continues throughout this issue. See the Managing Enterprise section, page 38, for the latest on Gigabit Ethernet networks and advanced planning software for rapid response. Engineering workstations are covered in the Product Development, page 48. Leading Edge, page 76, explains the technology of Fibre Channel.

Photo courtesy: Yushin America



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Demand Flow and the Theme of Speed

John Costanza has been pursuing speed for years—as a drag racing enthusiast and as a proponent of flow-based manufacturing. When he founded the John Costanza Institute of Technology (JCIT) in 1984, he took ideas he had developed at Hewlett-Packard Co. and unified them as Demand Flow Technology. As a racing aficionado (he takes the wheel himself occasionally), he has begun extending JCIT's influence into the hugely popular racing world, promoting a full-time team of drivers (Bill McCormack and Tim Wilkerson) in 5000 hp dragsters that hit speeds nearly 300 mph (*Managing Automation*, July 1997, page 30). It's a kick for Costanza that also pays off: JCIT claims \$1 million worth of free publicity on the circuit and its clients attend the races and hobnob with the drivers.

But fun and games stop at the classrooms, where over 50,000 manufacturing professionals have passed through, learning the methods of DFT.

"A lot of dyed-in-the-wool MRP people come in and are skeptical," says JCIT vice-president Bill Swisher. By the time they leave four days later, however, they have a different idea.

"Many of our customers have been through JCIT's seminars and we find that they are some of our best prospects," says Karin Bursa of American Software. "We fully support what [Costanza] is doing."

American Software offers an on-the-shelf flow-manufacturing software package. JCIT's software, based on patented mathematical models, supports its own Demand Flow Technology, and JCIT will begin marketing the software in another year or two. What follows is Costanza's outlook for DFT.

Is the company repositioning itself as a software vendor?

"I don't think we're repositioning at all. We're in the Demand Flow business, and one element of that is software. In order to do Demand Flow, do you need a computer? Yes. Do you need a scheduling system like MRP? No.

"My intention is to conquer the world with Demand Flow, but not to conquer every company. If a competitor uses Demand Flow against you and you don't fight back with Demand Flow, you lose.

"I think the flow industry will get very active in the software business.

For instance, we're talking to ERP vendors about licensing Demand Flow Technology. I also think you'll see more software companies introducing Demand Flow products, not because they love it, but because they have to."

You've been known for being "anti-MRP." Are you feeling more vindicated now?

"The fact that they acknowledge a need legitimizes Demand Flow Technology. Our relationship shouldn't be adversarial, though; there's nothing wrong with MRP. I was part of the MRP crusades in the 1960s and 1970s. But if you run a scheduled factory and want to cut lead time, from six weeks to four hours, I can't help you. No one can schedule that fast. You can take it from six weeks to one week. Getting to that one week is incredible. There's nothing wrong with that and never say it's wrong. On the other hand, if you've got a different set of tools..."

Aren't the APS vendors getting around the limitations of MRP by taking a rapid-response approach?

"With Demand Flow Technology, we're

taking a think-tank approach to manufacturing. Would you come up with scheduling now if it didn't already exist? Would you come up with manufacturing cells?

"At HP we took pride in asking, 'Is there a better way?' For example, why not eliminate disk drives? Today, you don't want to be developing a bigger and better disk drive. Today, manufacturing people are asking a simple question: Is there a better way, as opposed to making a bigger, faster planning system? Can you load it all into RAM? There's a great idea—let's put MRP on a chip. Question is, can you eliminate MRP?"

What do you do with your forecast?

"We have a thing called a flex fence. It says if you're going to need 15 parts, then order 17. There's no tie between what you think you're going to make and what you think you are going to buy, because we acknowledge that you are never going to hit a forecast. And with shorter and shorter lead times, it's going to get tougher and tougher. If you tie what you're going to build to what you buy, and lead times get shorter and shorter, the nervousness between you and your suppliers is going to increase.

"That's a flaw of MRP, and that's also where we disagree with just-in-time [JIT] proponents. Shorter lead times require a cushion of material. If you get an unexpected demand, be glad you have that cushion, because it uncouples what you build from what you buy and lets you process orders quickly without rankling your suppliers. If you're doing that, you technically are forecasting that cushion out to your suppliers, even if you change your volume mix every day. Why do you need MRP if that's the case? Eliminate the transactions.

"You need to simplify. The simpler it is and the faster it moves, the less you need to transact and the less data is relevant, because its moving too fast. Why try to assemble the ultimate data flow—execution, collection, integration—when you can just get rid of it?

"If you look at things that way, the need for data drops dramatically; you'll just slow down the process. If it takes 12 weeks to get a product through the process, you care where it is; there's a lot of places it can get lost. Plus in 12 weeks it's picking up a lot of incremental costs. If you take the same product through in one day, who cares where it was in the process?"

