

Hardware Status Update

2024-2025 SAE Baja
Suspension, Steering and Brakes



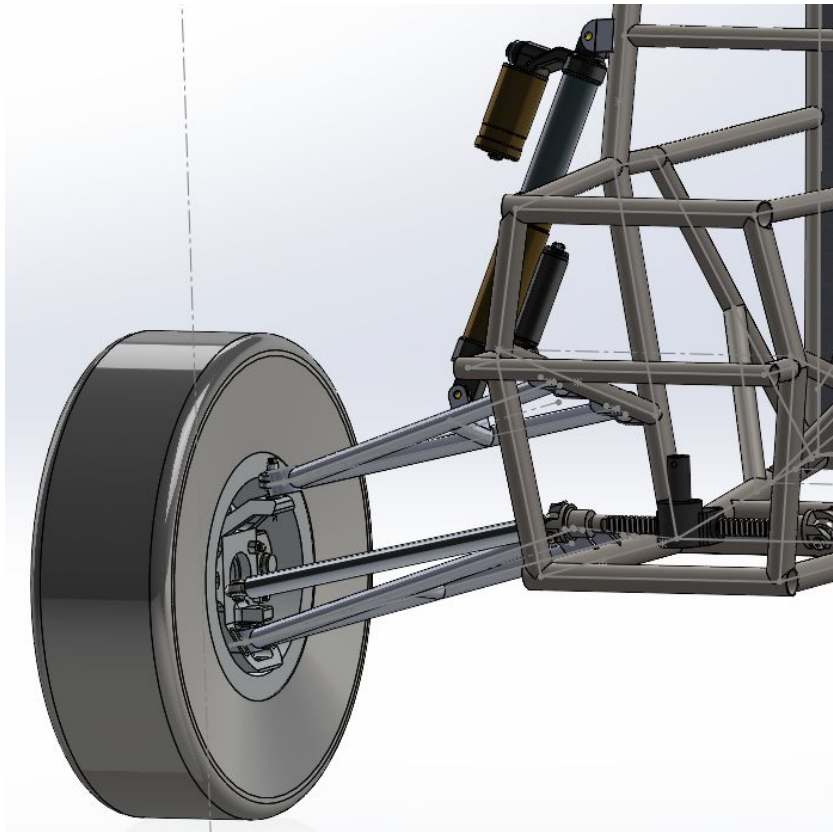
Ryan Key
Ryan Latulippe
Oliver Husmann
Brennan Pongratz
David Polkabla Jr.

Suspension

Taylor Hewitt
David Polkabla Jr.

Steering, Brakes

Front Suspension Design Efforts



- All suspension geometry is finalized
- Knuckle Design complete
- Control Arm design complete

Front Suspension Purchasing Plan

Delivery Status	Purchase Status	Vendor Name	Quantity	URL	Description	Price
In Transit	Purchased	McMaster	1x (1ft) 5x (3ft)	https://www.mcmaster.com/89955K318	Control Arm Tubing	285.02
In Transit	Purchased	McMaster	1	Low-Carbon Steel Rod, 1-3/4" Diameter McMaster-Carr	Control Arm Kingpin stock (1018)	33.95
In House	Purchased	McMaster	4	https://www.mcmaster.com/63195K25/	Ball joints	244.72
In House	Purchased	McMaster	1	https://www.mcmaster.com/8576K23/	Control Arm Delrin bushing material	N/A
In House	Purchased	McMaster	2	https://www.mcmaster.com/91259A104/	LCA S Bolt	N/A
In House	Purchased	McMaster	2	https://www.mcmaster.com/91259A104/	UCA S Bolt	N/A
In Transit	Purchased	McMaster	8	https://www.mcmaster.com/91259A108	Control Arm to Frame Shoulder Screw	26.4
In Transit	Purchased	McMaster	8	https://www.mcmaster.com/97135A210/	Control Arm to Frame Screw Locknut	5.2
N/A	Pending	McMaster	2	https://www.mcmaster.com/91259A102/	Tie Rod S Bolt	N/A
In House	Purchased	McMaster	1	https://www.mcmaster.com/91831A011/	10-24 nuts (CA and TR S Bolts)	N/A
In Transit	Purchased	McMaster	1	https://www.mcmaster.com/97250A150/	Snap rings	9.74

45% In house 91% Purchased

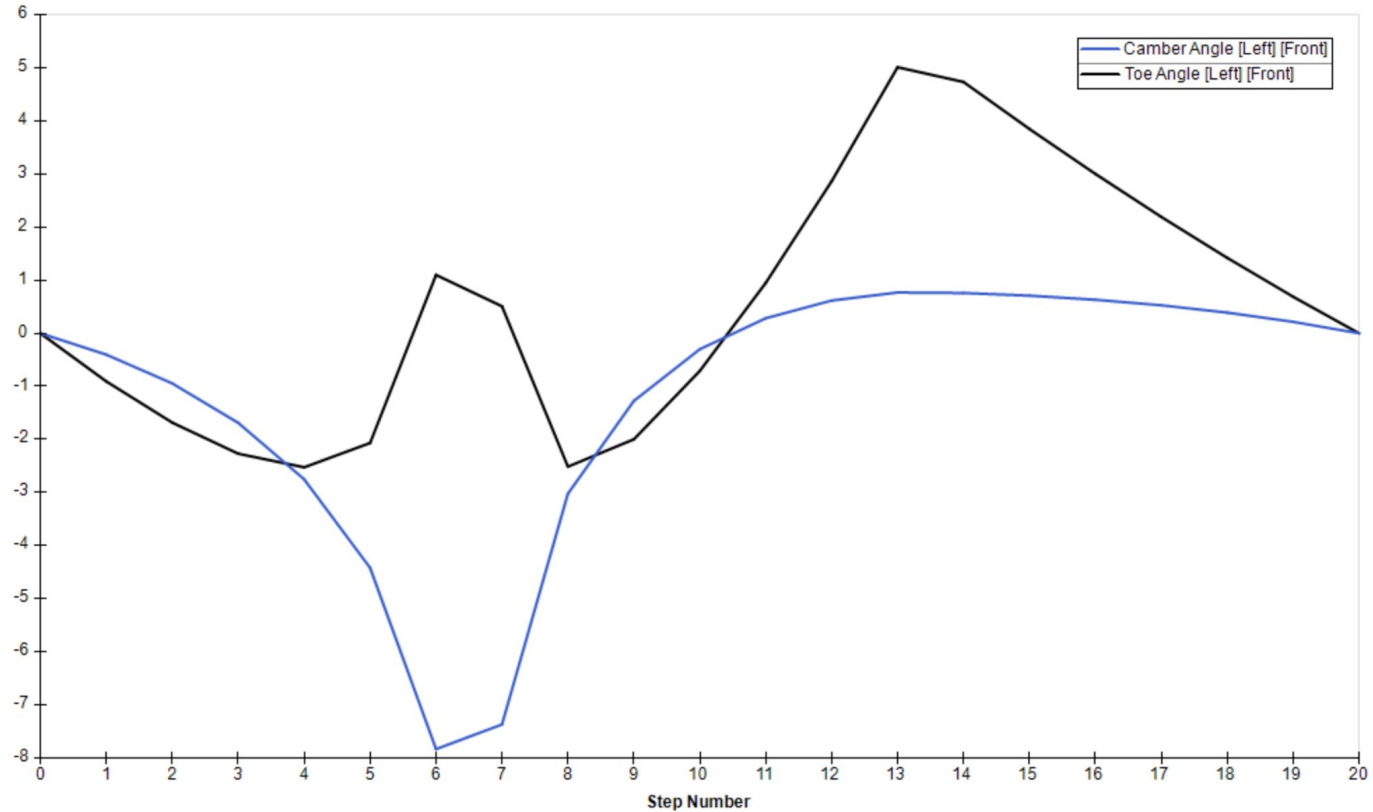
Ryan L.

Front Suspension Demonstration

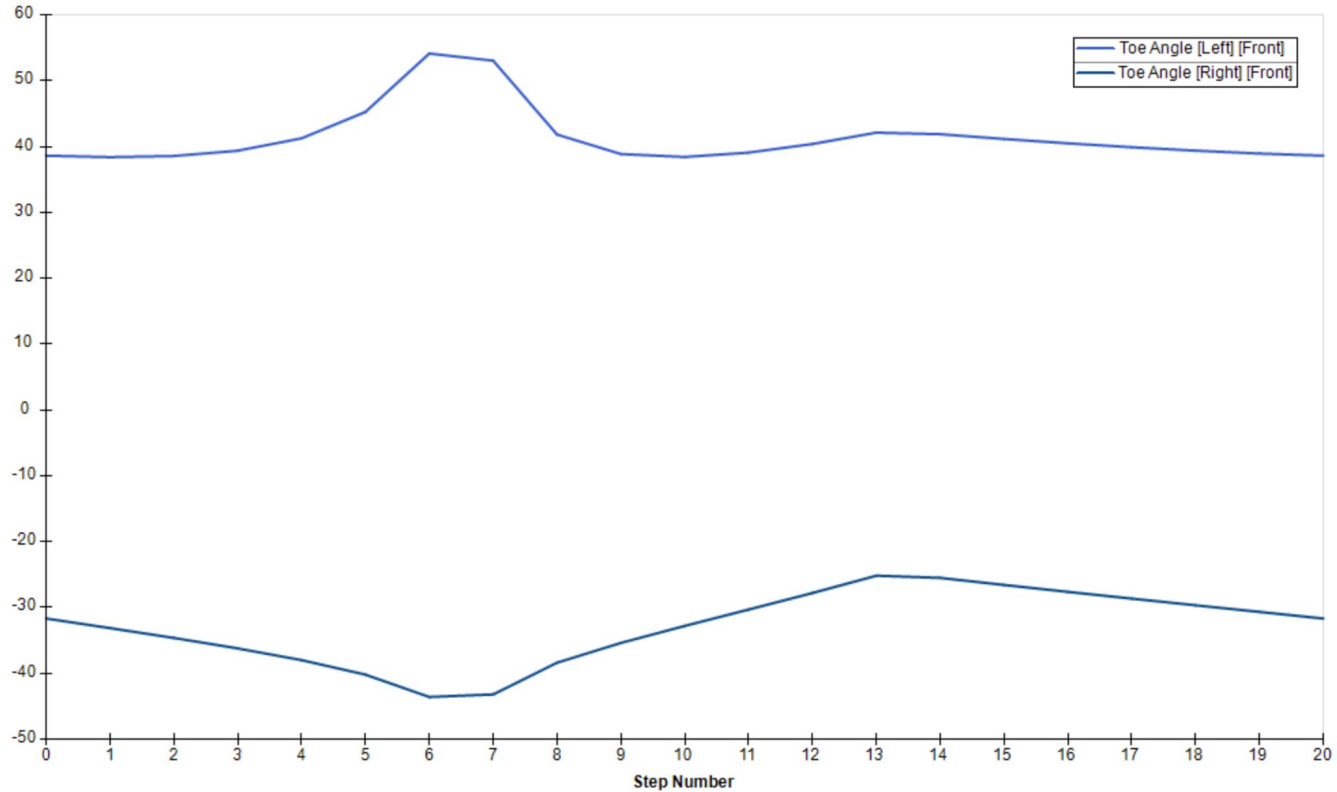


MAS allows for
~30% more
articulation

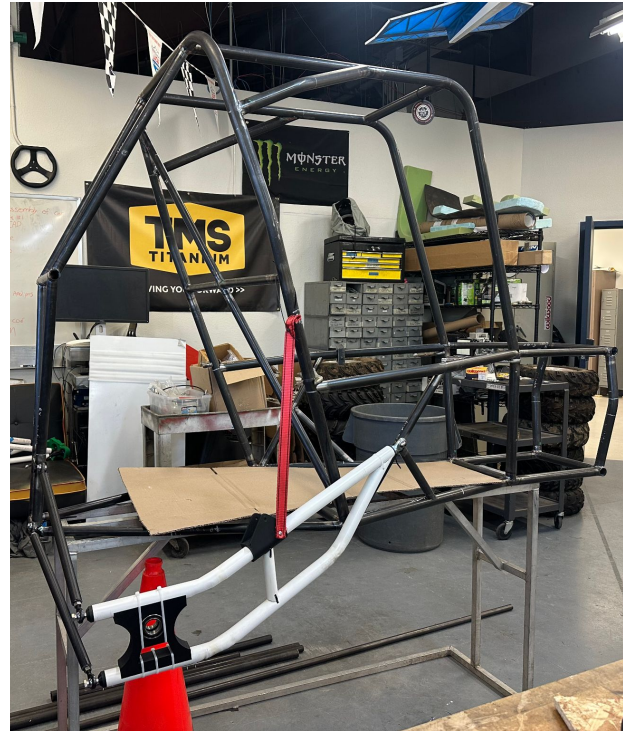
Front Suspension Demonstration



Front Suspension Demonstration



Rear Suspension Design Efforts



- Suspension geometry finalized
- Shock Mounting Location Finalized
- Frame Integration, clearances Confirmed
- Bend and Coping Jig Design In Progress
- Trailing Link and Camber Link Fabrication up-next

