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Common Success Strategy Among Industrial Giants Is Keeping Manufacturing Secrets In A 'Black Box'

CERNOBBIO, Italy — Samsung, the Korean electronics giant, has achieved rapid growth in recent years by embracing a strategy of in-house production and investment in manufacturing research and development. The company, with sales last year of \$36.4 billion, up from \$26 billion in 2001, focuses on keeping secret its "black box" manufacturing technologies and processes.

"If we got out of manufacturing, we lose," Ji Oh Song, executive vice president of Samsung Electronics, told the Intelligent Manufacturing Systems (IMS) Global Challenges in

Manufacturing conference held here in May. Advanced manufacturing technologies "enable extreme productivity" and provide companies with a long-term

competitive advantage, said Song. Co-locating research and development activities with manufacturing "is very important and leads to faster market domination."

Samsung has no intention of losing its manufacturing advantage through outsourcing. A strategy that focuses on perfecting manufacturing processes and integrating suppliers is leading to the "rebirth of the manufacturing giants" such as Toyota and Dell Computer, Song told the audience of almost 500 international executives and researchers. These companies have embraced business models that emphasize the importance of manufacturing. The manufacturing giants are proving to be dominant in each of their respective industries. "Nobody else can copy them," Song said.

Like Samsung, Toyota and Dell continue to increase profits and market share every year at the expense of competitors pursuing strategies that do not focus as heavily on developing their underlying manufacturing technologies.

Samsung views itself as a "manufacturing solutions provider" in all of its product lines, from home appliances, to flat panel displays, cell phones, MP3 players, digital camcorders, laser printers and semiconductors.

The companies that are dominating their industry segments rely on technologies that focus on digital convergence, customized production equipment and unique

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IMS CELEBRATES TEN YEARS OF SUCCESS

A Breakout Event For A Global Manufacturing R&D Program

CERNOBBIO, Italy — The Intelligent Manufacturing Systems (IMS) program will soon be completing its first 10 years of research and the general feeling among those involved is that it has been a success. Interest in the world's largest international collaborative manufacturing R&D program reached its zenith here on Lake Como in Italy in mid-May, when researchers, engineers, executives and administrators met to discuss trends in manufacturing, research results from projects and the future of IMS.

Organizers of the IMS International Forum were not anticipating a sold-out event. When planning first started, there were estimates that only 50 people would attend. But with more than 450 attendees, the forum was

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The Party Of Fiscal Restraint Has Become A Party Of Spendaholics, Says McCain

The Republican-controlled Congress is facing a budget deficit this year of \$521 billion, yet it continues to “spend and spend and spend,” says Sen. John McCain (R-Ariz.). Republicans and Democrats in Congress have found unity in one area amidst all the bipartisan sniping: fiscal irresponsibility, “and for that we should all be ashamed,” McCain told a May 18 meeting of Washington think tanks called “Restoring Fiscal Sanity — While We Still Can.”

“I am a proud Republican,” McCain told the group. “I’m a Barry Goldwater Republican. I revere Ronald Reagan and his party of limited government. Sadly, that party is no longer.” The Republican Party is “engaged in an outrageous spending binge” that is being encouraged by Democrats.

Special interests have a “stranglehold” on Washington, D.C. Catfish farmers in the South, blueberry growers in the North and pharmaceutical companies have all hired expensive lobbyists to press for favors; and Congress is obliging. The United States might be engaged in a costly protracted war, but there isn’t one bit of sacrifice, save for thousands of U.S. soldiers in harm’s way.

“What have we sacrificed?” McCain asked. In the past year, tens of billions of dollars were provided for pork-barrel projects. When Republicans seized control of the both Houses of Congress in 1994, McCain counted 4,126 earmarks in the 13 major appropriations bills. This year, there were 14,040. “Where are our priorities?”

There have been huge tax breaks for the wealthy. The Foreign Sales Corp. (FSC) legislation that passed in the Senate a few weeks ago will cost the treasury \$180 billion in lost revenue and includes a tax break of \$18 billion to wealthy oil and gas companies. The

Medicare prescription drug plan passed last year at a cost of \$400 billion, but three months later the pricetag unexpectedly increased to \$534 billion. “It pains me to acknowledge that the biggest expansion of Medicare since its inception happened under a Republican administration and under the Republican leadership of both Houses of Congress,” said McCain. “The party that was long known to be the guardian of the treasury is now its routine raider.”

The Bush administration recently requested a \$25 billion supplemental for the war in Iraq. This was not supposed to happen until next year, McCain points out. It’s important to help the troops, but the request came at the same time the \$180 billion business tax cut was passed under the FSC legislation.

“I don’t remember ever in the history of warfare when we cut taxes,” he said. “Thousands of miles from here young men and women are putting everything on the line so we can be free. And what have we sacrificed?”

Seriously, think about it carefully. Name one thing that Congress has told the special interests and their fat-cat lobbyists to do without since the war began?”

