

University of Wisconsin  
-Platteville-  
2011 Clean Snowmobile Team

Presented By:

Adam LePine

Steve Ruesch

# Design Objectives

- Create Efficient Snowmobile Fueled by E-2X
- Emissions Reductions
  - Noise
  - Exhaust
- Maintain Stock Riding Qualities
  - Performance
  - Comfort

# Snowmobiler Appeal

- Comfort
- Weight
- Reliability
- Low Maintenance
- Low Operating Cost
  - Fuel Mileage
  - Oil Mileage
- Easy to Operate



# Dealer Perspective

- Sales and Service
  - Clean
  - No Added Maintenance
  - Reliability
- Rider Comfort
  - OEM Seat, Suspension, Handle Bars/Controls
  - Reduced Noise

# Snowmobile Choice

- Chassis: 2009 Ski-Doo Rev-XP
- Model: 600 E-TEC

Engine Type	Two-Stroke
Engine Details	Liquid-cooled, eR.A.V.E.
Cylinders	2
Displacement	594.4 cc
Bore x Stroke (mm)	71 x 74
Exhaust	Single
Fueling	Electronic DI

# Design Strategy

- Efficiency
  - Engine Management
  - Driveline Improvements
- Clean
  - Engine Selection
  - Exhaust
    - Tikka Race Pre-Burn
- Quiet
  - Sound Deadening Material
- User Friendly
  - Ergonomically Rider Position
  - Trail Performance Related
  - Simple Display and Controls
  - Easy Starting

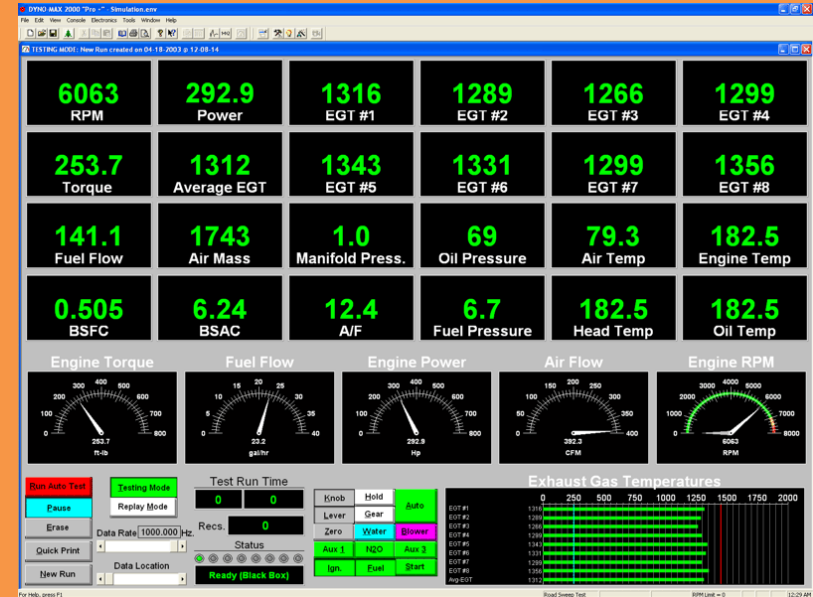
# Engine Management

- Stock E-TEC ECU and Fuel Delivery
- Auxiliary Throttle Body Injectors
  - Controlled by Split Second Additional Injector Controller



# Engine Tuning and Calibration

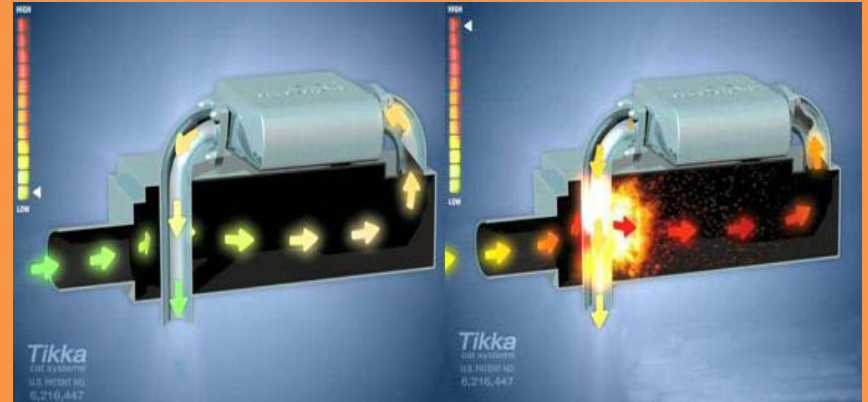
- DYNomite Water-Brake Dynamometer
- Innovate Wide-Band Sensor
- Exhaust Gas Temperatures
  - Exhaust Manifold
  - Pre/Post Catalyst
- EMS Emissions Analyzer