Rear Suspension Purchasing Plan

Part	Description	Quantity	Price	Links	Status
Rear Trailing Links	4130 Steel Tube, 0.095", 1-1/4" OD, 6'	2 (1 L, 1 R)	214.12	https://www.mcmaster.com/89955K338-89955K335/	Pending
Steel Camber Links	Steel tubing	4 (2 extra)	N/a	N/a	On Hand
Carbon Camber Links	Carbon fiber tube,	2	N/a	N/a	On Hand
Main Pivot Threaded Inserts	Round steel stock, 3/4"-16 Thrd.	2	N/a	N/a	On Hand
Camber Pivot Threaded Inserts	Round steel stock, 1/2"-20 Thrd.	6 (2 extra)	N/a	N/a	On Hand
Shock Mount Plates	1/8" in. steel flat stock	4	N/a	N/a	On Hand
Bearing Housing	1018 Plate, 6"x12"	1	40.94	https://www.mcmaster.com/8910K12-8910K598/	Pending
Bearing Housing	1018 Bar 1ft	1	66.61	https://www.mcmaster.com/8920K79/	Pending
Main Pivot Heim Rod Ends	3/4"-16 Thrd., 3/4" ID, 7/8" OA Width	2 (RH)	30.66	https://www.mcmaster.com/60645K18/	Pending
Camber Link Heim Rod Ends	1/2"-20 Thrd., 1/2" ID, 5/8" OA Width	10 (5 RH, 5 LH)	102	https://www.mcmaster.com/60645K16/	Pending
Main Pivot Bolts	3/4" Shoulder Diameter, 1-3/4", 5/8"-11	3 (1 extra)	59.16	https://www.mcmaster.com/91259A841/	On Hand
Main Pivot Nuts	5/8"-11 Thread	3 (1 extra)	4.83 (5)	https://www.mcmaster.com/90630A130/	On Hand
Frame Side Camber Bolts	1/2" Shoulder Diameter, 1-1/4", 3/8"-16	4 (2 extra)	13.16	https://www.mcmaster.com/91259A714/	On Hand
Frame Side Camber Nuts	3/8"-16 Thread	4 (2 extra)	4.50 (20)	https://www.mcmaster.com/90630A121/	On Hand
Link Side Camber Bolts	1/2"-20 Thread Size, 2-1/2" Long	4 (2 extra)	12.46 (10)	https://www.mcmaster.com/91247A358/	On Hand
Bearings	SKF 6006-2RS1	4	304.32	https://www.skf.com/us/products/rolling-bearings/ball-bearings/deep-groove-ball-bearings/productid-6006-2RS1	On Hand
Limit straps	20"	2	57.8	https://www.mojaboffroad.com/products/limit-strap?variant=45461528314129	Pending

65%
Purchased

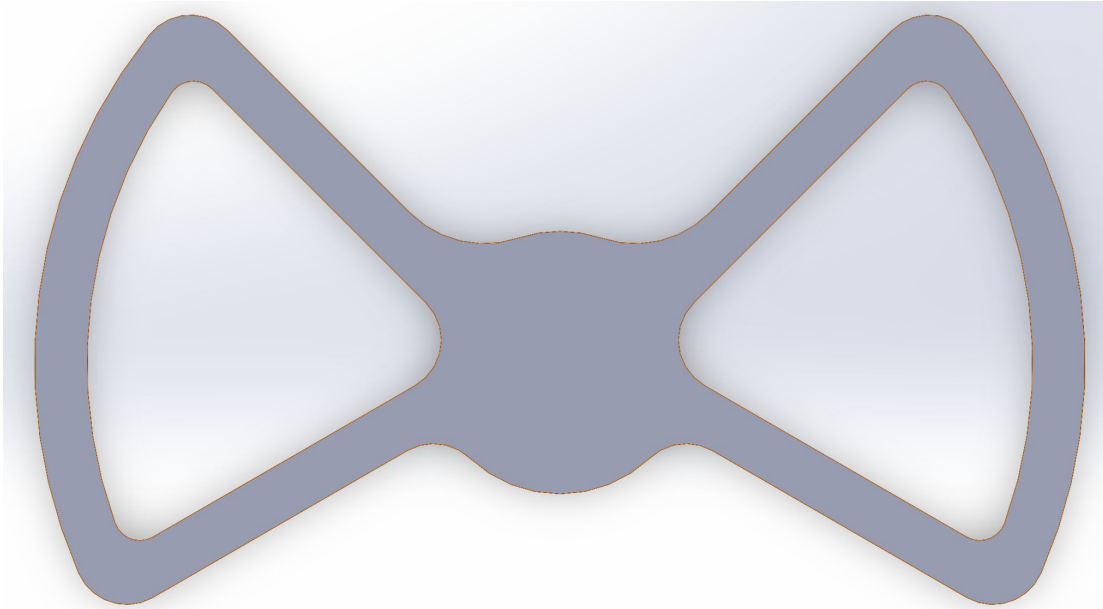
Rear Suspension Demonstration



Rear Suspension Demonstration



Steering & Brakes Design Efforts



- Brake and gas pedal in progress
- Steering wheel in progress
- Steering Rack Points finalized
- Front and Rear Rotors made

Steering & Brakes Purchasing Plan

Vendor Name	Weblink	Description	Item or Catalog #	Size/Color	Qty	Part Status	Total Cost
McMasterCarr	https://www.mcmaster.com/9056K33-9056K116/	tie rod	9056K33	4 ft sec	2	Purchased	52.72
McMasterCarr	https://www.mcmaster.com/9056K33-9056K117/	steering column	9056K33	8 ft sec	1	Purchased	42.18
McMasterCarr	https://www.mcmaster.com/products/screws/shoulder-screws~/alloy-steel-shoulder-screws-9/shoulder-diameter~3-16/shoulder-length~1-1-2/	3/16" Shoulder Diameter, 1-1/2" Shoulder Length, 8-32 Thread	91259A496	Alloy Steel	2	Purchased	7.86
McMasterCarr	https://www.mcmaster.com/products/rod-ends/rod-ends-1~/super-swivel-ball-joint-rod-ends-9/id~3-8-2/	Super-Swivel Ball Joint Rod End, Zinc Plated, 3/8"-24 Thread (Right Hand Thread)	6960T23	Zinc Plated Alloy Steel	2	Purchased	13.74
McMasterCarr	https://www.mcmaster.com/products/rod-ends/rod-ends-1~/super-swivel-ball-joint-rod-ends-9/id~3-8-2/	Super-Swivel Ball Joint Rod End, Zinc Plated, 3/8"-24 Thread (Left Hand Thread)	6960T23	Zinc Plated Alloy Steel	2	Purchased	13.74
Harsh CO	N/A	Front Brake Rotor	N/A	1011 Steel	2	Arrived	0
Harsh CO	N/A	Rear Brake Rotor	N/A	1011 Steel	1	Arrived	0
Summit Racing	Free Shipping on Orders Over \$109 at Summit Racing	Master Cylinder	76-875	Steel	2	Purchased	265.42
Hyper Racing	HBS LF Caliper Pin	Caliper Pin	366-054	Stainless Steel	2	Purchased	9.5
Hyper Racing	EZ Front Brake Caliper with Standard Brake Pads	Rear Brake Caliper	366-045	Steel	1	Arrived	124.07
McMaster-Carr	McMaster-Carr	Rear Mounting Bolts	91253A540	Steel	2	Purchased	11.11
McMaster-Carr	screws McMaster-Carr	Front Mounting Bolts	91253A630	Steel	2	Arrived	17.99
McMaster-Carr	low-profile head screws McMaster-Carr	Rear Caliper Bolts	92220A215	Steel	2	Purchased	9.62
McMaster-Carr	McMaster-Carr	Rear Brake Bolts	91251A192	Steel	6	Purchased	12.81
McMaster-Carr	low-profile head screws McMaster-Carr	Front Brake Bolts	92220A183	Steel	4	Arrived	12.95
Hyper Racing	N/A	Front Brake Caliper	N/A	Steel	2	Arrived	0
Speedway Motors	Speedway -4 AN Universal Racing Brake Line System	Brake Line Kit	91031884	Braided Stainless Steel	1	Pending	175.99
N/A	N/A	Hydraulic Reservoirs	N/A	Aluminum	2	Arrived	0
N/A	N/A	Brake Pedal	N/A	Aluminum	1	Purchased	0
N/A	N/A	Master cylinder balance bar	N/A	Aluminum	1	Arrived	0
Autozone	autozone.com/searchresult?searchText=dot+3+brake+fluid&sort=price-asc	Brake Fluid	AS401Y	Dot 3 Brake Fluid	1	Pending	4.49
						Total Cost	774.19