Right now, the unfunded federal burden for future costs of interest on the national debt, Social Security and Medicare is \$40 trillion — or about \$140,000 for every American man, woman and child. “Not long ago, we used to talk about the ‘lock box,’” McCain said. “But let’s get a little more basic. Let’s consider the ‘alarm clock.’ We need one big wake up call in Washington.”

Unfunded liabilities might be a lot higher than McCain believes, Sen. Joseph Lieberman (D-Conn.) told the conference. Medicare trustees estimate the unfunded liability for Social Security and Medicare is more like \$72 trillion, or seven times the current GDP and twice the entire net worth of the United States. Lieberman said: “Alexis de Tocqueville warned, ‘The American Republic will endure until the day Congress discovers that it can bribe the public with the public’s money.’ Sure does look like that day has arrived. We must end the bribery and change the dynamic.”

Textile Industry At Odds With NAM Over CAFTA

The National Association of Manufacturers loves the Central America Free Trade Agreement (CAFTA), but textile and apparel manufacturers hate it.

“This is the highest-quality trade agreement yet,” says NAM vice president for international economic affairs Frank Vargo. If approved by Congress, the agreement would immediately eliminate tariffs on 80 percent of U.S. manufactured exports headed into the five countries signing the pact (Guatemala, Honduras, El Salvador, Nicaragua and Costa Rica).

The textile industry doesn’t feel the same way. “This deal is riddled with loopholes that will destroy tens of thousand of U.S. textile and apparel manufacturing jobs,” says Augustine Tantillo, Washington coordinator of the American Manufacturing Trade Action Coalition (AMTAC). “To make matters worse, most of the loopholes in the deal will benefit China,” which will be able to transship products through the countries signing the agreement. “It is regrettable that the U.S. government continues to insist on trade deals that will exacerbate the trade deficit,” says Tantillo.

The industries that would benefit from CAFTA, says NAM, include paper, chemicals, pharmaceuticals and manufacturers of construction, agricultural, medical and scientific equipment.

The textile industry has dozens of objections to CAFTA. “While the Central American countries have substantial capability to produce finished goods for export, they have little ability to consume finished goods manufactured in the U.S.,” says AMTAC. “Why should the U.S. textile industry support a deal that would only increase the flood of job-destroying imports made with foreign components?”

U.S. INVESTMENT INTO CHINA DROPS SUBSTANTIALLY

U.S. Companies Favor First World Over Third World For New Investment

U.S. manufacturers are reducing their direct investment overseas, especially in low-labor-wage countries like China. Instead of investing directly in emerging markets, U.S. companies are favoring contracting out their manufacturing or forming joint ventures there, thereby reducing costs. But such a strategy is risky, says Deloitte & Touche in an analysis of U.S. manufacturers' foreign direct investment (FDI).

"As the hub of global manufacturing is moving towards low-wage nations...innovation in product and process capabilities and technology is likely to move along as well," says Deloitte in "Globalization Divided? Global Investment Trends of U.S. Manufacturers." "Without a strong foothold in those capabilities, many U.S. multinationals are risking their future competitiveness to short- to medium-term cost savings. Without more direct control and influence over a greater share of their manufacturing capabilities in low-wage nations, they are in effect creating competitors on a massive scale. Not only are these competitors fast-learning the ropes of global competition, they are also headquartered in areas that are likely to remain global low-cost locations for years to come — in particular, due to continued access to lower-cost, highly skilled and abundant labor resources."

U.S. manufacturers last year invested \$30 billion in overseas plants and equipment, down by \$1 billion from 2002, says Deloitte & Touche. Only \$2 billion of total FDI headed into low-labor cost countries, a drop of 83 percent from \$12 billion in 1999. U.S. manufacturers made only \$500 million in direct investments last year in China.

This dramatic slowdown in direct manufacturing investment in low-wage countries "is quite troubling," says Doug Engel, Deloitte Consulting's U.S. manufacturing practice leader. "It means, in essence, that U.S. manufacturers may be paying ultimately to create their own competitors."

Adds Peter Koudal, Deloitte's director of manufacturing research: "As the hub of global manufacturing moves toward low-wage countries, including China and India, product, process and technology innovations are going to move right along with it. U.S. firms may be sacrificing their long-term global competitiveness through too much reliance on an 'asset light' strategy."

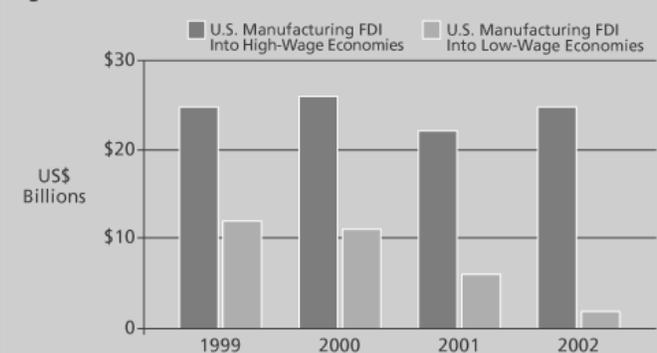
Outsourcing manufacturing to local companies in emerging markets and engaging in spot purchasing enables U.S. manufacturers to easily switch suppliers if anything goes wrong, says Deloitte. But by not investing in manufacturing, marketing and sales functions in these fast-

growing countries, U.S. multinationals could be "losing out on future growth opportunities and the possibility of learning effectively from leading customer groups in those markets to drive innovation efforts."

