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MAKING IT WORK

Manufacturers, who have been through many recessions before, have become tougher, leaner and greener.

by *Steve Lawrence*

Contrary to a lot of talk on Capitol Hill and around the nation, manufacturing was among the strongest and most productive segments of the U.S. economy before the economy went into a tailspin. To be sure, well before the present downturn, the sector had suffered heavy losses, by some measures, over the last 15 years. More than 3.8 million jobs lost since 2000, its contribution to the economy dropping. This had led some observers to warn of a “hollowing out” of American manufacturing and to press for government policies to stop the decline.

Yet pre-recession, American manufacturing, measured by output, productivity, revenue and even profitability, had never been stronger. It changed dramatically in just the last decade, becoming stunningly more productive, tougher, leaner and greener. Because of this, metal-using manufacturers in a broad range of industries, from aircraft to energy production, from agriculture to heavy construction equipment here and overseas, will remain resilient and recover as their markets do.

Last summer, even as the leading edge of the present disaster was unfolding, National Association of Manufacturers (NAM) President and CEO John Engler summed up the sector’s strength. “It is remarkable how the perception of American manufacturing differs from reality,” Engler said. “Not only is the U.S. the world’s largest manufacturer, but U.S. manufacturing output in 2007 set an all-time record. While there are more than 3 million fewer manufacturing jobs than in 2000, our productivity has grown so rapidly that today 75 workers produce what it took 100 workers to produce then.”

Although orders for durable goods fell 4.5% in September in the midst of the worst economic news in the United States since the 1930s, that decline followed three consecutive months of increases. The Federal Reserve reported that, overall, U.S. industrial production dropped a dramatic 2.8% in September, the steepest fall in 34 years. But this, and its accompanying expectations of a prolonged slowdown, were all the more shocking because they followed an 18% increase in U.S. manufacturing output in the last seven years, a commitment to research and development that in five years has catapulted industrial R&D investment to 70% of the national total from 45%, and profits, although admittedly cyclical, had been outperforming the returns of non-financial corporate businesses in this country for the last half century.

The U.S. manufacturing decline was, in fact, no worse than what’s been reported by Japan, Germany, France, China and other top goods-producing nations.



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The Fed's industrial production report was preceded by industry and government reports of declining steel demand due to all-but-paralyzed auto and construction markets. Exports also began dropping as foreign buyers became cautious about credit and their sources of project funding.

Before the credit crisis and unraveling of the domestic and global economies, the manufacturing sector here had built significant momentum. Weak auto sales from record high gasoline prices had become a serious drag on the economy. But Toyota Motor Corp. announced it would begin producing its wildly popular Prius hybrid sedans in the United States. Its new plant in Blue Springs, Mississippi, still scheduled to open in 2010, is the first Prius plant outside Asia.

A bit earlier in the year, United States Steel Corp. began to build a \$570 million, state-of-the-art, energy-producing coke plant in Granite City, Illinois. The joint venture with SunCoke Energy Inc. will provide 650,000 tons a year of screened blast furnace coke to U.S. Steel's Granite City Works. It includes 120 heatrecovery coke ovens with recovery steam generators, allowing it to produce its own electricity.

The lean and green facility is an example of how manufacturing has been developing. It will provide high-quality flat-rolled carbon sheet steel to the construction, container, pipe and tube, service center and electrical industries. It will do that with what the U.S. Environmental Protection Agency says sets the standard for coal processing ovens. It comes with a new commitment from the company for more intense emissions monitoring and reduction.

And in Louisiana, Nucor is still moving forward with its plans to build a state-of-the-art, \$3 billion, threestage pig iron facility and steel mill. Daniel R. DiMicco, chairman, president and chief executive officer of Nucor, told securities analysts in the company's regular third-quarter conference call that he expects the state to approve required permits and an incentive package for the plant. DiMicco said that Nucor is also looking at potential sites in South America, in case Louisiana rejects the new mill. Here, too, environmental considerations figure prominently: the company's goal for the plant is zero emissions. "What we can say is that 2008 will be another record year for Nucor," DiMicco told the analysts, "and today our competitive position is stronger than ever, both here and globally."

