

What lies beneath

A laser is only as accurate as the bed it sits upon

To meet demand for larger laser beds, two companies adopted strategies to ensure the machinery they build produces the most accurate cut.

Kern Laser Systems, Wadena, Minnesota, decided to change strategies for its light-gauge metal cutting lasers. Offering 4 ft. by 10 ft. or 5 ft. by 12 ft. beds, company engineers found they had to change components because users were experiencing lead screw sag on larger beds.

A lead screw is a device that converts rotary motion to linear motion. It is somewhat similar to a ball screw in function, that when rotated clockwise, pushes linearly in one direction; and if rotated counterclockwise, pulls in the opposite direction. Depending on machine requirements and sizes, these may be used on smaller, entry-level laser beds up through moderately sized, mid-level machines, explains Jean-Paul Beyak, regional manager for Midwest/Eastern U.S. and Canada for Nexen Group Inc.

The company previously used a lead screw system for beds because “it’s how we got our roots in the business—by building smaller systems,” explains Derek Kern, president of sales at Kern Laser. “The 2 ft. by 2 ft. and 4 ft. by 2 ft. machines worked well for those applications.”

The lead screw worked on smaller systems, such as the 8 ft.-long machines, but proved problematic for larger systems. As the company has grown, and with an increasing number of Kern Laser’s systems being 10 ft. and 12 ft. long, the company realized it needed to adjust for that, Kern says.

“We needed to change to something [flatter] with less vibration and we wanted something coated to prevent corrosion on



View of Kern Laser HSE 80 in. by 120 in. system with Nexen components.

the rack-and-pinion system,” he says, so Kern Laser turned to the roller pinion system from Vadnais Heights, Minnesota-based Nexen Group.

The longer distance with a traditional lead screw method, resulted in accumulated error increases and often must be compensated for—typically by mapping the error over the total movement area and making programming changes to account for it, explains Beyak. The Nexen RPS roller pinion system eliminates accumulated error through the manufacturing process.

Laser cutting job shop AltaMar Inc. installed Nexen components on its laser models as well. It provides lasers with radial (rotary) and linear motion. AltaMar emphasizes sourcing American-made products and after running into Nexen at a trade show, was even more pleased to discover a fellow Minneapolis-area company.