# Reducing Emissions

- Tikka PPC
- (Pipe Pressure Control)
- Pre-Burn Catalyst



# Emissions Results

Emissions (ppm)					
Mode Point	Speed (RPM)	Untreated		With PPC Catalyst	
		HC	NO <sub>x</sub>	HC	NO <sub>x</sub>
<b>1</b>	<b>8000</b>	3000	<b>530</b>	170	40
<b>5</b>	<b>1100</b>	1000	58	1	10

- Advantages
  - Maintains Stock Back-Pressure
  - Replaces Stock Muffler
  - No Maintenance

# Driveline Improvements

- Replaced Stock Rear Idler Wheel with larger 10 Inch Diameter Billet Wheels
  - Reduced Angular Acceleration at the Tracks Point of Contact
- Replaced 8 Tooth Drivers with 10 Tooth Drivers

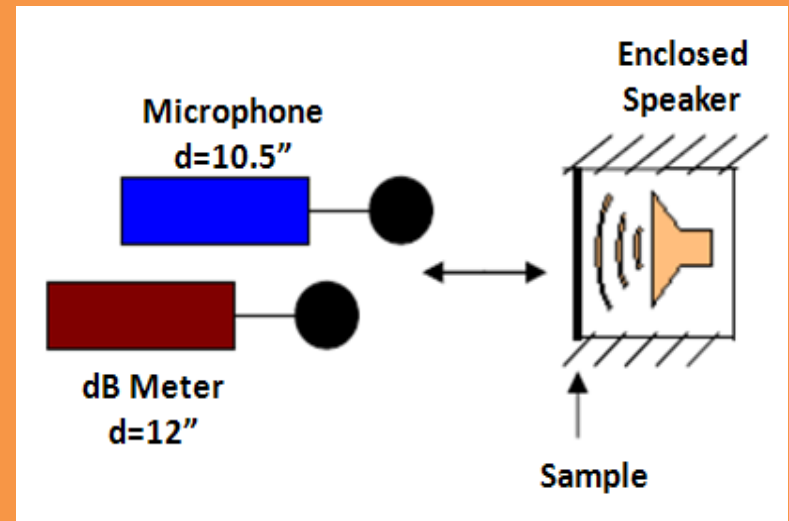


# Driveline Improvements and Results

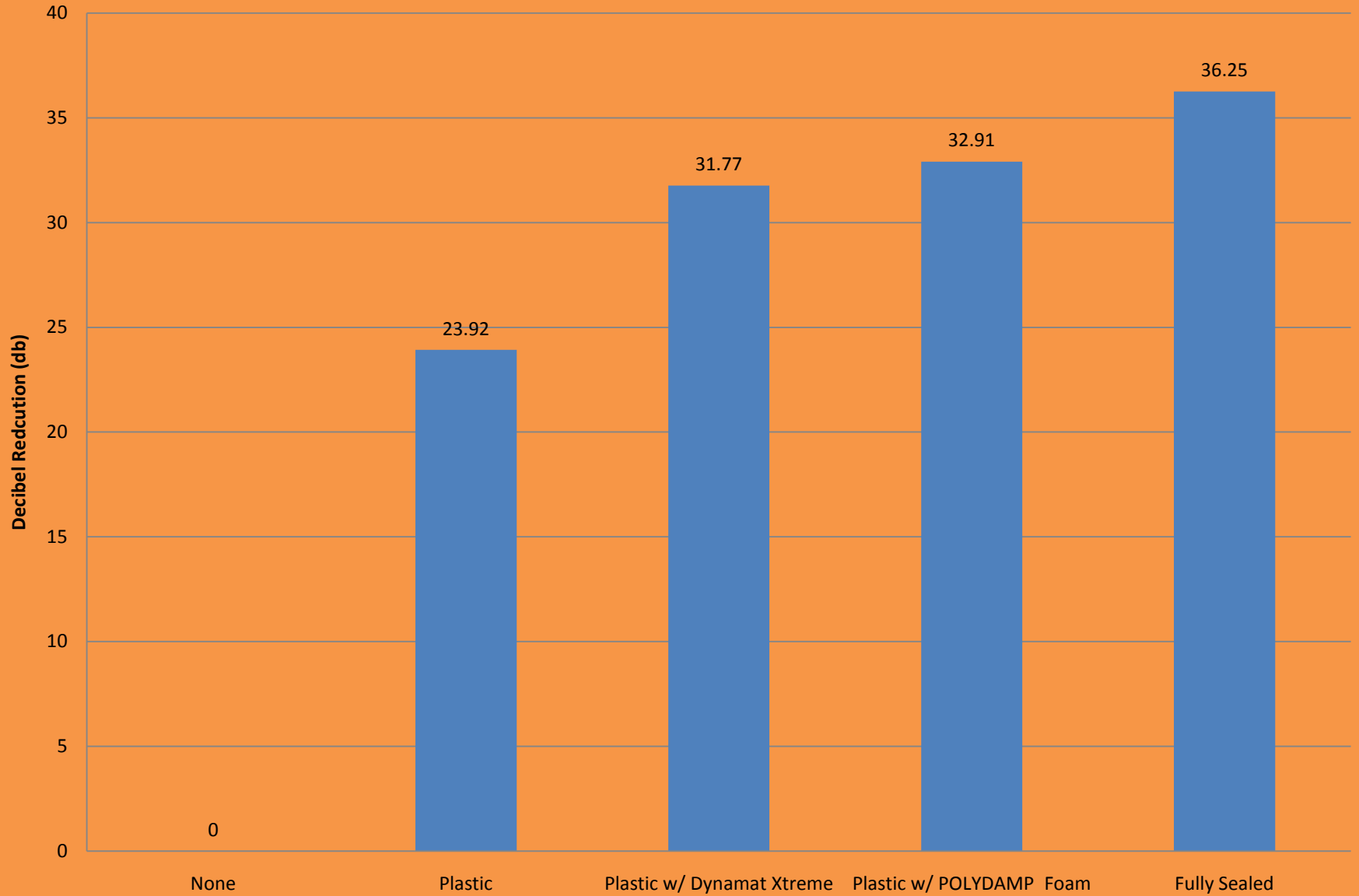
- Replaced OEM track (120"x15"x1") With 128"x13.5"x1" Quiet Track
- Total Driveline Improvements Showed an Increase in Fuel Efficiency
  - Stock setup: 14 mpg
  - After driveline improvement: 22 mpg
- Drill Test
  - Horsepower Lost = (115 Volts)\*(Amps)\*(0.001341Hp/Watts)
  - 33% More Efficient

# Sound Deadening

- Engine Compartment
  - XR Panels
  - Polymer Technologies Acoustical Barrier with Absorber
  - Pre-Burn Muffler
  - Quiet Track



# Sound Reduction vs. Material





# Sound Deadening Continued

- Soft Rubber Snow Flap
  - Flexible and Impact Absorbent
- Arctic Cat Quite Track



# Suspension

- Easily Adjustable Front and Rear Suspension
  - Capable of being tuned for various riding styles





# Benefits of UWP's Clean Snowmobile

- Consumer Benefits
  - Comfortable
  - Light weight
  - Two-Stroke
  - Easy and fun to ride
  - Competitive Cost
    - \$12,922.63 USD MSRP
- Dealer Benefits
  - Low Maintenance
  - Aesthetically Appealing
  - Easy to Sell Options
- Environmental Benefits
  - Low Emissions
  - Quite Exhaust

# Thank You



## Questions?