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Java Is Penetrating All Aspects Of Industry And New Products

BY MICHAEL McCORMACK

SAN FRANCISCO, Calif. — Publicity surrounding the meltdown of Internet stocks is masking an important development taking place in the information technology sector. Tens of thousands of software systems developers working on Java are still gainfully employed and are quietly — yet quickly — building the underlying infrastructure for what will become a new era in corporate efficiency.

Java, the programming language created by Sun Microsystems, is being written into hundreds of enterprise applications, industrial processes and new products that will be linked together via robust networks. The development of Web-centric computing based on interchangeable Java scripts is expected to transform many industrial sectors and mainstream society due to its ease of use and portability across numerous hard-

ware platforms. Java's promise is expressed aptly in its credo of "write once, run anywhere."

At the JavaOne trade show held early in June, more than 20,000 software developers from around the world descended on San Francisco's Moscone Center to share information, debate proposed industry standards and educate themselves on Java pro-

gramming techniques.

It was clear from the show that Java has gone beyond what most view are the traditional boundaries of IT's domain of desktop, server and network. Java technologies and standards are being offered everywhere, from digital televisions and set-top boxes, to telecommunications networks, point-of-sales tracking systems, intelligent vehicles and smart cards.

Java has spawned a crusade of systems developers throughout all of the major computer and software companies because its founders promoted it as an open forum for establishing industry standards for application interoperability. This movement has been codified and is called the Java Community Process (JCP). In only six years, the JCP has become an independent means to ensure application interoperability for the computer industry. Java is a bonafide threat to

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Danaher Is A Paragon Of Lean Success

For people in the "know," Danaher Corp., a diversified industrial conglomerate based in Washington, D.C., is one of the best-managed U.S. companies, ranking in stature with General Electric and Tyco. The maker of Craftsman Tools for Sears has spent the past 13 years perfecting its Danaher Business System (DBS), which is founded upon the principles of lean manufac-

turing and the Toyota Production System.

Danaher is considered to be one of the most advanced companies in the United States in lean implementation. It has quietly gone about its business, shunning publicity and instead concentrating on serving its customers.

The approximately 60 companies under Danaher's umbrella

are all autonomous units save for one major distinction: they have all deployed the Danaher Business System within their operations. This system "continuously strives to improve quality, delivery and cost," says Danaher. "The Danaher Business System can be found in every corner of Danaher operating units, not just on the shop floor. Customer ser-

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Mfg. Leads On EC Front, Says Census Bureau

The Internet and electronic commerce providers have to be thankful for the old economy, and especially manufacturing. As it turns out, the largest user of electronic commerce in the country is the manufacturing sector, according to the U.S. Census Bureau in its first ever measure of electronic commerce in the economy.

"Manufacturing led all industry sectors with 1999 e-commerce shipments that accounted for 12 percent (\$485 billion) of total value of manufacturing shipments" from U.S. plants (\$4.038 trillion), says "E-Stats," the Census Bureau's snapshot of e-commerce activity in the United States.

In the service industry, e-commerce accounted for only 0.6 percent (\$25 billion) of total revenues. "Retail trade, the focus of much e-commerce attention, had e-commerce sales in 1999 that accounted for 0.5 percent (\$15 billion) of total retail sales," says the E-Stats report.

To view the report, go to <http://www.census.gov/econ/www/ebusiness614.htm>.

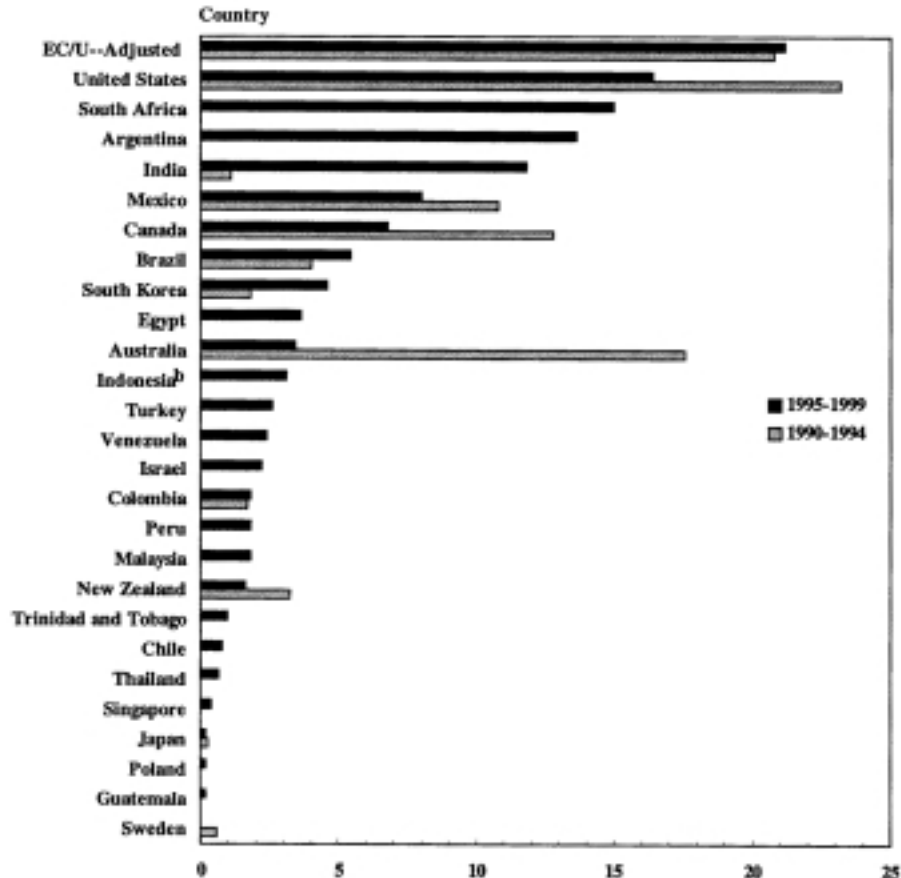
United States Leads The World In Use Of Anti-Dumping Actions