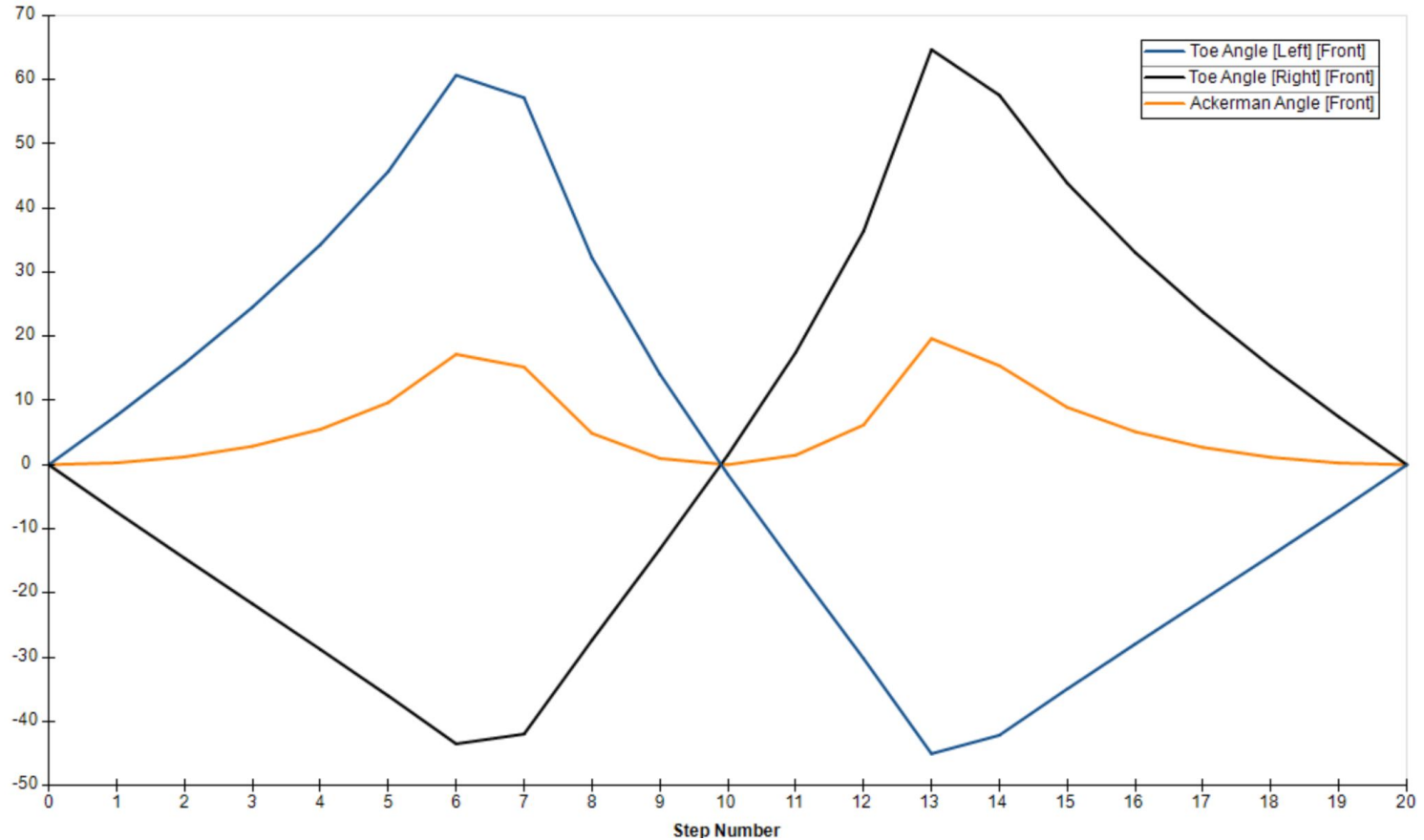
On Hand

- 38.1%

Purchased

- 90.5%

Steering and Brakes Demonstration



Manufacturing Plan

Part	Manufactured?	In progress?	In house or outsourced?	Total Hours Estimated
UCA misalignment spacers	yes		In house	8
LCA misalignment spacers	yes		In house	2
CA ball joint cup	no	no	In house	4
UCA & LCA	no	no	In house	4
Trailing link	no	no	In house	4
Suspension Tabs	no	no	outsourced	N/A
Front Knuckle	no	no	In house	10
Rear Knuckle	no	no	In house / outsourced	2
Steering Wheel	no	no	In house	2
Tie Rod Ends	Yes		In house	7
Steering rack	no	no	In house	2
Rack ends	no	no	In house	2
Rear Brake rotor	yes		outsourced	N/A
Brake pedal	no	no	In house	1
Gas pedal	no	no	In house	0.5
Front Brake Rotors	yes		outsourced	N/A
Rear Caliper Mount	no	no	In house	1

Manufactured
 ● 33.01%

Gantt Chart Update

- Current Progress: Behind
- Roadblocks: Machining efforts spent on other subteams

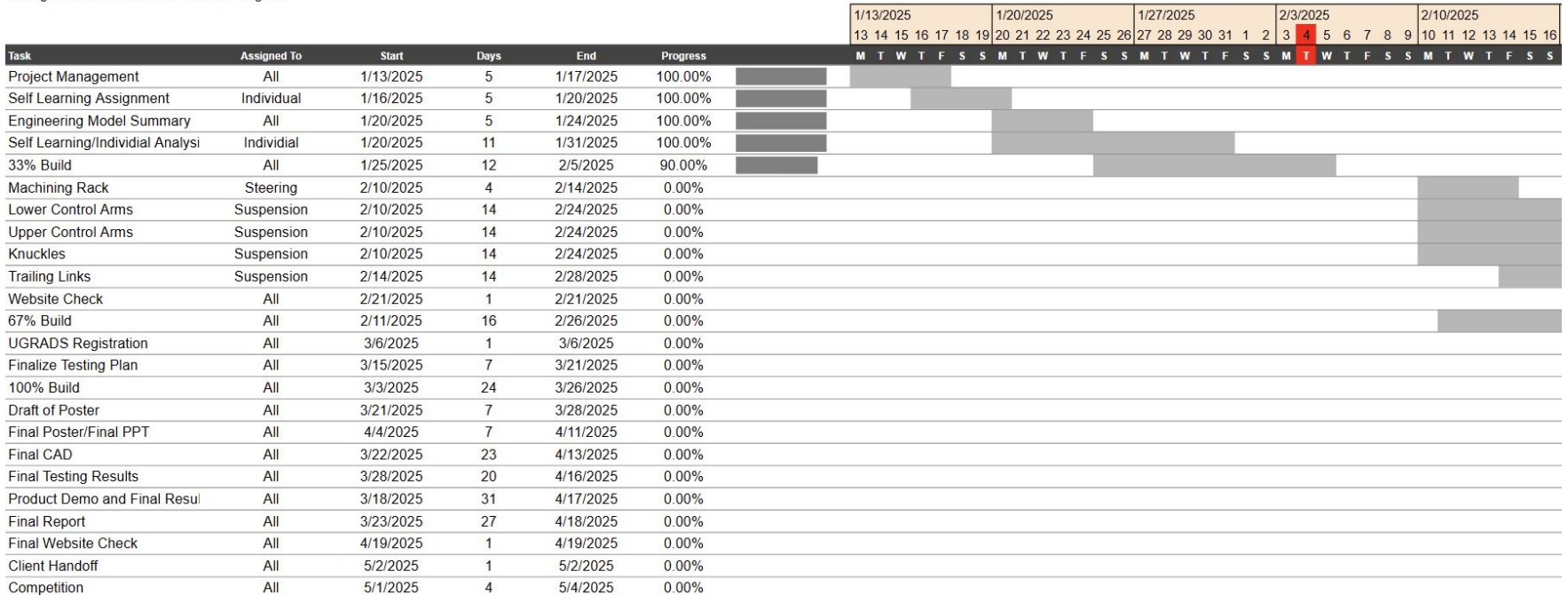
SAE Baja 2025

Contact Info: twh63@nau.edu ohh6@nau.edu bsp79@nau.edu

Gantt Chart for Suspension, Steering & Brakes Weeks 1-15 Project Start 1/13/2025

dp892@nau.edu ral425@nau.edu rwk47@nau.edu

Managers: Seth Scheiwiller & Brennan Pongratz





Thank You!

Questions?

SAE Baja

Drivetrain 33% Hardware Update

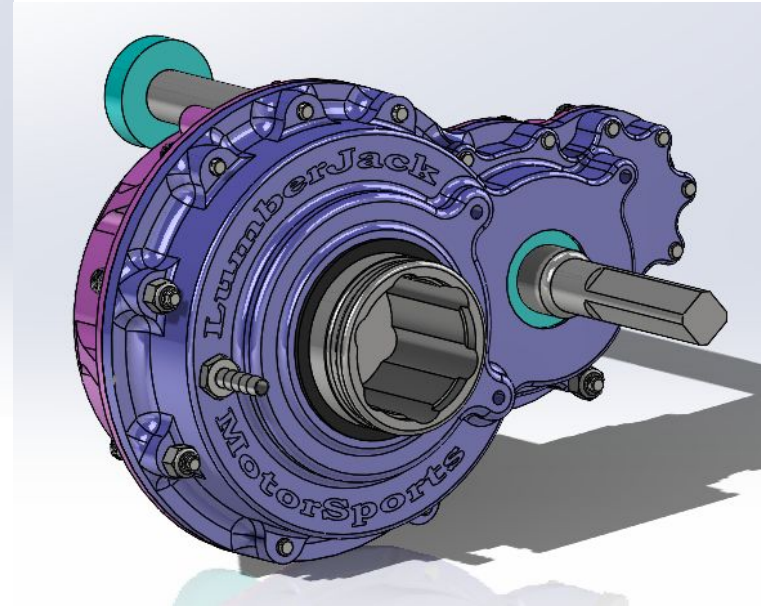
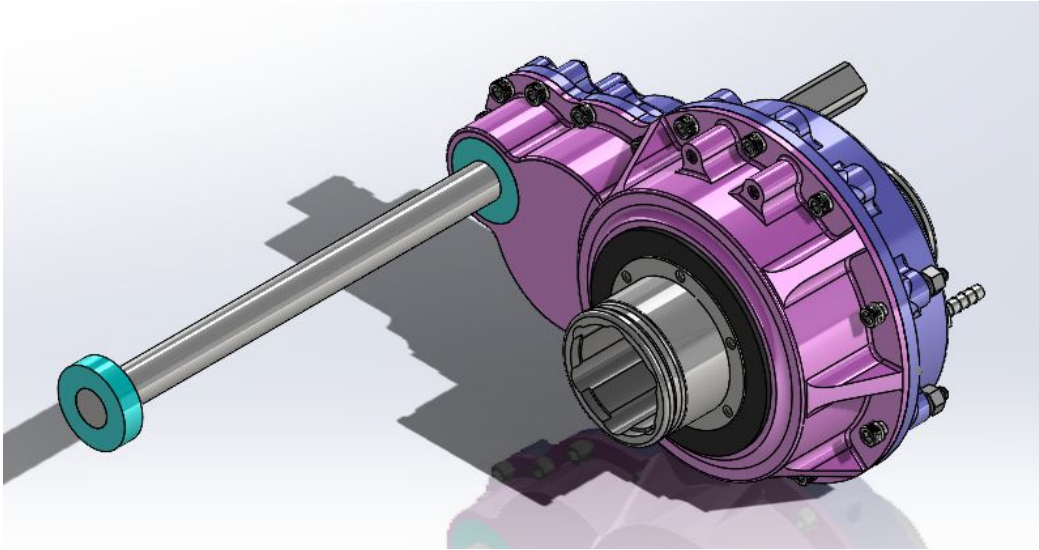


Gantt Chart

Task	Assigned To	Start	Days	End	Progress	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	
FGB Casing Manufacturing	Team	1/1/2025	12	1/12/2025	100.00%																												
RGB Casing Manufacturing	Team	1/13/2025	12	1/24/2025	100.00%																												
CV Axle Assembly	Team	1/25/2025	4	1/28/2025	70.00%																												
Hub Assembly	Team	1/28/2025	4	1/31/2025	100.00%																												
33% Build Check	Team	2/5/2025	1	2/5/2025	100.00%																												
Hub Integration	Matthew	2/5/2025	30	3/7/2025	15.00%																												
FGB Assembly	Rowan	2/6/2025	30	3/8/2025	20.00%																												
4WD Manufacturing	Team	2/6/2025	24	3/1/2025	25.00%																												
RGB Assembly	Dylan	2/20/2025	30	3/22/2025	10.00%																												
67% Build Check	Team	2/26/2025	1	2/26/2025	0.00%																												
Finalized Testing Plan	Team	3/21/2025	1	3/21/2025	0.00%																												
4WD Assembly	Seth	3/1/2025	35	4/5/2025	5.00%																												
UGRADs Registration	Team	3/21/2025	1	3/21/2025	0.00%																												
100% Build Check	Team	3/26/2025	1	3/26/2025	0.00%																												
UGRADs Poster Draft	Team	3/28/2025	1	3/28/2025	0.00%																												
Initial Testing Results	Team	4/9/2025	1	4/9/2025	0.00%																												
Final Poster and PPT	Team	4/11/2025	1	4/11/2025	0.00%																												
Final CAD	Team	4/13/2025	1	4/13/2025	0.00%																												
Final Testing Results	Team	4/16/2025	1	4/16/2025	0.00%																												
Final Report	Team	4/18/2025	1	4/18/2025	0.00%																												
Final Website Check	Team	4/19/2025	1	4/19/2025	0.00%																												
Ops Manual	Team	4/30/2025	1	4/30/2025	0.00%																												
Client Handoff	Team	5/2/2025	1	5/2/2025	0.00%																												

Collective Percentage Done
63%

Rear Gearbox



Design Efforts - Rear Gearbox

ITEM NO.	PART NUMBER	QTY.
1	Left Side of Gear Box Casing (Final/Final/Final)	1
2	Pinion (CVT)	1
3	Intermediate Driver	1
4	Intermediate Driven	1
5	Final Gear	1
6	Bearing 3 (inter med. left)	1
7	Input shaft	1
8	Bearing 1 (Pinion Shaft left)	2
9	Bearing 2 (Pinion Shaft right)	1
10	Right Side of Gear Box Casing (Final/Final/Final)	1
11	Bearing 4 (inter med. right)	1
12	Bearing 5 (Final left)	1
13	Bearing 6 (Final right)	1
14	CV Cup-Shaft-Cup	1
15	Intermediate Shaft new (2)	1
30	91251A542	13
31	91333A150	3
32	91251A527	3
36	Left Side Seal	1
37	Right Side Seal	1

REVISIONS AND COMMENTS:
 ALL DIMENSIONS UNLESS OTHERWISE SPECIFIED ARE IN MILLIMETERS.
 DIMENSIONS ARE UNLESS OTHERWISE SPECIFIED.
 FINISHES ARE AS SHOWN.
 UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS.
 UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN MILLIMETERS.

