# A CASE FOR Large-Scale Manufacturing

## BIG COMPONENTS AIM TO REVIVE NORTH AMERICAN INDUSTRIAL MARKET

Matthew Jaster, Associate Editor


**Brad Foote Gear Works has been building precision gears since 1924 for industrial markets as diverse as oil and natural gas, mining, steel, transportation and power generation (courtesy of Brad Foote).**

It's no great secret that the United States has lost a bit of its industrial mojo. This country's manufacturing complex once played a decisive role in the outcome of World War II, helped create a vibrant middle class and basked in all the glory of real economic expansion in the 1940s–1950s. Through the years, however, it seems that manufacturing ingenuity has been systematically replaced by a cubicle culture where information, bio-technology and service trump everything else. Thankfully, North America is still in the business of making *stuff*; the kind of *stuff* you need to run wind turbines, agricultural equipment, steel mills and transportation projects. The secret to a good, "ole-fashioned" industrial renaissance might just be found in the manufacturing operations that are currently supplying large power transmission components to the alternative energy, steel, off-highway/construction, oil and gas markets.

Tim Carpenter, vice president and general manager, Rexnord Global Gear and Services Groups, thinks the U.S. large-scale manufacturing base has the capacity and capability to be globally competitive. "Many operations started making this move in the 1980s and several are very successful today. The

implementation of lean and Six Sigma—not only in the operations but equally in the office—have allowed many businesses like ours to not only compete but be world class."

Carpenter believes that the U.S. still has a remarkable advantage over global competitors thanks to its experience, knowledge and knowhow and the existing base of equipment and skilled labor that sets it apart from other regions. "Companies that are investing in continuous improvements have the ability to compete in engineered /non-commodity production," Carpenter says. "The same can be said for much of Europe, provided their input costs can be managed."

For Sergio Gamboa, sales director at Brad Foote Gear Works, a Broadwind Energy company, the U.S. manufacturing base simply has to be faster, smarter and more productive than the competition. "Europe and Asia will always be a part of the landscape. What we really need to do is supply what the competition can't. We have to provide a better service to our domestic suppliers and customers with good parts, on-time, at a level that the foreign competition can't match."

In Canada, quality and skilled labor are two areas where large-scale manufacturing companies thrive. "We have had Chinese companies approach us because they cannot find the quality in the final product that they require," says David Manders, technical sales representative, Vancouver Gear Works. "North American materials and our skilled labor are hard to beat, and that is recognized by many foreign markets. Other nations, however, are catching up, and we need to squeeze out all the manufacturing efficiencies that we possibly can to remain globally competitive."

### From De-Industrialization to Re-Industrialization

A wind energy strategist recently suggested at an alternative energy summit that de-industrialization has plagued heavy industrial, large-scale manufacturing in North America since the 1970s and will negatively impact this segment in the future. While there's no arguing manufacturing isn't what it used to be, Pat McGibbon, vice president of strategic information and research at the Association for Manufacturing Technology (AMT), believes both the perception and reality regarding North American manufacturing is changing."

"History has shown that the North American manufacturing sector is very resilient. We were far behind in the 1980s, had a phenomenal period from 1992–1998, and in the last decade we've pushed manufacturing technology up another notch. North American companies are bringing new products and innovations to the table that didn't exist five years ago. I would argue that we've had slow periods as well as periods of significant, substantial growth."

Manufacturers that produce gears, bearings and couplings feel the same way.

"There is no doubt there has been a 'de-industrialization' in the United States since the 1970s. This is an irrefutable fact," Carpenter at Rexnord says. "However, much of what moved was not large-scale, highly engineered, mission-critical industrial equipment—and that is our business. For smart companies that have invested wisely over that same period, the core of the business gain remains and thrives in the U.S. while competing globally."

When the wind energy industry started taking off, Brad Foote became one of the leaders in the market. "We moved away from other industries at that time and followed the transformation into wind until it leveled off in 2008–2009," Gamboa says. "Today, we are a much more diverse company serving multiple industries. In the future, we will service all the industries that require coarse pitch gearing, all sectors on a high and low volume scale."

