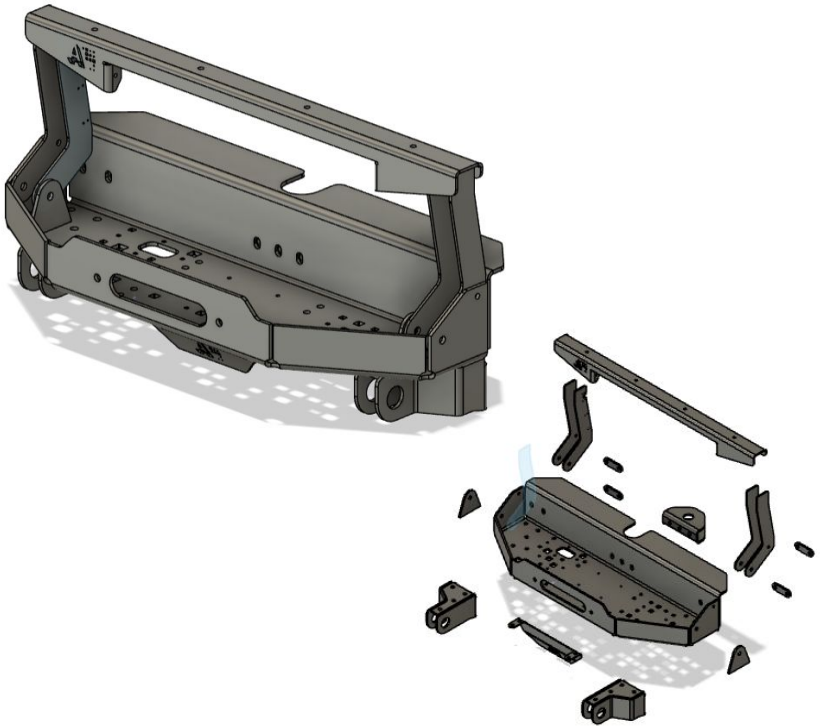
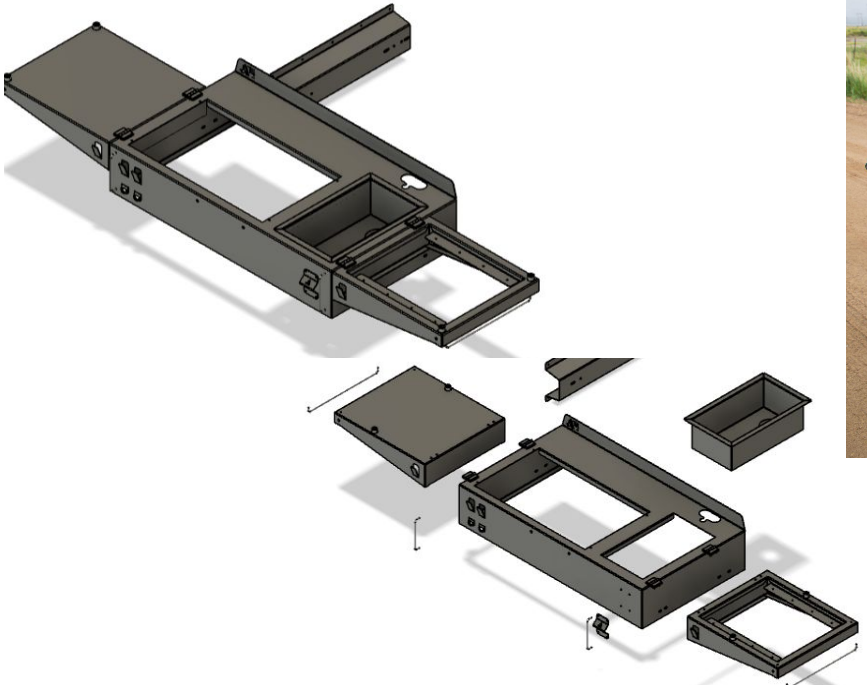
Professional Portfolio