REV	DATE	BY	CHKD	APPV

SIZE: DWG. NO. REV
gearbox final final
 SCALE: 1:5 WEIGHT: SHEET 1 OF 1

Purchasing Plan - Rear Gearbox

Sub-System	Purchase/Made?	Purchased	On Hand/Made	Part Name	Quantity	Cost	Total Cost	Material	Vendor	Link
Casing	Made			Left Side Casing	1	0	0	Aluminum 6061-T6	Online Metals	Casing Material
Casing	Made			Right Side Casing	1	0	0	Aluminum 6061-T6	Online Metals	Casing Material
Gears	Made			Pinion Gear	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Gears	Made			Intermediate Driven Gear	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Gears	Made			Intermediate Driver Gear	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Gears	Made			Final Gear	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Shafts	Made			Pinion Shaft	1	71.36	71.36	4340 Steel Normalized	Online Metals	Pinion Shaft Material
Shafts	Made			Intermediate Shaft	1	95.33	95.33	4340 Steel Normalized	Online Metals	Intermediate Shaft Material
Shafts	Made			Final Shaft	1	0	0	4140 Steel Normalized	IMS	Final Drive Shaft Material
Bearings	Purchase			Bearing 1 & 7	2	12.62	25.24	N/A	McMaster-Carr	Bearing 1 & 7
Bearings	Purchase			Bearing 2	1	32.56	32.56	N/A	123bearings	Bearing 2
Bearings	Purchase			Bearing 3	1	46.61	46.61	N/A	123bearings	Bearing 3
Bearings	Purchase			Bearing 4	1	21.68	21.68	N/A	123bearings	Bearing 4
Bearings	Purchase			Bearing 5	1	169.42	169.42	N/A	Quality Bearings Online	Bearing 5
Bearings	Purchase			Bearing 6	1	46.61	46.61	N/A	123bearings	Bearing 6
Screws	Purchase			Short Screws	1	12.36	12.36	Black-Oxide Alloy Steel	McMaster-Carr	Short Screws
Screws	Purchase			Long Screws	1	20.87	20.87	Black-Oxide Alloy Steel	McMaster-Carr	Long Screws
Nuts	Purchase			Lock-Nuts	1	8.18	8.18	Corrosion-Resistant-Coated Steel	McMaster-Carr	Nuts for Long Screws
Oil	Purchase			STP 75W-90 Oil	1	9.99	9.99	Oil	Autozone	Gearbox Oil
Expansion Chamber	Purchase			NPT Barbed Hose Fitting	1	6.27	6.27	Brass	McMaster-Carr	NPT Hose Fitting
Expansion Chamber	Purchase			Enclosed Rubber Bellow	1	15	15	Rubber	Summit Racing Equipment	Differential Bellow
Seals	Purchase			Right Side Seal	1	9.63	9.63	NBR	123bearings	Right Side Seal
Seals	Purchase			Left Side Seal	1	10.78	10.78	NBR	123bearings	Left Side Seal
Gasket	Purchase			Gasket Material	1	37.64	37.64	Hylomar M	Grainger	Gasket Material

Total Cost
2064.81

Purchased
Green
23
Red
1
0.958333333

On Hand
Green
16
Red
8
0.666666667

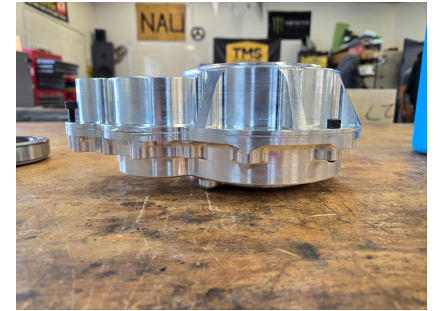
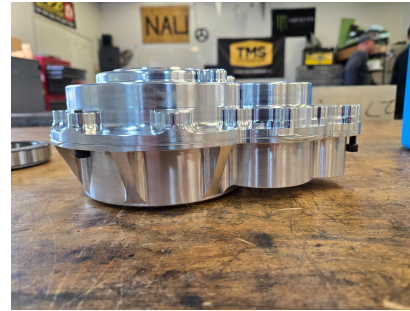
Manufacturing Plan - Rear Gearbox

Sub-System	Part Name	Material	Quantity	Where	Who	Duration	Percentage
Casing	Left Side Casing	Aluminum 6061-T6	1	Machine Shop	Brennan	12 Hours	100%
Casing	Right Side Casing	Aluminum 6061-T6	1	Machine Shop	Brennan	12 Hours	100%
Gears	Pinion Gear	4340 Steel Normalized	1	AZ Wire Specialist	AZ Wire Specialist	~1.5 Days	Out of House
Gears	Intermediate Driven	4340 Steel Normalized	1	AZ Wire Specialist	AZ Wire Specialist	~1.5 Days	Out of House
Gears	Intermediate Driver	4340 Steel Normalized	1	AZ Wire Specialist	AZ Wire Specialist	~1.5 Days	Out of House
Gears	Final Gear	4340 Steel Normalized	1	AZ Wire Specialist	AZ Wire Specialist	~1.5 Days	Out of House
Shafts	Pinion Shaft	4340 Steel Normalized	1	Machine Shop	Dylan/Seth	~6 Hours	25%
Shafts	Intermediate Shaft	4340 Steel Normalized	1	Machine Shop	Dylan/Seth	~12 Hours	25%

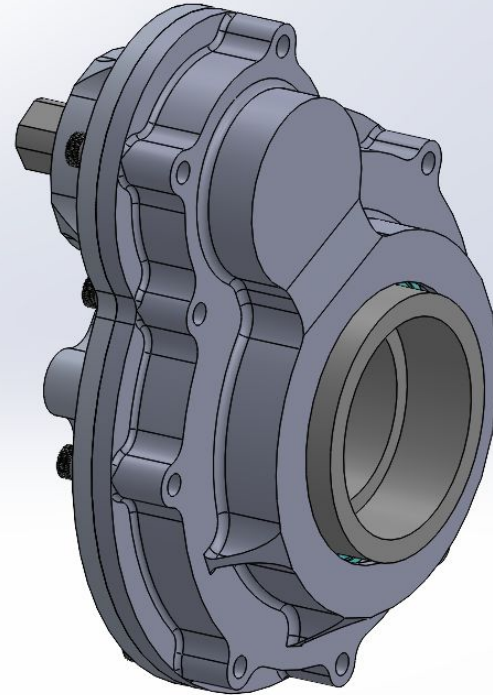
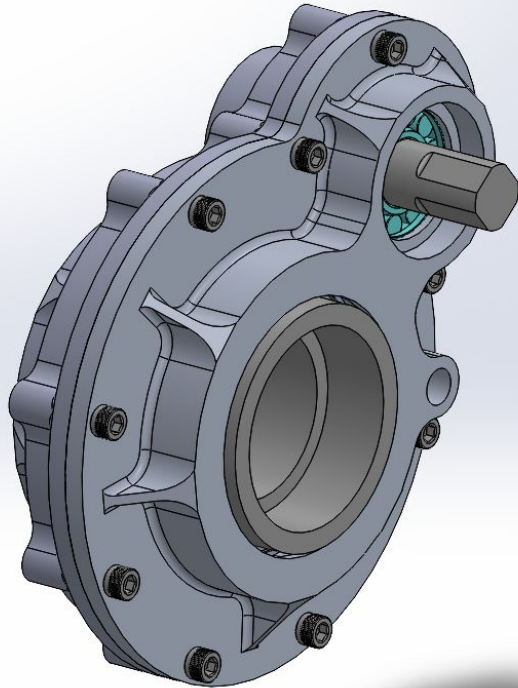
Total Percent Complete
68%

Total Hours
42
Hours Done
28.5

Demonstration - Rear Gearbox



Front Gearbox



Design Efforts - Front Gearbox

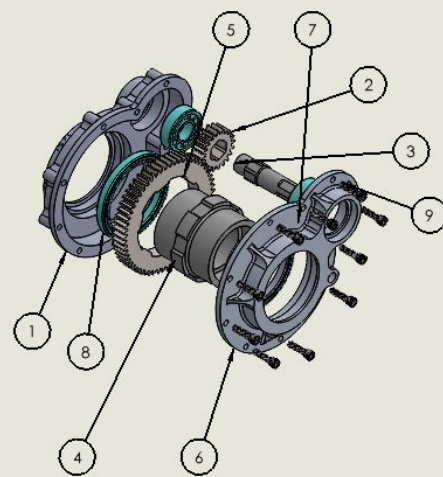
2
1

B
B

A
A

2
1

2
1



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	Bottom Casing (DS) v4		1
2	Input Gear v4		1
3	Input Shaft v6		1
4	Front Reduction Driving Shaft R3		1
5	Output Gear v4		1
6	Top Casing (PS) v4		1
7	skf_bearing_nj_204_eccp_2		2
8	skf_bearing_61815-2rs1_2		2
9	91251A542	Black-Oxide Alloy Steel Socket Head Screw	10

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		UNLESS OTHERWISE SPECIFIED:		NAME		DATE	
		DIMENSIONS ARE IN INCHES		DRAWN			
		TOLERANCES:		CHECKED			
		FRACTIONAL		ENG APPR.			
		ANGULAR: MACH <input type="checkbox"/> BEND <input type="checkbox"/>		MFG APPR.			
		TWO PLACE DECIMAL		C.A.			
		THREE PLACE DECIMAL		COMMENTS:			
		INTERPRET GEOMETRIC TOLERANCING PER:					
		MATERIAL					
		FINISH					
NEXT ASSY		USED ON					
APPLICATION		DO NOT SCALE DRAWING					

SIZE DWG. NO. REV

FGA Full Assembly v3

SCALE: 1:8 WEIGHT: SHEET 1 OF 1

TITLE:

