

University of Maine

2011 SAE Clean Snowmobile Challenge



Target Market



<http://www.taipeitimes.com/images/2008/01/26/20080125181455.jpeg>

- Younger demographic
- Casual snowmobiler in population centers
- Can be used at in-town snow park
 - Used for jumps, short high intensity rides
 - Tossable sled
- Reliable
- Easily serviced at any powersports dealer

Base: 2007 Yamaha Phazer



Engine Type:	Four-stroke IC
Displacement:	499.2 cc
Cooling :	Liquid
Design:	2 Cylinder 3-Valve
Fuel Delivery:	Fuel Injection, 43mm Throttle Bodies
Compression Ratio:	12.4:1
Maximum Crank Power:	80 hp
Dry Weight:	474 lbs



Who We Want:

**Snow park ... populated areas. Local rental
Snowmobiling 41 years 2009 → 44 years 2011#
X Games Demographic 12-24 year old Males***

Design Goals

- In town operation --- loss of open trails
 - No smell regardless of operating condition
 - Quiet enough to be neighbor friendly
- Tossable
- Flex-Fuel compatible
use any fuel no fuel
mixing or oil addition
- Increased operating range
- Low purchase and
maintenance cost

Snow Park picture

<http://www.bigskyevergreenlodge.com/img>

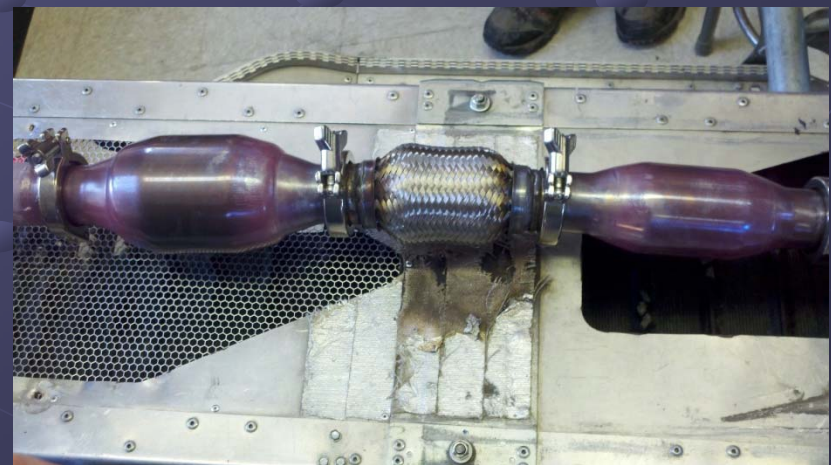


Flex Fuel Sensor & Catalyst

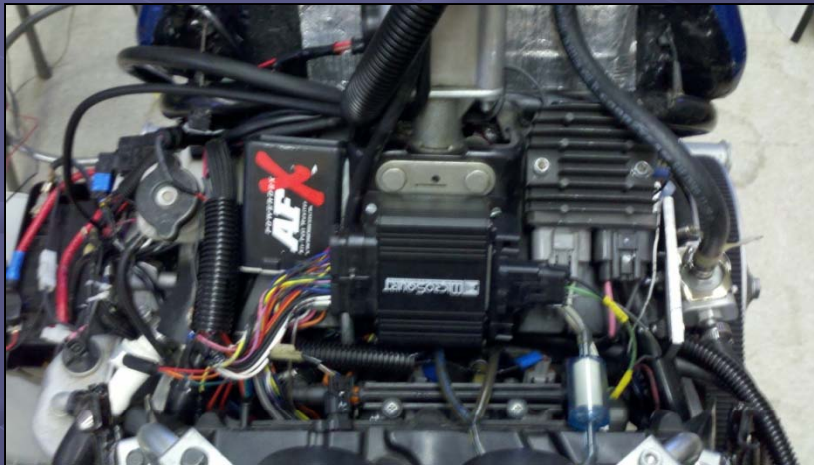


- Random Technology custom catalytic converters
- Pre-Catalytic converter to improve cold start emissions

- GM Flex Fuel Sensor
 - Works with any fuel
 - Automatic adaptation input to ECU