U.S. manufacturers are at a "crossroads," Deloitte concludes. "Are manufacturers going to leave investment opportunities in emerging markets to foreign competitors and indigenous firms and concentrate their investment spending in tried and true markets in the developed world as our analysis suggests they are starting to do? Or will they start to see the opportunities they may be missing and take a riskier but potentially more strategic course and redirect FDI to the fast-growing, low-wage economies" of Southeast Asia?

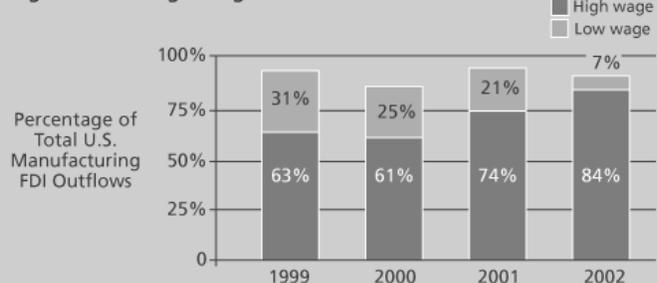
For more information on the study, set your browser to <http://www.deloitte.com/research>.

Figure 3. The Global Investment Divide?



Source: Deloitte Research; U.S. Department of Commerce, Bureau of Economic Analysis, International Investment Data, December 2003; and U.S. Department of Labor, Bureau of Labor Statistics, September 2003.
Note: Includes countries that accounted for 94 percent of total U.S. manufacturing FDI outflows in 1999; 86 percent in 2000; 95 percent in 2001; and 91 percent in 2002.

Figure 4. The High-Wage Paradox



Source: Deloitte Research; U.S. Department of Commerce, Bureau of Economic Analysis, International Investment Data, December 2003; U.S. Department of Labor, Bureau of Labor Statistics, September 2003.

Note: Includes countries that accounted for 94 percent of total U.S. manufacturing FDI outflows in 1999; 86 percent in 2000; 95 percent in 2001; and 91 percent in 2002.

Market Continues To Flourish For High-Volume Luxury Items

The “new luxury” trend of consumers buying the highest quality, highest priced goods continues to grow, reports the Boston Consulting Group. Companies that are able to produce high volumes of luxury items continue to outperform their competitors. “The consumer behaviors associated with trading up...have persisted and become widely recognized,” says the Boston Consulting Group (BCG) in a 44-page analysis of the trend called “Trading Up, The New American Luxury.”

The firm has created an index of 15 companies that provide premium goods and services and has analyzed their performance over the past five years. These companies have achieved “exceptional sales growth and strong shareholder return and their performance is virtually unaffected by general economic forces,” says the report. “We are now more convinced than ever that the ‘trading up’ phenomenon has become and continues to be a fundamental, ubiquitous and long-lasting aspect of our consumer-driven global economy.” The trend is apparent throughout most of the world.

The value of the new luxury goods market in the United States is \$400 billion and growing by 15 percent per year. “We expect that it will reach \$1 trillion by the end of the decade,” says the BCG analysis. “We also see continued demand for low-cost goods that enable consumers to trade down. ‘Trading down’ (when consumers choose the low-cost alternative in categories of little importance to them) is an essential part of the ‘trading up’ phenomenon.”

A number of societal factors are driving the trend toward the growth of new luxury items: increased wealth; changes in family structure; the heightened influence of women; improvements in the global supply chain; and the “freeing up” of funds due to the prevalence of low-cost retailers like Wal-Mart.

The trend toward purchasing luxury goods is impacting more categories of products. For instance, in the financial services sector, middle-income consumers want higher quality service and information on how to become

financially secure: they are willing to pay a premium for that knowledge.

Companies benefiting from the “new luxury” trend are not necessarily the “old luxury” suppliers of expensive products. Old luxury companies typically produce in small volume; whereas the new luxury companies “are able to move off the traditional demand curve and achieve high margins and high volumes at the same time,” says BCG. “Further, our research shows that new luxury goods typically account for 20 percent of a category’s unit volume, but 40 percent of its dollar volume and a remarkable 60 percent of its profits.”

Companies such as BMW, Starbucks, Under Armour, Amtrak’s Acela Express, and Westin’s “W” hotels continue to outperform their competition by stressing management practices “that are broadly applicable and replicable,” says BCG. These eight management

principles are:

1. First position is worth up to 80 percent of the category profit pool. The leader in each category wins far more than most people believe is possible.

2. Never allow a competitor to trump you. Increase the cadence of innovation and escalate quality. Once a new luxury product is surpassed by another in any way it is very difficult to regain momentum and leadership.

