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Axial flux motors will achieve price parity with radial flux motors in the future: Rory Brogan, founder and CEO, Torev Motors

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In an exclusive interview with S&P Global Mobility, Rory Brogan, founder and CEO, Torev Motors told Amit Panday, senior research analyst, that his early stage startup, founded in 2022 after years of electric motor research and development (R&D), is pioneering rare earth free axial flux motors to tackle supply chain vulnerabilities and deliver high-performance, cost-effective solutions for the automotive industry.

Source: Torev Motors

With early industry recognition, innovative wound-rotor designs, and a clear commercial roadmap targeting 2029 deployments, Torev is positioned to reshape electric motor technology while anticipating trends like modularity and smarter controllers. The following are edited excerpts.

S&P Global Mobility: Tell us about the genesis of Torev Motors; how did it come into being? How did you select axial flux motors? Was the focus always on rare earth free axial flux motors or did you pivot to this niche category after the recent supply chain gaps came to light?

Rory Brogan: Yes, absolutely. The company officially started in May 2022, although the actual idea for what would become Torev started much before that. I've been independently pursuing research and development of electric motor technologies since 2015. So, the world of electric motors, their operation, the technologies and principles are kind of second nature to me.

When I initially started the company, the original product was based on a two-coil design. The ultimate advantage was an additional level of control over the motor, which is very similar to how these externally excited motors today try to adjust the magnetic fields to get additional levels of performance. It was just a permanent magnet-based motor with a new-looking stator architecture. We initially got some pretty good traction because of that.

We went through a bunch of different startup accelerators. We got some early venture funding. We got some recognition from the automotive industry; we won the Global Automotive and Mobility Innovation competition in 2024 in Detroit. All this led to the closing of a pre-seed round of funding right after that 2024 competition.

Then what we started to see were the earlier signs of deeper instability within the motor market and specifically on the rare earth magnets. I've had conversations with countless folks in the industry who suggested that everyone has been looking to use fewer magnets, but the supply chain wasn't yet broken.

The more time we spent in the market, the more conversations we had, the more we started to realize that the supply chain is actually a much bigger problem than what the automotive industry understood it to be. That's when we made the bet on developing magnet-free axial flux motor technology.

So, today we develop axial flux, wound rotor motors that are designed to be externally excited, with the goal really being twofold. The first goal is solving that supply chain challenge at its core.

Rare earth magnets, mainly neodymium ones, get a whole lot of press. But if you track through the rest of the magnet supply chain — and it's not always as extreme — there are geographic supply chain bottlenecks facing almost every type of permanent magnet. It is still a tricky supply chain to navigate almost no matter what magnet technology you choose.

With the combination of external excitation and axial flux, we are able to overcome some of the limits that one encounters while working on a traditional radial flux technology. We're able to avoid magnets entirely while taking advantage of the size, torque and power characteristics of axial flux motors to make up some of the size and performance tradeoffs you'd see in legacy technologies. So, this becomes axial versus radial flux motor technology simply from an early market entry perspective.

If you're a startup making radial flux motors, inherently you have to go up against companies that are buying materials in mass volumes and who are exceptionally strong on price. Whereas with the axial flux and other new high performance motor technologies, you're able to command a little bit more of a price premium.

Personally, where I see the market going, in the world of motors for vehicles, the common perception around axial flux motors is that these are more expensive motors, they're more difficult to manufacture, and there are tight air gap tolerances which need to be maintained. That said, they also haven't had almost 200 years of continuous process improvement and innovation put into pushing the boundaries of their production.

I think we will see an improvement in the performance, torque density, power density [and] efficiency of these axial flux machines. We are looking to continue reducing the amount of magnet consumption in these motors. And over the years, innovation will do what innovation does, which is produce newer processes and manners to create these motors that ultimately bring their price down to parity with radial flux motors.

While I would like to get more clarity on how you think the axial flux motors will evolve over the next decade or so, let me ask you what materials are you using in your rare earth free motors? What kind of cost reduction have you managed to achieve?

The specific reason that we selected to do this motor is we understand that we do have to start with a more premium point. I got to the point of that early price premium to help offset the [expenses related to producing] new technology at low volumes.

That said, over the course of the next five to 10 years, I foresee ultimately the price of our [axial flux] motor coming down to a level where it is competitive within more traditional automotive [motor] platforms. Now that requires us to get to a scale and requires us to get to a much more mature point than we are right now. We're still a seed-stage company. We are currently in various stages of product development and R&D.

But over time, looking at where the cost of these motors come from, air gap control, actual material handling, brittleness of magnets in the first place, I see that there's a lot of soft costs that add up for, let's say, the most standard type of axial flux motors.

Over time, without using these magnets, we're going to be able to drive the costs down just purely from a material perspective. These rare earth magnets alone contribute about 30% of the total motor bill of materials (BOM) to start with. Then on top of that, you add the costs related to the additional complexity of axial flux motors, and it's not hard to see why these motors have a perception of being more expensive [than typical permanent magnet motors]. Our initial goal is just simply getting down to price parity in the next five to 10 years.

When you move away from using rare earth magnets in making e-motors like ours, you're essentially using just steel and copper. The advantage that we have is that it's a pretty simple structure, with just a wound core that sits on your rotor. It provides an additional level of control, especially in a

variable speed environment. I think that's a really important point of our motors relative to others — even more important as you start to look at the future of vehicles being more software-defined. When you're pushing updates, you're really going to look for technologies that offer more control over components.

Ultimately, we are just simply substituting the magnet content for steel and copper and are really looking at, in the future, how can we bring the cost of these motors from an area of really ultra-premium into the more commercial everyday vehicle.

When you replace rare earth magnets with other materials (steel and copper) in the motor topology, it would increase weight as well as create some gap in energy density. How do you manage these two areas in your motor design?

