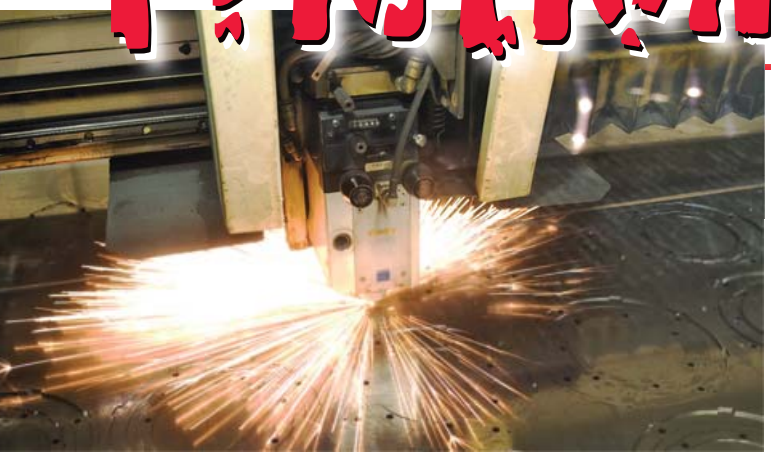
Friction Focused



Alto cuts many of its parts with a laser cutting machine.

"Our focus is on the continuous development of new friction materials," says David Landa, president of Alto Products Corp.

He points out that the future for a company like Alto is to advance the technology of clutches to match the technologies used in new transmissions. He also emphasizes that the company's role as a global OEM clutch-plate supplier requires a cutting-edge research-and-development program.

"Development of friction materials, particularly those for our OEM and High Performance customers, is the direct result of our customers' requirements such as the need for extended wear, improved torque performance, smoother shifts and higher coefficients of friction," Landa explained. "Once those improvements have been engineered into a friction material, the technology can then be applied again in the aftermarket to improve performances in those applications."

Alto was founded by Landa's father, Sandy, in 1952, with its operations in New Jersey. With continued growth, in 1995 the company relocated most operations to Atmore, Ala., where it occupies a campus of three buildings that combine to provide 375,000 square feet of manufacturing, research-and-development laboratory, warehousing and office space. The majority of Alto's 300 employees are based in Atmore. Additionally, the company maintains warehouses in New Jersey, Los Angeles and Miami. A secondary stamping plant is in Connecticut. Alto's international sales and distribution locations include Mexico, The Netherlands, Australia, India, Dubai and China, but all the manufacturing is in the USA.

Landa continues: "China has become one of our largest markets, particularly for OEM business. The market there is the largest in the world right now. While in the past Chinese OEMs mostly adopted transmissions from other manufacturers, many of them are beginning to design and manufacture their own. Alto is supplying many of those OEMs.

"Our largest customer there would be Geely, the largest Chinese car manufacturer and the owner via acquisition of Volvo. We supply all the friction plates for the new Geely six-speed front-wheel-drive units. We also supply plates for DCT applications being used in that marketplace."

Ray Engle, vice president of technical services, and Claude Hall, vice president of engineering, say Alto's focus is the development, prototyping and evaluation of new and continually improving friction materials.

Using a micrometer for measurements, Deantonio Jones builds prototype parts for testing and evaluation.

"Domestically we supply OEMs Clark, CNH, Dana, Eaton and Caterpillar, while internationally our customers include OEMs John Deere (Spain), Ssang Yong (Korea) and Mahindra (India), to name a few.

"We have an extremely large and growing library of friction materials with emphasis on DCT, heavy-duty and high-performance markets. Our formulation development takes advantage of using the latest in high-tech materials such as carbon fibers, para-aramid synthetic fibers (Kevlar), enhanced high-performance fibers and innovative custom-designed resins. Outside of Alto's friction-material library, we can further affect the performance of the clutch disc through various manufacturing processes such as changing of groove patterns, segmentation, compressions and other process techniques."

Ray Engel, vice president of technical services at Alto, adds: "The key to making a friction clutch plate is the lining. What we do here in the development lab is evaluate various combinations of fibers, fillers, binders and resins that are used to create the friction papers.

"To a large extent, our initial input for developing a new paper or a new variant of an existing paper comes directly from market demands. Alto's engineers and sales group are out there working with the customers and truly understanding their needs with regard to clutch performance. Those opportunities result in development projects for our research-and-development team.

"The more you look at what appears to be a simple clutch plate, the more you come to appreciate the complexity of the product. There are all the different types of materials that contain fibers, bonders, fillers and resins. Each of these has different grades. Finally, we need to decide on percentage of each of the materials in each grade. It doesn't end here … how you process a clutch plate via densification, groove and surface treatments also have a significant impact on performance; the combinations are nearly endless. And, what will work best with one type of fluid doesn't necessarily work best if a different fluid is specified by the OE."

Alto's vice president of engineering, Claude Hall,

Aftermarket Line Development

David Landa

"In the aftermarket we're able to look at how a product has performed and what wear issues exist. Then, we can look to the friction materials Alto has developed to see which one can best correct the issue. Warranties drive improvements. We're looking at OE warranties covering seven years and 100,000 miles today. Alto is proud to provide a lifetime warranty on our high-energy friction material. For the aftermarket, it's pretty much true that once a transmission has been rebuilt, it's likely to last for the remaining life of the vehicle, exceptions being high-performance and heavy-duty applications.