3. Be totally authoritative and expert in your category. New luxury leaders understand the consumers’ experience and live it themselves.

4. Dissect, understand and break the compromises in that consumer experience. New luxury goods do not require that the consumer give up one desire to gain another.

5. Never underestimate your consumers’ intelligence, emotional touch points and willingness to become your brand apostle.

6. Shatter the demand curve. Seek higher price points and higher volumes.

7. Own your value chain. Be sure the product and the experience that surrounds it are flawless.

8. Don’t rest on your laurels. Continuously attack the category like an outsider.

The BCG report, written by Michael Siverstein and Neil Fiske, is located at http://www.bcg.com/publications/trading_up/introduction.jsp.

Maytag CEO Questions Whether Manufacturing Can Remain In America

Maytag is struggling to stay competitive, says company chairman and CEO Ralph Hake. Having 96 percent of the company’s workforce in the United States “is not an advantage for Maytag,” he told the Maytag annual meeting in mid-May, as reported by the Associated Press. “We must continue to change how we do business, especially in the area of cost.”

American consumers are more interested in price and don’t care if a product is made in America, he told the meeting attended by labor union members and workers worried about their jobs. “It would be nice if people care where it was made, but they don’t,” Hake said. “They work hard for their money and they want value.”

Maytag is one of only three major appliance makers based in the United States, he told the annual meeting. The remainder are low-cost global competitors successfully increasing their market share. A Maytag washing machine made in 1974 sold for \$499. Today, the same model with more features sells for \$439.

China Is Asia's Vortex From Which The Exports To America Flow

China is attracting a vast amount of manufacturing investment from other nearby Asian nations, which then export their production to the United States, according to the Progressive Policy Institute. A new "Asian union" is forming that combines "China's manpower and low costs with money and technology from Japan, Korea, Taiwan, Hong Kong and Singapore," says PPI. "China's emergence as America's most visible source of goods reflects a structural change in the Asian economy more than it reflects new Chinese trade or labor policies."

In 2003, for the first time since 1873 (excluding the World War II years), Japan exported more to China than it did to the United States. Exports to China from Korea, Taiwan, Hong Kong and much of Southeast Asia will likely surpass those to the United States in the near future. Investment in China from other Asian countries dwarfs that from the United States. In 2002, total foreign direct investment in China was \$53 billion, with the United States supplying \$5.4 billion. Of the 60,000 new manufacturing plants built in China between 2000 and 2002, between 80 and 85 percent were financed by Asians.

"As Japanese, Korean, Taiwanese and other plants go onstream, 'Chinese' exports to America boom," says PPI in its study, "The Emerging Asian Union." Exports from China to the United States increased from \$100 billion in 2000 to \$152 billion in 2003, accounting for all of America's net import growth during that period.

"The fastest growing imports from China are now sophisticated, capital-intensive goods like TV sets, perfumes and child safety seats," says PPI. "More are on the way."

China has also become a major importer. China's imports have grown by \$244 billion since 1999, from \$166 billion to \$410 billion, an increase of 147 percent. But only a small portion of those imports originate from the United States. American exports to China increased from \$13 billion in 1999 to \$28 billion last year, an increase of 117 percent.

U.S. policies toward China of pursuing unfair trade practices through the WTO, an insistence that it devalue the yuan, and that it prosecute intellectual property abuses are important, but they will not be effective in helping U.S. manufacturers stay competitive, says PPI.

"Currency revaluation could ease the American trade imbalance,

which would help the United States and the world economy in financial terms, but a revalued yuan would also cut China's bills for imported oil, steel, computer chips and fabric making Chinese factories still more efficient and competitive," PPI notes.

U.S. industries that have tried to shield themselves through tariffs and quotas have not helped themselves, either. "Shoes, for example, have the highest tariffs in the American schedule with rates ranging up to 48 percent and even 60 percent for cheaper grades of sneakers," PPI notes. "Even so, shoemaking has walked away to China, Vietnam and Indonesia. The textile industry's battery of quotas

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Table 2: American Imports from China, 1999-2003

Product	1999	2003	Growth 1999-2003
Total (by value)	\$82 billion	\$152 billion	87%
Electric toothbrushes	767,000	55.8 million	7,380%
Child safety seats for autos	134,000	3,813,000	2,850%
Perfume	22,000 kilos	1.97 million kilos	890%
Wooden beds	584,000	3.2 million	650%
Television sets	3.6 million	13.3 million	470%
Shoes	1.25 million pairs	1.640 million pairs	31%
Dolls	460 million	454 million	-1%

Source: U.S. International Trade Commission

Table 3: American Imports from East Asia, 2000-2003

Source	2000	2003	Change 2000-2003
East Asia	\$427 billion	\$430 billion	+\$3 billion
Mainland China	\$100 billion	\$152 billion	+\$52 billion
Wealthy Asia	\$218 billion	\$211 billion	-\$47 billion
Japan	\$146.5 billion	\$118 billion	-\$28.5 billion
Korea	\$40 billion	\$37 billion	-\$3 billion
Taiwan	\$41 billion	\$32 billion	-\$9 billion
Singapore	\$19 billion	\$15 billion	-\$4 billion
Hong Kong	\$11.5 billion	\$9 billion	-\$2.5 billion
Other ASEAN	\$69 billion	\$67 billion	-\$2 billion

Source: U.S. International Trade Commission.

