

TEAM UWP

SAE

Clean snowmobile Challenge 2007

University of Wisconsin-Platteville



2007 SAE Clean Snowmobile Challenge

Houghton, Michigan

March 19 – 24th

Outline

- Team
- Chassis
- Engine
- E85 Fuel system
- Cooling System
- Driveline Improvements
- Exhaust
- Emissions Reduction
- Cost Analysis
- Conclusion

The Team

- Located in the southwest corner of Wisconsin
- Mechanical Engineering is the largest major on campus
- Team Host a variety of majors



Chassis

- 2002 Polaris Pro-X 440 Fan
- High Performance Platform
- Light-Weight, durable chassis
 - 661 lb. Wet

Before



After



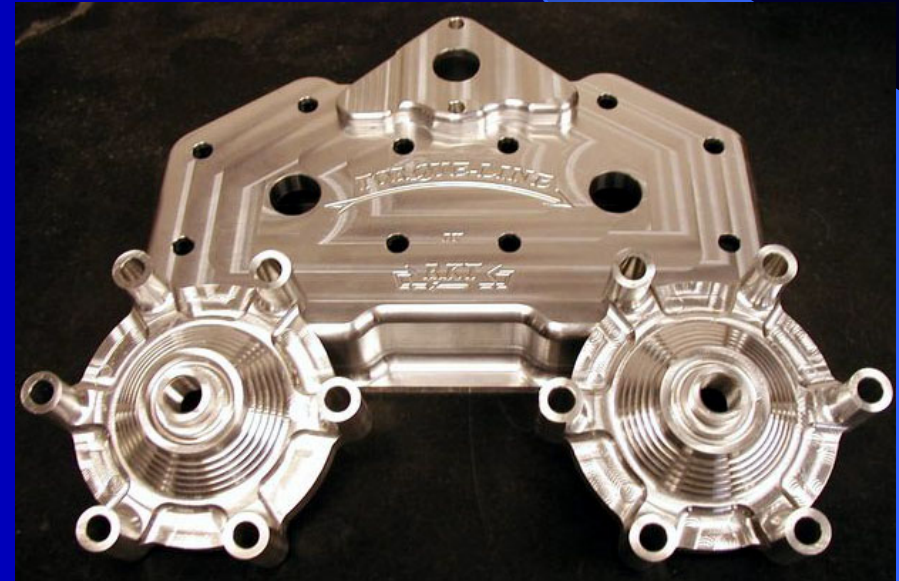
The Engine

- Rotax Semi-Direct Injected 600cc 2-Stroke (SDI)
- Electric Start
- Electronic Reverse (RER)
- Four Fuel injectors, two at idle, four under load



Engine improvements

- RK-Tek Head
 - Added cooling over stock head
 - Hemispherical cut domes increases combustion efficiency, while increasing fuel mileage and emissions
 - 14:1 compression combustion domes to utilize 105 octane E-85



E85 Fuel system

- Full Flex gold Fuel Manager
- DoBeck electronic jet kit
- High output injectors
- Stainless steel fuel lines

Full Flex gold Fuel manager

- Works with all stock sensors to extend the pulse of injection on all four injectors.
- It does not bypass stock ECM



DoBeck electronic jet kit

- Fine tunes fuel delivery curve
- It has three stages of fuel delivery adjustments.
- The first is equivalent to a pilot circuit on a carbureted motor.
- Second is what is called an accelerator adjustment which controls how fast the signal reaches the injectors.
- Last and most important is the main which controls the equivalent of a main jet
- Only Plugs into the outer two injectors in the fuel rail



Injectors

The inner injectors were replaced with 1000 SDI injectors

They control the midrange and top end throttle positions



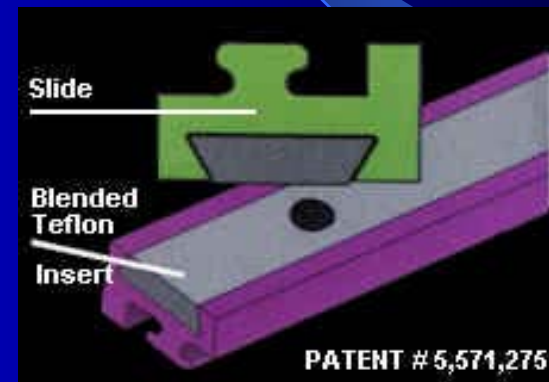
Cooling System

- Belly Pan Radiator w/Fan
 - Coolant Temps Reduced 30°-40°F
- Front Heat Exchanger in the tunnel
- Billet head for more efficient cooling.



