



Havlik International Machinery has been in the big gear business for more than 100 years with an emphasis on mining applications (courtesy of Havlik).

Sizing Up Big Gears

QUALITY, MATERIALS AND TECHNOLOGY CONTINUE TO CHALLENGE MARKET

Matthew Jaster, Associate Editor

It comes as no surprise to suggest we're living in an age of reduction. The automotive industry is now manufacturing smaller cars on tighter budgets, companies are consolidating instead of expanding and the manufacturing community has less experienced workers with little or no knowledge of the machines they need to be working on. The less is more philosophy is alive and well in 2010.

This makes it difficult to get things

done when your company is in the business of being big. Large gear manufacturers have all the same problems as their smaller counterparts with a few significant exceptions. These companies need to invest in more equipment, tackle greater production demands and maintain lead times that typically use the word "years" instead of "months."

The bar on quality standards continues to rise in this market even though many mining and off-highway

projects are being cut or temporarily shut down. It's a mad, mad world for large gear manufacturers, but if you've got the right technology, equipment and experience, it's an industry segment that can be highly profitable.

Big Gears: 6-8 Meters

There are big gears and then there are BIG gears. Companies like HMC Inc., Havlik International and Horsburgh & Scott fit the BIG gear category. These gears are typically

found in mining, steel and construction applications and come with a list of supply, material and quality concerns.

While big gears can be more profitable than other industry segments, new opportunities have cooled down recently. There's still plenty of business, but the game is changing, and companies are learning to adapt to a shrinking manufacturing base that is pinching every penny.

Horsburgh & Scott, headquartered in Cleveland, Ohio, specializes in the design, manufacture, service, rebuilding and repair of large industrial gears and gear drives. The company recently lost two customers due to economic hardships.

"One mining operation shut down for a year, and another customer shut down permanently. This is the nature of the beast lately. We see existing customers closing their doors and very few new customers entering the market," says Tom Putnam, chief customer officer at Horsburgh & Scott.

Putnam says the mindset in the big gear industry is no different than that of the typical homeowner right now.

"Customers aren't willing to spend money right now on new equipment; they're simply replacing what they absolutely must have. Our biggest challenge is getting the orders. The demand for large gears has changed in this economy."

Havlik International Machinery, Inc. has been in large gear manufacturing for more than 100 years. John Havlik, president and CEO, considers the mining industry to be the focal point.

Though business has been good in the past, a recent decrease in orders for Havlik illustrates the shaky manufacturing sector currently affecting large gear manufacturers.

"Our company manufactured 25 large ring gears in 2008, but only five in 2009," Havlik says. "What a difference a year makes. The amount of large gears being manufactured today compared to two years ago is incredible."

There are many reasons why orders were down in 2009—including economic issues and the simple fact that the demand isn't as great—but Havlik suggests that a bigger issue might be the quality standards that are not being met.

"If you want to succeed in this market segment, you have to make major capital investments in order to adhere to the quality standards customers are looking for today," Havlik says.

Havlik believes it's the large gears that present the biggest challenges in the industry.

"Customers want better accuracy, service and extended life on gears in this size range. I'm not convinced enough companies have the right capabilities to meet these standards."

Mining gears, by design, are created to perform in extreme conditions. This means tolerance levels and AGMA standards need to be met no matter the cost. If a company can't afford to produce what the engineering firms are looking for, they lose the



HMC can manufacture and inspect large gears of the highest AGMA quality at its facility in Princeton, IN (courtesy of HMC).

business, Havlik adds.

"It's also a difficult market segment simply because gears of this nature just take longer to produce than their smaller counterparts. It's a fact of life," Putnam says. "There's a gear for the cement industry that we've been working on for eight years, and they still haven't bought the thing. Industry, in general, is being affected the same way across the board; doesn't matter what your size, weight, height dimensions are, people are still cutting back."

"Getting the materials can also be tricky," Havlik says. "You're often held hostage by what the suppliers can give you, the time it will take to get it as well as the cost. We're seeing this in regards to forged rings. Right now, it takes almost three quarters to a year to get a large ring shipped out."

