Hog/Sheep Scale

Built by Jake Chulyak for Big Timber FFA

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Section 1: Inspiration/Intent of Use

The primary intent of this scale is to be used by FFA members on SAE visits to accurately and easily weigh their animals. This allows them to track weight gain and plan their feeding accordingly. When done properly this can yield a higher quality animal. Anyone can just go buy a scale, however, we took it a step further by designing and fabricating an enclosure to easily contain the Swine and Sheep on the scale.

The inspiration for this project came from a need of our members. The husbandry of SAE market animals is a challenging endeavor, which is made even harder by the absence of a way to track weight gain. Raiding one animal such as a lamb does not make financial sense to purchase a scale as it would eat up the majority of their profits. This scale will be available for student use at no charge. It was also extremely important that the scale was light and mobile as Mr. Standley will be primarily loading it by himself to take out to students. We didn't want to buy a premade enclosure as we knew that we could design and fabricate something of higher quality and learn valuable skills along the way.

There were three main skills that we developed on this project. The first of which is 3D modeling within SketchUp. The first step in the build was to create a design and order steel. Using the 3d modeling software SketchUp we were able to plan for the materials accurately. Beyond this, we were able to play with different designs without using expensive materials. The largest challenge in this step was designing all of our tube steel at a 45-degree angle. This feature is purely for aesthetics, however, it also brings another level of complexity to the building, and design process.

The next skill that was developed was welding. This project consisted of different angled joins as well as welding positions. I ran lots of practice beads on scrap steel to dial in the settings as well as hone my skills. Because of this I was able to confidently weld all necessary joints and create a strong and appealing joint in the steel.

The final skill that I developed during this project was learning to apply automotive paint using an HVLP spray gun. This was a learning curve due to the technique required to apply even coats that were free of imperfections. After practicing on scrap material in various orientations, I could paint the scale enclosure evenly and precisely.

This was an extremely beneficial project to our chapter and will be for years to come. It also served as a learning experience and taught me many valuable skills that I can carry with me as I venture into life after graduation.

Section 2: Career Relevance

Over the course of this scale build, This project taught me a ton of new skills and also showed me the value of hard work. It opened my eyes to what I might want to do in life. Here are a few main examples of the industries relevant to this project.

We will begin with the most obvious one to us: welding. I think that my skills as a welder progressed throughout this project and I could go make it a career in the future. According to Tulsa Welding School, there are 424,700 welding jobs in the United States that are in the manufacturing industry. Welders can work almost anywhere doing jobs such as construction, repairing military equipment, or even various pipeline jobs.

Another huge aspect of this project was the computer design. 3D modeling allows you to easily plan and edit projects quickly as well as accurately. This is a skill that is becoming required in numerous fields as industries progress. In this project, we not only used computers for design work but also for part production. The top rails as well as end caps were precisely designed and cut on a plasma CNC. This skill is extremely applicable to a multitude of industries from small-scale shops to industrial assembly lines.

Lastly, a big part of the build was the finish work. Everything from the paint prep to the final coat of finish was a learning experience and insight into a dying trade. The automotive paint industry is seeing less workforce than ever before. It is a skilled profession and important to repair damaged vehicles, build new ones, and restore classics. This high-quality finish will hold up longer compared to spray paint.

Beyond these hard skills I also developed a multitude of soft skills. One example was time management, this came in the form of budgeting time within my busy schedule to work on the scale as well as working with delivery dates of components to ensure that the project was completed on time. Another soft skill was work ethic. This was a fairly short timeline to complete this project so I had to work long days while keeping duality high and avoiding mistakes. These are only a couple of examples of soft skills that I developed, there are countless others including critical thinking and creative problem solving.

These are a few of the most obvious examples of industries involved in our project. I learned many new skills and gained valuable insight into trades that I may one day enter

into. This project was not only valuable to me as a skills builder but will also serve the Big Timber FFA chapter for years to come.

