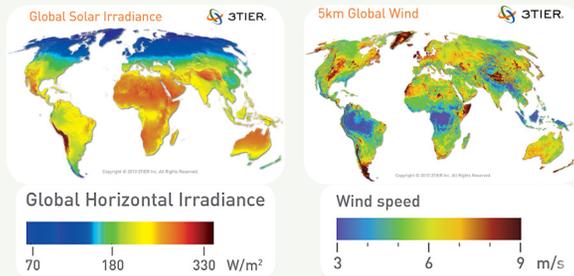


Motor Type Comparison

	AC polyphase induction	Brushless DC
+	Low cost, long life, high efficiency, large number of standardized types	Long lifespan, low maintenance, high efficiency
-	High starting current draw, speed control requires variable frequency source	High initial cost, requires a controller

Alternative Energy:



Between Solar and Wind energy, Much of the land on Earth has a renewable energy source. There are very reliable sources of energy all across the globe that can be used to power water pumps from well sources in off grid locations.

Using renewable energy sources for any application requires a method of storing energy integral to the system. Large banks of batteries are frequently utilized to carry out this duty. To meet the requirements of a water pump, a battery bank would have to be very large and may require a large array of solar panels to meet the output requirements.



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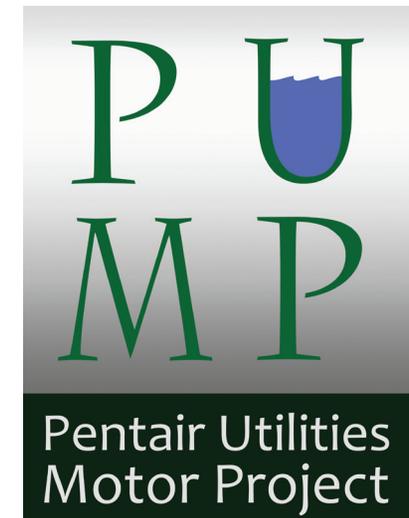


IPRO It takes a team!

INTERPROFESSIONAL PROJECTS PROGRAM

IPRO 348

Techno-Business Exploration
 of Water Pump Technology



Problem Statement:

Our Sponsor, Pentair, Inc. is hoping to replace the AC induction motors currently in use in their water pumps with motors that are greener - more energy efficient and longer lasting.

Methodology:

Our project had three main phases.

Research - We sought to learn as much as possible about AC and DC motors and controller technology for DC motors.

Motor Search - We searched for motors through the internet and found several that interested us from a few countries.

Design Phase - Designed adapters for both mounting the motor to the pump and driving the pump.

How Much Energy Can be Saved?

Pentair, Inc. is one of the largest distributors of water system technologies in the world. This includes, residential, municipal, agricultural, commercial, and industrial applications.

If a greener pump could be created, the total energy savings could be monumental.

Objectives:

- Research and test potential motor technologies
- Report to Pentair our findings and our recommendation for which motor they should select to use in their water pumps

Conclusions:

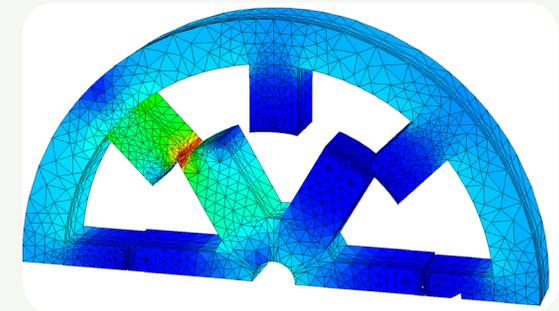
The Anaheim Automation BLZ48 Series Brushless DC Motors are compact and have a high power density. These motors are cost effective solutions to many velocity control applications. Many windings are available and can be customized to fit any application. The motors come in a standard 8-lead configuration. The winding of this motor can also be customized to match my voltage, current, and maximum operating speed. Shaft modifications can be requested as well.



Future Work:

Switched Reluctance Motors (SRMs)

The switched reluctance motor (SRM) is a synchronous motor which runs by reluctance torque. It has wound field coils similarly to DC motors for the stator windings. However, the rotor has no magnets or coils attached. The rotor becomes energized once the opposite poles of the stator become magnetized. To achieve a full rotation in an SRM, the windings must be energized in the correct sequence and with precise phasing.



A magnetic forces diagram showing the repulsive (reluctant) force between the stator and the rotor.

SRMs are believed to be the ultimate motor, theoretically, they would have the least amount of energy loss in a motor. At this time, they are not widely available on the market. Further testing should be performed once these motors are more widely available.