"The United States remains one of the most aggressive users of antidumping laws in the world," says the Congressional Budget Office in an exhaustive analysis of antidumping practices in countries around the world. "The duties it imposes are a substantial impediment to trade in the goods at issue, imposing net costs on the U.S. economy as a whole."

As of January 2000, the United States had 267 active antidumping measures in place against other countries, while there were only 107 measures against it. Antidumping restrictions "are a significant exception" to the general free-trade thrust embraced by U.S. policy makers, says CBO in "Antidumping Action in the United States and Around the World: An Update." "In addition to the costs they impose on the U.S. economy, they are one of the major focuses of foreign complaints about U.S. trade policy."

One of the reasons for the common use of anti-dumping actions is the ballooning U.S. trade deficit with the rest of the world, the CBO explains. "Consequently, if one expects the number of anti-dumping measures that one country maintains against another to be roughly proportional to the amount that it imports from that country...the United States should have more active anti-dumping measures against the rest of the world than the rest of the world has against the United States. For a copy of the CBO report, go to <ftp.cbo.gov/28xx/doc2895/Antidumping.pdf>.

**RANKING OF COUNTRIES BY AVERAGE NUMBER
OF NEW ANTI-DUMPING MEASURES IMPOSED PER YEAR**



GUEST EDITORIAL

The New ISO 9000 Standard Is A More Comprehensive Measure Of Quality

BY PAUL VRAGEL

The International Standards Organization's extensive overhaul of its 9000 quality standard makes the standard more useful for organizations seeking to improve performance and profitability. The new standard represents a change away from a procedure-driven system to one that is focused on results. Leadership, a customer focus, continual improvement and a process-based approach are the four principles adopted in the new standard.

The process-based approach, which permeates every area of the new standard, starts with understanding the interactions among the various areas of a company's business. Developing this understanding begins with a set of process maps that visually demonstrate the flow of work and information between and among these areas. The visual nature of these process maps makes it easier to see where there is "sand in the gears."

Other elements of a process-driven approach include establishing objectives, identifying the processes that support those objectives, making sure the resources and information needed for those processes is effective, establishing the measurement and monitoring necessary, and evaluating the results.

Using a process-based approach, companies have increased manufacturing yields by up to 80 percent, reduced processes from 35 steps to just six steps, and reduced turnaround time by up to 90 percent. Companies deploying the new system are creating new products for time-sensitive customers through better understanding of the company's own processes. Companies are also able to charge a premium price for a new product, consolidate procedures among departments and substantially reduce transaction times.

"We've seen the results of taking a process-based approach in a streamlining of our operations, reduced costs and improved turnaround time to our customers," says Elliot Goldman, president of Communication Coil, an aerospace electronics manufacturer. "We're also well on the way to getting our ISO 9001 (2000) certification based on processes and

documentation that are in our own language, and makes sense for our business."

The new standard requires fewer specific procedures than the 1994 and 1987 versions. The trade-off is that you have to look at your own business, decide what processes you need to both serve your customers and support your operating requirements and document and manage those

processes. The new standard avoids unnecessary documentation.

Leadership and Involvement

The new quality standard requires demonstration of top management's commitment to and participation in making the system effective. This is accomplished through assuring that measurable objectives are set and systems and processes are in place to meet those objectives. Having a better understanding of the processes of the business and the objectives of those processes creates additional opportunities for involvement of all employees in improvement of the system. No specific involvement approach is required by the standard.

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Comparison Of ISO 9000 From 1994 To 2000

ISO 9000 (1994)	ISO 9000 (2000)
Short Summary: "Document what you do and do what you document"	Short Summary "Identify, document and use processes that meet customer requirements; and be continually improving those processes"
Focused on documentation / procedures	Focused on how processes work together to meet objectives and requirements - a "process-based approach."
Having a procedure is sufficient	Continual improvement is required
Specified procedures required for most areas of the standard	Fewer procedures are specifically required by the standard - you determine what you need to control your processes, meet customer requirements and achieve continual improvement
Could exclude elements from the scope of your system even if they were important to your business (e.g., design), entirely at your option.	Exclusions limited to certain areas, must meet specified criteria, and be justified in your documentation.

Java... (From page one)

Microsoft's dominance.

The software industry is targeting its solutions with a new concept called "Web services," which are a collection of technologies that allow for an efficient way to deploy Web based commerce and IT applications. All of the major vendors are talking about their Web services solutions based upon Java.

"The name of the game is Web services — sophisticated network software that will bring us what we need, when we need it, no matter where we are, through any device we choose — wireless phone, pager, PDA, or one of the new hybrid handsets," says Sun Microsystems in a paper titled "Java Technology Today, Driving the New Wave of Open, Intelligent Web Services."

"Every major technology company — Sun, Microsoft, IBM, Oracle and Hewlett Packard — is talking

up the benefits of Web services." Java, Sun adds, is the platform that will "help make this common vision a reality."