Section 3: Budget

Hog/Scheep Scale Budget

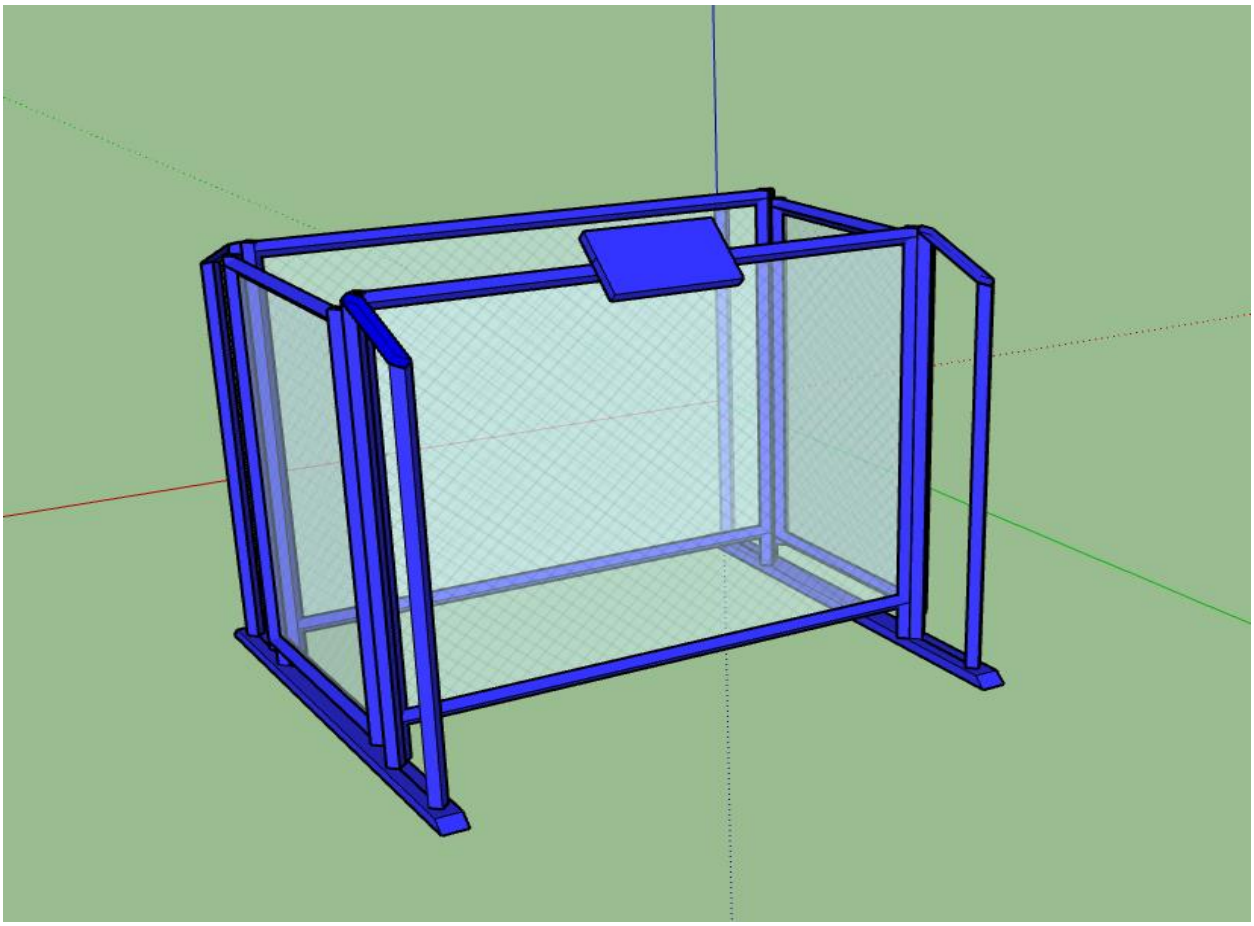
Part	Vendor	Quantity	Description/ Dimensions	Price
Scale				
Scale Base and Readout	A & A Scales	1	Base with 4 load cells, platform and digital readout	$315.00
Steel				
1x1 Tubing	Big Sky Steel	3	1" x 1" x 0.125" 24' sticks	$156.00
1x2 Tubing	Big Sky Steel	1	1" x 2" x 0.125" 20' stick	$93.00
Hog Panel	Yellowstone Feeds	1	50" x 16' Galvanized Cattle Panel	$34.99
Paint/Finish				
Primer	Ace Hardware	3	Clean Metal Primer (White)	$23.97
Paint Supplies	Ace Hardware	1	Mixing Cups, Drop Cloth, Masking Tape, Pre-paint Spray, Gloves, Acetone	$72.63
Paint Supplies	Carquest	2	Single Stage Automotive Paint (Blue Sapphire) Quart	$156.40
Accessories				
Hinges	Amazon	4	3" Weldable Bullet Hinges with Grease Zerk	$27.96
Hardware	Ace Hardware	1	7/16" bolts for pins, 3/8" NPT Pipe, Chain	$32.41
Spray Adhesive	Ace Hardware	1	For gluing rubber mat to base	10.98
Total				$923.34