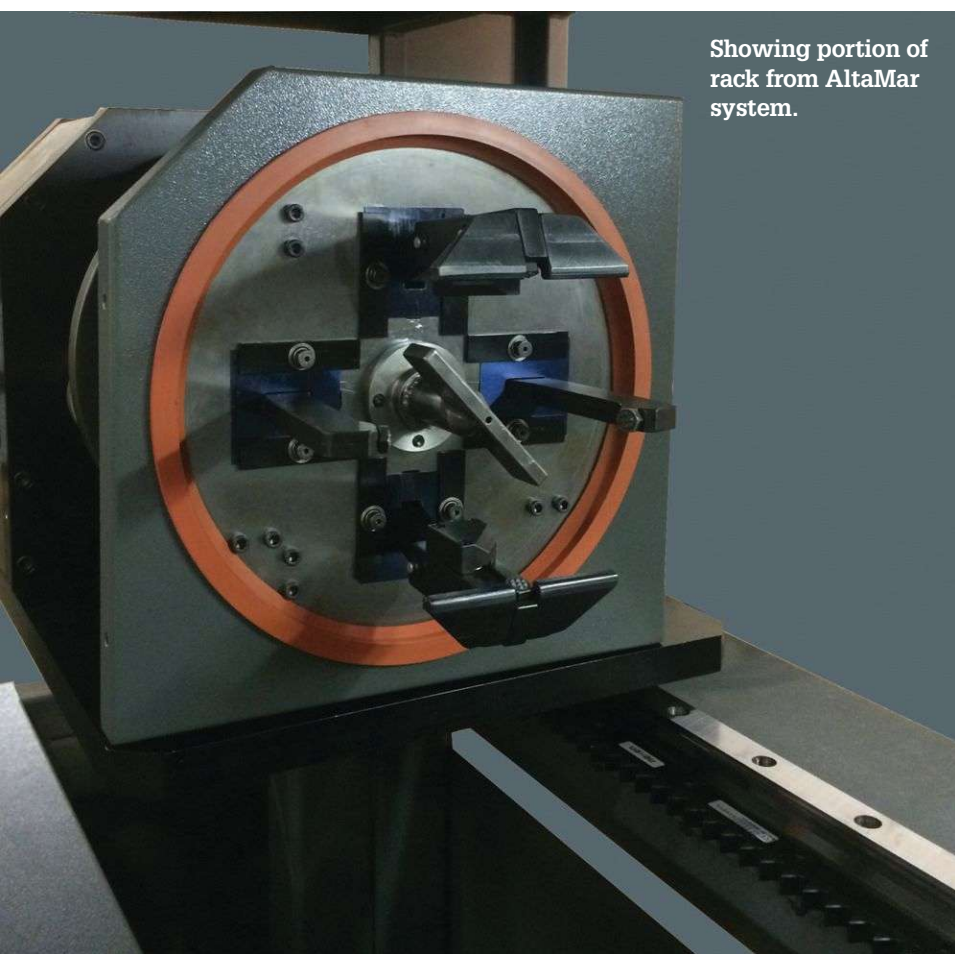
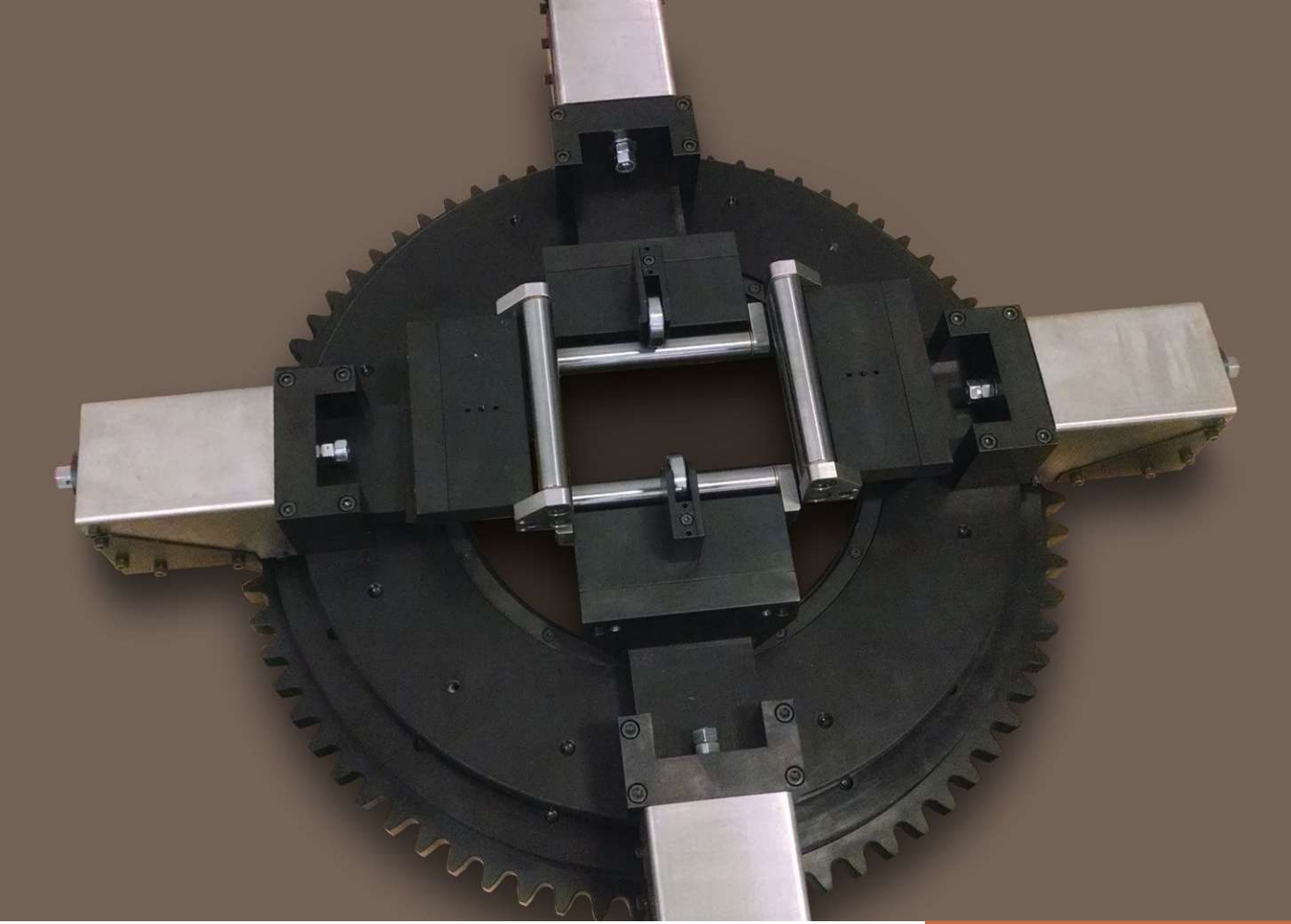
Fridley, Minnesota-based AltaMar uses a ring gear from Nexen in its larger tube lasers and the Nexen linear component,

