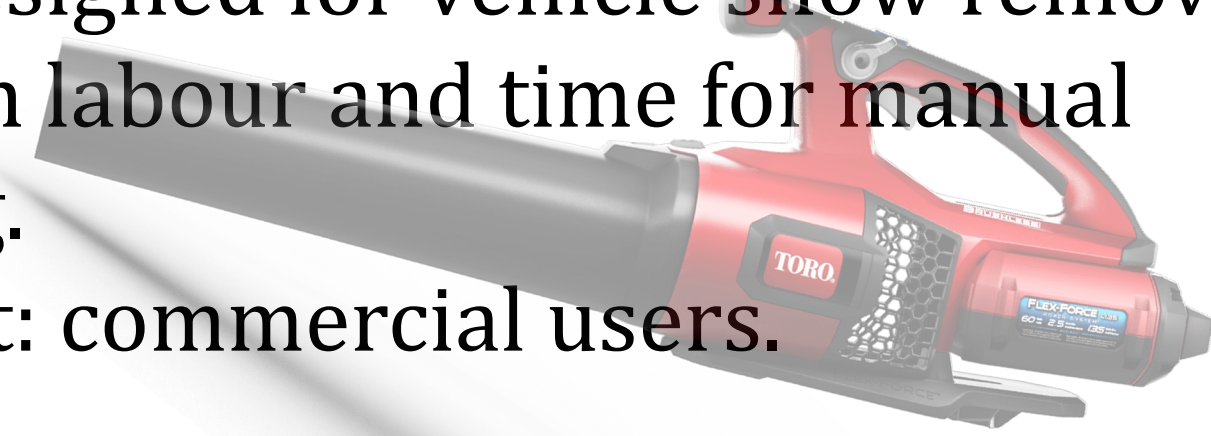


Background

- Vehicle snow removal via scrubbers requires considerable effort and time.
- Air blowers can clear snow from five vehicles in roughly ten minutes.
- Air blowers cost about \$250.
- Significant time needed for complete snow removal with either method.

Problem Statement

- Persistent snow accumulation on vehicles presents a major challenge.
- Removal efforts often worsen the problem.
- Potential solution: an electric device like a leaf blower but designed for vehicle snow removal.
- Goal: to lessen labour and time for manual snow clearing.
- Target market: commercial users.



Project Goals/Objectives

- Develop a blower with 450 CFM for efficient snow displacement.
- Strike a cost-performance balance for business affordability and functionality.
- Enhance speed and effectiveness in snow clearing to save time.
- Focus on reducing labour costs of manual snow removal for businesses.

Design Analysis

Material	30-Gauge Galvanized Steel	Vertical Tubes		
		Position	Bottom	Top
Length	87.49 in.	Material	6061 Aluminum	6063 Aluminum
Diameter	3 in.	Dimension (in)	2.99x2.99x39.37	1.5x1.5x60
Weight	2.89 lb	Weight (lb)	3.75	3.75