The Java version of Web services is going head to head with Microsoft's .NET version. The clear difference is that where Java standards are established via an open, democratic process, .NET is controlled by Microsoft.

A number of Java leaders view the effort by Microsoft as another way for Microsoft to extend its dominance in the IT realm. Conference speakers who addressed the Java versus .NET issue were not necessarily fearful of Microsoft, but there was a distinct sense that Microsoft's way of preaching standards does not sit well with the American psyche of what is fair and democratic. It was clear from the JavaOne show that the community is taking the Microsoft threat seriously.

The products and platforms that

are Java-supported are large and growing (see list below.) The reach is impressive. Consumers and employees will be touched no matter their location in the world, thanks to a system that is always on, always connected. The efficiencies that corporations will realize over the next 10 to 20 years will be significant based on the Java standards for wireless, say Java developers.

Corporate and consumer targeted applications that are on the near horizon will incorporate in-store point-of-sale terminals, notebook JavaCard readers, corporate security badges and readers, game consoles, cell phones, personal digital assistants, two-way pagers, video cameras and portable Web pads, among others.

The advent of these Java enabled wireless devices has IT organizations beginning to think about or in some cases deploying corporate applications to workers who are not

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Java Goes Wireless

A Partial List of Companies and Wireless Devices That Are Now Java Enabled

(A list compiled at this time last year would have only half a dozen entries.)

Personal Digital Assistants

- Palm IIIc - V, Vx, VII, VIIx, and M105 and M505
- Sharp - Zaurus
- Sony - Clie
- Handspring - Visor and Visor Edge
- Nokia - 9210 Personal Communicator
- Motorola - Accompli 008
- Kyocera
- Inventec - PDA / Phone
- Mitsubishi - Altair (prototype)
- Psion - Netbook, Series 5mx
- Insignia Solution - Qubit Orbit

Web Tablets, Web Pads

(Paper sized wireless terminals for Internet access)

- Be - Web Pad
- DT Research - Web DT
- Tadpole - RDI

Desktop Phones

- Sharp
- Alcatel
- Insignia
- Pintel

Internet Appliance

- Insignia Solution

- Sony - eVilla
- Compaq - iPAQ

Two-Way Pagers with Keyboards

- Blackberry
- Sharp
- Motorola

Cell Phones

- Sony
- Invnetec
- Motorola
- NTT DoCoMo
- LG Telecom
- Panasonic
- KDDI
- Seimens
- Sony
- Nokia
- Kyocera
- Sharp
- Samsung
- Fujitsu

Video Cameras

- Sony - MD Discman (Video stored on an internal disk drive)
- Sharp - JPHone

Home Entertainment Game

Console

- Sony Play Station 2

Set Top Box

- Samsung
- Motorola
- Phillips

Java Processors - Processing Chip

(Made specifically to power small Java enabled devices.)

- Zucotto Wireless

Payment Terminals, Point of Sale and ATM

- Banksys
- Ingenico
- AASTRA
- Microware

Java Enabled Smart Cards

Some cards have readers that attach to computers, allowing secure payments over the internet and other applications such as electronic airplane tickets, passports, digital money, and secure authenticated transactions.

- American Express Blue Card
- Visa

ISO 9000... (Continued from page three)

Increased Focus on Customers

The 1994 standard required defining and documenting customer requirements. It required that companies review information "related to the customer's perception of whether the organization has met customer requirements." While customer satisfaction surveys are one way to meet this requirement, the surveys by themselves may provide limited data.

For instance, if a company sends out a survey and asks customers to rate their product delivery on a one-to-five scale, with five being the highest level of satisfaction, what action does a company take if the product delivery rating is 4.6 this month vs. 4.8 last month? The measure tells you little about the action required. Companies must know specifically the products involved and such things as whether they were purchased under blanket orders or emergency orders.

Process-based customer satisfaction indicators provide firms with specific information they can use to improve performance. These indicators measure interactions between companies and customers. A good indicator will have specific links to operating processes, so actions are tied to results.

While indicators will differ from one organization to the next, consider such elements as: trends in product rejections or returns; repeat orders for product; increasing volume of orders for product; trends in on-time delivery; trends in installation assistance required; service call volume and types of issues; and levels of pre-sales interaction and corresponding change requests.

Continual Improvement

Continual improvement is a new requirement in the year-2000 standard. Companies must be able to demonstrate that continual improvement is being achieved.

This depends on effective application throughout the business of

tools for improvement such as process mapping and process management, root cause analysis and problem risk analysis using prevention tools such as failure mode and effects analysis (FMEA).

The key steps for action to achieve both next-level performance and certification are:

- Start by understanding how your processes really work together (and not how you think they work!).

- Involve the people who do the work every day in visually laying out those processes.

- Capitalize on employees' expertise to help improve your processes and results.

- Train employees to use tools for improvement such as process mapping, root cause analysis and problem risk analysis and prevention (through tools such as FMEA).

- Eliminate procedures you have in place "only to meet the standard."

- Re-focus your system on improving your business, not just meeting the standard.

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Java's Growth... (Continued from page four)

physically connected. This might entail people working on production lines, in power plants, or sales reps who need easy access to all types of strategic information.

In response to these emerging opportunities, the largest vendors in the industry were at the conference touting their Java solutions. Oracle, Nokia, BEA and iPlanet (a Sun/Netscape alliance) were headline sponsors. Other sponsors included Intel, Sybase, HP, Apple, IBM, Informix, Macromedia, Motorola, ATG, Nextel, Vodaphone, Palm, RIM, and Vignette.