Another major issue in large gear manufacturing appears to be the shortage of castings.

"We are not having any problems with our forging vendors and/or subcontractors as they relate to our fabricated gearing," says Robert Smith III, president at HMC. "On the other hand, it would be easier in many instances to travel to Mars than it is to get competitive pricing and realistic deliveries for large castings."

And the bearing issue reported in last year's *Gear Technology* big gear update continues in 2010.

"This has become an inventory management issue," Putnam says. "The bearings needed for the machines in the large gear market are often limited in availability. They're typically out of stock or take longer to get a hold of."

Putnam says that bearing distributors often frown upon buying small batches of large bearings because it ruins sales numbers. "They prefer very large orders when it comes to bearings."

Replacing the bearings in gearboxes poses additional challenges.

"We're putting the same bearings back in simply because it's the only bearing that fits on the market. Whether it was made in 1950, 1970 or 1980, we've got to come up with

that original bearing and this can be an enormous challenge."

Another problem, particularly in ring gears, is the quality of lubrication.

"Environmental concerns have made many [manufacturers] disappointed in the results of certain lubrications. Oils are either very good or very poor, there isn't much middle ground anymore," says Gary Bish, engineering manager at Horsburgh & Scott. "When customers invest heavily in large gears,

they want to make sure things like bearings and lubrication provide exceptional results."

The transportation and shipping of large gears is another area where large gear manufacturers have had to adapt to new laws and regulations.


"Many of these products are overweight, and it becomes an issue of what we can and can't move within the confines of regulations. We can split a

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ring gear in half and transport it without a problem, but some large gears can't be disassembled, and you've got yourself a large, unstable gear to transport. State department regulations have tightened since 9/11 and the I-35 bridge collapse in Minnesota. You have to find creative ways to ship gears of this size," Putnam says.

"There's a trend, in fact, right now for complete shaft assembly, and you

can't ship something that large," Bish says. "Now, you have to assemble it directly on your customer's premises."

HMC, located in Princeton, IN, is one of a handful of companies today in North America that can manufacture and inspect very large gears of the highest AGMA quality. Smith credits the company's quick response time and fast delivery for its success.

"With the addition of our six and

two meter form grinders along with our battery of Maag shapers, we're capable of producing advanced technology spur, helical, herringbone and/or double helical gears," Smith says. "We also have plans in place that will enable HMC to cut rough and finish gears of eight meters by the last quarter of 2010."

HMC's current market strategy is to offer advanced technology replacement gearing with extended warranties to assist customers with the increasing costs of replacement components. New technology investments in a heavy bay for large weldments and assembly as well as a super size stress relieving oven capable of facilitating up to eight meter gears will also benefit the company's in-house capabilities.

Although green technology typically doesn't apply to the lower quantity levels of large gears, HMC promotes environmental awareness through new machine technology and the "Reband Gear Process," an in-house conservation tool that reuses the center sections and hubs on large gears.

"HMC has and continues to be cognizant of and care for our environment," Smith says. "We use all of the latest in technology to ensure we do not cause negative impacts to our environment here in Indiana. And we have promoted conservation and been green for many years."

Big Gears: 3-4 Meters

While not as big as their counterparts, these gears are found in mining, off-road, construction, marine, wind and transportation applications. Overton Chicago Gear, located in Addison, IL, has made a name for itself with spur, helical, bevel and internal gears up to four meters.

"We have the right equipment in place to meet the standards for gears this size," says Kerry Klein, sales manager at Overton. "Quality levels range anywhere from AGMA 8 to AGMA 12 and our newest machine features have already provided improvements."

Overton's focal point is on new and improved methods of manufacturing and multiple machine setups on a sin-



A complete rolling mill drive for an Eastern European client of Horsburgh & Scott had to be disassembled and packaged in individual parts for transportation (courtesy of Horsburgh & Scott).



One of the major concerns in the big gear industry is getting the right materials in a decent time frame, according to John Havlik at Havlik International (courtesy of Havlik).

gle machine.

"In order to remain competitive, we're going to have to invest in new technology," Klein adds. As far as the industry is concerned, Klein believes there should be support groups in the United States that provide data and analysis on the large gear market, much like the VDMA Mining Equipment Association provides in Germany.