Driveline Improvements

- Hiperfax slides
 - Teflon Inserts
 - 700°F Melting Temp
- 96 Track Studs
 - Improved Control



Exhaust

- Custom AAEN Pipe
- AAEN compact double core silencer
- Modified Ski-Doo silencer



Exhaust Cont.

- AAEN Pipe



- AAEN compact double core Silencer



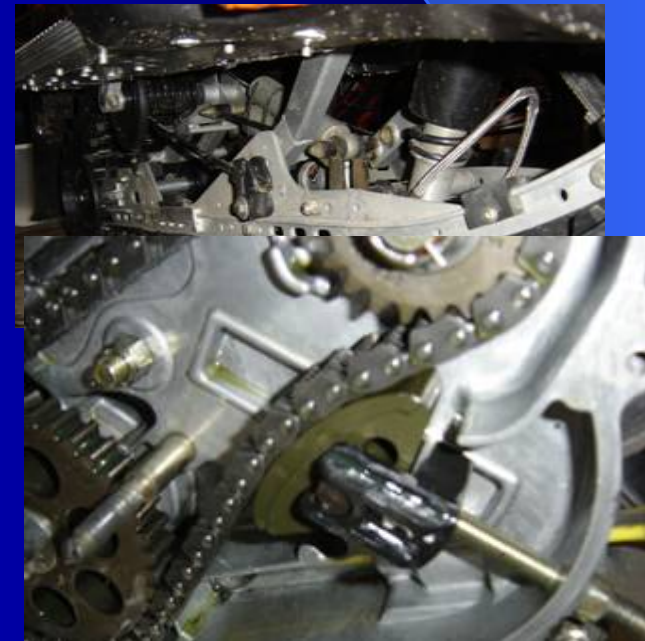
Noise Reduction

- Damping and absorption of under hood and tunnel noise
 - Dynamat Xtreme®
 - Vibration Damping
 - Dynamat Hoodliner
 - Sound Absorption



Noise Reduction Cont.

- Drive Train
 - Removal of Idler Wheels
 - Addition of a Vespel[®] Chain Tensioner
 - Camoplast hacksaw track



Noise Reduction Cont. Full throttle Pass

	Pass1	Pass 2	Pass 3
AAEN System With Secondary Silencer	90	88	91
AAEN Pipe and Silencer	82	82	85

Emissions Reduction

- 2 Stage 3-Way Catalyst
 - 200 Cells per sq/in
 - Ceramic Substrate
 - Designed to last the life of the vehicle
 - Custom diffuser help with quick light off on cold starts



Emissions Reduction Cont.

- Secondary air injection
 - Electric air pump
 - Quicker Light off
 - Compact

Under hood temperatures

- Under hood temperatures became a big problem due to the fact that the catalytic converter reaches temperatures as high as 1100 degrees.
- Custom aluminum heat shields were fabricated along with a hood scoop.



MSRP Cost Analysis 2007

● Base Line Snowmobile	● Cost
– 2004 Ski-Doo Legend Sport 600 SDI*	● \$8,149.00
● Fuel System	
– Full Flex kit	● \$493.95
– DoBeck Kit	● \$239.85
– Stainless steel fuel line	● \$18.95
– Fuel filter	● \$21.95
● Suspension	
– Fox Floats	● \$694.95
● Engine	
– RK-Tech Head	● \$385.00
– VFORCE Reeds	● \$318.95
– 14A Battery	● \$30.00
– PWR 660 Raptor Radiator	● \$449.00
● Exhaust	
– AAEN Exhaust	● \$300.00
– V-Converter Catalytic Converter	● \$95.00
– Digatron	● \$500.00
● Misc	
– C&A Skis	● \$208.95
– StudBoy Studs	● \$196.99
– StudBoy Brackets	● \$28.99
– Hiperfax Slides	● \$169.95
● Total Cost:	● \$12,301.48

Conclusion

- Environmentally friendly snowmobile
- Alternative fuel snowmobile
- Cost effective design
- Maintains performance attributes of a 2-stroke snowmobile

Sponsors

- Full Flex International
- DoBeck Racing
- Polaris Industries
- AAEN Performance
- Millennium Technologies
- Outlaw Composites
- Digatron
- TekVest
- Dynamat
- Hiperfax
- Camoplast
- NGK
- Castle
- HMK
- Digatron
- VConverter
- Stud Boy
- Click's Cycling Service

Comments and Questions?