"Nokia will support Java throughout its product offerings," said Nokia president Pekka Ala-Pietila. The company's mobile phones will be programmed with Java as well as the company's cellular infrastructure. By 2002, Nokia will deliver 50 million Java-enabled phones and by 2003 that number will rise to 100 million.

In addition, Nokia will open its mobile phone interfaces to make it easier for third-party developers to write applications for its phones. Pietila basically said that his company is now in the computer application business.

Nokia's growth has been impressive. In 1992, the company projected cell phone penetration by 2000 of 50 million phones. The actual deployment was 400 million phones. Nokia is now projecting more than one billion cell phones deployed by the middle of 2002.

Other Java-enabled multimedia applications built within the phone are now a reality. Sharp's new J-PHONE — a "Dick Tracy" phone — is impressive. The "innovative multimedia mobile phone," says Sharp, brings together a number of technologies in a clam-shell design that weighs less than 3.5 ounces.

The J-PHONE has a 120-pixel-by-180-pixel color display capable of displaying 65,536 colors. It is Java enabled meaning that Java applications can be wirelessly downloaded. It offers basic three-dimensional rendering, a first for a phone. It also includes a digital 110,000-pixel camera that allows e-mails to be sent with an attached photo. And finally, it includes a sound synthesizer with a 16-note harmony.

— Michael S. McCormack, 925-933-9456

Danaher Business System... (Continued from page one)

vice, finance and marketing all benefit from the application of DBS business tools.”

Danaher adopted the Toyota Production System in 1987 at its Jacobs Vehicle Systems division. The effort was led successfully by Mark DeLuzio, a financial executive, who then shifted to a senior position at Danaher and was the architect of the Danaher Business System.

“I saw it from an administrative side and a shop floor side as well and was involved in all the early kaizens and went to Japan five zillion times,” says DeLuzio. “I learned it from the bottom up.”

DeLuzio not only developed a system that deployed lean tools, but he created an overarching strategy built upon “break-through objectives” and a “policy deployment” plan that kept

managers focused on achieving results.

DeLuzio, who recently retired from Danaher and has a new firm called Lean Horizons (www.leanhorizons.com), spoke with *Manufacturing News* editor Richard McCormack about Danaher’s implementation of lean and the reasons for the company’s success. Here’s what he had to say.

Question: Danaher is frequently mentioned as being one of the best examples of how an old industrial company can transform itself and become a high growth, high performance company by using lean techniques. How did you deploy lean throughout Danaher?

DeLuzio: George Sherman said, “Hey, you’ve been doing well with this at Jacobs, let’s take it company wide.” As we started looking at the corporation there were a couple of things missing. Jacobs’ approach using the Toyota Production System was from a tool perspective. We were using Five-S and standard work and almost to our detriment we created a situation where the tools themselves became the objective. That was wrong and that is where a lot of companies today fail because they look at the tools themselves.

In order for lean to work, you have to have a business strategy. If you have a business strategy and understand your objectives then the lean tools will help achieve those objectives. But if you make lean the objective, you’re going to fail. The idea that we had to drive policy deployment gave birth to the Danaher Business System. We simplified policy deployment and made it effective throughout the corporation. It’s been almost a decade and Danaher is still using it. It’s time tested and is still going strong.

Q: In studying various implementations, have you found that even the Japanese have this problem of being too focused on tools and on lean being the objective?

DeLuzio: There are people out there who are big in the lean world in the U.S. and still don’t understand the strategy part. They feel that no matter what the situation, add a little lean and you’re going to fix it. If you don’t have a good business strategy, lean alone won’t solve your problems.

Q: What constitutes a sound

business strategy in the adoption of lean?

DeLuzio: You can apply lean to a buggy whip company and you’re going to fail. If you have the wrong product and the wrong strategy, it doesn’t matter. You have to look at the markets you’re in, the business, your technology and your competitive advantage. I’ve seen some businesses without good strategies that have done very well with lean and not perform. It’s as simple as that.

Q: Does lean help a company focus on strategy?

DeLuzio: If they do it right, it forces them to understand how much value they are truly adding to their customer base; but without the fundamentals of strategic planning and the right business, it’s useless.

Q: Can you give me an example?

DeLuzio: I had a president of a company call me a few years ago and he asked that we get involved his company and within the first 10 minutes I could tell him that it didn’t matter if he did lean in his company because he had a bad strategy. He had no leverage because of his size; he wasn’t in the big catalogs like Granger; and he had no competitive advantage to

speak of, zero. He truly believed that if he applied lean to the business, he’d kick butt. I said you might get some good leverage out of that, but you don’t have a good business strategy and without that strategy, it’s not going to work.

Q: What advice do you have for companies that don’t have a strategy?

DeLuzio: The companies that really make it — like Danaher — have a good eclectic view of their company. They don’t want to become just a manufacturing company. They aren’t just marketing driven or engineering driven. They have a balance between all of those disci-



DeLuzio: “If you don’t have a good business strategy, lean alone won’t solve your problems.”

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Danaher..(Continued from page six)

plines and come up with a good business solution. So it isn't just manufacturing and lean.

Quite frankly, there are a lot of manufacturing guys out there who don't understand strategy and conversely there are a lot of marketing guys out there who don't understand lean.