These are key questions, and this gets into why I am so bullish on axial flux motors.

Axial flux is able to squeeze out additional power in two ways: One, you have a larger surface area over which your magnetic field interactions occur. If you think about it, you've just got more face between the rotor and the stator, that translates into more power transfer from your stator to your rotor, therefore, more power output.

Similarly, because the torque is spread out over a longer lever arm relative to the shorter lever arm in the radial flux motor, you're able to get more torque for the actual weight of that unit. That translates right into higher torque density [and] more acceleration without adding a bunch of weight to your motor.

Why we like wound rotor so much is because you do have direct control over the rotor field, which increases with the current going into that coil. And the way we have developed our motors, we're able to get equivalent field strength within our motors than what you get with neodymium-based magnet motors.

How are you managing thermal stability, especially around the center of the stator, in axial flux topology?

We use an active on-rotor thermal system. Specifically, in our motor topology, I can say that we use an oil-based system. That said, I can’t explain how we exactly achieved that due to the proprietary nature of the system. But our [REE-free] axial flux motor is an actively cooled motor both on the stator and the rotor.

Can you elaborate on vehicle integration — whether you are looking at in-wheel or onboard motor integration for your specific axial flux motors?

We're working with customers on in-board [motor integration] right now. We certainly talk to folks about in-wheel. I think it's a really interesting technology that could find its place as we're looking at vehicle lightweighting and increasing the amount of space within a vehicle. I think there's a wonderful opportunity there. But from our approach in the near term, the focus is how do we build into existing or near-term architectures for our customers. At least right now, we are looking at in-line integration and not in-wheel motor integration.

I assume your motor prototypes must be in different stages of development currently. Can you tell us about the commercial roadmap or timeline that you are looking at for these?

Yes, we are in the R&D stage right now, running things with early development customers. We are

doing internal and independent validation testing. From there, we will look at doing real in-vehicle validation testing, manufacturing and process validation, and finally going into actual early deployments.

It's a very long sales cycle. We're asking customers to consider making a pretty big change, which they're willing to make, which is a very exciting part of our job. There's a very deep level of diligence that goes into making a purchase decision on a new piece of drivetrain hardware. This is a critical component of your vehicle. You don't want to get it wrong, and we work very closely from the earliest stages with our customers.

So, is it safe to assume that you're looking at 2028 or 2029 for your first deployments?

I'd say 2029 is a good target.

Although you are at an early stage of product development at the moment, and there is still some time before proper production happens where you get into procuring materials, how do you see material volatility in that context? What is your perspective on price fluctuations of iron, copper and other critical materials that you use in your motors?

That's the same problem we started with, right? When the company first started out, we were still in the neodymium magnet-based motor space. We looked at supply chain challenges and said, maybe it's not so good to have magnets in motors, and we transitioned. We made a big pivot, and now we use no magnets. But of course — look at our bill of material — we use plenty of copper.

In hardware, there's always a material risk. The best that we're doing right now is taking into account the fact that there is a lot of volatility and things can change. And we do have active R&D research looking at alternative materials within these motors. I can't go a whole lot deeper into this. But we're very familiar with it and are always watching it.

You have to take the approach of what's fine today may very well not be fine tomorrow. And it's much better to make that adjustment with your plan B and plan C already in mind than to get caught flat-footed and not have an idea of what comes next. We really work to be prepared for as many scenarios as we can.

On your business model, are you looking at scaling up operations to manufacture rare earth free axial motors in-house or basically own the design and someone else can do the manufacturing on your behalf? I see a lot of original equipment manufacturers looking at in-house production of critical components, including electric motors, to have complete control on the supply chain.

While our capacity is very small now, if someone puts an order for 1,000 motors tomorrow, we have options to scale up quickly. We already have relationships with contract manufacturers, suppliers as well as some specific OEMs where we can start to scale up.

On OEMs looking to produce motors in-house, this varies across different groups. Some OEMs are more advanced than others on how they handle the transition. But overall, the structure that we're taking is to really try and give ourselves the most opportunities to get this technology into the market. So, we are working with this white labeling process to be able to engage in a customer relationship with OEMs, with certain suppliers, integrators and as best as we can to set up the ability to engage with each of them on their preferred terms of engagement.

Is Torev Motors well-funded at the moment? Are you looking to raise fresh funds or have raised recently, can you please elaborate?

We are venture capital-funded. In August 2025, we closed $1.5 million in funding to allow us to do some more development between the dual coil into the wound rotor that I mentioned. We are now going out and targeting a larger seed funding round.

One of the nice things about how we have been structured so far is that we have a lot of support from the family office community. So, when you're looking at our capital stack, at least from a timing perspective, we have the ability to be patient. We have the ability to really be opportunistic and jump at opportunities where we really do have the best chance of winning as opposed to being pressured into running too fast, too soon. We are very fortunate.

Can you share a few trends that you anticipate in the electric motor space in the years to come? Do you see motors becoming smaller and lighter in weight in the future?

Smaller and lightweight motors are always going to happen. One of the areas that I am most excited [about] is the idea of motor modularity. You're starting to see the early signs of this. I'm going to point to Conifer, which is actually doing a great job on this.

At Conifer, at least from their marketing materials, they say we're going to let our customers tell us, do you want a ferrite magnet-based-motor or do you want a neodymium magnet-based motor? And we're going to make a motor that works — you can have both. You can do so in a package with a relatively small change. [The] price will change accordingly.

Further, I think one of the really exciting areas to look at will be with the rise of much smarter motor controllers, which will have the ability to adjust to multiple different operational architectures at the same time.

I believe that motor modularity will pick up as a critical learning from these supply chain shocks that have happened.

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