



100% Build  
Demonstration



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Engineering 218

# Progress Chart



Figure 1: Raw Frame CAD Redesign



Figure 2: Lane Automotive Discounted Frame



Figure 3: Benchmarked Frame Construction



Figure 4: Benchmarked Completed Pit-cart



Initial:  
Completed CAD  
Completed calculations  
Completed BOM



33% Build:  
Parts 100% Ordered



67% Build:  
Tire Carrier built  
Toolbox drawer latches  
printed



100% Build:  
Full 1x1 frame  
Integrated toolbox  
Full aluminum siding  
Tools/equipment in place  
Tests in progress

# Re-Design Efforts

100% Complete

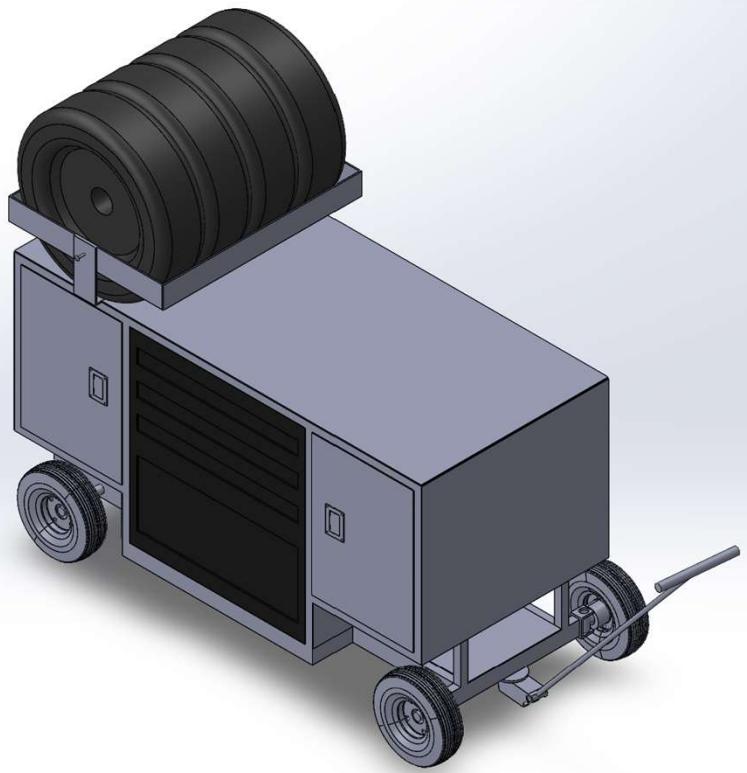


Figure 5: Complete Redesign (Front)

