A brake-through in electrohydraulics

Building upon the full power brake system, one company adds ABS, traction control and electronic stability control to off-road vehicles. 5

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Since the formation of Pioneer Solutions LLC, Cleveland, OH, in 2004, the partners and management team have had their eye on highly engineered specialty products that they may be able to supply in addition to offering engineering services. “Pioneer Solutions has had a strategic interest to identify a market need or niche area to manufacture components or systems to balance its business and provide consistent revenue streams through products and aftermarket sales,” says Christopher B. Althausen, Director of Sales & Marketing, Pioneer Solutions LLC. “We have a brake engineer who is one of the partners/owners of the company who has been working with wet disc brakes for dump trucks for over 30 years. When you look at the different components and systems across a dump truck, our company has a high level of expertise in all of those areas,” Althausen says. The company was formed from the former engineering department for the Euclid dump truck product line, which is now Hitachi brand.

In 2010, Pioneer Solutions acted on an opportunity to fill a market need and expand into manufacturing by developing and supplying oil cooled disc brakes (wet brakes) for off-highway dump truck OEMs (pictured left). “The absence of an independent wet brake supplier in these
sizes of brakes, and the unique design and application knowledge it takes to successfully supply brakes for these machines was a perfect fit for Pioneer to launch its manufacturing business,” says Althausen. “Part of the deal was that we had to make the initial investment in the design, so now we own the component IP and technology.”

The wet brake component was the perfect stepping stone for Pioneer Solutions to diversify into the manufacturing business. The product has good cost to revenue opportunity, and is easy to integrate into the equipment.

The brake design

Pioneer Solutions’ brakes are designed to operate on both mechanical and electric drive dump trucks, and can be used on both front and rear axles. The brake models are designed to fit into the tire and rim with diameters between 33 and 63 inches with minor modifications to the internal brake components, and the series is named accordingly (e.g. the brake system for 49 inch tires/rims is the 4900 Series).

The design is not exclusive to a single OEM, and since its first client in 2010, Pioneer Solutions has brought another customer on board in 2011 and is in conversations with several more OEMs about custom brake solutions. “We’re hoping to grow the business and work with as many different OEMs as possible,” says Althausen.

The initial brake design and prototype cycle took about nine months. With the company’s veteran engineering staff, the overall design of the brake was not the challenge. What proved to be more of a challenge was integrating the design into the preexisting axle and hydraulic system designs of the OEM. “There is a lot of fine dimensioning and tolerances that have to happen for the brakes to integrate into the axles and operate properly,” Althausen says. The hydraulic brake-apply and cooling systems also have to be designed to work with the brake to achieve the correct machine performance. Pioneer Solutions’ understanding of the entire machine’s engineering needs allows the company to assist OEMs with the design of their axles and hydraulic systems to properly integrate the wet brakes into the machine.

Thus far, the company has produced front and rear axle wet brakes for three dump trucks and is hoping to complete brakes for another six trucks before the end of 2012. The brakes are primarily going onto OEM prototype equipment for field testing, “so once the OEMs finish the prototype test phase, we’ll move into production with them. From the conversations we’ve had with our OEM customers, planned volume could be somewhere around 20 to 40 trucks per year, which our current manufacturing staff can handle. If the volume picks up, we’ll look into augmenting our current manufacturing layout to support it,” says Althausen.
The Pioneer Solutions’ dual approach design and manufacturing process also lends itself to risk mitigation. There are several layers of testing—factory testing, field testing—that go along with new truck development and the system functionality verification and regulatory standard compliance. “We go through ISO 3450 certification with our customers on these trucks. When it’s all said and done and the prototype is approved and released for production, we have a very high level of confidence that the brakes and the systems are working correctly,” Althausen says.

The company sees the market trending toward four corner wet brakes (wet brakes on the front and rear axles) on larger mechanical drive trucks whereas before they were generally just on the rear axles. “We’re also seeing more front and rear axle wet disc brakes on the large ultra-class electric drive vehicles, and we’re excited to seize a potential opportunity there,” says Althausen.

**Future opportunities**

As is the general trend in the industry to move from component manufacturer to integrated system solution provider, the company is considering expanding its product offering to incorporate other components like the brake-apply and cooling system elements, however for now its primary focus is to establish itself as a manufacturer and engineering firm. “A longer term goal would be to supply an entire braking system so an OEM could buy the entire brake package from one supplier. We see interest like that from some of the OEMs we’ve talked to,” confirms Althausen.

“We’ve also had our eye on some specialty gearing, primarily differential and planetary gearing, that would be used on drive axles for dump trucks which are highly engineered and have to have a high quality manufacturing process in place to be able to survive in the off-highway equipment market. We aren’t looking to become an OEM and start manufacturing dump trucks, but the highly engineered, highly manufactured, high quality component areas are where we have the most opportunity.”

Pioneer Solutions now presents itself to the public with two main business segments: One is technical engineering consulting, and the other is manufactured products. “We really look at providing solutions that an OEM can use across the life cycle of equipment design and development. In the beginning stages, it would be our consulting segment providing market analysis, technical specifications, new product development and engineering. But, after our OEM customer developed and prototyped their machine, we’d move into our manufacturing service to supply components and systems, aftermarket sales, spare parts and field support,” says Althausen. “The target customer is the same, so it’s very convenient and easy for us to flip between both business segments.

“We’re really excited about this capability and see this as a big step forward for our company,” he continues. “A big part of growing and stabilizing our business is by having a healthy mix of products and services to offer.”
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