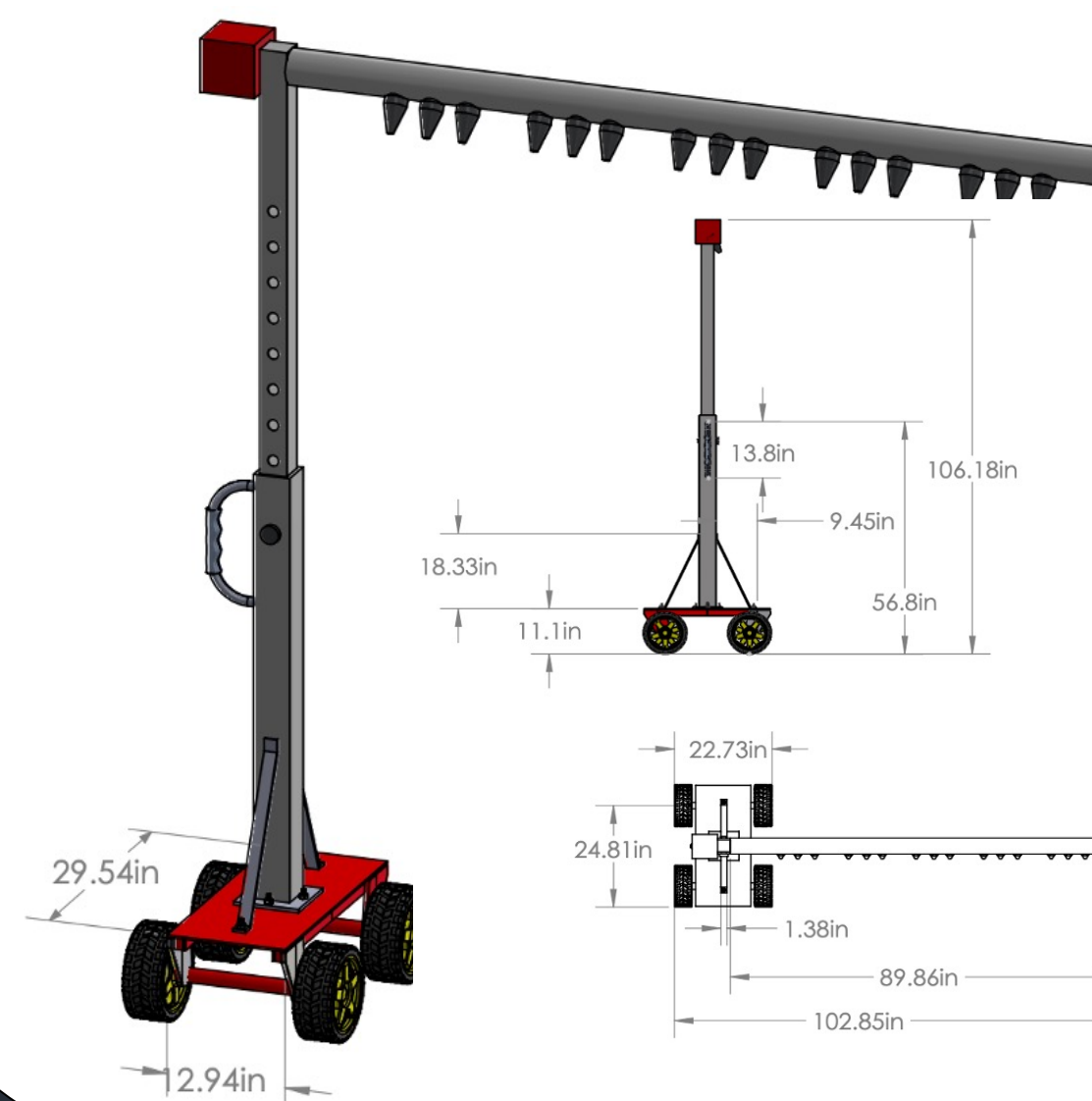
STRESS ANALYSIS	DESIGN
Equivalent Stress (psi)	187.9399
Bending Stress (psi)	2497.00
Elastic Strain	6.91E-06
Total Deformation (in)	0.00356457
X-Axis Deformation (in)	0.00000771
Y-Axis Deformation (in)	0.00019600
Z-Axis Deformation (in)	0.00108031



DESIGN 2			
MATERIAL	UNIT	COST/UNIT	TOTAL
MOTOR COST	1	\$50.00	\$50.00
NOZZLES	15	\$2.03	\$30.45
BASE (TIRES)	1	\$60.00	\$60.00
ALUMINUM 6061	1	\$87.28	\$87.28
ALUMINUM 6063	6	\$11.23	\$67.38
DUCT METAL HOSE	2	\$13.51	\$27.02
ASSEMBLING/WELDING	1	\$80.00	\$80.00
TOTAL			\$402.13