Purchasing Plan - Front Gearbox

Sub-System	Purchase/Made?	Purchased	On Hand/Made	Part Name	Quantity	Cost	Total Cost	Material	Vendor	Link
Casing	Made			Left Side Casing	1	0	0	Aluminum 6061-T6	Online Metals	Casing Material
Casing	Made			Right Side Casing	1	0	0	Aluminum 6061-T6	Online Metals	Casing Material
Gears	Made			Pinion	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Gears	Made			Gear	1	356.32	356.32	4340 Steel Normalized	Online Metals	Gear Material
Shafts	Made			Input Shaft	1	0	0	4340 Steel Normalized	Online Metals	Input Shaft Material
Shafts	Made			Output Shaft	1	0	0	4140 Steel Normalized	IMS	Output Shaft Material
Bearings	Purchase			Bearing 1 and 2	1	173.9	173.9	N/A	123bearings	Bearings 1 and 2
Bearings	Purchase			Bearing 3 and 4	1	41.5	41.5	N/A	123bearings	Bearings 3 and 4
Screws	Purchase			Short Screws	1	0	0	Black-Oxide Alloy Steel	McMaster-Carr	Short Screws
Bearing Seal	Purchase			20.47.7TC Rubber Oil Seal	1	5.71	5.71	Rubber	Bearings Direct	Seal
Oil	Purchase			STP 75W-90 Oil	1	0	0	N/A	Autozone	Gearbox Oil
Gasket	Purchase			Gasket Material	1	0	0	Hylomar M	Grainger	Gasket Material
Expansion Chamber	Purchase			NPT Barbed Hose Fitting	1	6.27	6.27	Brass	McMaster-Carr	NPT Hose Fitting
Expansion Chamber	Purchase			Enclosed Rubber Bellow	1	15	15	Rubber	Summit Racing Equipment	Differential Bellow

Purchased	On Hand
Green	Green
11	8
Red	Red
3	6
0.785714286	0.571428571

Total Cost
955.02

Manufacturing Plan - Front Gearbox

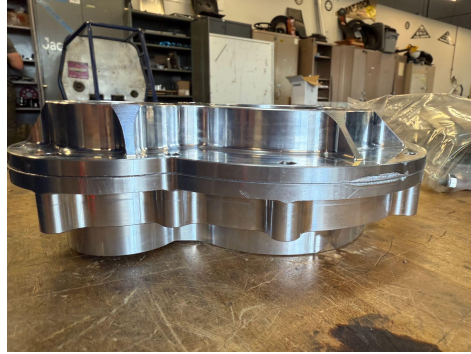
Sub-System	Part Name	Material	Quantity	Where	Who	Duration	Percentage
Casing	Left Side Casing	Aluminum 6061-T6	1	Machine Shop	Brennan	~12 Hours	100%
Casing	Right Side Casing	Aluminum 6061-T6	1	Machine Shop	Brennan	~12 Hours	100%
Gears	Pinion	4340 Steel Normalized	1	Out of House	AZ Wire	Unknown	0%
Gears	Gear	4340 Steel Normalized	1	Out of House	AZ Wire	Unknown	0%
Shafts	Pinion Shaft	4340 Steel Normalized	1	Machine Shop	Seth	~8 Hours	50%

Total Percent Complete
93%

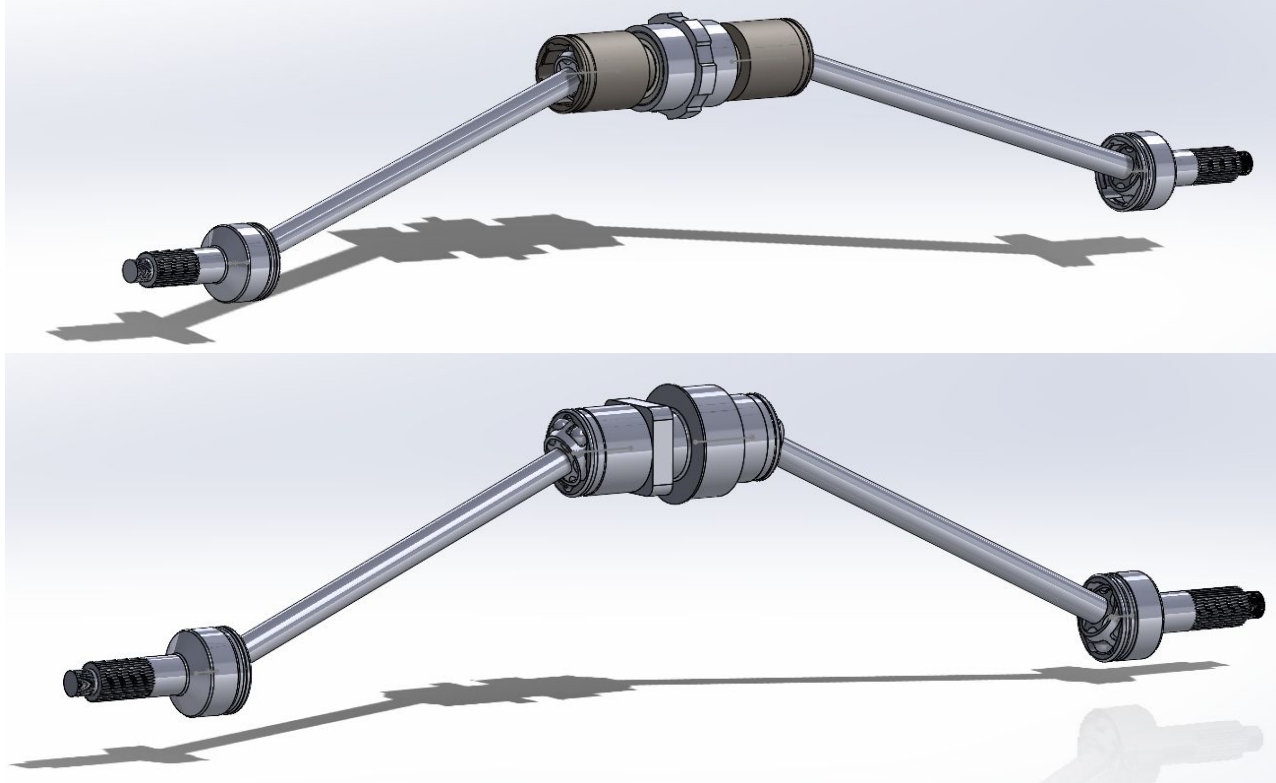
Total Hours
32

Total Hours Completed
28

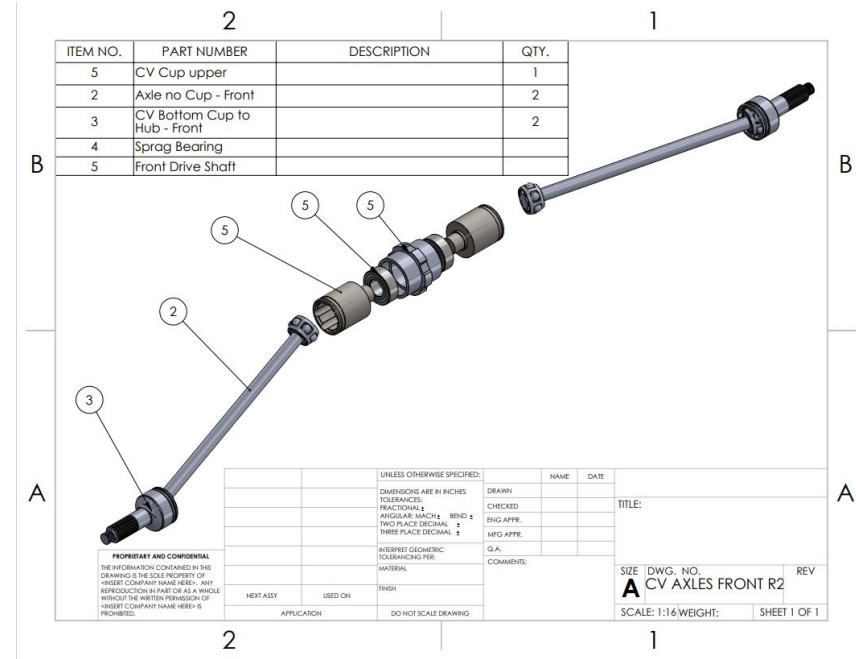
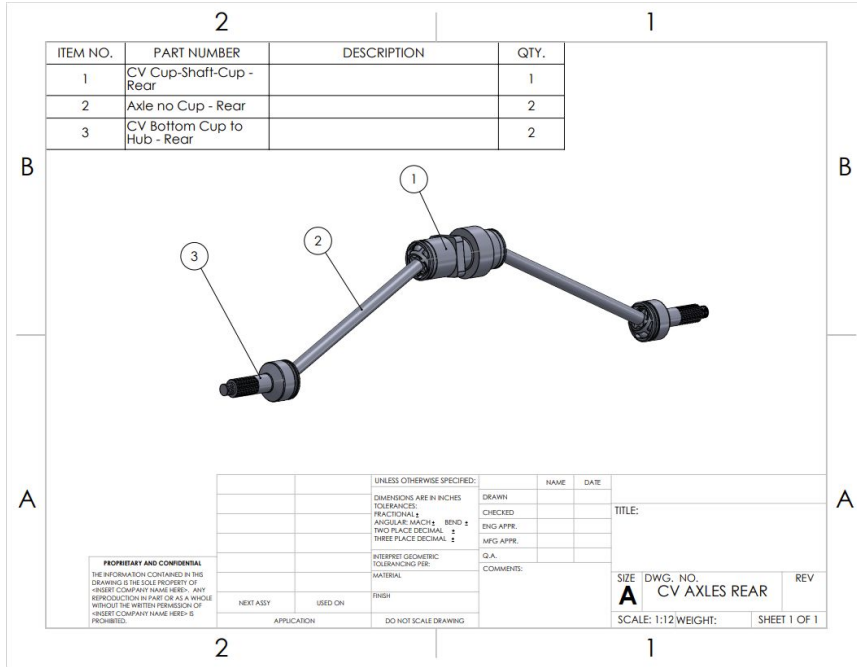
Demonstration - Front Gearbox



CV Axles



Design Efforts - CV Axles



Purchasing Plan - CV Axles

Sub-System	Purchase/Made?	Purchased	On Hand/Made	Part Name	Quantity	Cost (\$)	Total Cost (\$)	Material	Vendor	Link
CV Axles	Purchase			Caltric CV Axles	1	125	125	N/A	Amazon	Caltric CV Axle
CV Axles	Purchase			4130 Steel round tube (1"OD, 0.834"ID)	2 x36" Pieces	91.47	182.94	N/A	Online Metals	Axle Shaft Piping
CV Axles	Purchase			McMaster Sprag Bearing Fz 6206 2RS, for 30 mm Shaft Diameter	2	234.69	469.38	N/A	McMaster Carr	Sprag Bearing
CV Axles	Made			CV Cup-Shaft-Cup (4140 HT)	1	0	0	4140 HT	owned	N/A
CV Axles	Made			CV Cup for Sprag (4140 HT)	2	0	0	4140 HT	owned	N/A
CV Axles	Purchase			Snap Rings	10	\$8.50	\$8.50	N/A	McMaster Carr	N/A
CV AXles	Purchase			CV Axle Grease	1	0	0	N/A	owned	N/A
CV Axles	Made			Front Final Driveshaft (4140 HT)	1	0	0	4140 HT	owned	N/A

