

UNIVERSITY OF MINNESOTA DULUTH



Sam Cassibo
Miles Wittlief
Kyle VanTatenhove
Jeremy Olson
Asad Jawed



Content

- ▣ Tuning (Sam)
- ▣ Emissions (Sam)
- ▣ Ethanol (Miles)
- ▣ Noise Reduction (Miles)
- ▣ Suspension (Sam)
- ▣ Safety Modifications (Jeremy)
- ▣ MSRP (Jeremy)
- ▣ Future Efforts (Kyle)
- ▣ Constraints (Kyle)
- ▣ Conclusion (Sam)

Tuning

- ▣ Fuel Mileage/Horsepower
 - 700cc 2-Stroke Engine
 - Higher Horsepower to Weight Ratio
 - SDI in the crankcase and cylinders
- ▣ Fuel Tuning

EGT Gauges



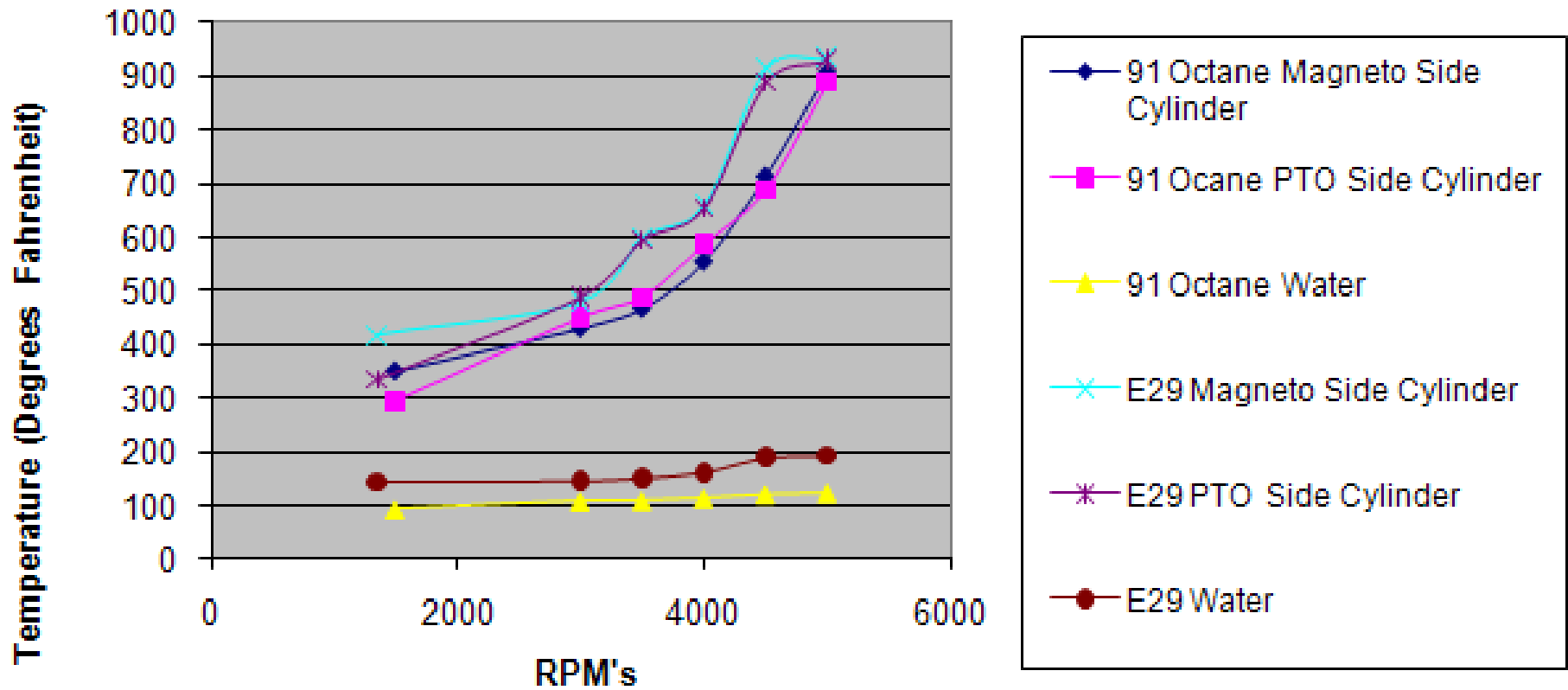
Dynojet Fuel Controller



91 Octane Operating Temperatures (°F)				
	RPM	Magneto	PTO Sid	Water
Idle	1500	350	295	93
	3000	430	450	109
	3500	467	488	110
	4000	555	587	115
	4500	715	689	122
	5000	910	890	125