You need a good mix. Danaher does a nice job of mixing the commercial side and the tactical side with lean and the Danaher Business System. It has a policy deployment process in place that really takes that strategy and drives it throughout the organization with breakthrough objectives and measurable quality, delivery, cost and growth objectives using the tools of lean to help achieve those business objectives. The objectives were what we were shooting for.

Q: Veeder-Root, one of Danaher's divisions, went from selling hardware that monitors gasoline tanks to being a company that serviced the tanks. Is that an example of the strategic policy that you were in charge of putting into place at Danaher?

DeLuzio: They could have sold their tank-level sensors and monitoring equipment to gas stations. But strategically, they said, the oil companies are very capital constrained and they cannot afford these systems. Veeder-Root was coming to them with a very expensive up-front hardware solution that was going to cost them a lot of money. We determined that if we sold a service instead with an annuity payment scheduled over five to 10 years, it made it a lot more palatable. The equipment itself became part of that annuity payment so that there were no big cash outlays. It was very easy to get in with the oil companies. That is what I mean by strategy. Without that strategy, the company would not have weathered that storm.

Q: Do you believe that only 1 percent of all manufacturers have adopted a lean strategy to grow their businesses?

DeLuzio: I agree on the numbers because lean exposes problems and is a pain in the butt to do. You have to be prepared to deal with big problems. Not a lot of com-

panies even think in the right frame of mind to be able to go and deal with the problems in a fact-based manner. Many people like to hide behind problems and hide behind inventory.

Q: How does a company overcome the hurdle of knowing their problems exist but actually saying we have to address them?

DeLuzio: It has to be a culture of how you think and how you deal with problems. One of the values at Danaher was that it was fact-based. We always made it tough on ourselves, even in the way we calculated parts-per-million rejects. We made the measure ugly. That was a cultural thing.

We made sure people were not hiding behind a problem and that they were dealing with the root cause. Even getting executives to understand what root cause is takes a long time and requires a cultural shift.

Q: How long does that shift take for a company that isn't running that way?

DeLuzio: If a company is really maniacal about lean it takes two- to three-years to go from kindergarten to first grade. That's how tough it is.

Q: Where is Danaher in the process?

DeLuzio: I think they're still in grade school, but they are a lot better than most companies in the United States. I don't mean that in a negative way because they've done a lot of great things. It's just the hurdles are so high. I have seen companies in Japan that are turning inventory 300 times and Danaher's best company turns inventory 25 times.

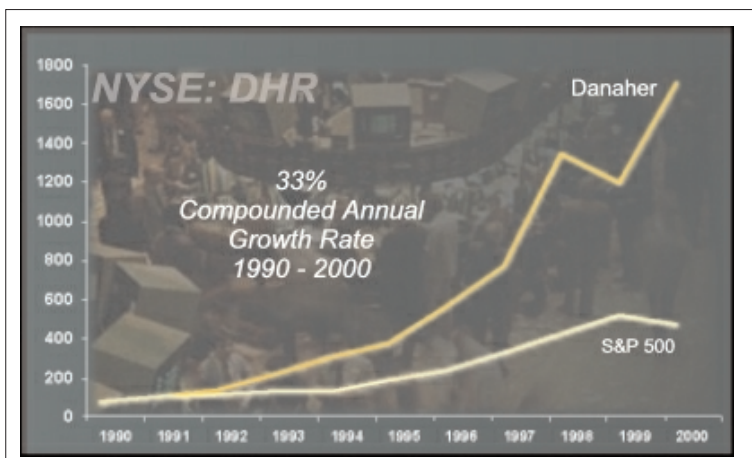
Q: How does Danaher go from 25 to 300?

DeLuzio: The company at Danaher that is at 25 turns went from two to 25 and they've been at it for over a decade. That is why I'm saying how tough this is. The company we saw in Japan has been doing it for 35 years.

Q: Where would you say Toyota is? Are they in high school?

DeLuzio: Toyota and some of their suppliers are

“For the companies that out-source manufacturing and then beat up the supplier all they are doing is moving the problem.”



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Danaher's Success...

(Continued from page seven)

the best manufacturing companies in the world.

Q: And yet when you talk to the guys at Toyota they think they stink.

DeLuzio: That is the key. People ask what kaizen and lean are all about and I say that the mindset you have to have is a healthy dissatisfaction with the status quo. You can't always be negative and beat yourself up, but you always have to understand that no matter what you've done, there is a better way. The fact that they make it ugly and they think they stink is cultural because they realize that if they become complacent they're not going to get there.

Q: What do you think GM faces, given that Toyota attitude?

DeLuzio: I don't think they understand it. It scares me. It's my sincerest hope that the auto companies don't look at this like it's another FreeMarkets or another cost-cutting activity because they will miss the point. You do get cost savings with lean and that is a byproduct, but there are so many other things that happen that I hope they don't use this to beat the heck out of their suppliers. That will just give lean such a bad flavor.

Joe Day who runs Freudenberg-NOK mentions service, delivery and quality, but what primarily comes out is cost, cost, cost. "Dear supplier, we want to be your partner, cut cost."

Q: What did it take to change the culture at Danaher?

DeLuzio: Number one, this can't be a middle-management type of thing moving up. The top guys have to be totally committed to it. They have to become educated and when I say educated I mean benchmarking like you wouldn't believe: going to Japan, seeing the best companies, talking to people who are doing it and really spending time benchmarking and understanding.