Currently, there isn't much information available or market forecast numbers specifically for the large gear market in the United States. Many companies would like to see some research that deals with the industry potential in the future.

Butler Gear contributes to this segment of the industry with customizable machining capabilities for heavy equipment, paper, machine tool, and agricultural gearing.

Tom Treuden, president of Butler Gear, located in Butler, WI, is facing many of the same challenges as his peers in regards to large gear manufac-



John Schnarr of HMC stands in front of a large fabricated gear for the steel industry (courtesy of HMC).

turing.

"Getting the right materials on time is an issue right now. We're just starting to expand our capabilities to the large gear market, so things like inspection, heat treating and lead times

are all going to present challenges."

There are only a handful of companies that do the heat treating work that Butler Gear needs, according to Treuden. "The sources are limited in

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A ring gear for a mining operation gets the final touches at Havlik International before shipping out to the customer (courtesy of Havlik).

many areas of the industry and more players would keep the pricing competitive.”

In dealing with gears of this size, Treuden says the overall business philosophy needs to change and companies need to be flexible.

“You need more floor space, you need bigger machines, and it’s a whole new set of challenges when you start looking at the AGMA standards and tooth tolerances. The time it takes to manufacture the large gears versus the small ones is a big concern.”

Technology seems to be the key no matter the size of the gear. Treuden says machine technology is one of the most important areas to look at.

“If you don’t have sufficient technology, you’ve got to catch-up. It’s simply a matter of obtaining the right equipment to do the job most effectively in this market.”

Which leads to the most basic question of all, why get involved with gears this size?

“There’s always going to be a mar-

ket. I believe the industry will grow significantly in the next five to ten years. The large gear contracts are the ones that keep you afloat during slow periods and recessions. These contracts play a huge role in the success of an organization.”

In the future, Butler Gear may start to look at producing larger products.

“I’m open to anything at this point. It’s a scary time in manufacturing, but it’s also exciting; there’s still business out there.”

The Future of Big Gears

The lack of skilled workers has been troubling the manufacturing community for years, and it’s still a major sore spot in the large gear sector.

“There just aren’t people coming into the workforce that want to learn manual work anymore,” Treuden says. “Nobody is beating down the door to become a gear cutter. The people that do come in want to immediately sit down behind a computer.”

At Horsburgh & Scott, Putnam says the new employees just don’t have

the knowledge or experience necessary to succeed.

“You see it in project management, you see it in inquiries and purchase orders. It’s not about old farts getting old and jaded. The retiring workers know the machines they’re working on. They know the history of each machine, and it’s impossible to replace them. Today, new employees are thrown into the mix without any real training.”

Without mentoring or training programs, the lack of skilled workers can really cause problems on the shop floor, Putnam adds.

“Our entire world is like this; everything is accelerated. Everyone is doing more work with fewer people. It’s not just gear manufacturing, it’s happening at Best Buy, Ford Motor Company and Boeing. The apprenticeship days are the good ole days; they’re long gone.”

And yet, the companies move forward. Despite material concerns, quality issues and technology costs, large

gear manufacturers overall seem confident that the industry will soon start picking up.

The growth potential in the international markets, for example, has Putnam intrigued heading into 2010.

"What we're seeing right now is more international business in areas like India, Eastern Europe, Central America and Asia. Central America is particularly interesting in the big gear market as sugar mills continue to present opportunities to gear manufacturers," Putnam says. "This is a bright spot in the industry, and it will go up and down with the price of sugar."

Although new customers are hard to come by, Horsburgh & Scott's Bish has seen plenty of opportunities for repair/replacement parts in the mining sector.

"The industry is going to be flat, but we'll have plenty of replacement and upgrade potential in the large gear market," Bish says. "This is an area that will continue to present opportunities for large gear manufacturers."

Smith, at HMC, has no complaints about the current state of the market. "Overall, our business was strong throughout 2009. Our sales manager is confident that we will see, from our well diversified customer base, at the very least, the same volume of sales in 2010." ⚙

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