which is a gear rack and pinion, for its smaller models. “We needed better accuracy with our linear drives and motion and wanted to eliminate a lot of the backlash,” says AltaMar Sales Vice President Rick Jackson.

AltaMar’s systems cut 6.5-in. diameters and $\frac{3}{8}$ -in.-thick walls in carbon steel or clean-cut $\frac{1}{4}$ -in.-thick stainless steel plate or 0.2-in.-thick aluminum sheet. “They’re not limited to those thicknesses but cutting thicker material would mean using a larger laser,” Jackson says. AltaMar offers what it believes is the smallest footprint machinery, making it ideal when shop floor space is critical.

Immediate results

When AltaMar installed the Nexen drive, backlash was immediately reduced to 0.001 in. and accuracy increased. On the radial axis, AltaMar installed the ring gear and pinion and achieved arc (rotational) tolerances within the range it needed to meet customer requirements. “Initially we



Showing portion of rack from AltaMar system.

Above: Rotary stage before mounting at AltaMar.

used a beveled rack and pinion for our long linear axis and for our radial axis we were using a belt drive,” recalls Jackson. “So we replaced the belt drive with ring gear and got much more torque, better accuracy and quieter motion.”

Primarily serving the agricultural, automotive, recreational vehicles, in-store displays and store fixturing sectors, AltaMar also has clients involved in oil exploration. “Our customers can come from any industry really but those are the most common,” says Jackson.

In addition to cutting material, AltaMar builds custom systems but also offers basic models (TL2403, TL2405, LT2410 and the LT2410FL). Its fiber lasers can cut copper, brass and bronze. The CO₂ lasers cut aluminum, titanium, mild steel and stainless steel.

Nexen’s components help AltaMar achieve an accurate cut on a tube, which is very important in industries using robotic welding. “If you’re not accurate or the laser isn’t pinpointing where it is supposed to cut the material or it’s not a good

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fit-up, then you can't robotic weld," Jackson explains. "The more accurate the laser system you're using, the more accurately you're able to robotically weld materials."

Kern Laser also offers a variety of machine sizes. "You don't need a huge, heavy-duty kilowatt-type laser to cut metal," Kern says. "They can do it with a smaller 400 W laser. That's one of the biggest myths—that you need a 2,000 W or 4,000 W laser. Our lasers start at 150 or 250 W and our most popular is the 400 W laser."

Kern Laser machines are used to cut cold-rolled carbon, galvanized and stainless steels, and aluminum alloys. Kern Laser specializes in smaller, light-gauge cutting systems, catering to those looking to enter into laser cutting.