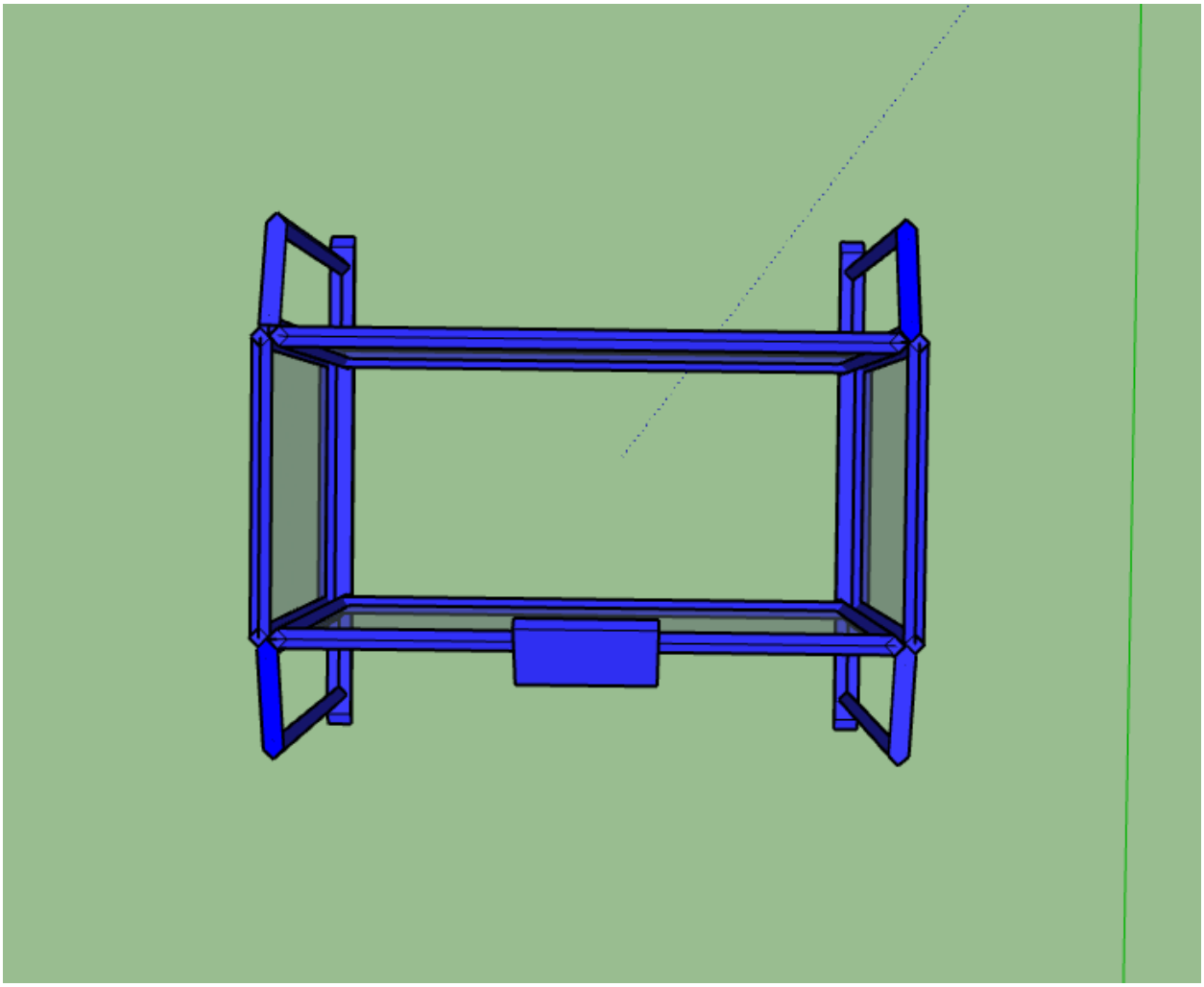
Resources

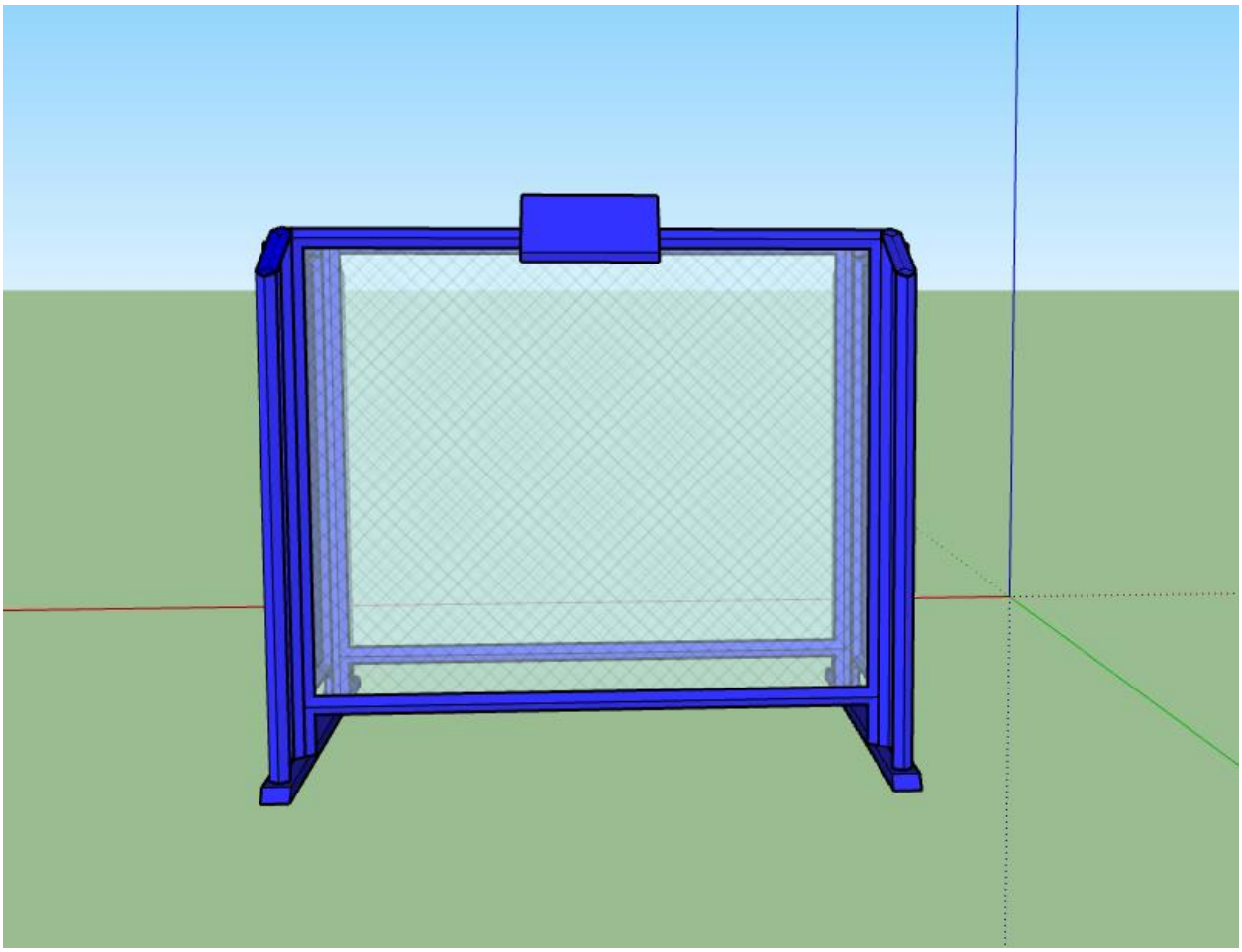
In addition to the resources there were a few resources that allowed me to do this project. Being a school project I used the school shop and school tools to complete this project. Beyond this I received help from a paint expert at carquest to help pick a single stage paint that will work well in the selected color. I also received advice from a professional painter on how to prep the surface and on painting technique.