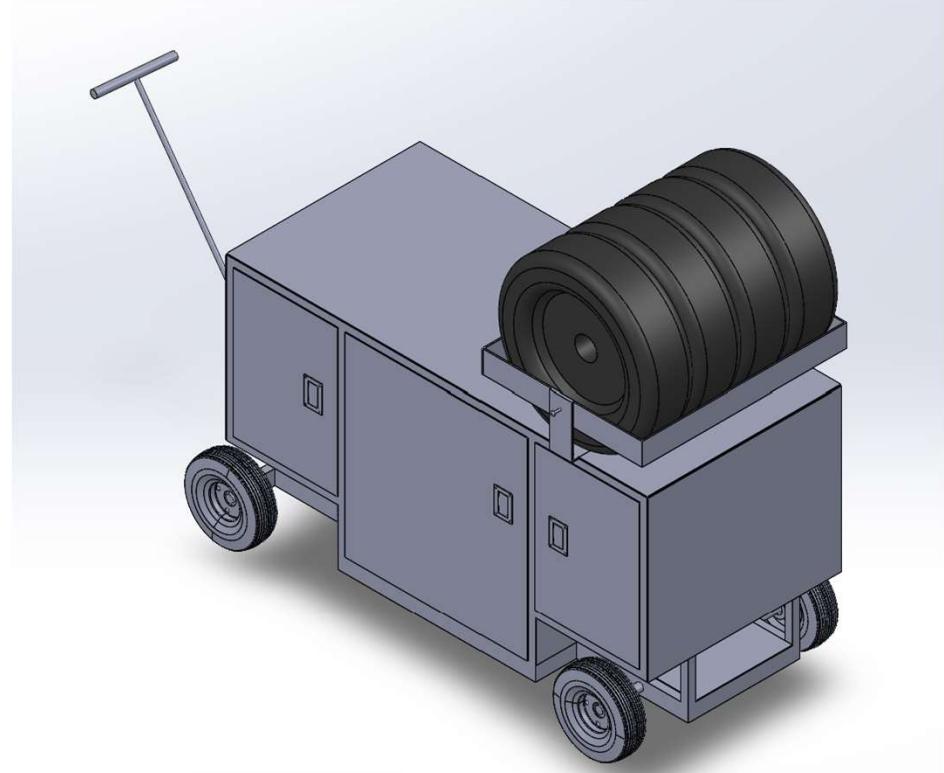


Figure 6: Complete Redesign (Back)

# Purchasing Plan

- 100% Purchased
- 100% On Hand
- \$2,000 Starting budget from NAU SAE
- Over budget by \$100 – split between team members

Table 1: Finalized Purchase Plan

Part	Price	Status
<b>Order Form 1:</b>		
13"Dx24.25"Wx29.33"H Box with 238 tools	\$ 284.39	Delivered
Fire extinguisher mount for 2.5lb extinguisher	\$ 8.85	Delivered
9" Safety wire plier kit	\$ 26.62	Delivered
Brake bleed kit	\$ 23.38	Delivered
2500W Inverter Generator	\$ 294.90	Delivered
120 V Power strip	\$ 31.87	Delivered
25 ft Extension cord	\$ 12.75	Delivered
Hinged aluminum trailer ramp extension		Canceled/Backordered
Formula rear swivel lift jack	\$ 290.84	Delivered
	\$ 973.60	
<b>Order Form 2:</b>		
0.065" 1x1 Square Tubing 6' Qty 18	\$ 306.90	Delivered
0.020" 36x96" Aluminum Paneling Qty 4	\$ 520.84	Delivered
Tax+Shipping	\$ 228.55	
	\$ 1,056.29	
<b>Order Form 3:</b>		
Door hinges/handles/latches	\$ 117.56	
minus brakes (-26.99)	\$ 90.57	Delivered
<b>In Person (Harbor Freight):</b>		
6" Vice, Super glue, tie-wire, bungee cords	\$ 77.59	Delivered
<b>Phone Order</b>		
Base Frame - Lane Automotive	\$ 403.87	
	\$ 403.87	
<b>Donated/Sponsored:</b>		
Formula Tire Holder	\$ 150.00	Delivered
Discount on base frame	\$ 270.00	Delivered
Full Vinyl Wrap	\$ 300.00	In Progress
Monetary	\$ 501.00	Deposited
	\$ 1,221.00	
<b>Total Spent:</b>	\$ 2,601.92	\$2000 NAU SAE Starting Funds
<b>Total Left:</b>	-\$100.92	

# Manufacturing Plan

100% Built

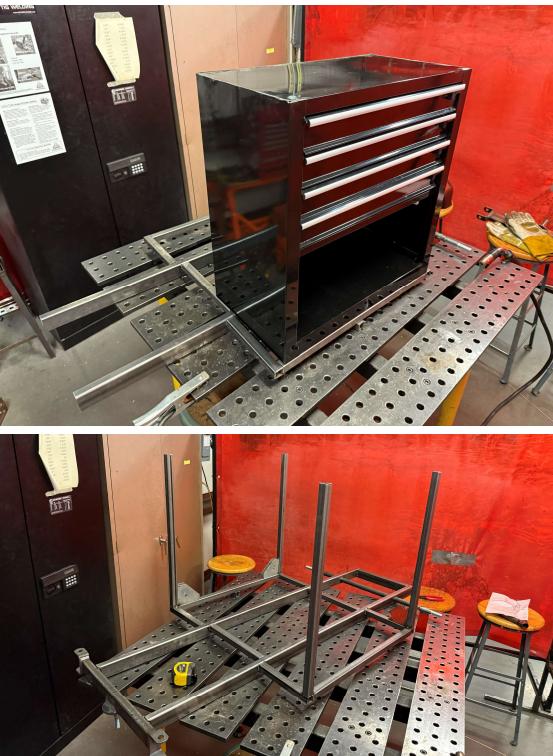
Table 2: 100% Progress Manufacturing Plan

