

EXPO

engineering ▲ design



SNOWMOBILE TOW-BEHIND ANALYSIS TRAILER (TBA)



Members: Brad Henke, McKenzie Reid, and William Thielman

(Left to Right)

Objective -

Design and manufacture a Tow behind emissions analyzer equivalent to the competition's trailer.

- ❏ Weighs 350 lb.-m
- ❏ Be able to go 45 mph
- ❏ Measure and record snowmobile emissions
- ❏ Use pre-existing suspension assembly
- ❏ Pin-hitch attachment
- ❏ Weatherproof storage
- ❏ Durable and stable

Background -

The University of Idaho Clean Snowmobile Challenge team has the goal of designing a cleaner, quieter, and more fuel-efficient snowmobile that competes in a nationwide competition.



Value Proposition -

A smarter way to record emissions data:

- ❏ New loaded emissions analysis concept
- ❏ UICSC emissions research
- ❏ Potential for industry use
- ❏ Cheaper solution than dynamometer

Concept Development -



Prototype 1 Analysis

Pros
Towed nicely at speed
Recorded emissions data
Waterproof functionality
Electronics worked in weather



Cons
High weight placement
Poor device security
Stiff suspension
Roll-over prevention failed

Solutions adapted to Prototype 2

- ❏ Weight placement outside of the box without rust corrosion or deterioration
- ❏ Interior device security approaches
- ❏ New shocks that can be customized according to weather and landscape conditions
- ❏ Pin-connection manufacturing and decoupling ideas

Design Validation -

Speed, stability, data acquisition, and usability were categories all scored using the following acceptance systems:

1. Pass or fail
2. Rating system
3. Progressive

Data Acquisition -

Chemical	Average
CO (%/vol)	0.15
HC (ppm vol)	220
NO (ppm vol)	16.5

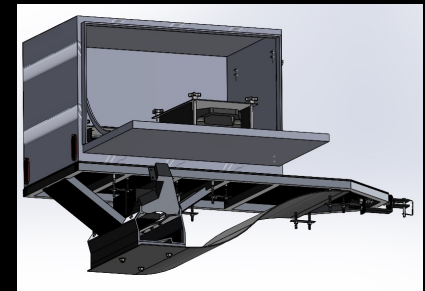
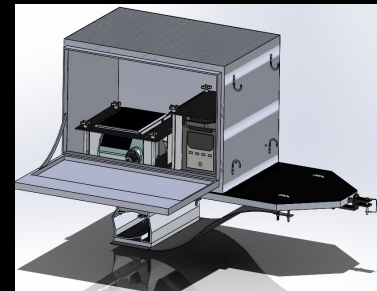
Chemical	Average
CO (g/mile)	26.16
HC (g/mile)	6.59
NO (g/mile)	0.41

- ❏ Tested Results (2/01/24)
- ❏ Competition Results for 2023

Final Design -

Final Refinements

- ❏ Relocated weights/alterd weight distribution
- ❏ Redesigned hitch
- ❏ Redesigned interior lockdown device
- ❏ Fox float shocks
- ❏ Additional usability-oriented components (belly pan, wire hooks, reflectors, rubber grommets, decals, RPM cable coupling)



Conclusions, and Recommendations -

Conclusions:

Our team produced a functional trailer that records emissions and performs on-snow to CSC team expectations.

Future Recommendations:

- ❏ Heated emissions line for accurate THC totals
- ❏ Can Bus recorder for accurate fuel consumption to convert from %/vol to g/mile

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