"In some instances we'll also offer an aftermarket high-performance clutch with friction material that addresses particular needs for a particular application, such as police and taxi fleets or racing. Around the world we sell a lot of taxi fleets and transit authorities. Those customers demand a higher grade of material that lasts longer and is more tolerant of high heat.

"We have the Red Eagle grade for high-performance; that was introduced first in 1982. The Red Eagle material (as with all other materials) is continuously improved upon through the efforts and skills of our R&D facility. We have a very nice business in high-performance that includes fleets, racing, diesel and heavy-use applications."

Donny Houston inspects an Alto part using a Micro Vu machine.

Customer-service and sales team (from left): Jose Pereira, Inez Etheridge, Stephanie Barnes, Sarah Nezovich, Trici Ramirez, Nora Aslanova, Claudia Lewis, Craig Cooke and Robbie Ferguson

says: "Today, there are much tighter tolerances involved with the development of a clutch pack. The energy levels that are handled by the materials are very different as the transmission engineers find ways to put more and more into less space. [This causes a clutch to have a set of requirements that must be accomplished with less surface area than was available in the past.] It's all about managing more torque with less territory."

"Energy-level challenges have been met by increasing the number of component frictions and steels in a typical clutch pack. The consideration of fuel efficiency is a constant requirement as well."

Landa recalls that the venerable THM350 transmission contained 17 frictions, comparing it to the 6L80 that contains double this amount.

"We're not using high levels of cotton fibers in the friction materials anymore, and the cost of the enhanced materials such as carbon or Kevlar fibers is much higher. In the end, there are more clutches made from more-expensive components, and that's one of the factors driving up the cost of rebuilding a

Robotic Processes

"The world's changing," says Alto President David Landa. "Everybody wants it better, they want it faster and they want it less expensive. Those criteria are the drivers for our manufacturing processes. We're finding ways to increase our use of robotics, automation and lean techniques within our factory to meet the growing demands of the market."

"We have numerous robotic lines in the factory now, with more on order.

"One use for robots is in the assembly of the friction materials to the steel core. We also use robots to load the clutch assembly into our bonding process. This robotic process will establish oil grooves, proper thickness and the bond. Alto also applies automation to facilitate quality checks through lasers and high-resolution vision systems. With the high-resolution checks, we are able to take a photo of the top and of the bottom of a finished plate and then evaluate it to assure the paper is properly aligned, the teeth are stamped correctly and that the plate is perfectly round. These quality checks can handle two plates per second. When any of the checks identify a quality issue the plate is removed to a controlled reject bin."

Robert Knight observes Stephanie Brown assembling sandwiches of plates and friction rings.

Comparing high-resolution photography with stored benchmarks, the vision system can inspect 120 clutch rings per minute.

unit. We've been able to mitigate the rising costs by finding more-efficient, technology-driven manufacturing methods."

The Alto people say that in recent years one of the hottest markets domestically has been in the area of diesel performance clutches.

"The transmissions in those trucks are built to stand more torque right off the showroom floor," says Robbie Ferguson, sales vice president. "In general that means they are physically a much larger unit, as is the case with the Allison 1000s and the 5R110s. Ford's new 6R130 is a huge unit.

"These transmissions are for trucks that come from the factory pushing 300 horsepower and 600 or 700 foot-pounds of torque. People are spending $65,000 buying a new truck and then an equal amount to redo the engine, the transmission, the suspension, wheels and everything else. We end up with customers who can't even tell from their dynos how much torque they have. The dyno maxes out at 3,500 foot-pounds and they're pegging the needle. Some are now pushing more than 2,000 horsepower in a diesel truck that they can drive to work or take to the drag strip to run a nine-second quarter mile."

Stamping presses are used to form steel plates.

Landa adds: "The materials that we have developed for diesels are much more durable than those required for most other applications we supply. Take, for instance, the racing market, where the transmission is replaced after every race. The durability there isn't as much of an issue. The diesel pickup is going to drive across the country and pass through the Rockies towing 20,000 pounds. This is the challenge we've been able to address with great success."

Engel said: "Across the board, we are committed to quality. We have all the certifications that attest to our commitment. The products Alto develops rely on what takes place in the manufacturing processes. I think that when you look at the factory, particularly the new robotic processes, you'll find we have built those quality requirements into every step of production, and that results in a very high-quality product that we have for a very competitive price."

"We are making everybody on the floor an inspector and every process more robust so that there is an ever-decreasing probability of error. Today's marketplace demands that quality, and we've been able to improve our products, our people and our processes to remain viable in today's competitive marketplace. At Alto, it is always about continuous improvement."

Landa concludes: "Alto has been doing this now for over 60 years. I am fortunate to have a great team who has made us successful. We make decisions and investments based on long-term goals, not maximizing short-term profits. We continually reinvent our products, our processes and ourselves. We're the last independently owned and operated company doing what we do. The good news we take away from that is that we can continue to compete and do all the things that public companies do while retaining the flexibility that allows us to be innovative and development oriented." TD