15 Nozzles Analysis	
CFM Input	450.00
CFM Output	431.00
Efficiency	96%
Cost	\$30.45

Final Design



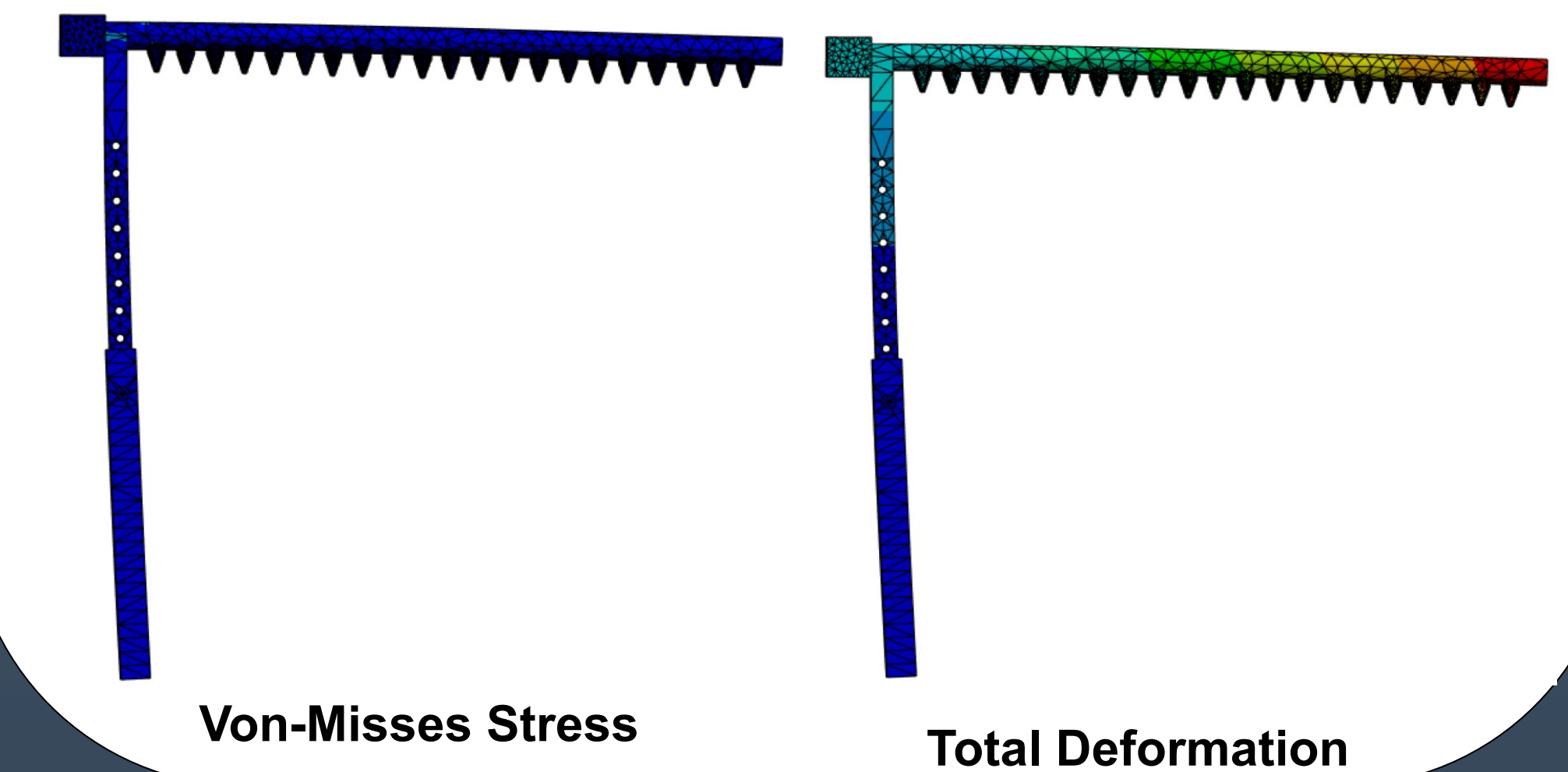
Nozzle Specifications	
# of Nozzles	15
ID	0.7 in
Length	3.937 in
Material	Plastic



Plastic Nozzles

Results/Outcomes

- Design time efficiency: New model clears snow from 5 cars in just 5 minutes.
- Efficiency gain: Efficiency enhanced by 50%.
- Air flow specification: Delivers 431 CFM air flow rate.
- Long-term labour savings: Anticipated to lower labour expenses over time.



Von-Mises Stress

Total Deformation

Conclusions/Recommendations

- Automatic nozzles with adjustable directions for efficiency.
- Easy assembly and disassembly for wider market appeal.
- Tire locks for stability on slopes.
- Sprinklers distribute salt and sand to prevent tire ice-traction loss.
- Multi-terrain functionality for removing snow, dust, leaves, and water.