



## Energy Research & Development Technology Brief...NovaTorque Motors

### Technology Description

NovaTorque brushless permanent magnet (BPM) motors may offer some significant advantages over induction motors for applications that require variable speed operation.

What makes the NovaTorque motor unique is the stator and rotor hub geometry (Figure 1). The field poles used in the stator (1) have conical end-surfaces instead of the conventional perpendicular flat cross-sections. The rotor (2) consists of a pair of conical hubs mounted on opposite ends

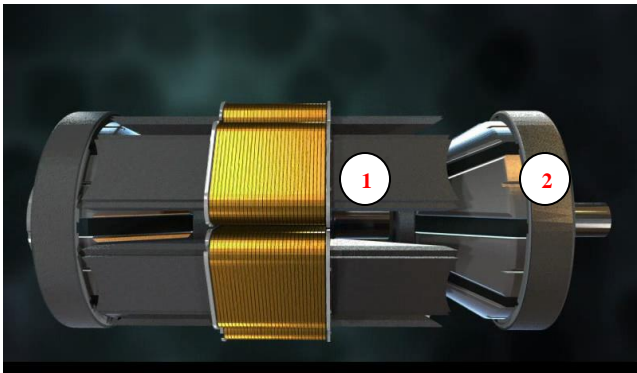


Figure 1: internal view of some of the main components of the NovaTorque motor. Courtesy of NovaTorque Inc.

of the motor shaft that match the end-surfaces of the field poles. These rotor hubs use an interior permanent magnet arrangement which provides magnetic flux concentration.

NovaTorque's design maximizes the surface area available for magnetic flux transmission, while minimizing the volume of materials. This allows NovaTorque to use lower cost ferrite magnets to achieve motor efficiency and performance that equals or exceeds much more expensive motors that use rare-earth (neodymium) magnets.

According to the manufacturer, the NovaTorque motor offers the following advantages over conventional induction motors:

- Maintains higher efficiencies during variable speed operation
- Cost competitive with NEMA premium efficiency motors with variable speed drives
- Generates less heat

- Enhances reliability due to cooler operation
- Smaller package enables the motor to be used in a wide variety of applications

### Demonstration Project

SMUD hired ADM Associates, Inc. to conduct an evaluation of the NovaTorque Premium Plus+™ 3 HP Motor System which includes a motor and a variable speed drive. The first phase of the project included testing at NovaTorque's laboratory in Sunnyvale, California and using the resulting data in computer simulations to develop comparisons. Results show that the NovaTorque motor system is more efficient than the standard and premium efficiency motors selected for the test (Figure 2). The report is now available via the Customer Advanced Technologies (CAT) program website: <http://www.smud.org/en/education-safety/cat/Pages/index.aspx>. Phase Two of this project, evaluating the NovaTorque system in various real world applications, is scheduled for mid 2011.

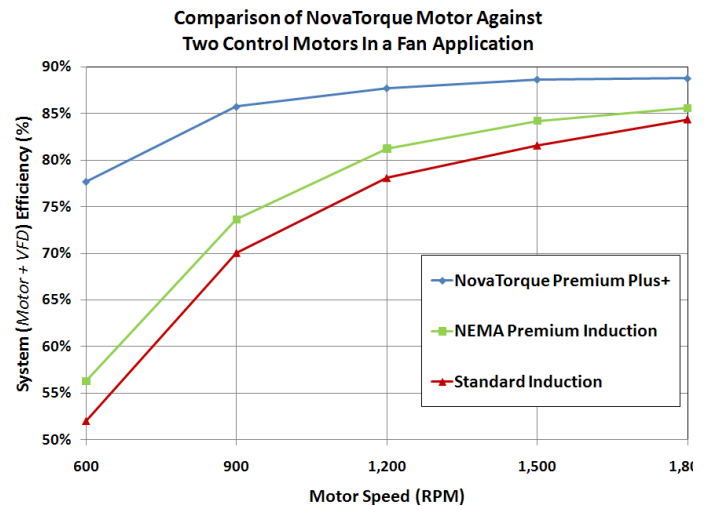


Figure 2: Data points are measured system efficiency values and were selected based on a calculated fan curve. Courtesy: ADM

### Acknowledgments

SMUD gratefully acknowledges the efforts of ADM and NovaTorque for their assistance in preparing this technology brief.