Purchased = 100%
On Hand/Made = 87.5%

Manufacturing Plan - CV Axles

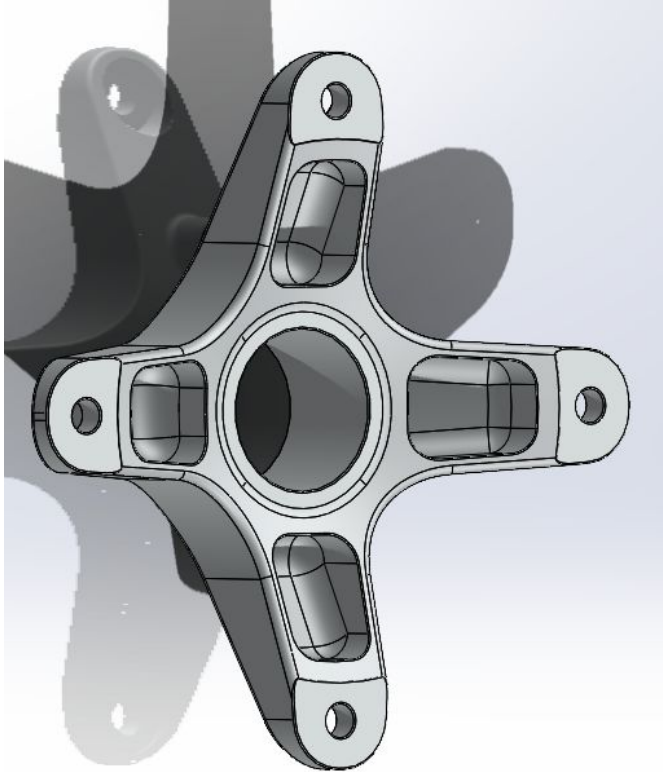
Sub-System	Part Name	Material	Quantity	Where	Who	Duration	Percentage
CV Axles	Axle Shaft	4130 Chromoly Steel	1	NAU Machine Shop	Maddix	1hr (welding)	0%
CV Axles	Rear CV Cup-Shaft-Cup	4140 HT Steel	1	NAU Machine Shop	Brennan P.	20 Hours	0%
CV Axles	Front Final Drive Shaft	4140 HT Steel	1	NAU Machine Shop	Seth S.	10 Hours	75%
CV Axles	Front Sprag CV Cup	4140 HT Steel	2	NAU Machine Shop	Seth S.	10 Hours	75%
CV Axles	Caltric AX113	N/A	2	NAU Machine Shop	Ethan N.	2 hr. (cutting and prepping for weld)	100%

Total Percent Completed	
40.47619048	
Total hours	Hours completed
42	17

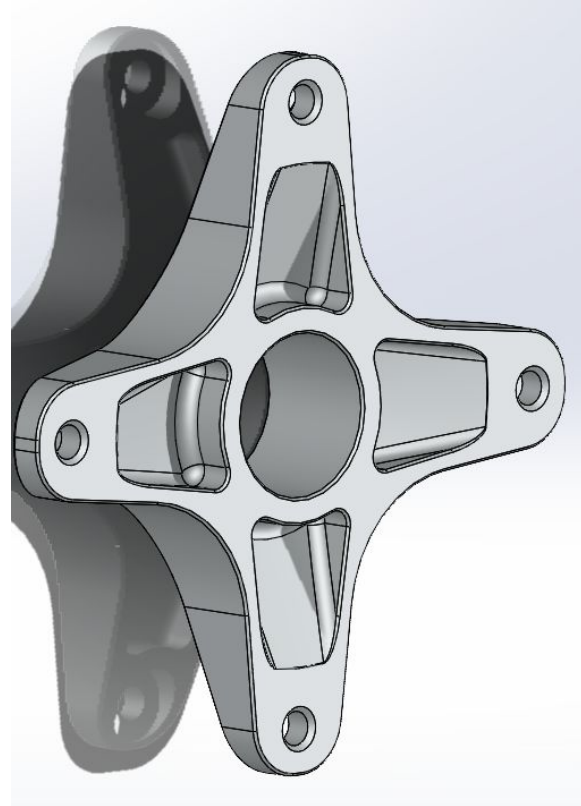
Demonstration - CV Axles



Hubs

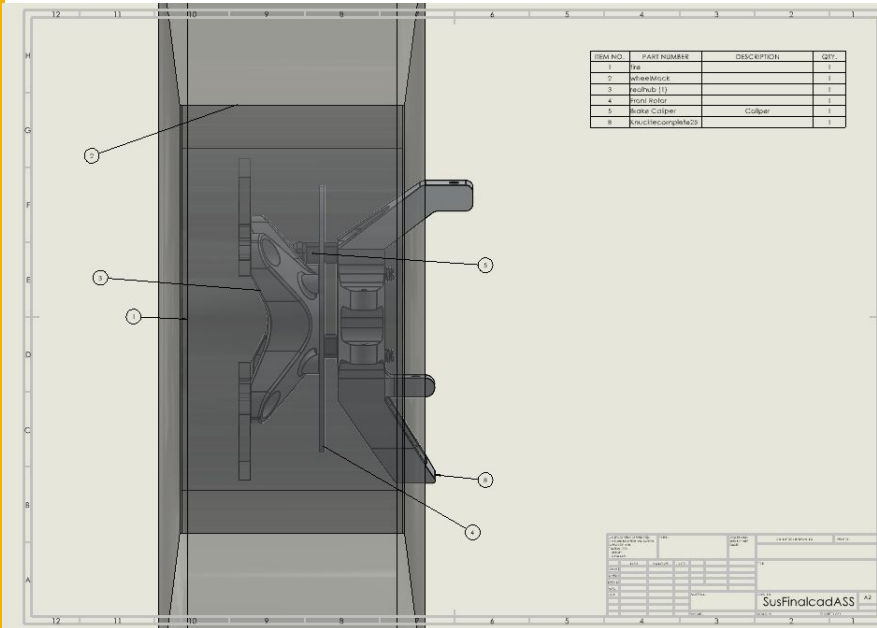


Front

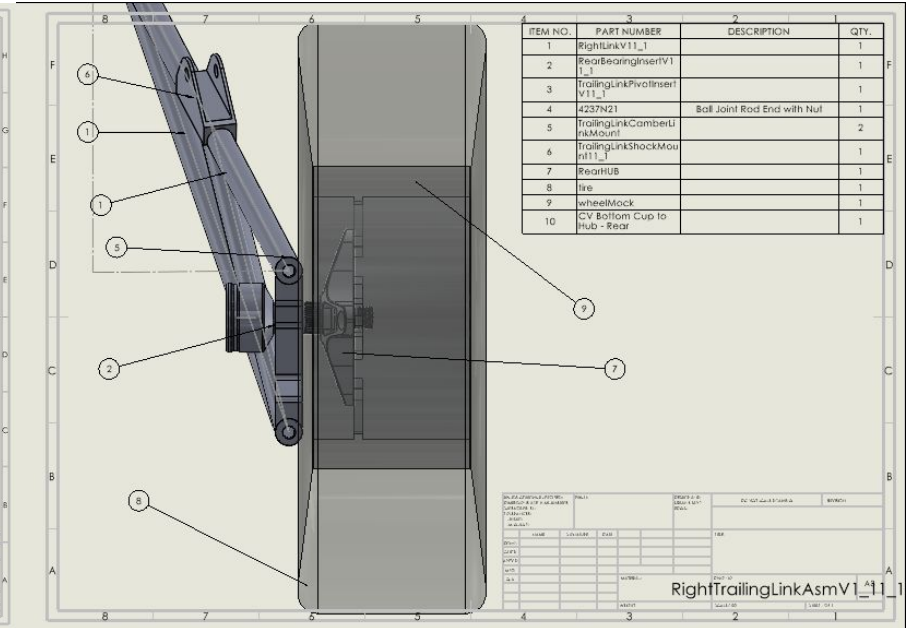


Rear

Design Efforts - Hubs



Front



Rear

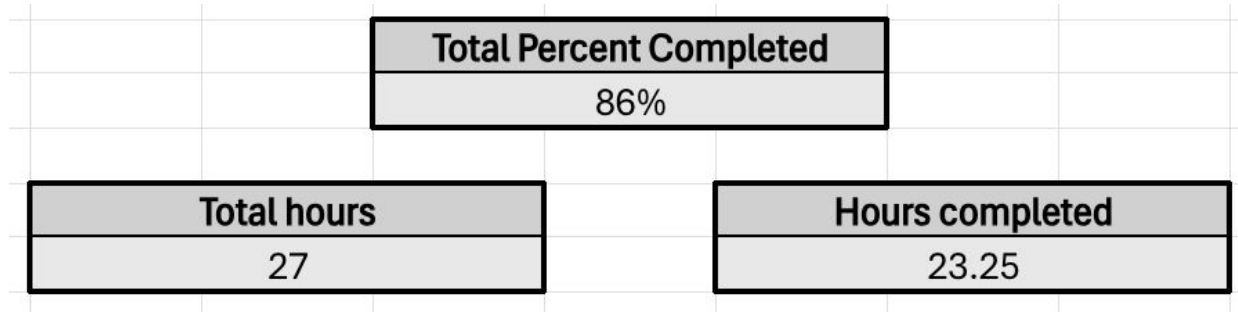
Purchasing Plan - Hubs

Hub	Made			Front Hub	3	0	0	Aluminum 6061 T6	Online Metals	N/A
Hub	Made			Rear Hub	3	0	0			
Hub	Purchase			Female Spline Cuff	6	0	0	Hardened Steel	RPM Powersports	Female Spline Cuff
Hub	Purchase			Wheel Nut	26	0	0	Titanium	Race Tech Titanium	Wheel Stud
Hub	Purchase			Wheel Stud	26	0	0	Titanium	RPM Powersports	Wheel Stud

Purchased = 100%
On Hand/Made = 86%

Manufacturing Plan - Hubs

Hub	Front Hub	Aluminum 6061 T6	3	NAU Machine Shop	Brennan P.	6 hr	100%
Hub	Rear Hub	Aluminum 6061 T6	3	NAU Machine Shop	Brennan P.	6 hr	100%
Hub	Female Spline cuff	Hardened Steel	6	NAU Machine Shop	Matthew D.	15 hr	75%

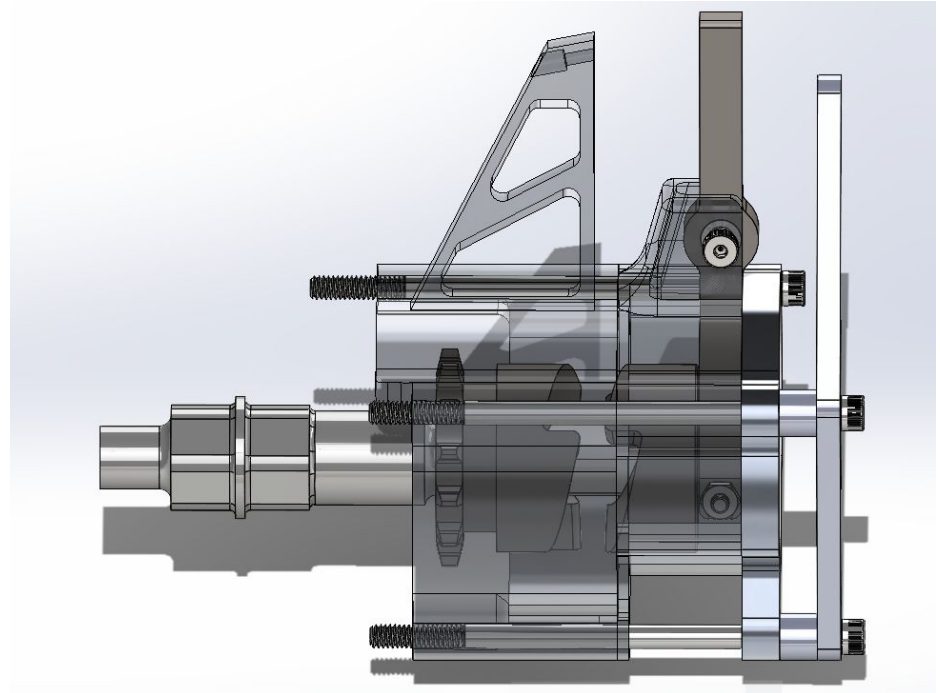
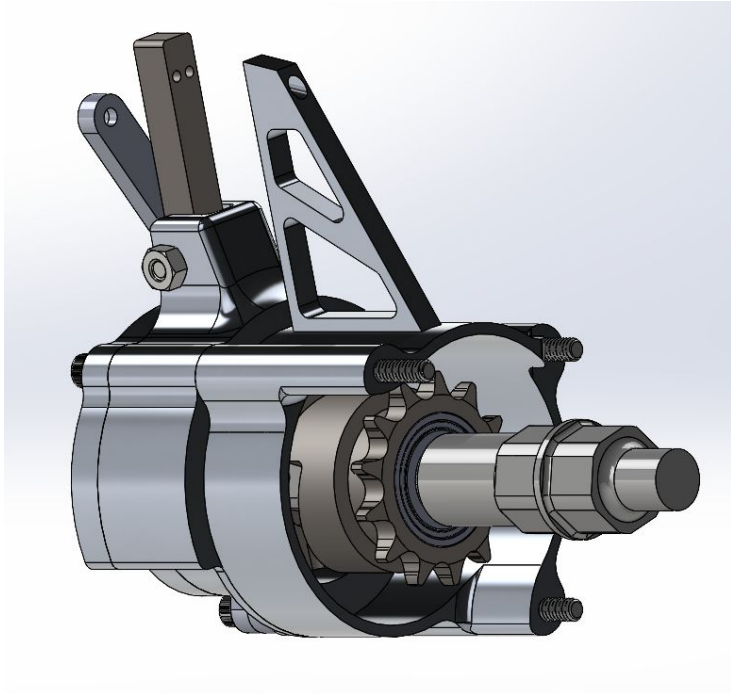