Custom ECU -- MicroSquirt



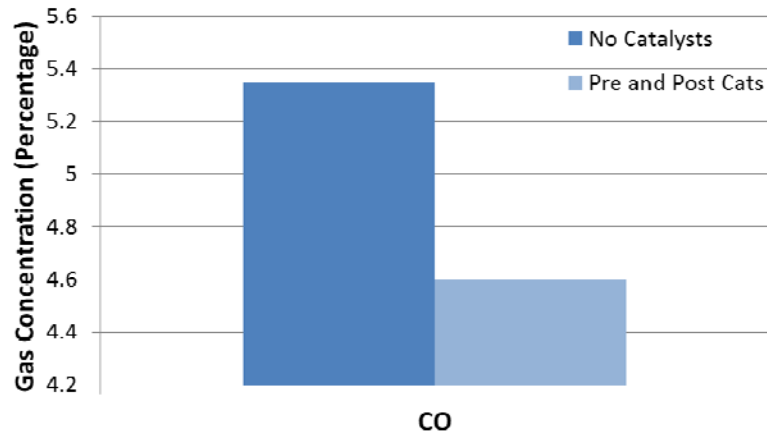
- Accurate A/F ratio control
- Inputs
 - Wideband O2
 - TPS
 - MAP
 - Flex Fuel Sensor
 - Temperatures etc.
- Result
 - Mapped for all operating conditions
 - Best use of pre-catalyst and catalytic converter

Emission Data

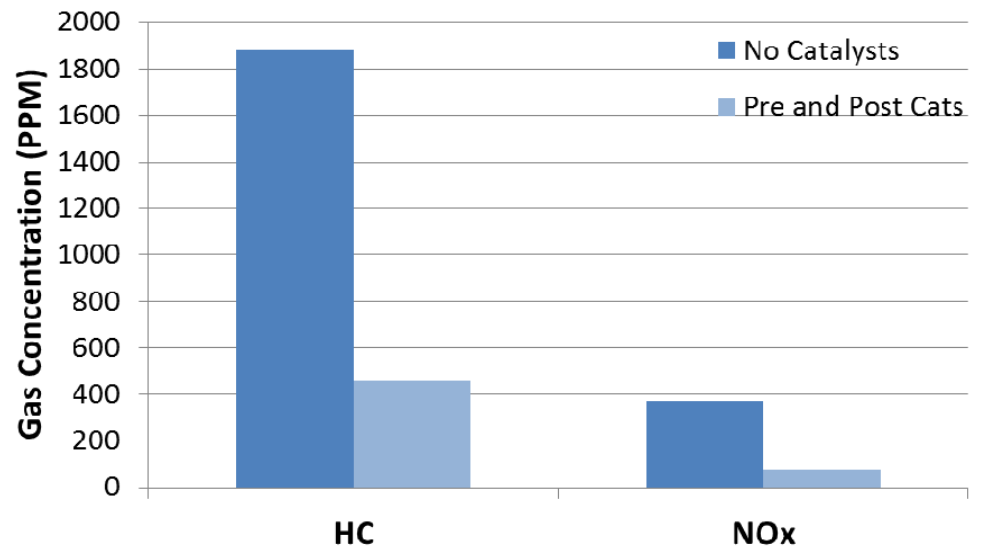
	No Catalyst	Main Catalyst	Pre Catalyst and Main Catalyst
HC	3000 ppm	590 ppm	55 ppm
Nox	280 ppm	105 ppm	60 ppm
CO	7.00%	5.50%	2.50%

Emission Data

Carbon Monoxide



Hydrocarbon and NOx



Noise reduction



http://www.flickr.com/photos/royal_broil/sets/

- Target:
Young market & near populated areas
- Focus on noise in mid frequency range traditionally associated with annoyance ...