They also have to become educated not only from a book sense but a hands-on sense in terms of participating because the light bulbs don't turn on until you actually do it. It's not until their light bulbs go on and they

truly internalize it that they will start creating a culture.

At the end of the day people do what the boss is expecting them to do. If the boss only drives cost then there will be no results. They have to be measured on quality, delivery and how they solve problems. Policy deployment is all about creating sustainable business processes that yield results.

A lot of managers today are only being measured on results and they are not being measured on creating the business process. People say, "You just delivered a new product in 16 months, that was fantastic." Nobody says to them: "Show me the business process that yielded that result and I want to make sure it's sustainable so we can repeat it again next time."

The whole measurement system and how we measure people on results is our biggest problem. The senior guys have to understand that. They have to be asking for the sustainable business process that gets the result as well as the result itself. That is the culture shift that has to happen. Without that happening at the very top level, it's not going to take over.

Q: And Danaher had that support?

DeLuzio: We had that with George Sherman and the Rales brothers.

Q: Why did the Rales brothers buy in?

DeLuzio: They saw it work and they weren't manufacturing guys and for non manufacturing guys this stuff makes a lot more sense than to manufacturing people and the reason is there are so many new paradigms involved.

When I start my training sessions, I ask everybody to write their name with their dominant hand and then I have them switch hands and have them write their name again. I say, "Do you see how uncomfortable and how odd that was? That is how lean is going to feel to you initially. It's going to feel that odd because it really is counter intuitive."

One of the things I say is that things are going to get worse before they get better because lean doesn't create problems it exposes them. People who don't understand say that lean causes all of these problems because we've never had these problems before. The reality is you really did.

Q: Did it get worse at Danaher before it got better?

DeLuzio: It got worse at every company at Danaher. There was a lot of chaos in every company.

Q: How did Danaher and all of its divisions overcome that chaos?

DeLuzio: It was management persistence and fallout on the leadership side. People aren't going to get it and you have to make that change at the top. That is just a fact of life.

My approach with a lot of the new companies we acquired was I'd sit down with the CEO and ask him what he was

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Danaher's EPS



Danaher's Sales 1996 - 2000

Danaher... (Continued from previous page)

really concerned about. Are you concerned that I'm going to screw up your 3 percent operating income? Or are you concerned that I'm going to bring your two inventory turns down to one and a half? Or am I going to mess up your 80,000 parts-per-million quality reject rate? I'd say guys, come on, if you keep doing the same things over and over again expecting different results, you're crazy.

Q: What would you generally hear when you asked those questions?

DeLuzio: It was usually silence.

Q: Do you have to have tough love in order for them to change?

DeLuzio: There is a mix. You have to do things tactfully. I really don't believe the in-your-face things works.

Q: Was it to your advantage to know how the process plays so that you could provide guidance as companies went through the difficult period of transition?

DeLuzio: When we did this at Jake Brake, we had nobody to go to because nobody in the United States was doing it. The only people we could point to were companies in Japan. As a result, there were all the excuses such as it was cultural.

As we began to gain momentum at Danaher, we were able to point to the companies at Danaher that had successes. But even then people were making excuses. They say, "They're in a different industry, our company is different." And I'd say, "You are truly different: they're making money and you're losing money. So when are you going to get on board?"

It wasn't that bad because we created a culture in which new acquisitions knew they were going to do the Danaher Business System and it was just a question of how.

Q: Did you find that the implementation changed

with each company?

DeLuzio: You can't take a cookie-cutter approach. Value stream mapping and policy deployment work hand in hand because there is not an approach that says do A, then do B, then do C. There are some things I wouldn't recommend doing first, second and third on a macro basis. But when you get into it, you start asking, "Do I do a SMED [single minute exchange of dies]? Do I do standard work? Do I cellularize?"

The policy deployment and value-stream map help you identify where and when you should be doing those things. One of the things we learned over the years is that every company is different and every company will have a different implementation strategy.

Q: Is the value-stream map one of the key tools to deploy immediately?

DeLuzio: What we do first is look at the strategy and try to figure out two, three or four breakthrough objectives for a company. Then we deploy policy deployment.

Q: What are some of the breakthrough objectives?

DeLuzio: They change from company to company, but an example of one could be as simple as drastically improving on-time delivery. To get a company that is delivering at 20 percent on time to 85 to 90 percent in one year is nowhere near world class but it is a breakthrough.

Another could be a huge quality objective — taking defects from 125,000 parts per million to six sigma. Then there are growth objectives. Quality, delivery, cost and growth are the four main categories of breakthroughs.

Q: Do you produce a written goals document?

DeLuzio: The policy deployment process is a very rigid process and it is what made the Danaher Business System a system. It documents what you want to do on a three- to five-year basis while reducing it to an annual basis for the assignment of responsibilities and targets.

Those annual objectives are then deployed down into

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the organization. You could be deploying to a functional team, a multifunctional team, a function itself, a person or any number of those. Then there is a linkage from all the way down to the lower end of the organization all the way back up so that people who are working three or four levels down are working on the things that are necessary to achieve the strategy.

The other element of policy deployment is deciding what you're not going to do. A lot of well-known lean practitioners today are pursuing 25 objectives. There is no way a company can be successful with 25 objectives. It's just too much, and when everything is important, nothing is important. There has to be an A, B and C ranking of those. You can't attack every problem facing your company, like absenteeism, safety, delivery, quality and square footage.

Q: But each of those is important in its own right.

DeLuzio: You can't argue with any of them. But how can you do them all? How do you prioritize your day?