E29 Operating Temperatures (°F)				
	RPM	Magneto	PTO Sid	Water
Idle	1350	418	335	144
	3000	480	489	146
	3500	600	595	151
	4000	660	655	162
	4500	915	889	190
	5000	935	930	194

RPM vs. Operating Temperatures



Emissions

- ▣ Oxidation Catalytic Converter
 - Magnaflow
 - Robust
 - Designed for high temp lean combustion
 - Reduce Hydrocarbons
 - Reduce Carbon Monoxide
 - Converts to Carbon Dioxide and Water Vapor



Ethanol

- ▣ Why E20 to E29 fuel?
 - Increased fuel mileage
 - Decreased tailpipe emissions
- ▣ Blending of fuel for testing
 - Ratios of 91 Octane with E85

91 Octane	
5 Gallons of E20	
	Gallons
% 91 Octane	4.3333
% E85	0.6667
Resultant Octane	93.53346

5 Gallons of E24.5	
	Gallons
% 91 Octane	4.03325
% E85	0.96675
Resultant Octane	94.67365

5 Gallons of E29	
	Gallons
% 91 Octane	3.7333
% E85	1.2667
Resultant Octane	95.81346

Noise Reduction

- ▣ Catalytic Converter
 - Adds sound dampening capabilities to the exhaust system



- ▣ Rubber Skirting
 - Baffle the sound emitted by the moving components of the rear suspension and track



Suspension

- ▣ Suspension Tuning
 - Trail Riding
 - Lengthened Front Limiter Strap
 - Rear Suspension Springs Set At Medium Stiffness
 - Front Shocks Set More Stiff Than Stock

Safety Modifications

- ▣ Rear Snow Flap
- ▣ Traction Control
- ▣ Clutch Cover
- ▣ Kill Switch/Disconnect Tether

MSRP

	2008 Polaris IQ 700	2008 Polaris IQ 700 UMD Edition	Modification Prices
MSRP	\$9090.00	\$9648.98	
Features :	Liberty 700 Cleanfire Engine	Liberty 700 Cleanfire Engine	
	Perc Reverse	Perc Reverse	
	15 x 121 x 1 HackSaw Track	15 x 121 x 1 HackSaw Track	
	P-85 Drive Clutch with LWT Team Driven Clutch	P-85 Drive Clutch with LWT Team Driven Clutch	
		Catalytic Converter	\$ 90.00
		Studs and Carbides	\$ 169.99
		Tunnel Skirts	\$ 50.00
		Accel Fuel Pump	\$ 139.99

Future Efforts

- ▣ Exhaust Re-Routing
 - Keep catalyst
 - Replace existing canister.
- ▣ Seat Suspension
- ▣ Obstacles to take into account when designing:
 - Gas tank
 - Geometry of the seat
- ▣ Reduce drag in the drive train

Constraints

- ▣ All the time put into working on the snowmobile is completely voluntary (non-credited from the university)
- ▣ Received our competition snowmobile late November
- ▣ Wait time on manufacturer parts
- ▣ Limited budget

Conclusion

- ❑ Environmentally friendly
- ❑ Improved ride ability
- ❑ Lower noise levels
- ❑ Preserve the sport of snowmobiling
- ❑ Snowmobiles in national parks.
- ❑ The 2010 UMD Bulldogs redesigned a 2008 Polaris IQ 700 to be a more efficient , quiet, and pleasant riding trail snowmobile while operating on fuel in the range of 20% to 29% ethanol.

Acknowledgements

- ▣ Polaris
- ▣ Voyager Snowmobile Club
- ▣ UMD Facilities
- ▣ UMD Student Association
- ▣ IEEE
- ▣ Two Harbors Ford
- ▣ TH Auto Body
- ▣ Woody's
- ▣ International Voyageurs Snowmobile Club
- ▣ Swenson College of Science and Engineering
- ▣ Team Leader: Dr Stanley Burns
- ▣ All of the SAE Clean Snowmobile Challenge Sponsors

References

- ❑ Power Sports TV
- ❑ International Snowmobile Manufacturers Association
- ❑ Barrett, Rick. "Snowmobile sales in U.S. get chillier."
- ❑ E85 Fuel
- ❑ The American Coalition for Ethanol
- ❑ AAA Fuel Gauge Report
- ❑ Brekke, Krisitn "GROUNDBREAKING STUDY FINDS THAT CERTAIN ETHANOL BLENDS CAN PROVIDE BETTER FUEL ECONOMY THAN GASOLINE"
- ❑ Exhaust Gas Technologies
- ❑ CL International Inc
- ❑ Magnaflow
- ❑ Vintagesnowmobile.com
- ❑ Alaska Mining & Diving Supply
- ❑ Power Sports Network
- ❑ Woody's Traction Control
- ❑ Polaris Industries
- ❑ Google News