"The de-industrialization taking place in the United States is a problem that we also face here in Canada," Manders says. "With a hard-nosed determination to make everything as low a cost as possible, we as a society have proactively chased heavy industry to foreign markets where you can get forty workers for the price of one North American skilled tradesperson. We have chosen a disposable lifestyle which accepts second or even third rate products simply because they are cheap, but in reality, one well made product would be cheaper in the long run."

The difference between a world-class manufacturer and a run-of-the-mill manufacturing outfit might simply come down to the investments made in new technology. It's in this area where North American manufacturers can excel in the global market.

"Technology will continue to allow for continuous improvements in through-

**continued**

**Rexnord is one of the few companies in the world that offers gear casting, in-house heat treating and carburizing, sophisticated gear cutting and precision grinding at a single location (courtesy of Rexnord).**

**Given the length of time that large-scale manufacturing takes, any minor advances in technology can have major impacts in manufacturing times (courtesy of Vancouver Gear Works).**

put, cycle time reduction and cost out. It will also afford improved performance in our end products through higher quality parts," Carpenter says. "Near term advancements will address throughput and increased quality while mid-term to longer term advancements will afford us the options of manufacturing products in entirely new ways. New breakthroughs—at least for us—will come from heat treat and machining."

Gamboa notes that Brad Foote's success is largely based on its machine technology investments. "In order to be a premier supplier of high quality bevel gears, we've made technology investments for the sole purpose of driving down costs and saving valuable time on the manufacturing floor. In the future, multi-axis machining centers will play a large role in decreasing cycle times and lowering costs."

"Given the length of time that large-scale manufacturing takes, any minor advances in technology can have major impacts in manufacturing times. It seems that more and more machines are coming out with gear cutting as part of the machine options. Being able to turn, mill, drill and machine the teeth in one setup improves the quality and costing," Manders adds.

**Meeting Large-Scale Expectations**

If there's a common thread to be found between companies that produce big gears, bearings and couplings, it's the engineering, design, safety, maintenance and technology requirements needed for these large-scale power transmission components. These components come prepackaged with challenges including delivery expectations, global competitiveness, raw material shortages and education/training obstacles.

"Our greatest challenge is meeting the delivery expectations in the large gear market. It really does not want to hold inventory," Gamboa says. "Brad Foote is meeting raw and finished goods inventory levels with improved communication with our customers as well as a very good process flow."

"In the supply chain, it is critical that companies spend time and money investing in their own associates but equally in their suppliers. Partnering is more critical now than ever before," Carpenter says. "Being globally competitive is a huge undertaking but it often starts by leveraging what made a company successful to start with."

While the skilled workforce in North America is stronger than most areas around the world, it's still nowhere near what it needs to be for future success in manufacturing. "I travel to our customers and end users and the message is unanimous—it's education," Gamboa says. "Training of our human resources is important, but there's also a growing demand that can't be met because of a lack of training and education on the shop floor. Actually it's gotten worse in the last couple of years; not a lot of people would like to run a machine. They'd be much happier sitting behind a desk. If we really want to change the manufacturing perception, it starts here."

"Many foreign companies are using the exact same machinery that we take pride in housing. The difference is that they do not have the skilled labor to operate it the way we do," Manders says. "Our governments need to be proactively promoting the skilled trades in North America. We cannot afford to lose the knowledge that we currently take for granted and expect to keep offering superior products."

Not only must skilled labor requirements be met; the access to market data and analysis needs to be more readily available to certain segments of the man-

ufacturing industry. "I think an organization like AGMA would play a vital role in gathering *clean data* to help us make logical business decisions in the gear industry," Gamboa says. "I'm sure Europe and Asia currently do a much better job. We need more of the gear industry to get involved and get the material from a single source."