The big guys like Toyota, Nucor and U.S. Steel grab the headlines, but nimble, expansion-minded smaller companies have been at the heart of record output and productivity figures in North American manufacturing. The 295,000 small and mid-sized manufacturers, those with up to 2,000 employees, make up 99% of the manufacturers in the United States, and are responsible for more than 40% of the output.

They are run by people such as Troy F. Berg, president of Dane Manufacturing, just outside Madison, Wisconsin. For the second year in a row, Dane made the Inc. magazine list of the 500 fastest-growing companies in America in 2008. Dane is a custom machine tool shop that Berg and his wife bought six years ago. They retooled, invested in new equipment, eliminated outmoded processes and began to concentrate on the expanding health services industries for customers. "We have tripled the size of the company by every measure in that time—sales, employees, metal volume," he says. "We've gone from 12 to 45 employees, sales from \$1 million to \$7 million a year, and our metal consumption was up four times in the period."

Dane specializes in quick turnaround, often limited-run and custom products for customers mainly within a 250-mile radius of his plant. Berg ships perhaps 2% of output to Canada. When an area hospital supplier needs a specially designed stainless and wood handrail for hallways and a stainless corner protector to



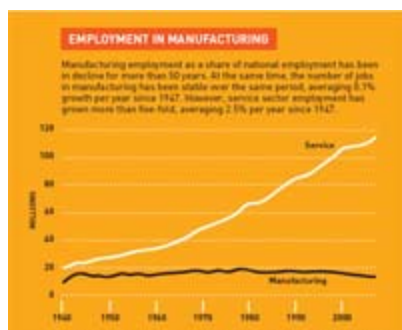
keep hospital crash carts from chipping the walls, it turns to Dane. “We work with industrial designers, our own and others, and deliver the items quickly and on time,” Berg says.

His next move is to become an OEM, producing his own brand-name parts in addition to custom items. “In five years, I think we will be at \$15 million a year, even with a recession,” Berg says. “We are getting clients in the energy business, wind power, and there is huge opportunity there.” Health care, alternative energy and high-tech, custom designs—Dane is right where manufacturing experts say it needs to be today.

WHAT’S THE REALITY?

As the new century began, American manufacturing was battered by a particularly severe confluence of economic and political events; events that produced those “hollowing out” warnings. U.S. equity markets fell into the dot-com bust in early 2000, plunging the country into recession. Energy prices escalated. Al Qaeda attacked the United States on Sept. 11, 2001, shaking the economy further. Starting in late 2001, corporate governance scandals—Enron, WorldCom and the rest—devastated confidence in U.S. securities markets. Wars began in Afghanistan in 2001 and in Iraq in 2003.

In this period alone, some 3 million manufacturing jobs disappeared. Auto, textile, appliance, furniture and low-end electronics manufacturing jobs were lost as consumer demand dropped. Many of them reappeared in succeeding years, but offshore, in the low-wage factories of China, Mexico and Vietnam, among others.



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Manufacturing employment as the current recession began hovered between 13.4 million and 12 million, depending on who is doing the counting. As a percentage of gross domestic product (GDP), manufacturing had declined from around 16% in 1995 to around 12% today, far from the 25% it represented in 1960. Likewise, its share of total employment had dropped from 15% or so in the mid-1990s to about 10% today.

This has led all manner of congresspersons, industry lobbyists and editorial writers to lament the fate of the American factory and its workers. It has also set economists to wrangling over how much of the decline is a result of low-cost producers in emerging markets, with China generally tagged as the main culprit. Some, such as Robert Scott at the labor-leaning Economic Policy Institute, joined at times by NAM, American Manufacturers Trade Action Coalition and other industry lobbies, say as many as 2.5 million of those lost jobs can be blamed on China’s artificially cheap currency and the Bush

administration’s refusal to do anything about it.