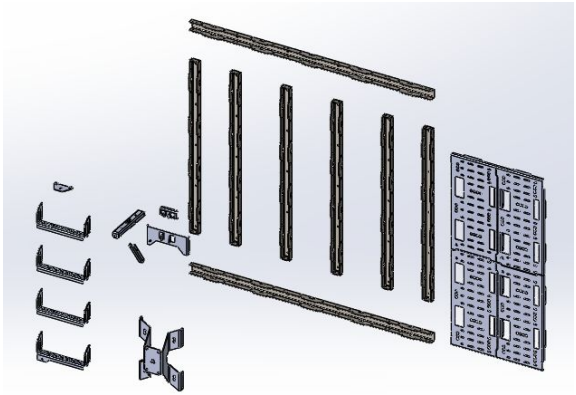
WINCH MOUNT PROJECT

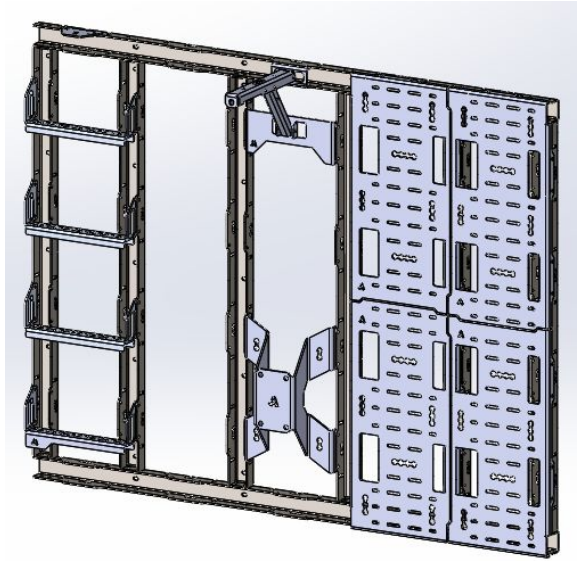
The goal of this project was to design a winch mount for the front of an expedition truck. This mount had to be designed in a way that it could support an immense amount of weight and look aesthetically pleasing. It also had to incorporate a light mount that could articulate down to access the engine.



OUTDOOR KITCHEN

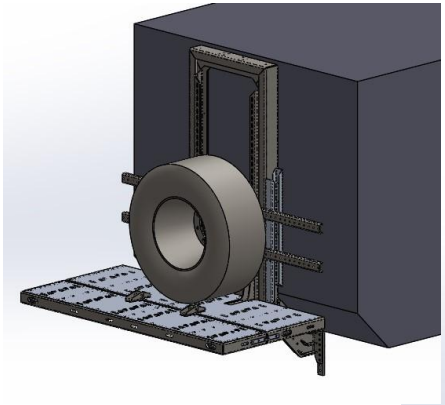
This project was to design an outdoor kitchen that could stow away in a storage box. This kitchen needed to include a electric grill, sink, and area to prep food. A big challenge on this project was tolerances and ensuring the assembly would have room to stow and fold out.

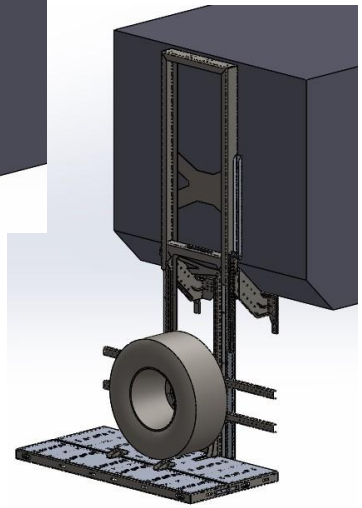




REAR RACK AND TIRE CARRIER

This rear carrier was designed for a Mercedes Unimog. We needed a solution to carry the rear tire as well as a method to get the tire down. It also needed to be aesthetically pleasing.