Part	Manufacture Status	Location	Hours	Comment
2x1" Steel Base Frame	100%	Sponsor Shop	2	Arrived/Assembled
1x1" Steel Frame shell	100%	98C Machine Shop	18.5	Cut & Welded
Aluminum Paneling	100%	98C Machine Shop	7.25	Cut, Wrapped & Mounted
3/16" Flat-strap Tire Carrier	100%	Sponsor/Machine Shop	2.5	Mounted
Steering Handle	100%	Sponsor Shop	0.25	Installed
Extinguisher mounting	100%	98C Machine Shop	0.25	Mounted
Brake Build/Mounting	100%	98C Machine Shop	2.75	Being tested/changed
Door latch/handle install	100%	98C Machine Shop	3.5	Mounted
Toolbox drawer latch 3D	100%	98C Machine Shop	1.75	Functional, redesign

# Build Demonstration



Figure 7: Initial Setup



Figures 8, 9: Toolbox Setup and Frame

Hailey Hein, SAE Toolbox



Figure 10: Mid-Step

# Build Demonstration



Figures 11, 12: Completed Frame

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Figure 13: Hinged Door Demonstration  
Derek Griffith, SAE Toolbox



Figure 14: Inside View

# Build Demonstration



Figures 15, 16: Painted Components

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Figure 17: Raw Frame With Wheels  
Yanbo Wang, SAE Toolbox



Figure 18: Rolling Cart

# Build Demonstration



Figure 19: Beginning Paneling

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Figures 20, 21: Integrated Toolbox + Steering

Haoran Li, SAE Toolbox



Figure 22: Brake Close-up

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# Build Demonstration



Figure 19: Toolcart Side



Figure 20: Cabinet Side



Figure 21: Full Cart Walk-around

# Build Demonstration



Figure 22: Open Toolbox/Cabinets



Figure 23: Empty Interior Cabinet



Figure 24: Loaded Inverter

# Build Demonstration



Figure 25: Mounted Tire Carrier/Extinguisher

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Figure 26: Lower Storage Area

Yanbo Wang, SAE Toolbox



Figure 27: Mounted Vice

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# Build Demonstration



Figure 28: Full Cart Walk-around

Haoran Li, SAE Toolbox

# Customer Requirement Checklist

Table 3: Client/Engineering Requirements

Category	Client Requirements	Engineering Requirements	Solution	Met? (Y/N)
Mobility	Terrain capable tires	Rubber casters >8" OD, 6" Minimum	13" D x 5.5 W" Casters	Y
	Steering system	Human operated steering system	Tie-rod steering system	Y
	Brake system	Human operated brake lever system	Two caliper system	Y
	Trailer footprint	Fits and can maneuver in the travel trailer	60"Lx32"Wx33.5"H Frame	Y
Storage &	General tool storage	Secure drawers with latch systems	3D Printed add-on latches	Y
Tooling	Ancillary equipment	Space to store required equipment	5 cabinet doors	Y
	Driver gear storage	3'x2'x1' Internal cabinet volume minimum	> 23 ft^3 cabinet storage	Y
	Fire extinguisher	External quick-acces mount	Exterior un-latch mount	Y
	Tire carrier	Storage for 4 Baja or Formula SAE Tires	30x25" 4-Tire carrier	Y
Power &	Integrated power system	Stand alone system that can handle loads	2500W Inverter generator	Y
Electrical	Charging capabilities	Extension cord with power bank	25 ft extension cord	Y
	Powered tools	Capacity for power tools to charge	13-outlet 120V strip	Y
Work Features	Mounted vice	Top mounted vice big enough for work	6" Table-mount vice	Y
	Tabletop work area	Top panel doubles as the workspace	60 x 32" Top panel	Y
Durability	Strong materials	2x1" and 1x1" steel frame construction	A36 welded steel	Y
	Construction	Sufficient welds and mechanical fastening's	MIG welded connections	Y
Identity	Visual Branding	NAU, SAE and Sponsor logo display	Sponsored vinyl wrap	Y