*Interview:***Sujeet Chand, Rockwell Automation's CTO**

Rockwell Automation, one of America's leading manufacturing technology providers and service companies, is beginning to feel the positive effects of an improving market for industrial automation. The company, which includes divisions Allen-Bradley and Reliance Electric, has been managing to grow revenues and earnings over the past two years. "We are winning," says company president and CEO Keith Nosbusch before a May 18 Merrill Lynch Global Industries Conference.

The company, says Nosbusch, is well positioned technologically to take advantage of the global trend of integrating plant floor

information systems with enterprise resource planning systems installed by most manufacturing companies. Supply chain integration, plant software, and automation are all potentially huge growth areas being fueled by demands for companies to become more efficient in rapidly introducing and producing high-quality goods.

Rockwell Automation's revenues for the second quarter 2004 increased to \$1.113 billion, up from \$1.029 billion from the same period in 2003. Earnings increased from \$109 million (\$0.26 per share) in the second quarter of 2003, to \$152 million (\$0.41 per share) in its second quarter of 2004.

The company is active in numerous R&D programs and its chief technology officer, Sujeet Chand, is a busy globetrotter. He runs the company's research operations in Milwaukee, Cleveland, Prague and Shanghai. He is also the United States secretariat to the Intelligent Manufacturing Systems (IMS) program, a major multinational R&D collaboration. He spoke with *Manufacturing & Technology News* editor Richard McCormack while hosting the IMS International Forum held in May in Cernobbio, Italy, on Lake Como in the foothills of the Alps. Here is what he had to say.

Q: Rockwell Automation works with manufacturing companies throughout the world. What strategies are best-in-class-manufacturing companies currently pursuing?

Chand: They are building the infrastructure to design anywhere, build anywhere and source anywhere. That is the strategy. They want to source from anywhere in the world for the best possible cost that they can get on a quality part. They can design anywhere in the world and move their CAD drawings to manufacture anywhere in the world. That is the mantra for the leading companies that are doing manufacturing.

Q: Does that bode well for the small- and medium-sized manufacturing companies that supply them, the tool and die shops that are not too adept at following the multinationals on their worldwide journey?

Chand: A lot of OEMs are located in Europe. Many OEMs are in Germany, Italy and Western Europe. These are the people who build complex machines. They are extremely cost conscious because any cost they add comes off of their bottom line. Some of them are moving to Eastern Europe to leverage the lower-cost structures. More and more automotive companies are locating in Eastern Europe. Toyota is building a huge plant in Kolin in the Czech Republic, two hours from Prague. They are putting that plant there because there are OEMs located nearby that can supply all kinds of plastic injection molded parts and different pieces of the automobile that they need. The infrastructure is already there in Eastern Europe.

What does that mean for the small tool and die makers? Unless they are in a niche market building something highly specialized, they have to compete with that lower cost structure that is available elsewhere. That is the reality.

Q: Is Rockwell Automation selling its products and services into the manufacturing growth areas of the low-cost labor countries in China and Eastern Europe?

Chand: It's evolving in steps. In China, for example, the biggest market right now is for electrification. You have a lot of electromechanical types of systems that are being converted to electrical systems such as motor starters, drives, motor control centers and electrification components. There is a huge market there. The next wave will be controllers and robots because today they are relying heavily on labor. Over time, that's going to shift and labor will move into more knowledge-based activities.

Q: Everybody talks about moving up that knowledge-base manufacturing curve. Is that where manufacturing headed?

Chand: It comes back to intellectual property. If you are producing a mold and I can replicate that in my garage, you have very little left to hold. But if you are producing a machine that has proprietary control algorithms and technology embedded in it, it becomes a significant hurdle for other people to reproduce. That is where the knowledge element comes in — the intellectual property and the differentiation.

"We have pockets of good manufacturing R&D in the U.S., but the glamour is lost."

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Sujeet Chand...

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Q: What manufacturing is still left in the United States?

Chand: Speaking for Rockwell, we do all of our electronics manufacturing in the U.S. For certain types of electric drives, we do that in the U.S. because there is a lot of technology and intellectual property involved. A drive that runs an electric motor is a complex beast because it has electronics and power electronics. There are algorithms embedded in the electronics. It really has to be designed in the right way. Taking heat out of the drive is a big deal so you have to design heat sinks and integrate heat sinks with the drives. But for the real low-end commodity drives, we manufacture in China.

Q: Are there any breakthroughs occurring in the automation industry?

Chand: Vertical integration is the biggest trend in manufacturing. Supply chains are competing with supply chains. There is very little greenfield work, but companies are investing in integrating the factory with business systems. They are pulling in a lot of software and database technology.