rumble not whine

Custom Cowlings



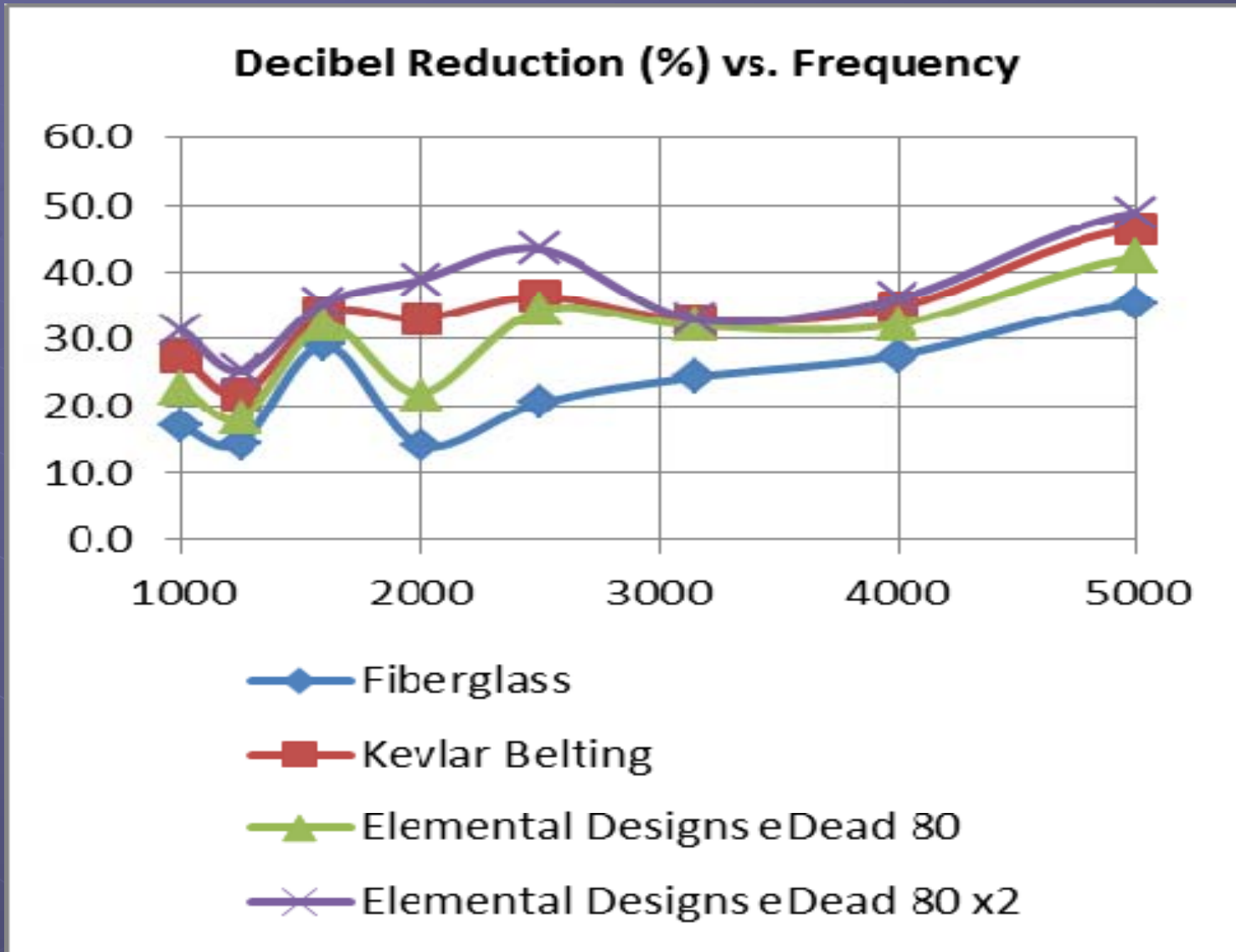
- S/Glass - Epoxy
- Layup
 - 1 layer satin weave 2 oz s-glass
 - 1 layer fiberglass chopped mat
- Cost effective, light weight
- Backed by eDead 80 and tech lite foam

