



Induction Motor Wastes Less Power

[View U.S. Patent No. 9,379,657 in PDF format.](#)

WARF: P140055US01

Inventors: Thomas Lipo, Prabhdeep Virk

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an open winding induction machine that can operate at unity power factor for all load conditions.

Overview

The induction machine is by far the most heavily used industrial motor, and ranges in size from a fraction of a horsepower to more than a megawatt. It produces torque by the electromagnetic interaction between its stator windings and rotor windings.

As a result, these machines inherently consume current at a lagging power factor. 'Power factor' is the ratio of the true power (watts) utilized in the system to the apparent power (volt-amps) drawn from the grid. The power stored in and discharged by the motor, called reactive power, also plays a role.

A low power factor means energy is being wasted during operation. Electric utilities typically charge a higher rate and add penalties for loads operating at a poor power factor.

The Invention

UW-Madison researchers have developed a method to control the supply of reactive power to/from an induction motor so that it operates at approximately unity (1:1) power factor. In other words, the motor consumes voltage and current in phase from the terminals of the electric grid.

In essence, multiphase voltage from the grid is applied to one side of the motor's open stator windings. A processor receives this voltage and determines its phase. At the same time, stator currents are measured from the second side of open windings and converted to a type of reference frame having voltage on one axis. Based on this reference frame, a second output voltage signal is determined and applied to the second side of open windings.

Applications

- Manufacturing and retrofitting induction motors

Key Benefits

- Corrects to unity power factor regardless of load
- Could help reduce the amount of frequency supplied by the grid by 20 percent
- Reduces stator copper loss
- Better overall efficiency

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

Stage of Development

OK



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850

Simulations show improved voltage and current output.

Tech Fields

- [Engineering : Electric machines](#)

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867

We use cookies on this site to enhance your experience and improve our marketing efforts. By continuing to browse without changing your browser settings to block or delete cookies, you agree to the storing of cookies and related technologies on your device. [See our privacy policy.](#)

OK



WARF
Wisconsin Alumni Research Foundation

| info@warf.org | 608.960.9850