Q: Don't you think people need help to do this?

DeLuzio: I love the guys at Shingijutsu, they are great, but one of the things I've always said is that — as much as I love them and they trained me — they are not business people. These guys were middle-level managers and engineers who became very good at the Toyota Production System and are now sitting down with the CEO of a \$4-billion company telling him how to run his business. That does not compute. That is where the strategy piece and policy deployment are never talked about with Shingijutsu because they don't understand that. We would use them for very good tool training but don't ask them to do strategy.

Q: How hard is it to bring it down to the guy on the shop floor?

DeLuzio: That is the beauty of the policy deployment process. It gives you the tactical hands-on methodology to drive it right down to the janitor and he'll know every day when he wakes up and goes to work how he is going to get measured and what is important to the business. If you do it right, he'll be able to say that what he is doing in his job every day is going to help that objective. If he is able to say that on the shop-floor level, then you know you've got it.

Q: The other aspect of lean that proves to be so difficult is the back end of a company's operation: human resources, accounting, financing, engineering, product development, mar-

keting and ordering. How hard is it to deploy lean throughout that part of a company?

DeLuzio: It's extremely difficult to implement. Every function within a company is going to change. If it doesn't change, you haven't done lean. For example, the traditional accounting systems that we have set up are geared toward SEC and IRS statutory requirements. We take the output from these systems and we say manage your business with them. Yet they are motivating the wrong behaviors because they're asking you to do the wrong things.

Absorption accounting, for example, and purchase price variance drive the wrong behaviors. They're anti lean. When you tell this to the finance guy, he says they are good measures. No they're not. Again, it's like writing with your left hand. You have to get the accounting guys to change.

You have to get the HR people to change. HR people need to understand that the work environment will be truly different in that we're asking people to do a lot of different jobs and they're going to be multiskilled. We have to put reward systems in place so there is an incentive for them to learn new jobs. If we don't do that we're going to have a lot of problems.

How the sales and marketing guys take orders definitely impacts the shop. If they take batch orders and allow their customers to order once per month to buy three months of supply, then you'll never be able to level the load in manufacturing. Level loading is almost impossible without your sales department changing how they incentivize the sales force, and how they manage their distributors and their customers. Every single function has to get on the same page.

Q: How do you get these people on board?

DeLuzio: They have to be on the shop floor when you do the first kaizen. The only way they understand is if they get out there and do it. I had a sales guy one time tell me, "Mark I never knew what I was doing to the shop floor until I got on this kaizen."

"When you do a kaizen, you are kaizenizing your mind because you are changing the way you think."

Q: Do all these functions revolve around manufacturing?

DeLuzio: They should, but not always. It is amazing to look at how much time the accounting function spends on things you don't need. The first thing you have to ask these guys is who is your customer? The accounting function will have several, the IRS, the SEC, corporate and several other different customers but rarely do they say they have an internal customer.

What I like to do is use the lean tools in the administrative environments to reduce the amount of time it takes to do the statutory stuff so that the administrative people can spend more time being knowledge workers and adding value to the business and the functions. Instead of taking two weeks to close your books,

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here's your breakthrough, close in three days. And let's kaizen the accounts payable process so that instead of three people doing the job you have one person. You then take those two people and upgrade them and have them work on design teams doing target costing and proactive things that will help the business rather than just being scorekeepers. That is the kind of mentality you have to have in order to change.

Q: Does this work successfully at Danaher?

DeLuzio: Not always. But this is a real mature look at the business and not everybody gets there. When I say Danaher is still in grade school that's what I'm talking about.

Q: How do you convince someone in the finance department to change the way he does his books?

DeLuzio: I went up to a company in Massachusetts and the president said to me, "Mark, we're trying to get rid of labor reporting, we know it's the wrong thing but we can't convince the finance guy. You've got a finance background, can you help him?"

We figured out that the accounting guy was just worried about his variance accounts. He was the only one who looked at them. I looked at the president and said, "Do you use this?" And he said no, and I turned to the accounting guy and said, "Well there is your customer and he doesn't use it, so get rid of it." They stopped their labor reporting in their machine shop and saved \$100,000 a year in time and effort recording those transactions.

Q: Is that a lean process?

DeLuzio: Absolutely, because the activity was non-value added. It was wasteful. Their operators were sitting at their computers for half an hour a day. My definition of lean is the maniacal pursuit of the elimination of waste from every business process. That's it.

Lean is not only about the physical surroundings of how you handle materials, the shop floor and the machines. When you do a kaizen, you are kaizenizing your mind because you are changing the way you think. Everything is going to be a byproduct of how you think. The key is how leaders think about their business. That is what you are changing. That is really the kaizen.

Q: How long did it take for you to get the financial systems aligned with lean operating practices?

DeLuzio: About two years. The thing about finance is you cannot lead it, you have to follow the changes in the company. You can't go make changes in your financial systems without the company making the changes first.

Q: A lot of companies are doing their strategic planning and are deciding to outsource their manufacturing. Is that a good way to get rid of their batch-and-queue problems rather than having to go through the turmoil associated with a lean implementation?

DeLuzio: You don't get rid of anything. You're handing over designs that were probably not leaned out anyway and they still have inherent problems within them. You're adding a margin somewhere to the costs.

I'm not saying outsourcing is the wrong thing because there are things you should outsource if they're not your core competency. But for the companies that outsource manufacturing and then beat up the supplier all they are doing is moving the problem.

