



Parker Races In to Traction Motors

After years of development, the company plans to launch a new line of traction motors this summer.

By Michael Kent

Parker Hannifin is an industrial motion and control powerhouse. With over \$13 billion in sales last year, its products range from hydraulics to pneumatics to electric motors. But until recently, the company's selection of motors was solely targeted at industrial applications.

The design of a traction motor for on-road vehicles varies greatly from the design of a motor for industrial use. Other than the fact that they both contain magnets, copper and steel, everything is different. The orientation of the magnets themselves is very specific to each market.

Because the motor can represent a fair percentage of the cost and weight of a drive system, you don't want to over-design it in vehicle applications. It needs to be just right. Typically, industrial motors can be oversized and it's no big deal, because the applications are less sensitive to the weight and volume of the package.



In vehicles, cooling is very important. It can shrink the physical size of the motor by as much as 200 or 300 percent, depending on how it's implemented.

And since there's less of an emphasis on size, industrial motors can get away with simple forced-air cooling, or no cooling system at all. There are also shock, vibration and environmental specifications--all much tighter in vehicle applications.

Mobile moves

Parker has long-standing relationships with a variety of customers in the mobile space, including off-road, construction, and agriculture equipment makers, as well as over-the-road trucks. Back in the early 2000s, they started to talk to Parker about the electrification movement taking shape.

They said "We see electrification as something we want to look into more," explained Jay Schultz, Parker's Traction Motor Product Manager. "What do you guys have?" At that time, Parker had nothing

in mind for traction motors. So, the company fitted some of its industrial products for use in pilot programs and proof-of-concept vehicles, and started studying the application. “We knew that it wasn’t a specific vehicle-duty motor. So, over the course of five to seven years we did a lot of research, listened to our customers’ needs and then kicked off the vehicle motor program back in 2010, with all that experience under our belts,” Schultz told Charged.

Timing is everything

At the same time the company decided to start with a clean sheet of paper and develop a traction motor line, along came e-motorcycle builder Brammo. “We had just come off running Isle of Man TT with our first electric race motorcycle, and we were looking for a more powerful motor option to compete in the TTXGP in North America,” said Brian Wismann, Brammo’s Director of Product Development. “So, we started collaborating with Parker.”

The partnership allowed Parker the opportunity to test prototypes and first-run samples in one of the most demanding environments, the racetrack. “We really got to push the motors to the extent of their capabilities, and Brammo was always demanding more. So, we’d go back to the drawing board to try and get more performance,” said Schultz.

The volume and space limitations on a motorcycle are unique - perhaps the most demanding of any traction application. That focus pushed Parker to squeeze every bit of performance into the given package size. With the ultimate goal of developing a standard product line, Parker based the magnetic design around Brammo’s unique requirements.

GVM

The result, launching this summer, is Parker’s Global Vehicle Motor (GVM) series, which Brammo features in its Empulse R production bike.



The motor comes in a variety of different sizes and power ranges. “One thing that we learned from the years prior to launching the development program was that the flexibility we had in our industrial product made us successful with our OEM customers,” explained Schultz. Parker set out from the beginning to have that flexibility be part of its traction motor.

With the new release, the company plans to have 10 different physical sizes with a variety of winding variations in each size to deliver

dozens of power levels. The production motorcycles for Brammo are at the lower end, and at the higher end, the GVM could power something as big as a small delivery truck.

For packaging flexibility, the GVM line comes in two different diameters, 142 mm and 210 mm. Within each of those diameters the length of the motor can grow, starting at 50 mm and going all the way up to 400 mm. “Within that range we have five different standard sizes per diameter,” said

Schultz. “A couple of the power outputs overlap, which gives the customer the ability to choose either a narrow long motor that might fit well into one space, or a short fat motor that might fit into another.”

Generally, the new motor line will be used in all-electric vehicles and PHEVs, which have higher power requirements than standard hybrids. In addition to Brammo, Parker is also working with a number of other automotive customers, including a couple of tier-one suppliers, with hopes of going into production in the next year or two.

Like most of us in the EV world, Parker sees a huge potential in the market, although the consumer acceptance timeline is a little hard to predict at the moment. In the commercial vehicle space, however (Parker’s specialty), the math is a bit more straightforward. If a fleet wants to put a hybrid truck into operation, they’re going to be evaluating vehicle costs versus fuel savings, and doing a four- to five-year payback calculation.

With commercial vehicles, Schultz believes the scalability of the GVM solution will give it a leg up against other traction motor manufacturers. “Because we are very flexible and can do a 15 kW motor as well as a 200 kW motor, that’s a huge advantage. The competition has a much more limited offering.



With our product, customers can use the same technology not only for traction, but for other systems, like body hydraulics and pumps. They can stick with one vendor, one manufacturer, the same type of technology across all of their high-power components.”

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