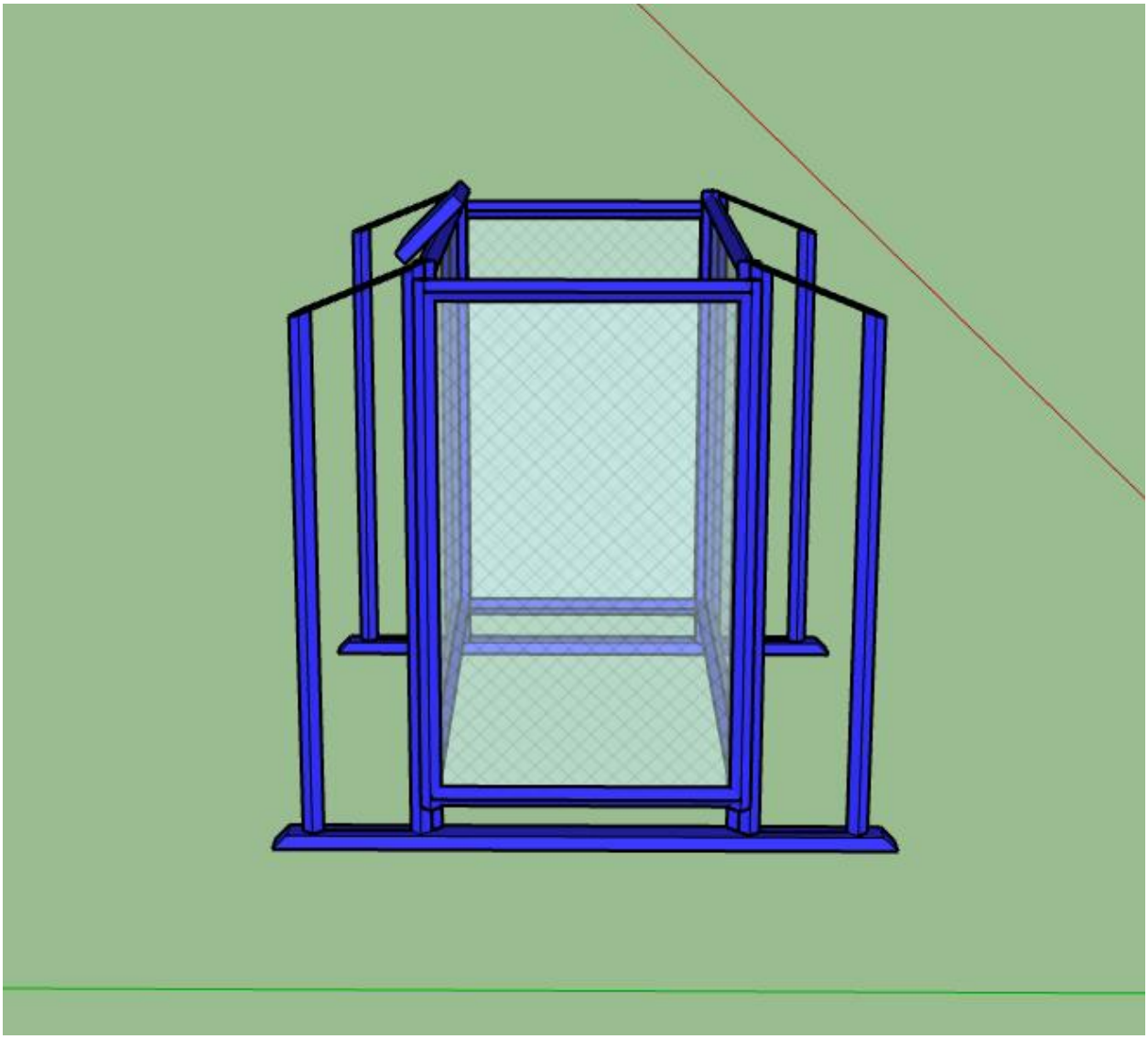
Section 4: Design

The following pictures are of the computer drawings created on Google Sketchup. For each component, we referenced the measurements of the CAD drawing to get exact measurements to manufacture the parts. Only minor changes were made during the building process, which did not affect the overall dimensions.