Q: Yet with much shorter product cycle times, most companies in the electronics sector are outsourcing all of their manufacturing.

DeLuzio: Many companies think of manufacturing in terms of buying large increments of capacity. But if you think of lean in a machine design sense, you are purchasing small increments of capacity that is flexible and can be quickly changed over. It can be easily adaptable to new designs, and can be easily movable within your plant so that you can add an extra 10 percent of capacity without any problem. Your investment is small — you're not adding another \$500,000 machine to add just 10 percent more capacity.

A lot of the companies that are making these outsourcing decisions haven't thought that through from a machine design point of view. You can really build

a superior competitive advantage through machine design.

Any company can go out and buy the same materials and equipment and compete for the same labor. But if I can build a competitive advantage with my equipment, then all of a sudden I have something you don't have and I can take you to the cleaners.

We had a case in Danaher where we bought a huge \$1-million piece of equipment and we found out that the guy we bought it from sold one exactly like it to one of our competitors, even after we gave him a lot of the ideas for upgrades. Because we did not build our own internal capability we didn't have a competitive advantage. Building your internal capability using 3-P —the production preparation process — is the key.

Q: Is it inevitable that manufacturing companies will move towards a lean system?

DeLuzio: I think it is. It's common sense. I actually

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"My definition of lean is the maniacal pursuit of the elimination of waste from every business process. That's it."

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think common sense is misnamed, it's not common.

Q: Is Six Sigma covering the same territory?

DeLuzio: Some of the tools of Six Sigma can be very powerful, but companies like GE and AlliedSignal have elected to create cultures around a tool. If you really look at Six Sigma, it's not a culture, it's a tool. It's not a philosophy, it's a tool. It's a problem-solving process with some very sophisticated tools and techniques. Six Sigma is no different from any of the lean tools.

The more important questions to ask are: What is your business process? What is your problem? What is your strategic objective? What are the tools you're going to need to achieve your objective?

If I'm digging a hole and am using a shovel, if I hit a rock, I use a pick and if I need a stick of dynamite, I'll use it. But I'm going to use the tool that will help me achieve the objective. Maybe it's a Pareto analysis, maybe it's a 5-Why, maybe it's a design of experiment, maybe it's standard work, maybe it's SMED.

Six Sigma and lean can work together, but companies that look at them as an either - or make a mistake.

Q: What about a company that deploys just-in-time delivery as a way of doing business? Isn't that company deploying a lean philosophy?

DeLuzio: JIT is used synonymously with lean. When you look at the definition of JIT, it's the right product at the right time at the right place and that is what lean is trying to do.

Q: So are all of the companies that have gone to a JIT system basically lean?

DeLuzio: Unfortunately, a lot of the JIT world focuses on the supplier side and it's basically an approach to move inventory back to the supply base. As a result, nothing gets leaned out. Nothing gets improved. All the waste is moved back to another level.

Q: When you were implementing lean at Danaher, how hard was it to get buy-in from the shop-floor workers?

DeLuzio: I have had less problems with operating folks than I've had with managers. The operating folks are pretty smart and logical especially when they see something that is going to make their life easier. I have had operators come up to me and say if you go back to the way we used to do it, I'm quitting. Their life is chaos until you can straighten it out. They don't like to live in chaos every day.

Q: What types of behaviors must leaders exhibit in order for lean business practices to stick?

DeLuzio: One of the problems is they try to delegate it and that doesn't work. If you really want to drive

change you can't just say go out and be a better leader. You have to actually describe the behaviors that leaders need to exhibit in order to support the effort.

Q: What are some of those behaviors?

DeLuzio: You must participate in hands-on kaizens. You must do at least six to 12 hands-on kaizens in the first year. Presidents and vice presidents have to learn how to walk the talk. First it shows support, but second, their light bulbs are going to get turned on if it's done right.

Then they must participate in kaizen report-outs. All the kaizen teams have report-outs on Friday afternoons. They have to participate in those. They can't ignore those.

Another one is that as you go through your facilities, make sure you spend time on the shop floor. Go

through the design engineering office. Ask questions. Look for metrics. Look for visuals. It's your opportunity to find out what's going on and to show support.

I had a president that actually went into one of his divisions and his total trip to this company was the conference room. He didn't go to the shop floor. So I pulled him aside and said you have to spend time on the shop floor. You have to be able to walk out there and spend time there because you are sending a message by not going out there. What you don't do is just as important as what you do do. Facility wide reviews are important.

The leaders must learn the tools well enough to teach them. You must

learn them that well because then nobody is able to show you and you're showing how important it is to you.

Become maniacal about learning about lean. I say you have to read six books annually on lean business practices, at least six. One every other month is not a big deal.

Benchmarking other companies is another behavior. Take those benchmarking trips to Japan. Go to Toyota in Georgetown. Visit Freudenberg NOK or Wiremold or whoever will let you in their doors. It is absolutely key that you personally proactively go out and benchmark. You have to do it.

Another way for them to behave is pure thought process in terms of insisting on facts and data and not on opinions.

They need to really drive process improvements and not just results.

Another is to provide the support and resources necessary to build your own internal lean capability within your business. You have to talk about lean balckbelts, or whatever you want to call them — lean champions.

You have to build that capability internally so that you're developing two, three, four or five people who are learning these tools. They have to go to school and bring that knowledge internally and drive it. If you don't provide that kind of support system it won't work.

"The leaders must learn the tools well enough to teach them."