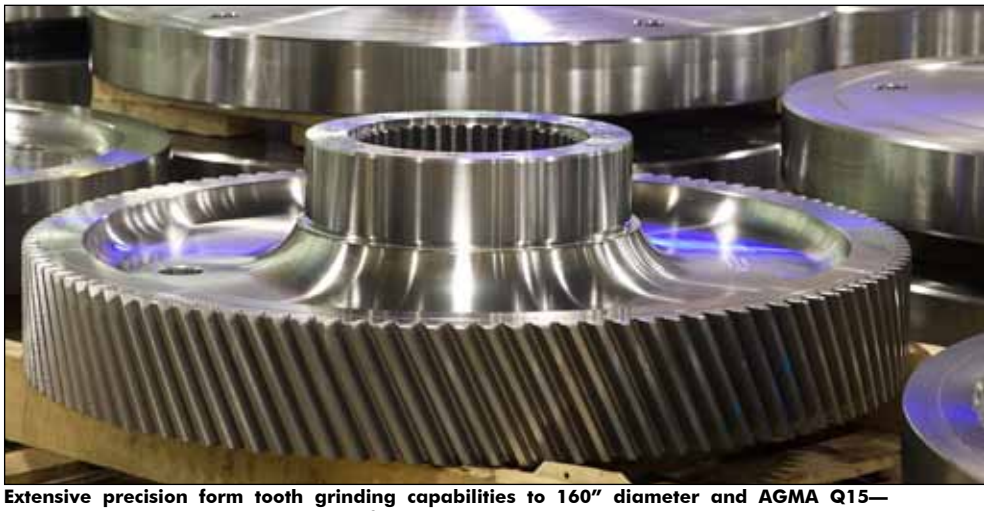
"Given the relatively small size of the large-scale manufacturing community in North America, we need to work together sharing industry knowledge through forums such as AGMA and other industry-based groups. The old adage, 'Together we are strong…' comes to mind," Manders adds.

Despite these challenges AMT's McGibbon thinks North America is neck-and-neck with Japan and Europe regarding technology, cost structure and meeting these various manufacturing demands. "The Germans have a slight advantage in heavy components because they have closer access to Central Europe and Russia where the foundry regulations are not as strict as they are here. They also have an education system that provides an excellent labor force geared toward quality and accuracy. In Japan, it's all about making costs disappear. The U.S. excels at the process engineering side. From a manufacturing technology perspective, Europe, Japan and the United States should have control of this market segment for many years to come."

AMT's Manufacturing Mandate is trying to assist where it can by focusing on global regulations and cost structures, R&D opportunities and building a stronger, educated and trained workforce. "It all comes down to taxes, labor supply, regulations and the overall image of manufacturing today," McGibbon says. "I think North America has made significant improvements in all these areas in the last four years."

### Expanding North American Infrastructure

Politicians and economists have been pushing for more emphasis on North American infrastructure projects recently. Since the end of the economic downturn, the focus has been on alternative energy, bridges, tunnels, mining and heavy equipment projects. If these projects come to fruition, it would not only benefit the manufacturing community; it may also take a bite out of the unemployment rate. Are a significant number of these projects already under way, and if so, what real effect will they have on power transmission component manufacturers?



**Extensive precision form tooth grinding capabilities to 160" diameter and AGMA Q15—including the largest internal/external form grinder in the U.S.—have helped to establish Brad Foote Gear Works as a leader in large gearing (courtesy of Brad Foote).**

"Infrastructure development projects have been active in the quoting stage. Much of the funding, though, has not reached the contractors and thus not reached the manufacturers," Carpenter says. "Alternative energy spending (wind, solar and hydro) appears to have slowed a bit, but it remains stronger than the overall economy. However, to the extent these are subsidized markets, the underlying demand appears unclear."

"We have heard these statements being proudly proclaimed but many wind turbines are still made in Europe or increasingly Asia," Manders says. "Tunnels get dug once, the majority of major rivers have already been dammed and those projects operate 30+ years between refits, etc, etc. These proclamations do very little to sustain industry in the long term."

McGibbon at AMT notes that off-highway, construction, mining and heavy industrial equipment orders *are* up significantly and continue to climb at double-digit rates. "This is by no means the largest market in terms of manufacturing technology, but it's certainly the fastest growing at this point in time. There are some positive signs heading into 2012."

Carpenter is generally optimistic about the future of large-scale manufacturing in North America. "There is no reason a U.S. based manufacturer of highly engineered, mission-critical products can't thrive and win for decades to come. Frankly, many U.S. companies are now "on-shoring" or bringing production back to the United States that they had moved off-shore in the time period since the 1970s. We expect on-shoring to continue as global capacity is constrained and quality expectations continue to rise."

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