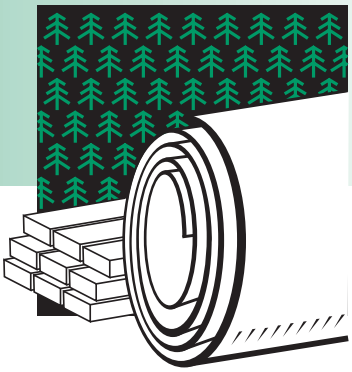
FOREST PRODUCTS

Project Fact Sheet



ADJUSTABLE-SPEED DRIVES FOR 500 TO 1500 HORSEPOWER INDUSTRIAL APPLICATIONS

INNOVATIVE DESIGN DRAMATICALLY REDUCES ENERGY CONSUMPTION WHILE MAKING VARIABLE SPEED CONTROL AVAILABLE FOR LARGER MOTORS

Benefits

- Could save 6.5 billion Btu annually per 750-hp installation
- Could save 15.6 trillion Btu annually by 2010 from 2400 installations
- Could reduce emissions of CO_2 and NO_x by 15% to 20%
- Could save 20% in pump energy and 15% in fan energy

Applications

Targeted industries for this NICE³ project include forest products, water and wastewater, utilities, and steel.

Project Partners

NICE³ Program
Washington, DC

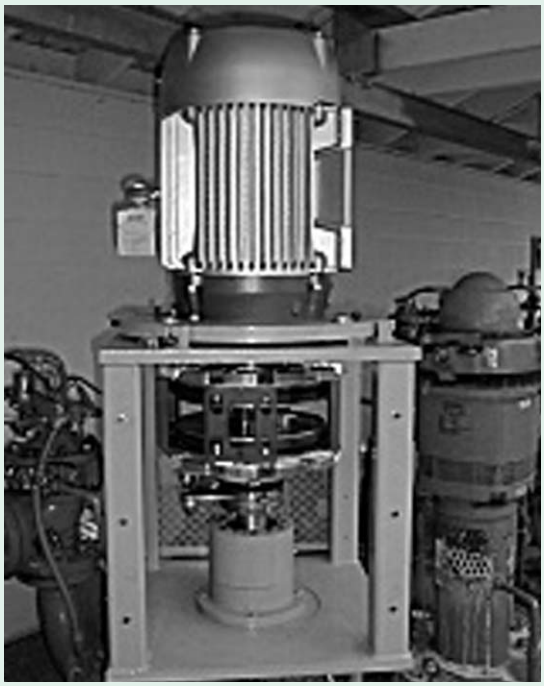
Washington State University
Extension Energy Program
Olympia, WA

MagnaDrive Corporation
Seattle, WA

In recent years, variable frequency drive (VFD) units have been considered state-of-the-art technology, but they are usually only used for low-voltage applications. While VFDs reduce energy use and motor wear, they do not perform well in medium- or high-voltage environments, where sensitive VFD equipment needs to be contained within a controlled environment. They can generate harmonic frequencies that shorten the life of equipment or adversely affect the utility power distribution system. Their performance is also limited when power quality is low.

MagnaDrive Corporation, with assistance from the U.S. Department of Energy's NICE³ Program and Washington State University's Cooperative Extension Energy Program, is demonstrating a highly efficient adjustable speed

MAGNADRIVE ADJUSTABLE SPEED DRIVE



MagnaDrive's ASD provides users of medium voltage motors with the first dependable speed control that increases motor efficiency and substantially reduces operating costs.

drive (ASD) for various industrial applications. The MagnaDrive ASD has been successfully tested in industrial environments with motors up to 300 horsepower (hp). The new demonstration will include four industrial settings where motor energy requirements range from 500 to 1500 hp.

Project Description

Goal: Install and demonstrate the ASD technology for fans and pumps at four separate industrial locations. The installations will be monitored to assess energy savings, environmental and other benefits, and to demonstrate the commercial viability of the applications.

The ASD is an extremely durable, precision-crafted piece of rotating equipment installed between the motor and load. The ASD consists of two major components that never touch: 1) the copper conductor assembly, directly connected to the motor shaft, and 2) the magnet rotor assembly, directly connected to the load shaft. The torque is transmitted across a thin air gap that can be continuously adjusted to control the speed of the load. The actuation components are attached to the magnet rotor assembly on the load side of the ASD. Rare-earth permanent magnets are the key to the system's performance. The magnets are made of neodymium, iron, and boron (NdFeB), and retain their magnetic properties for the life of the system.

The motor is started with the ASD system in a position that places the largest air gap between the magnet rotors and the copper conductors. The motor quickly comes to full speed in an unloaded condition. The magnet rotor is then actuated to adjust the rotors closer to the conductors. As the components approach each other, eddy currents are induced, allowing a smooth transfer of torque across the air gap until the distance between the magnet rotor and the copper assembly closes to approximately one-eighth inch. At this point the ASD reaches its maximum efficiency of up to 99% of the torque transferred between the motor and the load.

Progress and Milestones

- Investigate potential demonstration sites.
- Write modification and construction documents for the potential demonstration sites.
- Manufacture the ASDs and modify the demonstration sites.
- Ship and install the ASDs.
- Start up the ASDs and conduct operations and maintenance.
- Conduct performance auditing.

Economics and Commercial Potential

This technology could save 6.5 billion Btu of electricity per 750-hp installation per year. First sales of ASDs for applications of 500 hp and above are expected in 2002. Based on 20% penetration of the 500 hp and larger variable-speed market by 2010, annual savings could be 15.6 trillion Btu with 2400 operating units. Continued market penetration by 2020 could save 38.7 trillion Btu from operating 6800 units.

NICE³ – National Industrial Competitiveness through Energy, Environment, and Economics:
An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry.
This grant program provides funding to state and industry partnerships for projects that demonstrate advances in energy efficiency and clean production technologies. Awardees receive a one-time grant of up to $525,000. Grants fund up to 50% of total project cost for up to 3 years.

For project information, contact:

Bruce Densmore
Vice President of Engineering
MagnaDrive Corporation
1177 Fairview Avenue East
Seattle, WA 98109
Phone: (206) 694-4717
Fax: (206) 694-4747
bdensmore@magnadrive.com

Home Page:
www.magnadrive.com

For more information about the NICE³ Program, contact:

Lisa Barnett
Program Manager
NICE³ Program
Phone: (202) 586-2212
Fax: (202) 586-7114
lisa.barnett@ee.doe.gov

Visit our home page at
www.oit.doe.gov

Office of Industrial Technologies
Energy Efficiency and Renewable Energy
U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585-0121

Order # NICE³ FP-12
February 2002