Noise Control Material Testing



Standard test, but using one microphone and PVC pipe pip

Noise Control Material Testing



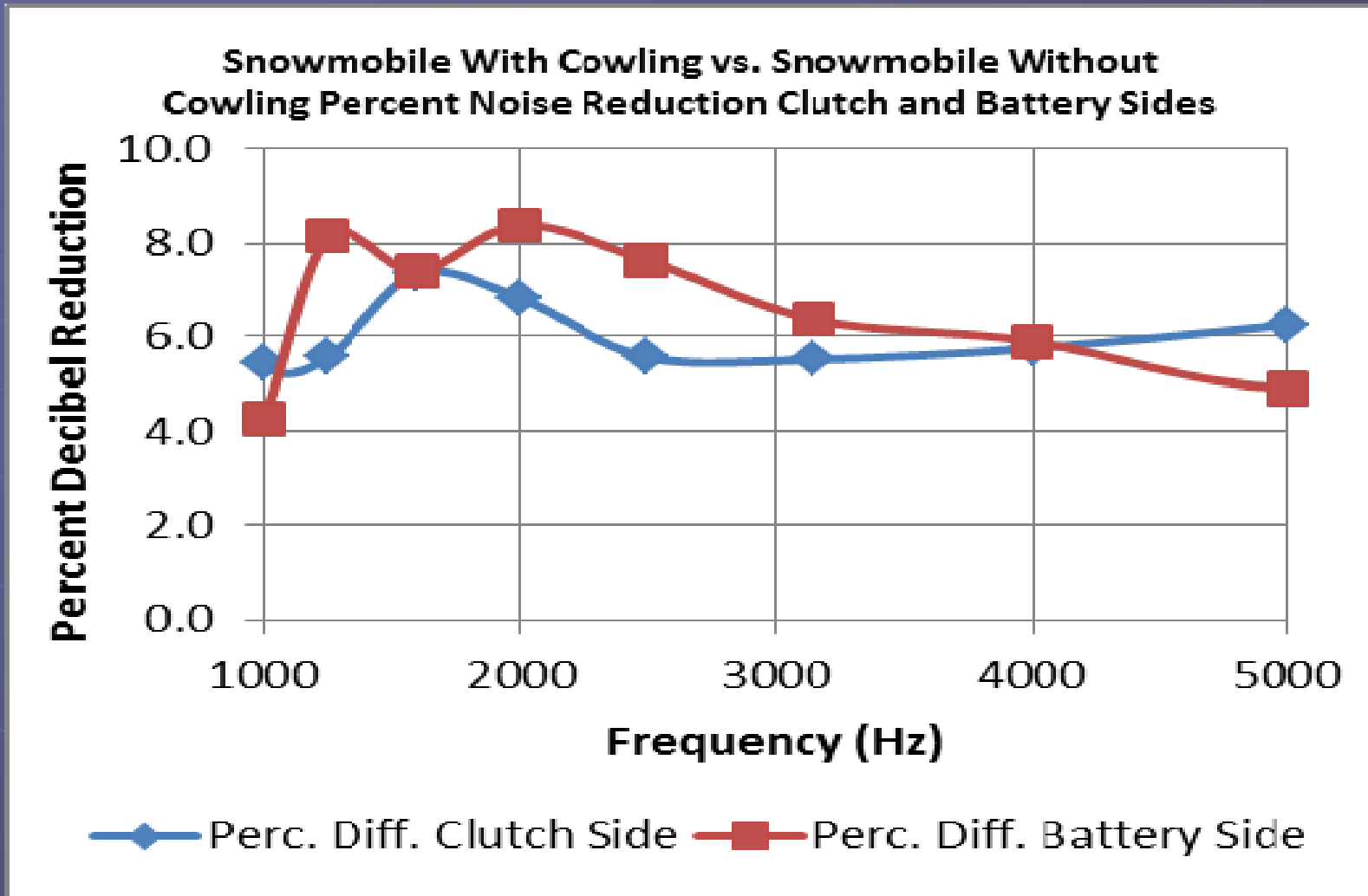
Sound Data



- Larson Davis Model 831 sound level meter – SAE J-192
- 100-16000 Hz frequency bands used for material testing
- Additional damping, Quiet Car for cowling, tunnel and clutch cover

rumble not whine

Sound Data



rumble not whine

Features for Market



- Analog gauges
- Gauges in clear view
- Rider forward positioning

- Cost Effective
 - MSRP=\$10,119.26
 - Cost spread across platforms, ATV, Motorcycle, snowmobile



<http://www.dreamgarage.com/snowmobiles/featured/yamaha-phazer-mtx>

Thank You

Questions?

