

# 2010 Zero Emissions Snowmachine



# Overview

- Application
- Design Focus
- Simple Efficiency Gains
- Maintenance
- Environmental Perspective

# Product Application

- Polar Research
  - Applicable
  - Malleable Market
- Recreation
  - Hunting
  - Day Touring
  - Limiting Range
- Village Transport
  - Suitable Range and Speed



# Design Focus

- Optimization of Range
  - Large Battery Pack
  - Weight Savings
- Off Shelf Components
  - Ideal Platform
  - Low Cost
  - Current Manufacturers



# '09/'10 Battery Comparison

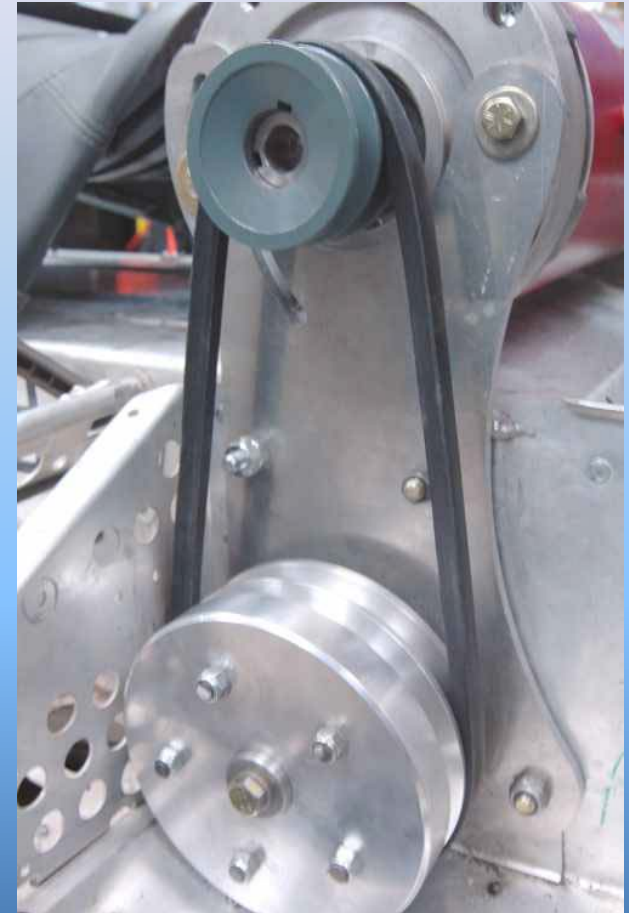
	<b>HeadWay 38120</b>	<b>Clean Power TS-90</b>
<b>Mass</b>	125 kg (275 lb)	24%
<b>Nominal Voltage</b>	211 V	211%
<b>Capacity</b>	60 A·h	-33%
<b>Energy</b>	12.6 kW·h	41%
<b>Energy Density</b>	100 W·h/kg	4%
<b>Power Density</b>	5 W/g	66%
<b>Power Density (pulse)</b>	10 W/g	n/a

# Simple Efficiency Gains

- Implementable in Manufacturing
- High Voltage System
  - 211 Volts, Nominal
- Motor Modifications
  - Redtop Brushes
  - Stiffened Brush Springs
  - Advanced Timing
  - Ceramic Bearings

# Maintenance

- Limited Moving Parts
  - Dual Pulley
  - Multi-belt Drive
- Availability of Replacements
  - Generic V-Belt
  - Limited Custom Components



# Environmental Perspective

- Low Impact Components
  - LiFePO<sub>4</sub> Battery Pack
  - V-Belt
  - Minimal Fluids
- Environmental Advantage
  - Inherent Lack of Efficiency
  - Implementation
  - Energy Production