This brings in a lot of big players into that domain like IBM with their integration environment like WebSphere. It brings in Oracle with its database systems. It attracts Microsoft because they want to make it a .NET. Then it brings in Rockwell Automation because we can take data from the lowest level and make it available to these middle-level systems that IBM and HP and others make. That is a rapidly evolving area and is one of the biggest changes occurring in factories today.

Q: U.S. companies should benefit from that trend.

Chand: American companies are very well positioned because they have a huge amount of intellectual property in this area. Look at IBM. It's one of the largest holders of patents in the world. We did a search on the words "data-driven" in patent titles. IBM has close to 1,000 patents with just that "data-driven" title in it. That is where the knowledge type of work is moving to.

Q: Does Rockwell Automation feel the need to be more aggressive in its patenting activity?

Chand: Oh, absolutely. Our patent disclosures year after year have gone up about 40 percent because we are aggressively staking out intellectual property in the "touching" parts area — the intersections between factory automation and IBM, for instance.

Q: Is the U.S. research infrastructure robust in the area of manufacturing R&D?

Chand: Manufacturing as a profession has lost some of its glamour and sex appeal.

Q: Do you get that back by having the government provide some designated funding for leading edge

manufacturing R&D?

Chand: That would help. There are some areas like sustainable or environmentally conscious manufacturing that are ripe for that kind of research. Government is certainly funding a lot of work in nano and biotechnology, but focusing on manufacturing is not there yet.

Q: Has Rockwell Automation found a shortage of highly educated engineers in the manufacturing sciences?

Chand: One of the things that has changed recently in terms of hiring engineers who are manufacturing engineers is that manufacturing has become interdisciplinary. In the past, a manufacturing engineer would be a guy who knew how to program robots, drives and CNCs.

They could go on the factory floor and hit the ground running. But today, a manufacturing engineer is not perceived that way. I don't hire manufacturing engineers. I hire the basic disciplines: a computer science guy, a double-e, or a mechanical engineer who has some training in manufacturing or in some aspect of manufacturing.

If I'm interested in safety systems, I hire a double-e who understands networking and redundancy and who understands how to build safety in software. I would bring him up to speed in safety standards and then I would let him loose with some domain knowledge to develop safety solutions.

There are not as many people walking the shop floor with manufacturing degrees today than there were five years ago. That's because of various trends, such as cutting back on investments, and outsourcing.

Q: Is outsourcing healthy for U.S. manufacturers?

Chand: The game is just beginning. We've seen the first wave. This is the time to act. It's a call for action.

Q: Why do you say that?

Chand: Earlier in the year I met Dr. Inaba, who founded Fanuc. He's a very impressive man and he took me through his factories. What he told me was that many years ago he made the decision to invest very heavily in capital equipment. His factories are highly automated in every area, from making mechanical parts for his robots to electronics. He has no reason to go anywhere else but to stay in Japan. It's the Samsung "blackbox" business model of keeping intellectual property close to your vest. He said: "I have no reason to move because labor doesn't give me an advantage; sourcing doesn't give me an advantage. I have everything I need right here. It's all centralized."

He has 20-plus factories in the beautiful foothills of Mr. Fuji and each one is a showcase that has been functioning for years. Fanuc is a profitable company.

Why can't we do that? The simple answer is economics. If I were to put up that amount of capital to automate what I'm doing, ignoring some of the sourcing issues, it may be a no-win situation. But if we

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IMS Breakthrough...*(From page one)*

deliriously described by organizers as a “coming out party” for IMS. Others called it a “breakout event,” a “home run” and a “slam dunk” for the global manufacturing R&D community.

“It’s an indication of the growing importance of manufacturing R&D,” said one IMS official.

IMS was created in the late 1980s in response to an overture from the Japanese to U.S. industry for a \$1 billion collaborative manufacturing R&D program. Officials at the Commerce Department during the first Bush administration interceded, claiming that the Japanese were interested in “cherry picking” advanced U.S. manufacturing technologies. The U.S. officials then worked with Japan to broaden the scope of the program to include Europe, Korea and Australia. They also established a unique intellectual property regime contained within the IMS charter.

But the United States government has never provided funding for research under the IMS umbrella, instead allocating only a small amount (\$250,000 per year) for administrative oversight. This has been a bone of contention for most regions involved in IMS, especially Europe, which has devoted significant resources to IMS projects. Fifty-one percent of participating organizations in IMS come from Europe; 25 percent from Asia and only 12 percent from the United States.

“We’ve had a very good experience with our companies and researchers gaining much advantage in collaboration from across the world,” said Rosalie Zobel, director of the Information Society Technologies research program at the European Commission. “It’s the world’s only global R&D framework that exists and works. It has standard intellectual property rights that are accepted by everyone. There are no problems with collaboration across the world in very large projects. We hope IMS will continue to develop with more countries.”

The European Union’s R&D managers believe the time is ripe for boosting manufacturing research programs because of their “strategic importance,” said Zobel.

