



Clean Snowmobile Challenge
2008

Design Presentation

Presented by Simon Ouellette

Introduction

- Challenge of making an electric snowmobile
- Vehicle design



Challenge

- Energy Density

Energy Carrier (EC)	Gasoline	Batteries (Li-Ion)
Vehicle	Ski-Doo Tundra	
Dry Weight	172 kg	
Energy On-Board	297,840 Wh	
EC Volume	34 l	1049 l
EC Weight	24.8 kg	2837 kg
Ratio EC Weight / Vehicle Dry Weight	0.144	16.5

Competition Performance Assessment

Event Category	% of SAE CSC vehicle performance points
Noise	34.3%
Handling	14.3%
Weight	11.4%
Range	11.4%
Towing Capacity	11.4%
Cold Start	5.7%
Acceleration	5.7%
Cost	5.7%

Noise

- CVT
- Motor
- Track

Event Category

% of SAE CSC vehicle
performance points

Noise

34.3%

Noise



Event Category

% of SAE CSC vehicle
performance points

Noise

34.3%

Noise

1- Over tightened

2- Properly tightened

3- Loose

4- As loose as possible

Tension	Objective result (db)	Subjective result (1 – 10)	Comment
1	62.2	6	Main noise seemed to come from rear suspension vibration.
2	60.8	7	There wasn't one sound in particular which was overtaking the others. Just a relatively constant "humming" sound.
3	62.0	3	Some metallic rattle sound; not very pleasant.
4	63.7	1	Very distinctive metallic rattling sound which was observed to come from the tack guide clips hitting the rails from flapping of the loose track at the front between the drive sprockets and the rails

Event Category

% of SAE CSC vehicle performance points

Noise

34.3%

Handling

- Front suspension
- Rear suspension
- Weight



Event Category

% of SAE CSC vehicle
performance points

Handling

14.3%

Weight

2007: 499 lbs

2008: 582 lbs

Difference: 83 lbs

Event Category	% of SAE CSC vehicle performance points
Weight	11.4%

Weight

- Doubling the battery pack
- Sound insulation
- Rear suspension + track
- Component mounting

Event Category

% of SAE CSC vehicle
performance points

Weight

11.4

Range

- Battery pack
- CVT



Event Category

% of SAE CSC vehicle
performance points

Range

11.4

Towing Capacity

- Torque
- Traction



Event Category

% of SAE CSC vehicle
performance points

Towing capacity

11.4

Towing Capacity

- Torque
- Traction



Event Category

% of SAE CSC vehicle
performance points

Towing capacity

11.4

Cold Start

Greenland 2007



Event Category

% of SAE CSC vehicle
performance points

Cold Start

5.7

Acceleration

- Weight
- Power
- Traction

Speed (km/h)	Time (s)
10	0.8
20	2
30	4
40	8.6

Event Category

% of SAE CSC vehicle
performance points

Acceleration

5.7

Cost

- Low Vehicle Cost
- High battery cost

Cost Breakdown

Batteries 80%

Chassis 10%

Motor 4%

Controller 2%

Event Category

% of SAE CSC vehicle
performance points

Cost

5.7

Conclusion

- Operator Perspective
- Dealer Perspective
- Environmental Perspective



Questions