Others, such as the rightward Cato Institute, roll out their own figures to counter the China critics and say the jobs would have been lost in any case. They also point to vibrant expansion in the service sector as the story behind manufacturing’s declined percentages.

William Strauss, senior economist and economic adviser at the Chicago Federal Reserve, argues that the

decline in total jobs along with the phenomenal boom in the service economy and industrial productivity are both characteristic of a basically strong, high-tech country. "Manufacturing as a share of national employment has been declining for over 50 years," Strauss says. "But service sector employment has grown more than five-fold over this period, averaging growth of 2.5% since 1947.

"While manufacturing employment growth was flat over the past 50 years, manufacturing output increased by 3.7% each year. And this translated into an almost 700% increase in manufacturing output in this period."

The strongest productivity gains within the sector have been in durable manufacturing, Strauss' numbers show.

Finally, and perhaps happiest for the sector, Strauss says, "More cyclical profits in manufacturing have outperformed returns in non-financial corporate businesses."

Just as encouraging, Strauss says this has very likely built resilience into American manufacturing that should temper the impact of recession. "Even as the credit markets deteriorated, the manufacturing base was in pretty good shape," Strauss says. "Manufacturers had already begun to control inventory levels more intelligently. They were moving to more high technology, energy efficient processes and operations, and we saw real improvements in the way supply chains and operations were being managed. The entire sector had become more forward-looking and was in better shape than in some previous downturns."

"If you live in a manufacturing community, you can get the perception that it is going away because jobs in big plants are going away," says Michael J. Hicks, director of the Bureau of Business Research at Ball State University in Muncie, Indiana. "But it is mostly a mirage. The big factories with 2,000 to 3,000 jobs, are being replaced by dozens of small and medium factories."

These high-tech jobs do not require the same kind of labor force common when Detroit prospered. And yes, part of that productivity is outsourcing both overseas and domestically.

"We count workers differently now," Hicks says. "Every factory in the U.S. in 1970 had a nurse. Today she may still be there, but she is outsourced. She doesn't work for the company and doesn't show up as a manufacturing job like she did back then. The same with security guards. They may work for Brinks or Wackenhut, but not GM."

Hicks, too, believes that U.S. manufacturers are now strong enough to weather a tough recession. "Commodity and energy prices will have dropped," says Hicks, "which should improve margins. Emerging markets will slow less. Families in India did not lose a lot in the market. And there is a tremendous pent-up demand for housing in this country, once the credit markets recover. On the other side of this recession, markets will be safer and more robust, and I think this will be sooner rather than later."

Strauss figures that "depending on credit availability, consumer driven sectors of manufacturing will likely be the slowest to recover." For strength, he points to the most successful pre-recession segments. "Machinery and fabricated metals have been solid," he says. "It was mainly those industries with the most value-added



content." Chemicals, which includes pharmaceuticals, and plastics and rubber, have been strong, he says. "But the strongest, and will continue to be, is computers and electronics, which began in this country from a low base, but the growth has been huge.

"The steel industry was running at close to full capacity. John Deere is literally sold out of tractors and heavy farm equipment for the next several years. The same is true of heavy mining equipment: It's sold out of heavy construction equipment, cranes and the like."

At the same time, the United States is exporting significant amounts of steel, he says. And will again. "Just a few years ago, we may have had \$400 million in exports—really nothing—and now it is at least three times that, maybe \$1.2 billion, which is very good for our trade deficit. We've been running a deficit of 5% to 6% of GDP, and a comfortable rate is plus or minus 1%."

COPING WITH CHALLENGE

Painful as it may get, there is considerable agreement that a downturn also offers plenty of opportunity. "A recession can do a good job of separating the bad from the good," says Hicks at Ball State's Bureau of Business Research. "Bad companies can survive in good times, but only good companies survive in bad times. So I think we'll see companies across the board sorting through their operations, discarding the ones that don't work, modernizing processes, getting more efficient."

