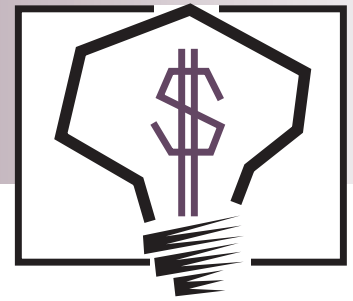


# INVENTIONS & INNOVATION

## Project Fact Sheet



## VARIABLE SPEED, LOW COST MOTOR FOR USE IN RESIDENTIAL HVAC SYSTEMS

### LOWERING THE COST OF VARIABLE SPEED MOTORS WILL ALLOW HVAC SYSTEMS TO BECOME MORE ENERGY EFFICIENT

#### Benefits

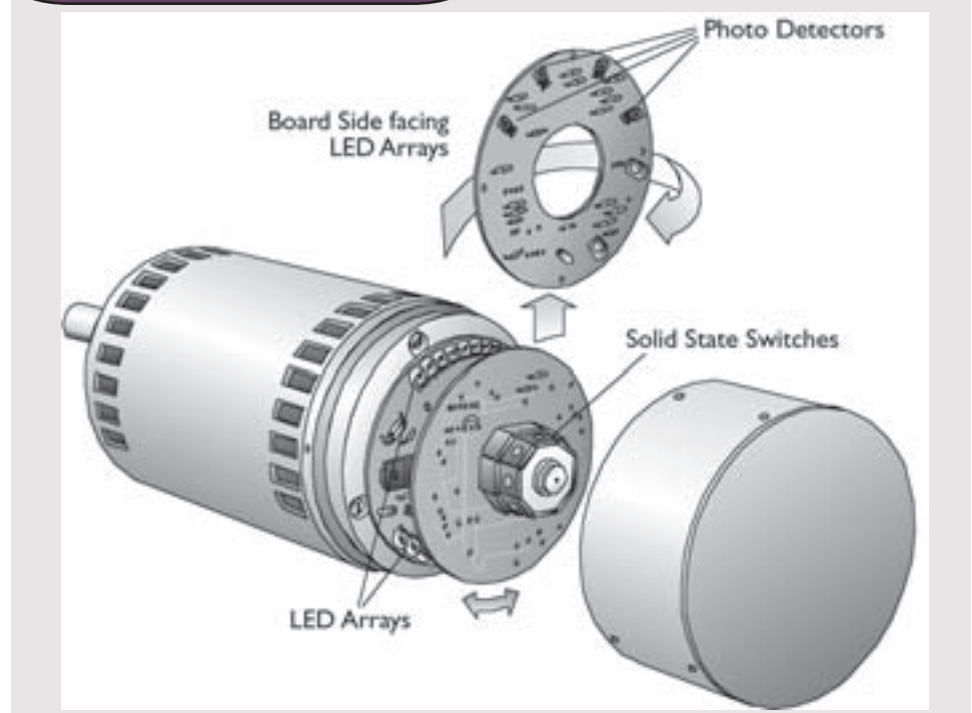
- Offers savings of 14.5 trillion Btu by 2010
- New technology reduces the cost of variable speed motors by 40% to 50%

#### Applications

The new motor is primarily targeted at the residential HVAC system market. Other potential applications could include electric vehicles, aircraft and factory automation.

DynaMotors Inc. has developed a revolutionary low-cost, brushless, variable speed motor technology that has solid state switches on the rotating armature. These switches are optically controlled thereby controlling motor torque and speed. The goal of this project is to develop a version of this technology for use on residential HVAC blowers. Existing HVAC systems use low cost, low efficiency, single speed permanent split capacitor induction motors. These motors are cycled on and off as required by a thermostat. A variable speed motor running continuously at a 1/2 speed uses 1/4 of the power to move the same amount of air. Today, variable speed motors are used in only 5% of residential HVAC systems. The reason is cost. Existing variable speed motors cost at least 4 times as much as single speed motors. Price has been the major reason that the HVAC industry and consumers have not widely adopted the technology. This project will result in the DynaMotor selling at 40-50% less than existing variable speed motors.

#### VIEW OF THE DYNAMOTOR ELECTRONIC CIRCUITS



Cutaway shows stationary printed circuit board with LED array's and rotating board with photo detectors and solid state switches.



## Project Description

**Goal:** Develop and begin commercialization of an efficient variable speed motor for residential HVAC fans (and later compressors and pumps) that will be inexpensive enough to replace today's single-speed motors and reduce national electric energy consumption and related air pollution. The product will be based on the fundamentally new, proprietary DynaMotor technology.

The overall goal in more specific terms is to design a line of variable speed motors for residential HVAC applications that can be sold at a profit in large volume to HVAC manufacturers for \$60 for a 1/2 hp model.

## Progress and Milestones

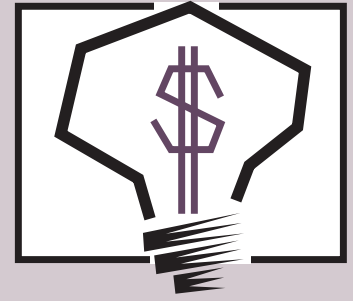
The following are the main tasks to be performed:

- Design non-transistor (alternistor) system which lowers parts count by more than 50%.
- Acquire motor design tools and capital goods to design the mechanical and electrical components of the motor.
- Select an HVAC partner and build, test and evaluate lab motor prototypes.
- Select a manufacturing partner and continue the design/test process and also investigate conforming to industry standards.
- Build pre-production motor prototypes and begin final testing.

## Economics and Commercial Potential

The residential HVAC market is 8 million central systems installed per year by local independent contractors. Over 90% of these units are supplied by six major corporations: United Technologies (Carrier & Bryant), Lennox, Goodman, Rheem, American Standard and York. It is highly competitive in price. It has been affected by the introduction of variable speed motors following the lead of the commercial and industrial systems. Quality is important to the manufacturers since long warranties are required and replacement or servicing in the field is very costly. Variable speed motors are chosen by upscale buyers for comfort rather than energy savings.

Variable speed motors are used in only 5% of the HVAC market because of the substantial price differential with fixed speed motor systems. The proposed DynaMotor will reduce the motor price by 40% to 50% thus accelerating the acceptance of variable speed technology and the associated national benefits. Commercial introduction of the technology is expected by 2005. Annual energy savings by 2010 would be 14.5 trillion Btu. By 2020 the savings would grow to 139 trillion Btu.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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