Case Study

AVENTICS pneumatic technology provides solutions to sawmill production demands

Keeping up with production demands is a continuous challenge in the lumber industry. To remain competitive, operations demand higher performance and lower cost of ownership for automated equipment. Original equipment manufacturers (OEMs) and timber processing end users want solutions to the problems encountered in the harsh environment of the mills where temperatures fluctuate, dust produced from the manufacturing process damages equipment, and vibrations stress and grate machinery. Traditionally, heavy-duty steel pneumatic cylinders were the only long-lasting hardware used in lumber production machinery. However, in the past few years, pneumatic solutions combined with lighter weight and less expensive aluminum cylinders have gained popularity and are proving to be extremely valuable for improving outputs and production, particularly in sawmills.

Mills had resisted using aluminum in the past because failure of aluminum pneumatic cylinders was common on equipment such as high-speed trim saws. This was due in part because trim saw applications involved such speed and shock load that they stressed the aluminum units to the maximum. As a result, even though aluminum cylinders were less than a quarter of the price of steel, the cost of downtime from inevitable failure made sawmill operators question their use.

Challenge:
Increase speed on ASM’s Series 140 Trimmer

Solution:
AVENTICS ISO 15552 aluminum pneumatic cylinders with “Ideal Cushioning” capability

Benefits:
- Increased speed, lower component costs, decreased downtime, better lumber production
- No end-of-stroke bounce or end-cap slamming noise
- Less wear on cylinders for longer life
- Reduced vibration in host structure
- Aluminum material for lighter weight, faster acceleration on trim saw
- Opened up 140 to 200 lugs-per-minute market for ASM

The ASM Series 140 Trimmer uses pneumatic cylinders and “Ideal Cushioning” from AVENCTS to help increase cutting speed and reduce maintenance.
This reasoning has changed recently, however, because of a specialized process that reduces wear and tear on pneumatic cylinders. A unique combination of pneumatics, aluminum and the concept of “Ideal Cushioning” increases cylinder longevity and performance and provides sawmills with greater savings, faster productivity and more profit.

“Ideal Cushioning” for trim saws
“Ideal Cushioning” is a specialized pneumatic solution developed by AVENTICS Corporation, (www.aventics.com/us) formerly Rexroth Pneumatics. Cushioning is particularly important for the fast process cycles and high kinetic-energy levels that often occur in sawmills, especially in trim saws where pneumatic cylinders are constantly driving saw blades up and down. The “Ideal Cushioning” helps accelerate lumber cutting by using a combination of lighter cylinders, eliminating excess piston movement and bounce, and quicker cycle times. In addition, less wear on the cylinders reduces the amount of maintenance and cost needed for replacement parts.

“Ideal Cushioning” is a method of decelerating a pneumatic piston as it reaches the end of its stroke inside the cylinder. Essentially, there is no end-of-stroke bounce or end-cap slamming which is a main culprit of cylinder wear, speed and noise. The piston velocity is at its maximum speed throughout the entire stroke sequence. Its velocity is exactly zero by the time it reaches the end cap. By reducing the piston velocity to zero speed at the end of travel, the cylinder incurs less stress. Vibration in the host structure is reduced and the total cycle time is improved, sometimes boosting machine speed by as much as 30 percent. In addition, the loud noise from the piston striking the cylinder’s end cap is negligible.

Calculating the amount of cushioning needed is easy to accomplish. An electronic meter, such as the AVENTICS velocity time meter (VTM), allows monitoring of the piston speed and cycle times. In the past, the velocity of the piston was difficult to detect and was done by guesswork or “eyeballing.” This electronic aid, which is attached to the outside of the cylinder tube, enables the true velocity of the piston to be determined quickly and easily. “Ideal Cushioning” adjustment is done with a simple screwdriver and allows a free outlet flow adjusted so the piston stops right at the end cap with zero speed. Pistons are then adjusted one at a time with the first one used as a standard to conform to a maximum speed for a given pressure and cylinder load.

The end result: By knowing how to control a high-speed mass moving at a consistent speed and reducing the non-cushioned lag and bounce, the machine’s controls can be adjusted to reduce the usual program lags and thereby tighten the entire operation to increase board count. The AVENTICS aluminum cylinders with “Ideal Cushioning” substantially increase speed, lower component costs, decrease downtime, reduce noise and increase overall lumber production.