IMS involves researchers and companies from throughout the world, providing them with insights into new ideas, technologies, processes and markets. During the three-day conference, hundreds of researchers presented their findings on all the current — and common — issues facing manufacturers worldwide. Many of these researchers spoke about how they conducted their research and then were hired by the companies involved in their projects. IMS is seen as a way to train the next generation of manufacturing personnel on the latest technologies and trends, said those in attendance.

The Europeans hope to double the Europeans

Commission’s R&D budget and want industry to substantially increase its spending on research. “We would prefer to see more participation from North America” in IMS, said Zobel. “For Europeans, it’s great to have win-win projects with people in North America along with the rest of the world.”

Those involved in the administration of IMS are beginning to undertake negotiations for continuing the program into its second phase, which would start in May of 2005. The Koreans and Japanese have committed to their involvement, but the Europeans must proceed through a formal process to gain approval. China has been approached for inclusion, but has not responded to any of the overtures.

The United States has not yet made a commitment to its involvement in a second, 10-year phase of IMS. “The jury is still out right now as to whether or not the Department of Commerce, which funds the program, is going to make a commitment,” said Kevin Lewis, managing director of the IMS Interregional Secretariat and the program’s top official. “Technically they can still make it.”

The United States government has never provided funding for IMS research, although U.S. companies, universities and research institutes have participated in some of the most robust IMS projects. U.S. government decisionmakers — undersecretary of Technology at the Commerce Department Phil Bond and Manufacturing Engineering Lab director at NIST Dale Hall — were invited to the IMS conference in Italy, but did not attend.

“The problem is two-fold,” says Sujeet Chand, chief technology officer at Rockwell Automation and head of the U.S. IMS Delegation. “The problem is awareness that such a global infrastructure exists and what they can leverage it for. The second is funding, which comes up all the time because IMS is a framework for pre-competitive R&D. For companies to do pre-competitive R&D, you need discretionary funding. It’s not product development. If discretionary funding is not available from companies, it’s not going to happen.”

A \$5 million commitment from the United States government would be a blessing, said the handful of Americans attending the event, because it would help support the involvement of researchers from universities and non-profit organizations. But the United States has other priorities.

Conference organizers say there are plenty of opportunities for collaborative R&D in common areas of interest, particularly in sustainable or environmentally sound manufacturing, manufacturing manpower development, nanotechnology fabrication and standards, and literally dozens of other fields.

“Never before has there been a greater need for collaborative research, dissemination to industry and building a global experience,” said Bob Herbert, chief executive of the Australian Industry Group.

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NACFAM WILL CHANGE ITS MISSION AND BECOME A WASHINGTON THINK TANK

The National Coalition for Advanced Manufacturing (NACFAM) is preparing to change its name and alter its mission. The board of directors of the 15-year-old Washington-based group is expected to approve a new charter for NACFAM on June 10 that will transform the organization into a think tank for policy research and program development in the area of manufacturing, science and technology. The word "coalition" in its title will change to "council."

The word coalition "has the overtone of a lobbying group and a temporary organization," says NACFAM founder and president Leo Reddy.

NACFAM originally started as a Washington membership group that lobbied on behalf of industrially oriented federal R&D programs. It intends to adopt the organizational model of the influential Center for Strategic and International Studies (CSIS). "We're really trying to deepen our role as the leading think tank in Washington for policy research in productivity, innovation and competitiveness for the industrial base," says Reddy. "We have the same basic goals but the time has come for there to be a much higher-level dialog between industry and government on how to have a breakthrough in some of the challenges in manufacturing." NACFAM's new subhead will be: "Strategies For a New Industrial Era."

As a think tank, NACFAM intends to unite under one umbrella high-level policymakers in government with leaders in industry, says Reddy, who worked as a resident diplomatic scholar at CSIS before forming NACFAM. "It's not having academics study a problem with recommendations," he explains. "Essentially, we'll bring people who are making the decisions into the room and integrate them into the process and think through issues. You need academic people and research to provide the parameters but the recommendations should engage people."

NACFAM's board wants an organization "that is capable of making decisions on resource allocation because policy without resources is meaningless," says Reddy. "Policy is action backed by resources. We'd like to see more robust investment in manufacturing technology research and development; a lot more done to improve the skills of the workforce; and improve the performance of small- and medium-sized companies."

NACFAM will strengthen its in-house studies functions and data generation and analysis skills. "As a serious think tank we want to mine data and develop data on our own," says Reddy. NACFAM will study issues related to global sourcing, global design and global production. It wants to develop strategies on how to make the United States the first choice for the location of new manufacturing plants, and reverse the decline of manufacturing employment, foreign direct investment and manufacturing as a percentage of GDP. It also wants to study trade and cost issues.

"One thing I'd like to do is historical analysis on trade agreements based on two factors: one, the degree to

which we have applied the principal of reciprocity on trade agreements; and the second is the degree to which non-economic issues have affected trade agreements," says Reddy.

NACFAM intends to increase its leadership forum from 65 to 90 individuals and include members of Congress, governors, labor union officials, researchers and industry executives.