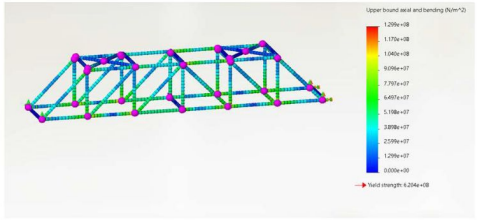
REAR CARRIER

This rear carrier was designed for a larger Mercedes sk1224. This project was challenging due to not being able to mount on the box. After doing research on other solutions we took inspiration from a company in germany. The rear tire carrier lowers to the ground to get access to the tire. This is done using a winch and a pulley system. Pins are used to lock the rack into the raised position.

Academic Portfolio

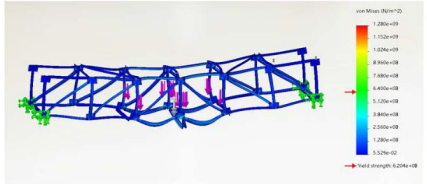
My three designs came from previous truss designs. All three performed well but the first design performed the best and had the greatest factor of safety. The second design performed well but with the amount of steel that was needed would've made the cost very high. The third design also performed well but didn't have as high as a safety factor and the displacement was greater. Therefore, the first design was selected for its highest factor of safety and minimal material usage to achieve that.

This is the stress simulation for the first design. It performed very well with a safety factor of 4.78



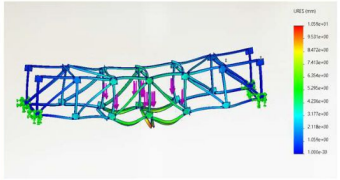
Part Name	Quantity per part	Length(in) per part	Length(ft) per part	Length in Total	Price per Foot	Costs
Horizontal 17	24	18	1.5	36	0.86	30.96
Vertical 20	14	20	1.666666667	23.33333333		20.06666667
Diagonal 23	12	23.67	1.9725	23.67		20.3562
Top 20	10	21	1.75	17.5		15.05
Top Diagonal	2	27.25	2.270833333	4.541666667		3.905833333
Plates	28	4	0.333333	9.333333	1.8	16.8
Connectors	92				1.5	138
					Total Cost	245.1387

However, when the same test was performed on the assembly it produced a different result. The safety factor calculated to be .48 this was due to how to load is simulated within the assembly. In the previous test the load was placed directly on the center beams while in the assembly the load cannot be placed directly on the center beams.



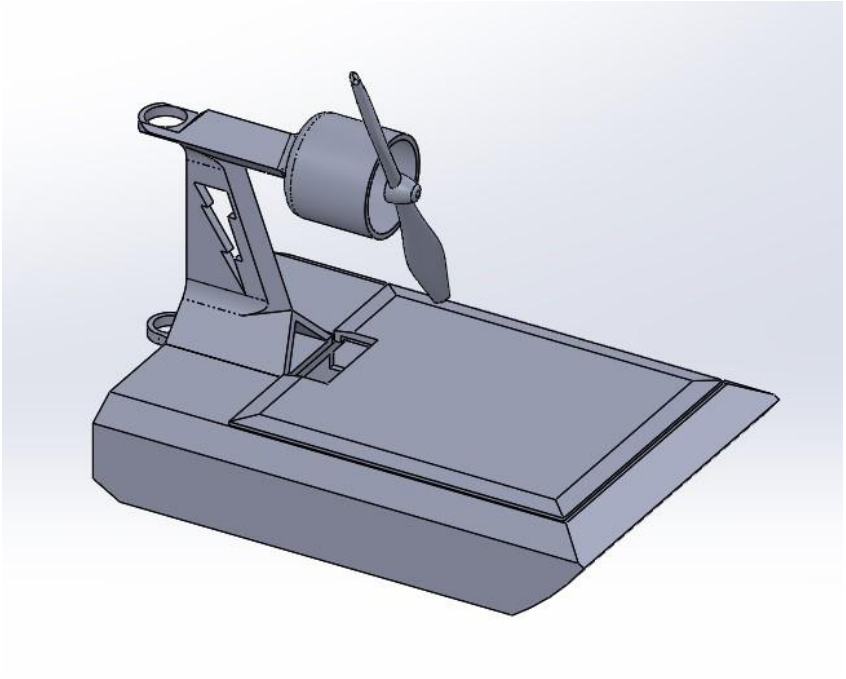
Final Bridge Results:
Maximum Stress: 1.280e+09 N/m^2
Factor of Safety: .48
Maximum Displacement: 10.59mm
Cost: $245.14