Demonstration - Hubs

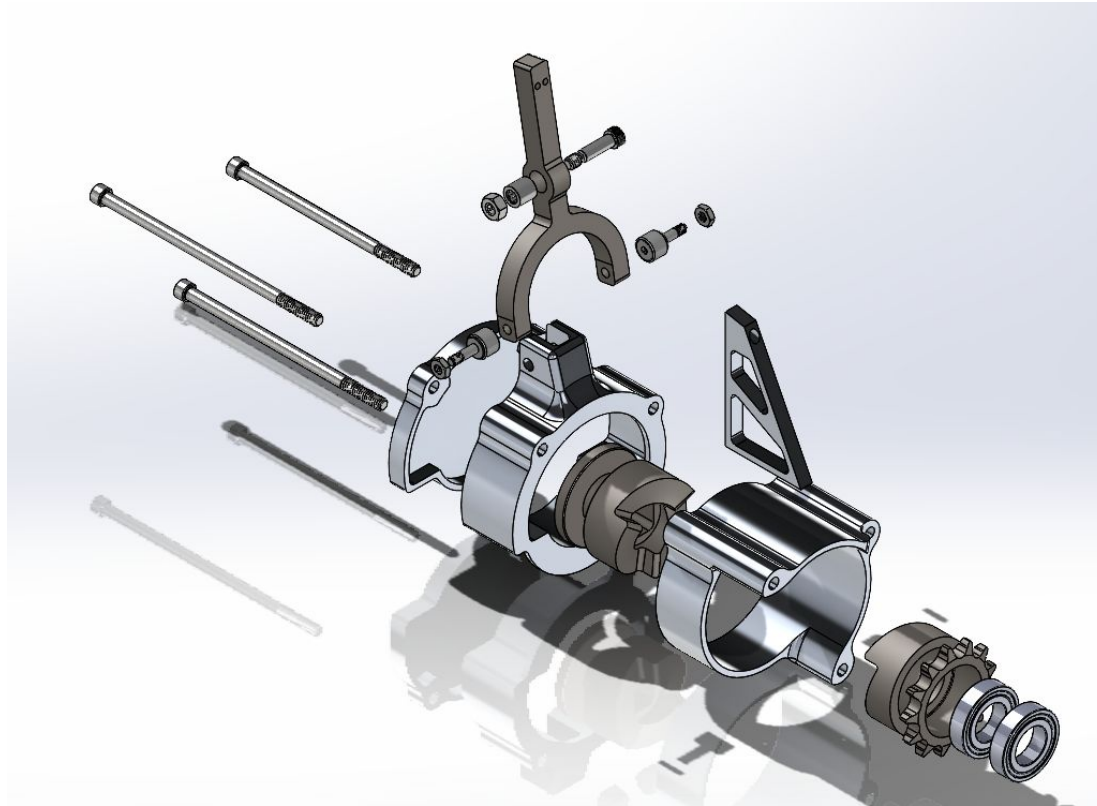
Matthew



4WD



Design Efforts - 4WD



Purchasing Plan - 4WD

Sub-System	Purchase/Made?	Purchased	On Hand/Made	Part Name	Quantity	Cost	Total Cost	Material	Vendor	Link
Dog Box	Made			4WD housing	1	\$90	\$90	6061-T6 Aluminum	Ryan Kendrowski Aluminum Vendor	N/A
Dog Box	Made			shift fork mount	1	N/A	N/A	6061-T6 Aluminum	Ryan Kendrowski Aluminum Vendor	N/A
Dog Box	Made			4WD cap	1	N/A	N/A	6061-T6 Aluminum	Ryan Kendrowski Aluminum Vendor	N/A
Dog Box	Made			sprocket clutch	1	\$101.22	\$101.22	4140 steel	Ryan Kendrowski Aluminum Vendor	N/A
Dog Box	Made			jaw clutch	1	N/A	N/A	4140 steel	Ryan Kendrowski Aluminum Vendor	N/A
Dog Box	Made			shift fork	1	0	0	4140 Steel	On Hand	N/A
Dog Box	Made			cable mount 1	1	N/A	N/A	6061-T6 Aluminum	On Hand	N/A
Dog Box	Made			cable mount 2	1	N/A	N/A	6061-T6 Aluminum	On Hand	N/A
Dog Box	Made			cable mount spacers	3	0	0	6061-T6 Aluminum	On Hand	N/A
Dog Box	Purchase			5905K494 needle bearing	1	\$6.48	\$6.48	steel, etc.	McMASTER-CARR	Needle Roller Bearing
Dog Box	Purchase			shift fork shoulder bolt, 1/4" shoulder dia, 3/4" shoulder len, 1/4"-20	1	\$5.70	\$5.70	alloy steel	McMASTER-CARR	Shift Fork Shoulder Bolt
Dog Box	Purchase			10-32 hex nuts	2	\$2.32	\$4.64	zinc-plated steel	McMASTER-CARR	10-32 Hex Nuts
Dog Box	Purchase			1/4"-20 hex nuts	1	\$8.90	\$8.90	black-oxide steel	McMASTER-CARR	1/4"-20 Hex Nuts
Dog Box	Purchase			1460T11 threaded track rollers	2	\$29.31	\$58.62	black-oxide steel	McMASTER-CARR	Track Rollers
Dog Box	Purchase			61904-2RS-SKF Deep Groove Ball Bearing	2	\$14.77	\$29.54	steel, etc.	123bearing	Sprocket Clutch Bearings
Dog Box	Purchase			mounting bolts	3	\$8.50	\$8.50	steel, etc.	McMASTER-CARR	4WD Housing Bolts
Dog Box	Purchase			Cables	1			steel, etc.		
Dog Box	Purchase			Set Screws	2					
Chain Drive	Made			chain drive intermediate shaft	1	N/A	N/A	4340 steel, normalized	Online Metals	N/A
Chain Drive	Made			ANSI-40 sprockets	3	N/A	N/A	4140 steel	Ryan Kendrowski Aluminum Vendor	N/A
Chain Drive	Made			Chain Tensioner Tabs	6	N/A	N/A	Steel	Online Metals	N/A
Chain Drive	Made			Sheet Metal HROE guards 24" by 48"	2	\$53.61	\$107.22	A653 Steel	Online Metals	Sheet Metal HROE Guards
Chain Drive	Made			Perforated Aluminum PPAE guards24" by 48"	1	\$79.39	\$79.39	3003-H14 Aluminum	Online Metals	Chain Drive PPAE Guards
Chain Drive	Made			Intermediate Shaft Supports	2	0	0	6061-T6 Aluminum	On Hand	N/A
Chain Drive	Purchase			6302-SKF chain drive intermediate shaft bearings	2	\$4.85	\$9.70	steel, etc.	123bearing	Chain Drive Shaft Bearings
Chain Drive	Purchase			Chain tensioner pulleys	6	\$10.99	\$21.98	Steel, etc.	Amazon	Chain Tensioner Pulleys
Chain Drive	Purchase			ANSI-40 Roller Chain	1	\$26.95	\$26.95	steel, etc.	Nitro Chain	ANSI 40 Chain
Chain Drive	Purchase			Mounting Bolts	4	\$7.80	\$7.80	steel	McMASTER-CARR	Chain Drive Shaft Support Bolts

Purchased = 77%

On hand = 54%

Manufacturing Plan - 4WD

Sub-System	Part Name	Material	Quantity	Where	Who	Duration	Percentage
Dog Box	4WD Housing	6061-T6 Aluminum	1	NAU Machine Shop	Brennan/Seth	~3 Hours	100%
Dog Box	Shift Fork Mount	6061-T6 Aluminum	1	NAU Machine Shop	Brennan	~3 Hours	0%
Dog Box	4WD Cap	6061-T6 Aluminum	1	NAU Machine Shop	Brennan/Seth	~3 Hours	100%
Dog Box	Sprocket Clutch	4140 Steel	1	NAU Machine Shop	Brennan/Seth	~ 10 Hours	0%
Dog Box	Jaw Clutch	4140 Steel	1	NAU Machine Shop	Brennan/Seth	~10 Hours	50%
Dog Box	Shift Fork	4140 Steel	1	NAU Machine Shop	Brennan	~3 Hours	0%
Dog Box	Cable Mount 1	6061-T6 Aluminum	1	NAU Machine Shop	Brennan	~3 Hours	0%
Dog Box	Cable Mount 2	6061-T6 Aluminum	1	NAU Machine Shop	Brennan	~3 Hours	0%
Dog Box	Cable Mount Spacers	6061-T6 Aluminum	2	NAU Machine Shop	Seth	~ 1 Hour	0%
Chain Drive	Chain Drive Intermediate Shaft	4340 Steel, Normalized	1	NAU Machine Shop	Brennan/Seth	~3 Hours	0%
Chain Drive	ANSI-40 Sprockets	4140 Steel	3	NAU Machine Shop	Brennan	~6 Hours	100%
Chain Drive	Intermediate Shaft Supports	6061-T6 Aluminum	2	NAU Machine Shop	Brennan	~ 3 Hours	0%

Total Percent Complete

29%

Hours Total

41.5 Hours

Hours Complete

14 Hours

Demonstration - 4WD



Thank you!

Any Questions?