Pentagon Will Develop A National Mfg. Strategy

The Office of the Secretary of Defense is sponsoring a project aimed at providing the department with an investment strategy for the transformation of the U.S. manufacturing base. The Next Generation Manufacturing Technology Initiative (NGMTI) "seeks to energize a national consensus for investing in high-leverage, high-impact manufacturing technologies that enable faster delivery of affordable systems for defense while at the same time improving the global competitiveness of U.S. manufacturers," says the Charleston, S.C.-based Advanced Technology Institute (ATI), which is spearheading the project.

Partners involved in the initiative will spend the next 12 to 18 months devising an investment plan for manufacturing technologies. They will launch an industry/government forum of manufacturing leaders to guide the effort; and they will devise a broad implementation program. The National Coalition for Advanced Manufacturing (NACFAM) and Integrated Manufacturing Technology Initiative Inc. (IMTI) are partners in the project.

"Our objective is to radically enhance the nation's return on its manufacturing investments," says NGMTI general manager Gerry Graves of ATI. "We want to reestablish U.S. leadership in manufacturing science and technology by delivering a plan to double the nation's manufacturing technology investments and increase the return on those investments by a factor of ten."

Another goal is to figure out how to change the fundamental economics of manufacturing to enable the United States "to retain a robust industrial base for both national security and national economic growth," says Leo Reddy, president of NACFAM, which will be heading up the industry-government forum.

The NGMTI team has identified six technology areas for investment including emerging process technologies, model-based enterprises, intelligent systems, enterprise integration, knowledge management, and safe, secure and reliable manufacturing operations.

Sujeet Chand...

(Continued from page seven)

create intellectual property for products that have a high level of IP embedded within them, then manufacturing can be done in the United States.

We need to reinvigorate manufacturing. We need to somehow find a way to catalyze it. We need to make it exciting and make it sexy for someone to say: I got a degree in double-e but I specialized in safety for manufacturing systems or security for industrial automation systems.

You don't see that in the United States.

We have pockets of good manufacturing R&D in the U.S., but the glamour is lost. I don't think a professor working in manufacturing technology has the same clout of going to the National Science Foundation and getting funding as someone working in the bio-nano area because it's not sexy.

Some groups have done well. Jay Lee a professor at University of Wisconsin-Milwaukee has been very successful with his Center [on Intelligent Maintenance Systems] that focuses on diagnostics and prognostics for manufacturing systems. It's a very manufacturing focused activity. He has 35 companies that belong to his consortium.

We need a lot more of those types of centers and those kinds of activities. You need aggressive professors with vision being able to drive it.

The United States is moving more and more to a service based economy. But is that a sustainable model? If you ask me, we need a balance. You can't get out of manufacturing entirely. Manufacturing is the source of wealth for most nations.

China Vortex... (From page five)

and tariffs has likewise done more to embitter relations with its customers than to keep mills in gear and workers on the job."

America needs a new competitiveness agenda to counter China and its neighbors. U.S. firms must adopt successful strategies being deployed in the high-wage and high-cost countries of Denmark, Germany, Italy and Japan. They must emphasize quality, brand recognition, customization and rapid shifts of product lines. The federal government's Manufacturing Extension Partnership program should be boosted and promoted, PPI recommends. A new "Sematech" type of industry R&D consortium model should be considered. And workforce training must be embraced. "Perhaps a competitive challenge from overseas may provide a push for action here when domestic politics has not," says PPI.

For a copy of the report "The Emerging Asian Union? China Trade, Asian Investment and a New Competitive Challenge," call 202-547-0001.

Samsung... (Continued from page one)

product technologies.

Song is in charge of Samsung's Mechantronics Center, which oversees the company's Institute of Intelligent Systems, teams of manufacturing equipment and robotic systems researchers, and a precision optics group. Samsung's primary business focus is on flexible automation and assembly, the efficient movement of material in its logistics operations, precision assembly and packaging, and machine intelligence-based inspection technologies.

Samsung's Strategy In Manufacturing: Speed And Minimum Capital Investment

Investment:

- Practice Strong Simulation — Saves Vast Capital Investment Through Prediction By Simulation
- Simulation Provides Optimal Level of Equipment and Factory Space and Optimization of Local and Global Material Flow
- Use In-House Development Of Custom Equipment and IT Solutions For Innovative Products
- Maximize Factory Efficiency — Less Additional Investment
- Continuous Innovation for Extreme Productivity

Research and Development:

- Practice Strict CAE, CAD, CAM and CAT
- Serious Management of Product Lifecycles
- Diversify Technology Sources and Human Resources
- Keep Core Technology In-house As Long As Possible
- Design for Manufacturing

Manufacturing:

- Maximize Each Tool For Efficiency
- Find the Best Operational Conditions
- Customize Equipment and Operation Software To Increase Yields
- Integrate IT Solutions From ERP Level to Tool Control Level
- Translate and Analyze Raw Data Into Explicit Knowledge
- Customize and Modify Equipment, Hardware and Software In-house

Global Trend In Electronics Manufacturing