In the displacement simulation the bridge performed well. A similar outcome happened when testing the assembly in contrast to the part. The displacement was much higher on the assembly than the part. This also due to where the load is simulated.



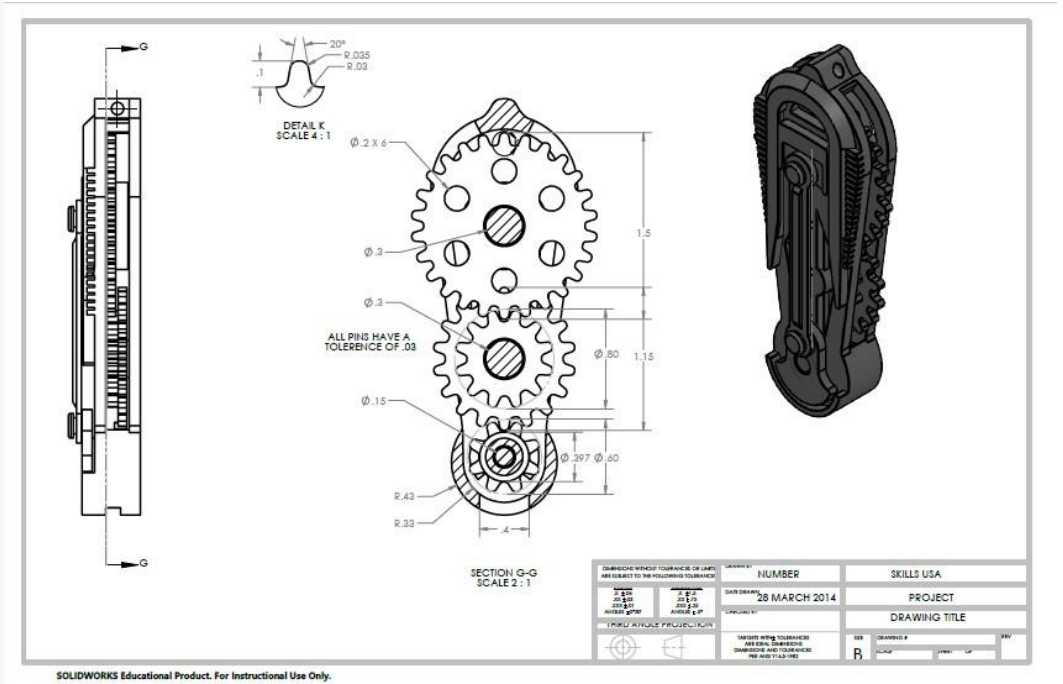
Bridge Simulation Project

This project we were asked to do research on different bridge and truss designs. We then selected 3 designs and modeled them as weldments in Solidworks. Then, after running static load simulations on each design we were to turn our best design into an assembly.



3D Printed Boat Project

This assignment was one of my favorites. We had to design a 3D printable boat that we would race. We choose to go with a fan boat design. We used calculations for buoyancy to determine how big the boat needed to be.



PRINT IN PLACE ASSEMBLY

For this project we had to design a assembly that could be 3D printed in place. We did this with a Stratasys Uprint Plus 3D printer that has dissolvable support material. I choose to design a gear system that moves a piston up and down.