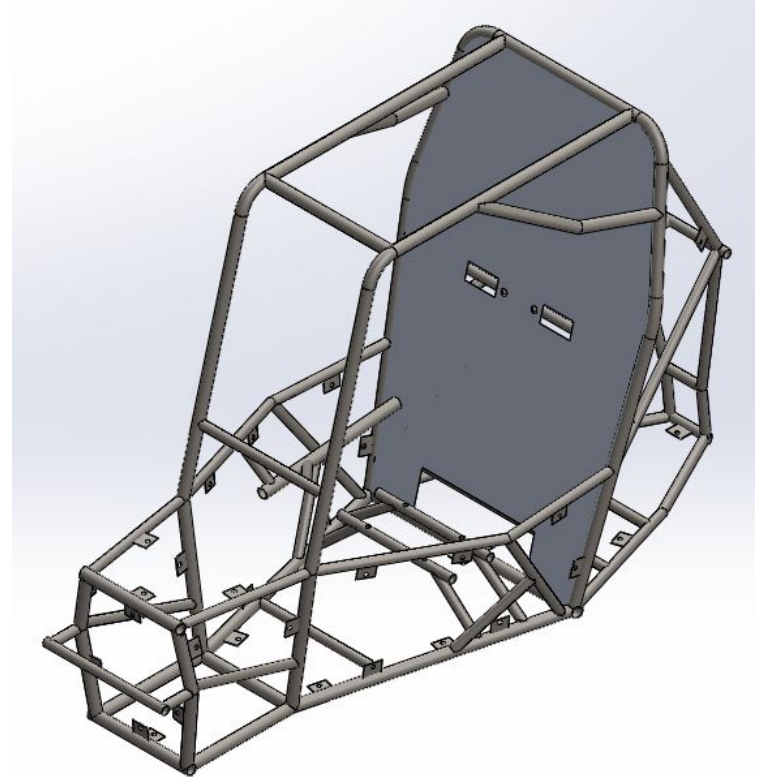
SAE Baja

Chassis Team
2024-2025



Design Efforts (100%)

- **Body panel tabs added**
- **Seat dimensions finalized**
- **Ergonomics**



Purchasing Plan

- 83% Purchased, 76.9% On Hand, One item in the process of being made

Item Number	Part Number	Description	Material	Quantity	Total Cost	Acquisition Method	Primary Vender	Part Status	Links	Legend
1	[4130RDT12506]	Steel Round Tubing 1.25" OD x 0.065" Wall	4130 Chromoly Steel	60 ft	0	Buy (Donated)	IMS	In House	om/4130-seamles	Acquired
2	10751	Steel Round Tubing 1" OD x 0.035" Wall	4130 Chromoly Steel	48 ft	0	Buy (Donated)	Online Metals	In House	w.onlinemetals.co	In Progress
3	N/A	Body Panels	Carbon Fiber	TBD	200	Make	Nova Kinetics	In House/Progress	N/A	Need to Order
4	N/A	Seat Belts	Nylon, Steel	5	0	Buy (Donated)	In House	In House	N/A	
5	AAF-ALL19361	Body Panel Tabs	Steel	50	150	Buy	Summit Racing	In House	mitracing.com/pa	
6	AAF-ALL19190	Quick Release Fasteners	Steel	50	150	Buy	Summit Racing	In House	cing.com/parts/a	
7	LINED034343	Filler rod 1/16in Diameter	ER80SB2 Electrode	10 lbs	120	Buy	Linde	In House	electric-superglaz	
8	61SH032412	Firewall Sheet Metal	Aluminum	4 ft x 4 ft	100	Buy	Online Metals	Pending	061-aluminum-st	
9	SFC1000	Fuel Tank	Aluminum	1	0	Buy (Donated)	Pyrotect	In House	ctstore.com/prod	
10	85718	Black Wire	Copper	20 ft	12.49	Buy	AutoZone	In House	trical-wire/p/dorm	
11	85716	Red Wire	Copper	20 ft	12.49	Buy	AutoZone	In House	trical-wire/p/dorm	
12	21991	Steel Sheet Metal	10 ga. 0.135" Carbon Steel	2.5 ft x 2.5 ft	105	Buy	Online Metals	Pending	e-ga-0-135-carbor	
13	053380-10	Switch	Metal	2	15.18	Buy	AutoZone	In House	ches/p/moeller-2	

Manufacturing Plan

Members	Quantity	Completed	Members	Quantity	Completed
RRH	1	Green	UCA	2	Red
FAB Upper	2	Green	FBM Front	2	Green
RLC	1	Green	ELC	1	Green
SBT Right	1	Green	Tow Bar S	2	Red
SBT Left	1	Green	Tow Bar	1	Red
FAB Mid	2	Red	GLC	1	Green
RV	2	Green	FBM Lat	1	Red
RH 1	1	Green	SM	2	Red
RH 2	1	Green	RHO	2	Green
Fab Low	2	Green	CLC	1	Green
Enigne Support 1	1	Green	LBM	1	Green
Enigne Support 2	1	Green	RHO G	2	Green
Sims	2	Yellow			
Sim Support 1	2	Yellow			
Sim Support 2	2	Yellow			
UST 1	2	Red			
UST 2	2	Red			
UST 3	1	Green			
LFS	2	Green			
Sim Front	2	Green			
FLC	1	Green			

Need to Add	Total Welded	Partially Completed	Total Members
14	33	3	50
Percent Complete			
28%	66%	6%	

Manufacturing Plan

- **Weighted percent**
 - Fully welded frame 75%
 - Tabs mounts and misc 10%
 - Body panels and seat 15%
- **An estimated 300-400 hrs spent on fabrication**

Manufacturing Plan Tasks	Amount Completed	Total Amount	Unweighted Percent Completed	Weighted Percent Completed
Cut &/or Coped Members	36	50	72	
Tacked Members	36	50	72	
Fully Welded	33	50	66	52.5
Tabs, Mounts, & Misc	0	50	0	0
Body Panels & Seat	2	11	18.18	2.73
Total Completed				55.23

Demonstration

- [1] Tube bending: 100%
- [2] Tube Coping: In Progress.
 - Approximately 8 Members left to cope.

[1]

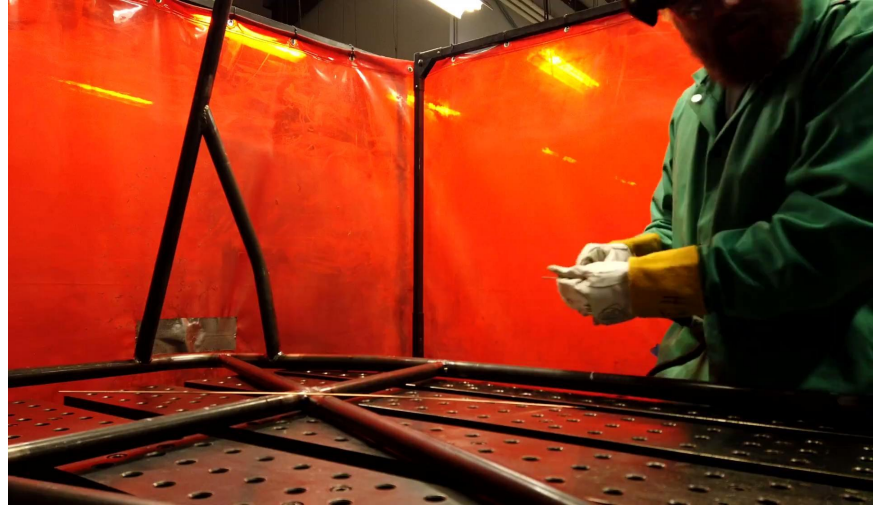
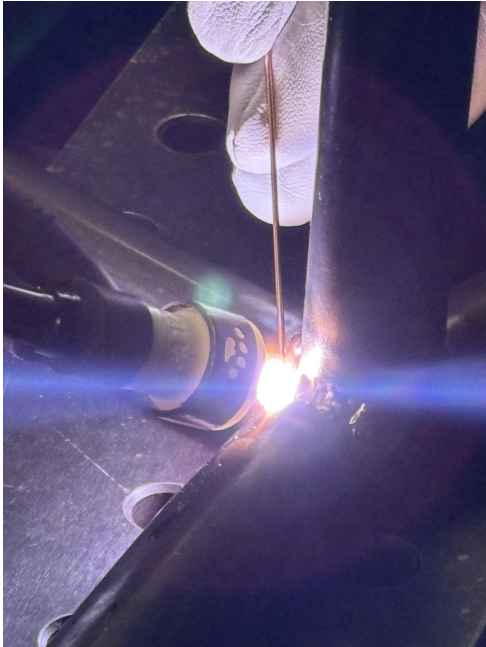


[2]



Demonstration

Welding: In Progress



Honorary 4th chassis team member:
Taylor Hewitt

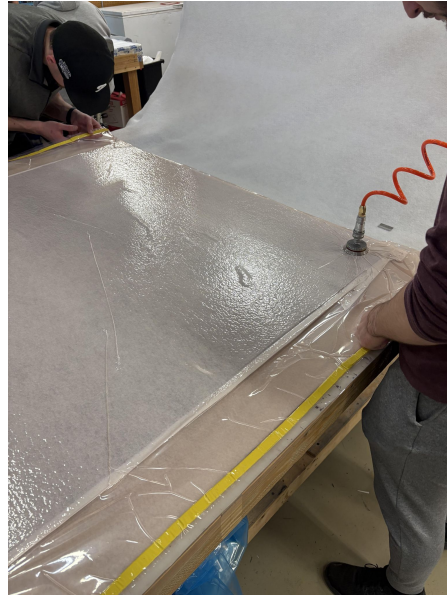
Difficulties: Balancing
Schedules with SAE Formula
And 286L

Demonstration

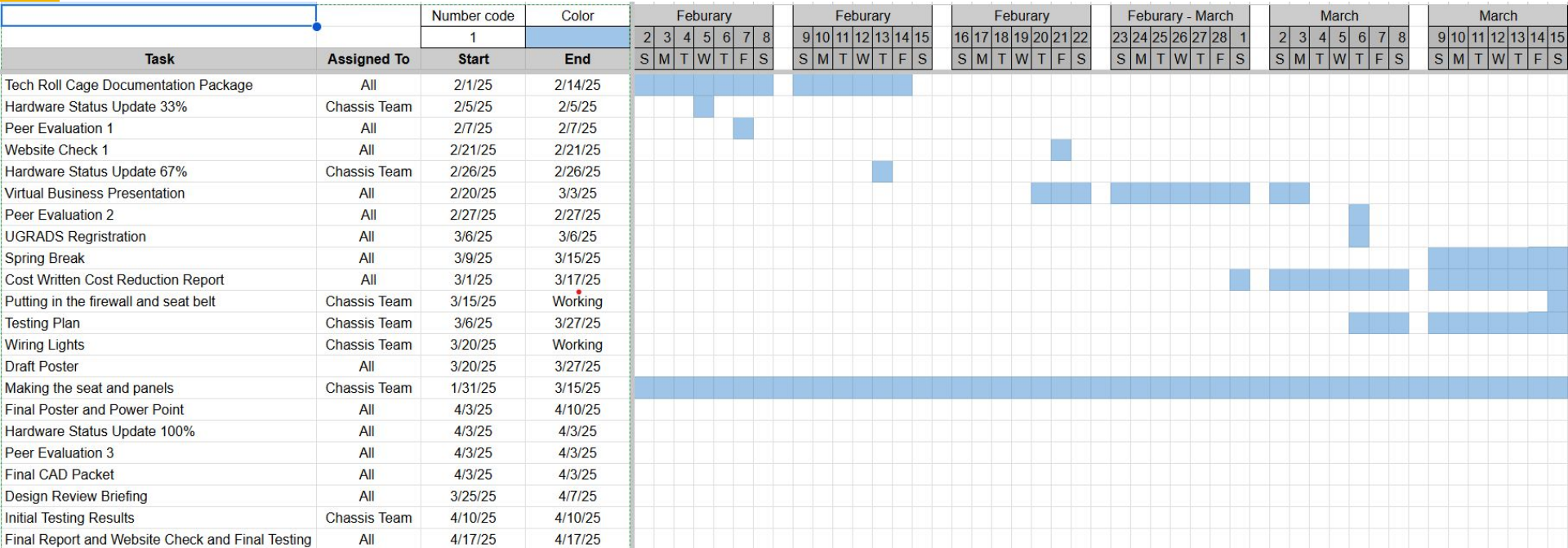
Body Panels



NOVAKINETICS
AEROSYSTEMS



Gantt Chart



Thank You