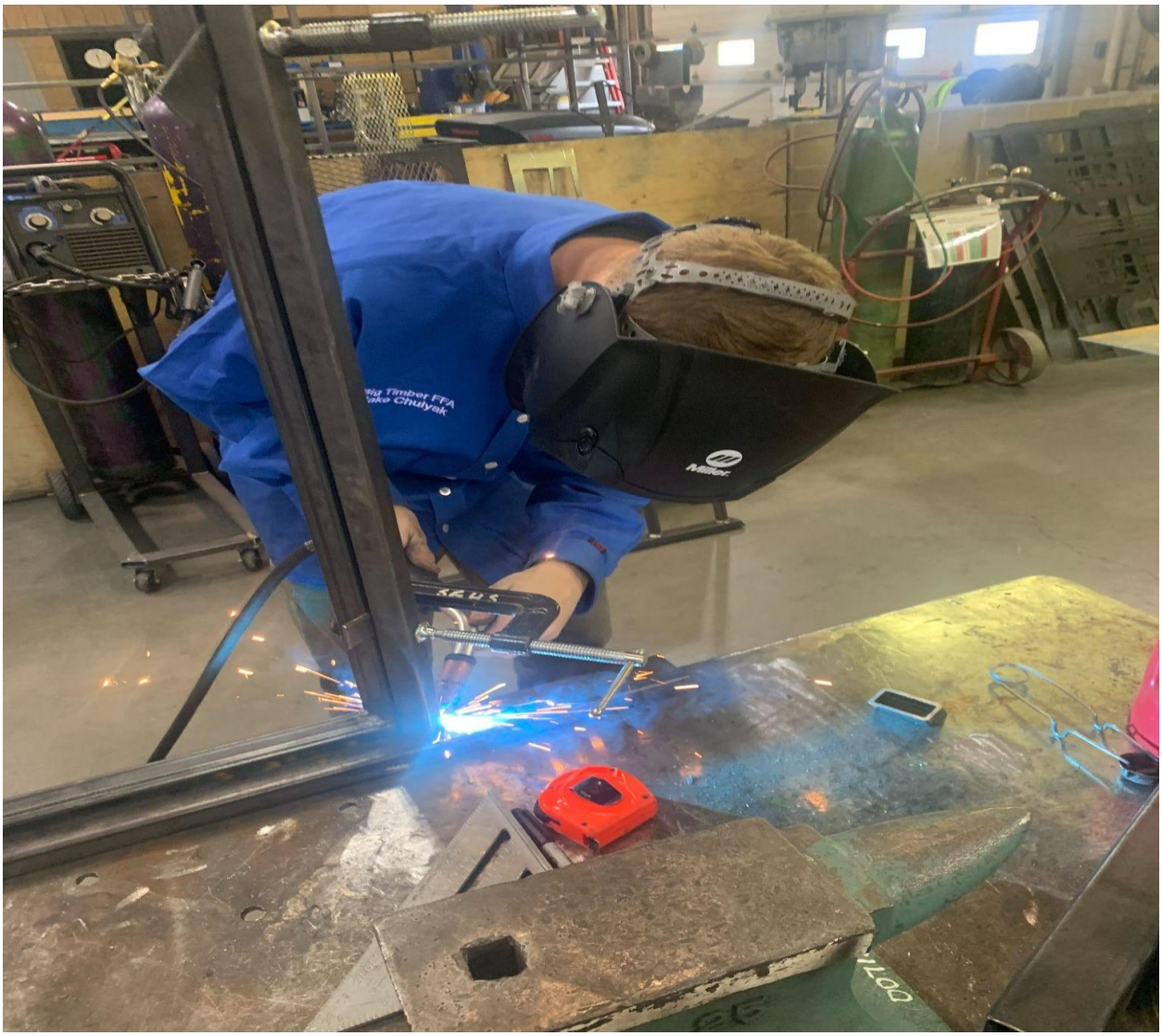






Section 5: Pictures

Step one was to cut all the steel. Since I designed everything “on diamond,” a special jig was required for cutting. The tube was marked at 35 degrees and cut at 45 degrees so it would fit at a 90 degree angle. The challenge was getting all the parts to the same length as it was difficult to line up the blade.



Once I had all of the parts cut I tacked everything together, did a test fit, then fully welded every joint. Everything was clamped in place during welding to avoid warping.

After all full welds were in I was able to test fit all the panels and clamp them together with shims. The purpose of shims between pieces was to allow a small tolerance so it is easier to connect pieces together and allow for the thickness of paint.

After the panels were assembled I added the hinges and latches.

The next step was primer and paint. After I used a self etching primer and let it set for 30 min I proceeded to mix the automotive paint. This was a 4:1 mixture of paint to reducer, with hardener already in the paint.

I then sprayed the first coat of blue using an HVLP sprayer. Adjusting the settings correctly took some practice, but once the gun was dialed in, painting went quickly.

One of the hardest parts of painting was to get in the corners including spraying nearly upside down at times.

For the Door panels we created a custom stand to hold the gate open and off the ground. Once all parts were painted we let them dry and then removed all masking.

Thank you for your interest in our project!

Sweet Grass County High School