Across the country, in fact, manufacturers of all sizes were already looking at ways to cut waste, shorten supply lines, reduce energy costs, develop more innovative new products, capture a greater share of foreign markets and even take more advantage of government support.

As a result, fuel, hydraulics and flight control systems manufacturer Parker Hannifin, Goodrich and General Electric Aviation all became suppliers for China's first commercial jet airline project, the ARJ21. Conversely, the weak U.S. dollar and high worker productivity here had been making it easier for individual states to attract foreign investment with generous incentive packages. Tennessee got Volkswagen to break ground in the middle of last year on a \$1 billion car plant in Chattanooga, for example, with a package totaling \$577 million. ThyssenKrupp AG got more than \$811 million from Alabama to build a new steel plant there.

These global strategies not only mean more business, but also apparently higher margins. Businesses with global strategies report 4% higher gross margins than those without, reports a spring 2008 survey of 911 U.S. businesses by Minneapolis-based RSM McGladrey, the nation's fifth-largest tax, accounting and business consulting firm. "And global operations may be favorable for U.S. workers, as well," says Tom Murphy, McGladrey's executive vice president of manufacturing and wholesale distribution. "Companies with foreign operations hire U.S. workers at twice the rate of domestic-only companies, and they are more robust here in the U.S."

THE HUGE POTENTIAL OF LEAN

One of the most significant unrealized opportunities for building new domestic manufacturing strength is inside factories themselves. It goes by several names—lean, Kaizen, Toyota Production System, Rapid Continuous Improvement, Zero Waste—but it is still vastly underused in the United States. It means

assigning someone full time and developing a continuous process for eliminating waste and improving efficiencies throughout a business. It involves workers in a collaborative process, with regular meetings that examine every part of the manufacturing process, from parts arrival to administration to find ways to eliminate waste and procedures that don't add value. Sometimes this means eliminating forms and paperwork. Sometimes it means rearranging an assembly line to put similar operations closer to one another or to the point where parts arrive "just in time." Sometimes it means building a new machine to perform an operation done manually.

new machine to perform an operation done manually. And it produces results. "U.S. plants that have implemented at least one of the lean approaches report a median 35% gross profit margin and \$197,000 sales per employee, versus just 31% gross profit and \$150,000 for those not implementing lean," says a 2007 report published by The Manufacturing Institute and RSM McGladrey.



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But the study also found that while some 80% of large corporate manufacturers use some form of lean manufacturing, they fail to achieve anything close to its full potential. Many use it only on the assembly line, for instance, or on one part of the line. Most—up to 75%, say most estimates—try it once and stop. "It has to be a relentless pursuit of eliminating waste," says McGladrey's Murphy. "And many don't try to introduce lean practices into the supply chain. Too many do it too superficially. Lean is not a flash in the pan; it is a change in the culture." (See "No Easy Fix," Forward, May/June 2008.)

Lean worked for Power Curbers, the 55-year-old North Carolina maker of paving machinery that turns concrete into curbing. The company, with \$11.2 million in annual sales in 2007, has grown 7% to 7.5% a year since the early 1990s because of its lean program, says CEO Dyke Messinger. "Employment has been steady over that period of time."

Companies that want to really learn lean can look to the Manufacturing Extension Partnerships, a joint effort of all 50 states and the National Institute of Standards and Technology. MEP acts as a consultant offering workshops, on-site analyses and on-going advisory services.

"There are maybe 1,600 manufacturing specialists in the MEP system," says Michael Klonsinski, executive director of the Wisconsin Manufacturing Extension Partnership (WMEP), which assists Wisconsin's small and mid-sized manufacturers, and a founding director of the MEP system. "Lean and continuous improvement is 60% to 70% of what we do. It's true, though, that maybe 75% of the companies that start with lean technology abandon it at some point. They pick up the tools and use them once or twice, but it is harder to create the organization and lean corporate culture necessary to sustain it. You need to drive it into the back office and the supply chain, into the entire operation," he says. "It used to be that production was the only issue, but today it's a lot more than that."

