# Magnets shown to create more power in electrical generators

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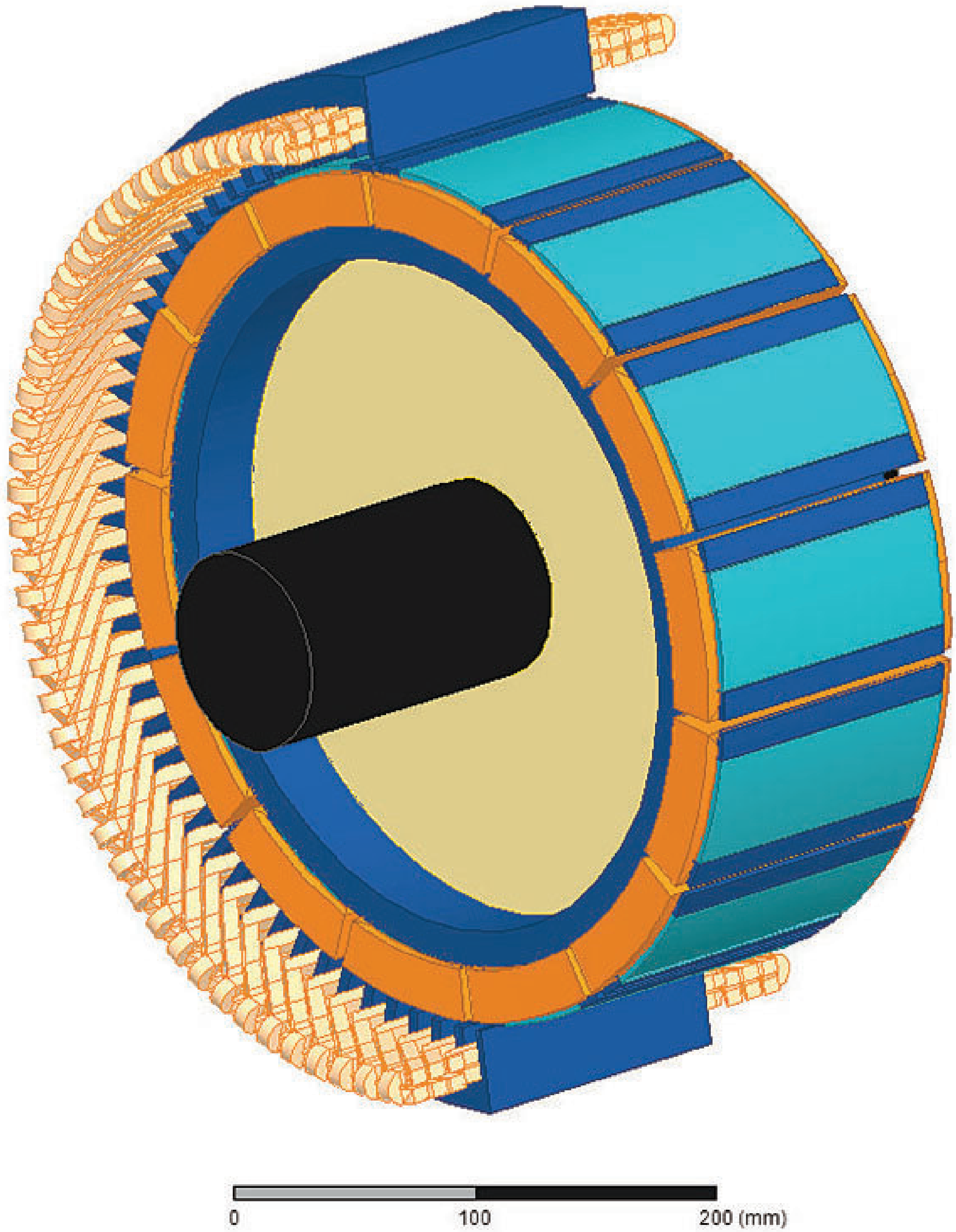


Purdue University researchers developed a parallel inner-magnet device to reduce the size and increase the efficiency of the moderate- to low-power electric generators. Credit: Purdue University

Electric generators have a plethora of uses—ranging from automotive to aircraft to microgrids. There is currently a strong desire to reduce the size and increase the efficiency of the devices.

Researchers at Purdue University have come up with an effective way to reduce the size and increase the efficiency of the moderate- to low-power electric generators used in those applications.

A wound rotor synchronous machine contains a field winding—a group of insulated current-carrying coils—on the rotor used to create a rotating magnetic field and regulate the output voltage. Associated with this winding are losses, which generate heat that must be removed from the spinning rotor. Permanent magnets can also be used to generate the magnetic field with much less loss and heat generation, but this approach does not facilitate output voltage regulation.

"The Purdue parallel inner-magnet device is a hybrid solution that creates some of the field with a permanent magnet and some of the field with a field winding," said Scott Sudhoff, the Michael and Katherine Birck Professor of Electrical and Computer Engineering in Purdue's College of Engineering, whose research focuses on power electronics and electromechanical devices. "This allows for regulation, but with lower losses than a conventional machine."

Omar Laldin, a former Ph.D. student of Sudhoff, helped lead the Purdue team that created the inner-magnet device. Sudhoff said the device could be used in a variety of AC and DC (with a rectifier) generator applications. Key issues include the questions of the best machine structure in terms of merging the two field sources, electromagnetic damping and fault performance. The team has validated the design code through finite element analysis based testing.

Provided by Purdue University