# What's Next

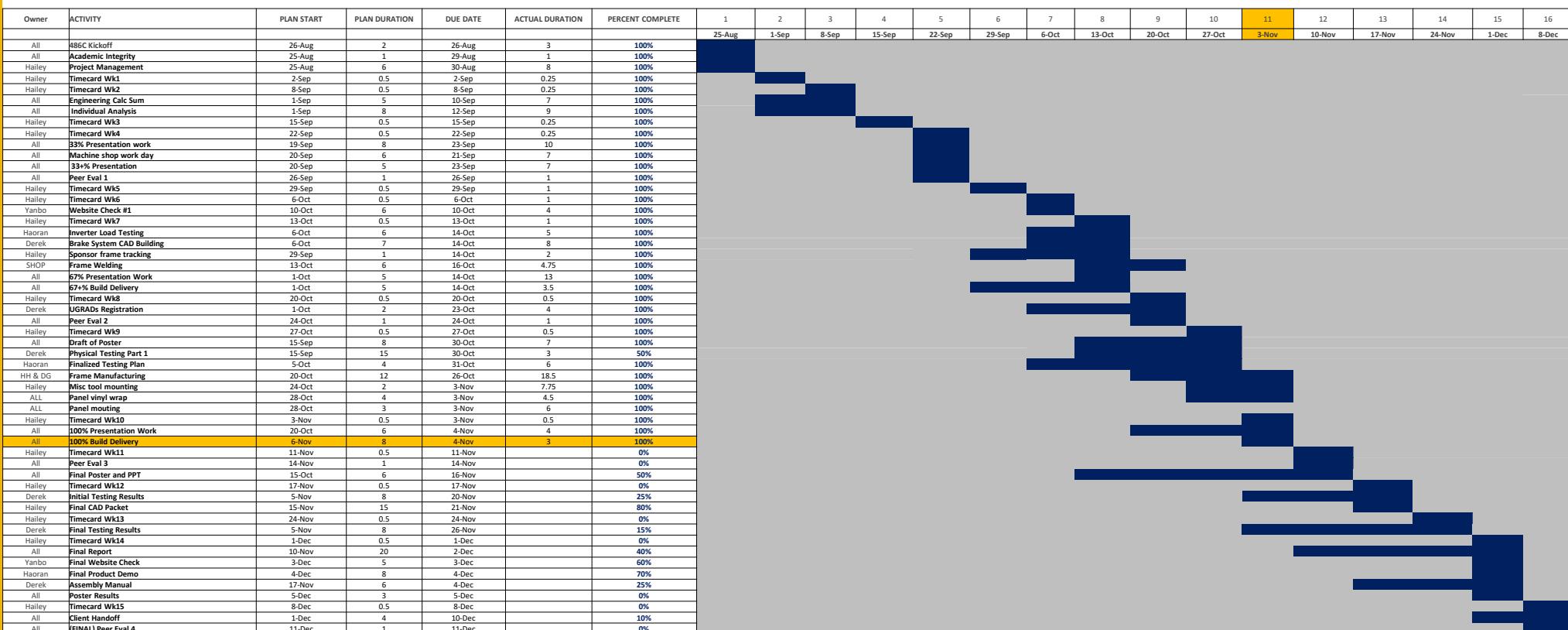
Table 4: Testing Procedure Overview

Testing Procedure	Engineering Requirement Met	Equipment Needed	Testing location
Brake application	Safety, fast brake response	Completed cart	Inclined parking lot outside of 98C
Power Supply	Tool charging, supplied power	Inverter generator, gas, 10W-30 oil	NAU Machine shop 98C
Turning Radius	Able to maneuver swiftly/easily	Completed cart, SAE enclosed trailer	NAU Machine shop 98C
Weight capacity	Able to withstand loads	Various heavy objects, all tooling	NAU Machine shop 98C
Equipment fitment	Able to store tools, tires, driver suits/helmets	Completed cart, driver equipment, tools, tires	NAU Machine shop 98C
Correct tools	SAE teams can go through tech with the provided tools	Tools and toolbox	NAU Machine shop 98C

# Gantt Chart Update

On Track

Table 4: SAE Toolbox Fall 2025 Gantt Chart



# Thank You

# Questions?