Klonsinski and WMEP seem to be doing something right. In a July survey at the end of its 2008 fiscal year, 185 WMEP-assisted companies reported \$226 million in benefits from the consulting programs. These included \$128 million in sales, \$16.9 million in cost savings, \$81.3 million in investments, including new

plants and equipment, and 1,235 new jobs created in the period.

“But we are changing because the manufacturing climate is changing,” says Klonsinski. “We are now doing more work on product development and marketing development, especially nationally. We teach structured brainstorming, and, again, this is a culture change that is often hard to sustain. But often, these guys need to break free from the market they are in. We have a dairy equipment manufacturer, for instance, who is now making stainless steel vats for the pharmaceutical industry. We are trying to show American manufacturers a structured way to be innovative.”

Klonsinski is another who firmly believes there is opportunity in this downturn. “This is a real chance for manufacturers to focus on productivity, getting leaner, eliminating waste and introducing those continuous improvement programs into their shops,” he says. “This is a time to work on waste reduction and training, all those things they didn’t have time for when they were going flat out. With all this, U.S. manufacturing should be in a strong position as we come out of this.”

FINDING WORKERS

Klonsinski and his MEP colleagues around the country had already begun a project to study what manufacturing in 2015 would have to look like to prosper. The changes they see are not just in what manufacturers make or the lean processes they use to make them. It is also in who leads and who does the work. CEOs in manufacturing will be from different backgrounds, says Klonsinski, from international marketing development, for instance. They’ll be able to manage partnerships with vendors. They may be supply chain specialists or from a continuous product development background.

Finding, training and retaining skilled workers will be perhaps the biggest challenge. “It used to be you didn’t need a high school degree to work in an auto plant,” says Murphy at RSM McGladrey. Today’s entry-level workers have to be able to do math, geometry and read blueprints. Many companies are already investing in this training themselves. They attempt to keep the most desirable workers beyond traditional retirement (see “Staying Power,” pg. 12).

“We are constantly recruiting,” says Berg at Dane. “We have to keep our wages and benefits in the higher end to attract people. We start at \$12 an hour and move people up to \$25 an hour. Health care costs are definitely an issue. We used to pick up 80% of health insurance, but now it is down to 60%. Our people get a 401(k), as well, that we contribute to, and we seem to keep our turnover at around 10% a year. We do train intensively for specific jobs, but now with 45 to 50 people, we are going to have to formalize our training.”

Klonsinski says the manufacturing community also needs to take a critical look at immigration policies. The limited number of skilled worker visas does not allow the industry to tap into the talent pool from other countries.

Crucial to this vision will be for manufacturing to retain its strong level of research and development spending. “Manufacturing’s continued strength has much to do with the fact that manufacturing companies need to be knowledge-intensive and highly creative to develop new products,” says William Testa, vice president and director of regional programs in the economic research department at the Chicago Fed. Indeed, in the last five years, the industrial investment in national research and development has

accelerated from 63% of the total in 2003 to an estimated 70%, or \$258.7 billion of \$367 billion expected in 2008, reports Ohio-based Battelle Memorial Institute.

"Innovation is the key. We still lead the world in innovation," says Murphy.

Will it happen? The experts point to at least four important areas to watch: Research and development spending, the pace of start-ups, the strength of U.S. exports and the availability of financing.

Yes, recessions are tough and unpredictable. Hard to find anyone knowledgeable who is willing to predict how deep and long this one will be. Nevertheless, the basic strength is there, waiting for the inevitable upturn. As NAM President and CEO Engler told Congress late last year, "Our manufacturing future is in our own hands."

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