Opening new markets
Advanced Sawmill Machinery Equipment, Inc. (ASM) based in Holt, Florida (www.asmei.com), is one OEM that worked with AVENTICS to incorporate aluminum cylinders with Ideal Cushioning in its Series 140 Trimmer. The machine builder wanted to offer faster cycle rates and more durability.

“These AVENTICS cylinders helped us to become very competitive with our high-speed trimmer,” explained ASM president David Seffens. “They’ve played a big role in opening up the 140 to 200 lugs-per-minute market for us.”

Seffens said that all the saw ladder surfaces on the Series 140 Trimmers are machined and keyed and require no alignment by the customer. The saw ladders do not pivot on the line shaft which results in fewer bearings and longer service life. With the AVENTICS cylinders, each machine leaving their shop is customized for speed at the request of the end user. “If they ask for a certain lug rate per minute we can

For ASM, the AVENTICS cylinders opened up the 140 to 200 lugs-per-minute market.

North Florida Lumber runs the ASM Series 140 Trimmer at 140 lugs per minute.
set it up that way. Using the AVENTICS cylinders and a VTM measuring device we can be extremely precise so the trimmer is adjusted before going out the door,” he said. “And, there’s no alignment or adjustment needed for the saw ladder at installation, which means it can be installed quicker.”

North Florida Lumber
North Florida Lumber in Bristol, Florida (www.northfloridalumber.com), is one example where ASM and AVENTICS helped improve a customer’s trim saw performance. Arthur Wilson, the company’s general manager, says the need for lighter equipment, reduced downtime and increased speed played a significant factor in their choice of trimmers when they were seeking to replace old equipment. The company recently purchased three trimmers from ASM for their saw and planer mills.

“We needed cylinders that could run fast enough,” explained Wilson, who said they were previously running 120 lugs per minute. With the new trimmer he has seen substantial speed improvements, especially in the planer mill where they’re now running 140 lugs per minute. “Those cylinders are fast and operate very smoothly,” he said.

Wilson added the new trimmers are expected to cut down on maintenance, too. “With our older equipment we had multiple electric motors with a lot of mass moving up and down all the time so the wear-and-tear was incredible. We constantly had to replace parts,” said Wilson. “With the new trimmers we’ve eliminated a lot of the weight so electrical and mechanical downtime should be drastically reduced. And with the cushioned aluminum cylinders, we feel like we won’t need to replace the cylinders as much so we don’t have to stock as many parts.”

With lighter equipment Wilson said they can begin using smaller blades, too. In addition, the cylinders help lower the noise of the machine. “That’s one of the things people notice is how much quieter the trimmer is,” he said.

Valley Timbers
The Valley Timbers sawmill in Antlers, Oklahoma is another mill experiencing the advantages of pneumatic aluminum cylinders using “Ideal Cushioning.” They needed improvements on an existing trimmer used for green lumber, so ASM incorporated the AVENTICS cylinders to help increase productivity.

“We developed a mechanical design for their trim saw so it could operate faster with lower maintenance,” explained Seffens. “They wanted to increase speed because the older design couldn’t cycle fast enough to meet the production required in today’s market.”

ASM had designed and built the original mechanical design. Seffens said AVENTICS offered to put a test cylinder on the machine. The lightweight aluminum cylinders helped reduce the total swinging mass of each saw ladder which improved ladder response.

“After running the machine through extensive testing in our shop, we found that it was better than the original design. The new cylinders allowed us to increase the trimmer speed from 120 lugs per minute up to a maximum of 200 lugs per minute,” said Seffens. In addition, he said the new cylinders should lower the maintenance downtime from having to replace worn out un-cushioned cylinders.
Bill Bowlin, an industry consultant who has worked with Valley Timber for many years making recommendations for machine design and equipment purchases, said the ASM trimmer offers several benefits.

"Downtime in a mill is about $1,000 an hour," said Bowlin. "So if a trimmer stops for some reason, the whole mill stops because all the boards have to pass through the trimmer to get out of the mill. This machine cuts the downtime and saves money. Having the ability to run faster and be more efficient is the most important aspect of being able to stay competitive in our market," he said.

For additional information on how to use “Ideal Cushioning,” visit: www.aventics.com/us/IdealCushioning