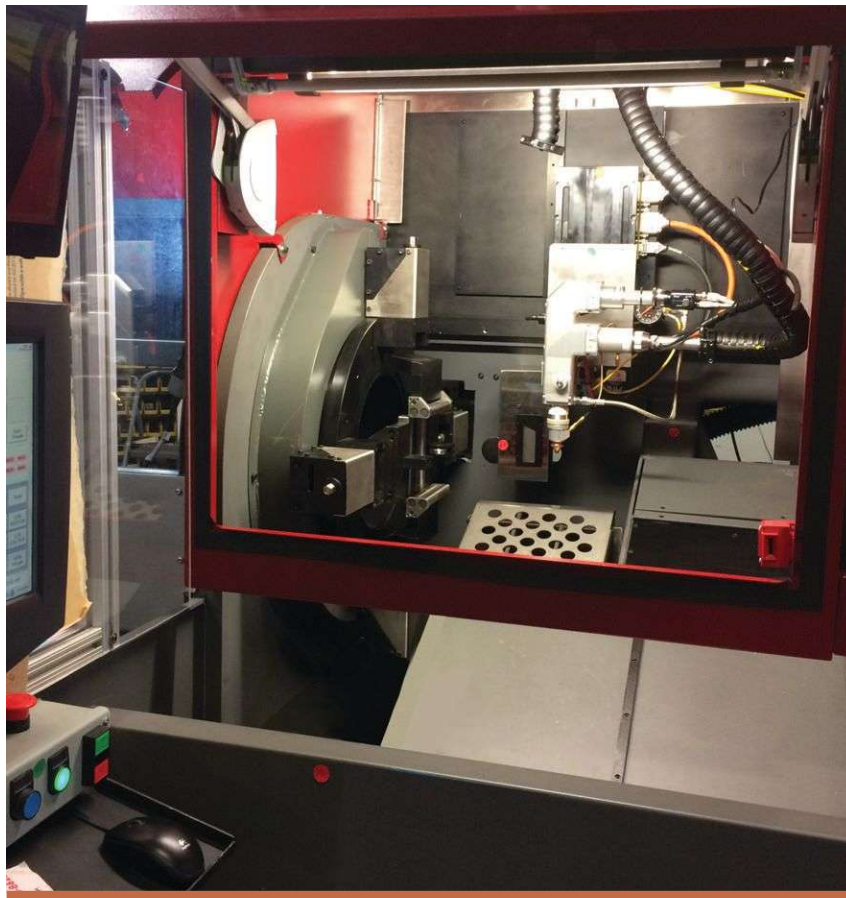
Increased accuracy has helped Kern Laser customers that build medical equipment, for example, because they need parts cut with extreme accuracy. "One customer makes a blood spinning machine that allows platelets and plasma to separate from the blood," explains Kern.

Other customers cut a wide range of parts not always requiring such precise tolerances. "We work with a lot of job shops that cut anything their customers bring to them," Kern says, noting that by purchasing their own laser machine, customers are able to keep jobs in-house instead of outsourcing. Many Kern Laser customers serve the automotive industry, cutting everything from aftermarket chrome grills to gaskets.

Looking ahead

Nexen Group offers its roller pinion system in standard lengths of 0.5 m and 1 m. The modular segments are easily mounted end-to-end on the machine frame (parallel to the bearing/support system) using an RPS alignment tool. "You can mount as many segments as you need along a drive axis on a machine and not have to have a custom length drive system built," Beyak says.

Nexen continues to invest in research and development, and recently released a thermoplastic Versa Rack and aluminum body Value Pinion version of the RPS. Engineered thermal plastic provides a lower cost option for companies that don't have



AltaMar LT2410FL cutting enclosure.

to achieve as tight tolerances or high speed production, but still want the modular, zero backlash, and low maintenance design of the RPS.

"Building off of the same advantages of the innovative tooth profile and roller pinion design of the RPS, it can allow machines to move/cut at speeds up to 2 meters per second without lubricating the RPS drive system," Beyak says. "This reduces [the number of] components needed in the lube system and also reduces particulate accumulation."

This lower cost option was built as a direct result of customer feedback. "Everyone likes the RPS design when they see it. Engineers hold it in their hands and then roll the pinion in the rack and say 'Wow, this is really cool,'" he says.

"It's all part of our evolution with different linear and rotary precision motion control product options including linear rack, rotary gears, and braking elements," Beyak says. "We've made arc segment

gears that would make a 36-ft./11-m diameter full ring that ended up on machines built for Boeing—virtually eliminating arc radius and arc length limits, so there's a wide range we can work with."

Going forward, both Kern Laser and AltaMar expect overall sales to remain strong.

"People have started investing in capital equipment. We saw this especially during the last year," says AltaMar's Jackson. "We anticipate this trend to continue going forward." **FFJ**

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