Redesign Bike Rack

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Clients: Mark Stevens, Gloria Brown

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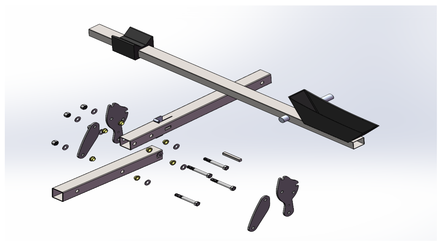
Mission

- The project objective was to be able to lift our clients bike rack to the tow hitch of her Tesla car.
- The client has trouble lifting the bike rack and she asked if we could design a lift to make loading and unloading easier.
- The client is an older women and her current bike rack lift serves to help older women like herself to lift a steel bike rack to the receiver hitch of their vehicles with more ease.
- Ensuring that the client was able to use the lift easily and efficiently to put on and take off the bike rack from the vehicle while just using a few pumps on the foot pedal and moving the lift system.

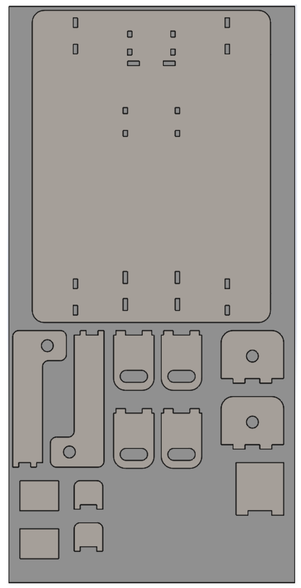
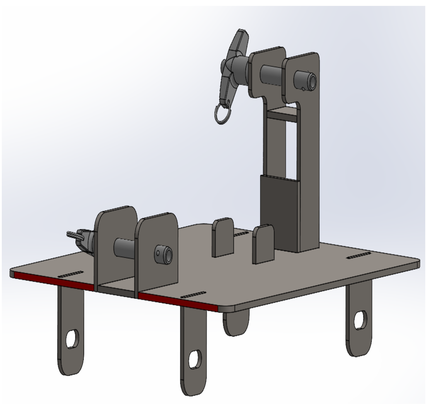
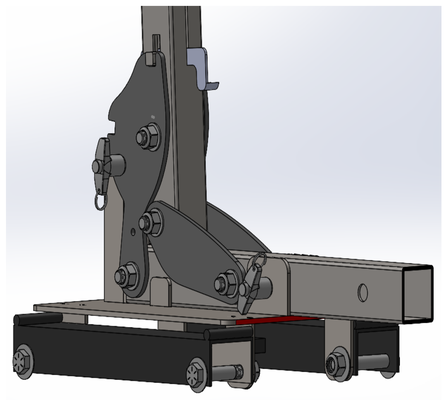
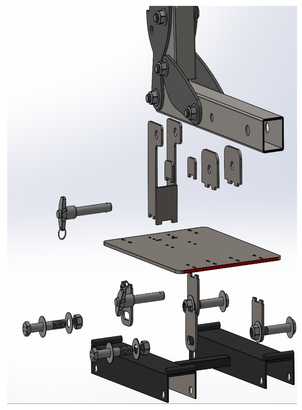
Research

- Early in the project we were focused on the weights and strengths of materials to try and find the best materials for the guide plates that we were looking to change but had to pivot due to concerns with liability for machining those parts.
- Met with Ken Ruble and the AIS Machine Shop to brainstorm ideas to lift the bike rack to the receiver hitch of car.
- We produced the idea of manually lifting the bike rack with a bike lift that uses a bottle jack to elevate the lift and bike rack to the hitch.
- We researched different ways in which this could be done and produced this idea to add onto the bike lift while putting our own jig on it to hold the bike rack in place.
- The materials researched for the mold came to be Plain Carbon Steel since it is strong and reliable and the use of quick-release pins to hold the jig in place with the bike lift.
- Began CAD modeling and made s re all components are included for lifting mechanism to be able to have primarily and critical design review with AIS Machine Shop.



Final Design



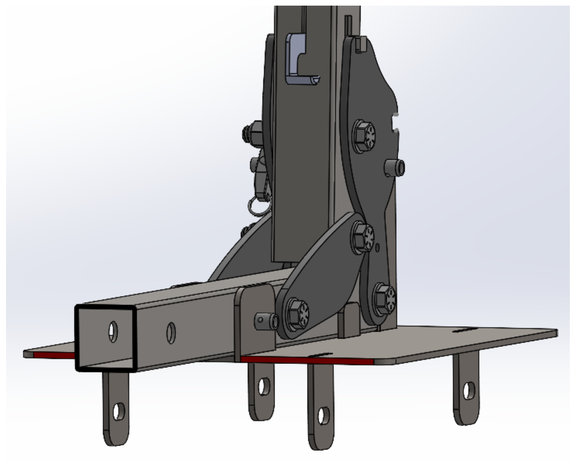
The final design was produced to achieve our goals and purpose which was to efficiently assist the user with installation of the bike rack into the hitch receiver with the use of the bike lift mechanism. The lift was purchased due to the time restrictions and since it would have been more expensive to manufacture it ourselves, we decided it would be more cost efficient to do that considering the time and costs associated with materials.

We engineered a bike lift jig which will be how the bike rack is secured and held down while being on the lift. The jig was engineered using SOLIDWORKS and the parts were water jetted in the NMSU AIS Machine Shop. The use of holes on the lift is how the jig is connected to the lift and secured that way with the assist of pins. The holes on the bottom flanges of the jig are slotted holes so that the tolerance will fit securely with the bike lift. The reason for designing the u-shaped flanges was to eliminate the presence of sharp edges which can cause problem for the user as well as the fit of the flanges. The design was produced while keeping in mind that each piece needs to be made to be water jetted which will help with the ease of the manufacturing process. We also added fillets to all the edges to avoid any sharp edges at all, which makes for a cleaner appearance and less hazards.

GLORIA'S BIKE RACK

Concept Development

- Early in the project we were focused on changing the original materials to lighten the bike rack.
- Modeling of the entire original bike rack was produced which helps to see it digitally.
- We had to pivot due to liability concerns and now focused on producing a bike lift mechanism.
- We decided to design a bike rack lift to manually lift our clients current bike rack.
- We designed it to lift the rack to hitch of client's tesla and to be easily installed and secured.
- The lift will allow the bike rack to be connected to the hitch effortlessly.
- Lift clients 50 lb. bike on and off the receiver hitch effortlessly using the bike rack lift.
- Meet client's expectations of appearance, design and functionality.
- Be sure client can easily load bike rack to the tow hitch with ease with use of bike rack lift.



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