To Efficiency and Beyond

Infinitum has been a proud member of the National Electrical Manufacturers Association (NEMA) since 2019. We like to stay close to industry news and up to date on standards and best practices. In 2021, NEMA launched the “Beyond Efficiency” initiative to emphasize that resiliency and sustainability are powerful business drivers.

With “Beyond Efficiency,” NEMA’s goal is to advocate for the “holistic benefits of electrical systems” with a focus on “safety, reliability, resiliency, digitalization, connectedness, and sustainability.” In a recent article on the subject, Kevin Cosgriff, NEMA President and CEO wrote, “Energy efficiency is no longer a differentiator for many products; it is a standard feature. Therefore, electrical manufacturers are thinking ‘beyond efficiency’ when developing new products and systems.”

NEMA wants to make efficiency table stakes for new product development, and at Infinitum, we’re out in front. This initiative really resonated with us because it’s the foundation of the work we do every day. Building the next generation of motors is about more than efficiency – it’s about creating something that’s better for the planet and for all of us. We set out to design something smaller, lighter, and quieter than a conventional motor to pave the way for radically sustainable systems. Here’s how we’ve made progress on this initiative so far:

**We're focusing on the system level.**

Going beyond efficiency means considering a system’s total impact on the spaces, places, and people it serves over its working life. Infinitum motors are designed for high efficiency over a wide operating range. For HVAC applications, improved motor efficiency provides optimum power for the airflow required at any operating point. The efficiency of a conventional system declines when it’s not functioning at full power.
We’re building for reliability from the start.

Infinitum uses an innovative copper-etched printed circuit board (PCB) stator to avoid one of the main points of failure for motors—windings. The motor design also minimizes induced voltages in the shaft that are typically caused by high-frequency harmonics. In a traditional motor, induced voltages can cause breakdown of the bearing lubricants and eventually lead to premature bearing failure. With its air core topology, Infinitum’s motor is virtually free of eddy currents in its magnets. In iron-core permanent-magnet motors, eddy currents are a source of magnet heating and a potential cause of magnet demagnetization.

Another benefit of the copper-etched PCB stator is the absence of the traditional iron core itself. Removing the iron core eliminates the magnetic forces between the rotor and stator, making Infinitum motors free of torque ripple. With less vibration and less wear, our motors extend the life of the whole system and suit applications that don’t tolerate torque pulsations, like centrifugal compressors. To avoid torque pulsations, other motor manufacturers use design tricks that tend to have unwanted side effects, like using magnetic wedges. Over time, magnetic wedges tend to shift, so as part of the design process, other components need to be added to ensure they stay in place. In other cases, designers put a flywheel between the motor and the driven equipment to absorb torque pulsations. Those components bring their own shortcomings to the system. For example, a flywheel creates additional inertia, so system start-up is more difficult. The designer must account for a high inertia load, which can increase the cost of the system.

We’re shrinking form factor.

The presence of a small, lightweight motor impacts the whole system. For example, in HVAC applications, a smaller form factor can significantly improve the efficiency of a fan array system and the electricity it consumes. When the motor is smaller, surrounding equipment can be smaller too. For example, a smaller motor footprint accommodates a smaller plenum. A simple size reduction can reduce the amount of material involved and the overall weight of the system. Smaller and lighter also means easier to install and service, lowering long-term maintenance costs.

We’re integrating motor and drive.

With an integrated system, motor speed is fully optimizable, and there’s no need to purchase and mount the drive externally, which minimizes the wiring involved. On a foundational level, Infinitum designed the motor and drive as one unit to maximize system efficiency. By designing the motor and drive under one roof,
we can account for manufacturability — the system is designed to optimize manufacturing-related resources from the start.

Further, the integrated unit offers better serviceability. If there's a failure, only one component needs to be removed. The servicer doesn’t need to pull out the drive, motor, and cabling like they would in a traditional set up.

**We're incorporating connectivity.**

You can’t fix a problem unless you know it’s happening. IoT connectivity enables a data-driven response. Predictive maintenance capabilities minimize system downtime and maximize energy savings by keeping operations efficient.

If more companies take “Beyond Efficiency” head on, we have a shot at creating the products and systems needed for the next generation. For more information about Infinitum motors, check out our website. If you're interested in learning more about NEMA's strategic initiatives for 2022, you’ll want to check out their website.

Learn more about Infinitum's breakthrough technology.