

Little Man Jr.

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Team AM01

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Introduction and Background

What is the Project?

We were given specific design criteria we had to meet for this project, as follows:

- Must have some moving parts
- A minimum of three unique components per person for a total of twelve minimum unique parts total
- A minimum of one subassembly per person
- At least one screw per person using a M2.5 or M3 Heat Set Insert

We decided to create a “little man” with moving limbs to meet the design criteria. We did this by breaking him up into four sections: head, arms, abdomen, and legs.

Our team mainly utilized ball and sockets within our design, deciding to also do a different elbow connection to represent the limited mobility of your arms.

The head has a hat screwed onto it, with the ball and socket neck attaching the torso and head. The socket rod had a tight fit into the head, requiring no screws to hold the pieces together.

The arms are connected to the abdomen at the shoulder joint by ball and socket. The hands are connected to the forearm by a smaller ball and socket joint, and the upper arm and forearm connection at the elbow allows for motion along one axis. To connect the shoulder socket to the upper arm, we used an insert, screw, and washer to ensure proper rotation of the shoulder socket with the arm.

The abdomen consists of one of its own balls and socket in between the hips and torso, giving it the ability to twist the hips around the z-axis indefinitely. The chest fits over the torso and has an insert to hold those two parts together. The chest has a ball to fit with the socket from the head and two balls to fit with the arm sockets on the sides. The hip has two sockets to fit with the balls connected to the quads. The back has an insert to hold together the torso and chest.

The legs consist of eight parts: the foot, the rod to connect the foot and shin, the shin, the ball for the knee, the socket for the knee, the quad, a quad pant, and finally the ball attached to the hips. The foot clicks in with the rod which connects to the shin. Then the ball piece is put into the hole at the top of the shin, and the socket is placed into the hole at the bottom of the quad. These two “subassemblies” will then click into each other. The last ball piece goes into the top of the quad and then connects with the hips. In the quad, an insert is placed so that the quad pant can screw onto it.

Dimensions

Total Length: ~221mm

Total Width: ~88mm

Head: ~55mm

Torso Length: ~70mm

Arm Length: ~77mm

Leg Length: ~111mm

Entire Assembly

Isometric Exploded Pictorial View

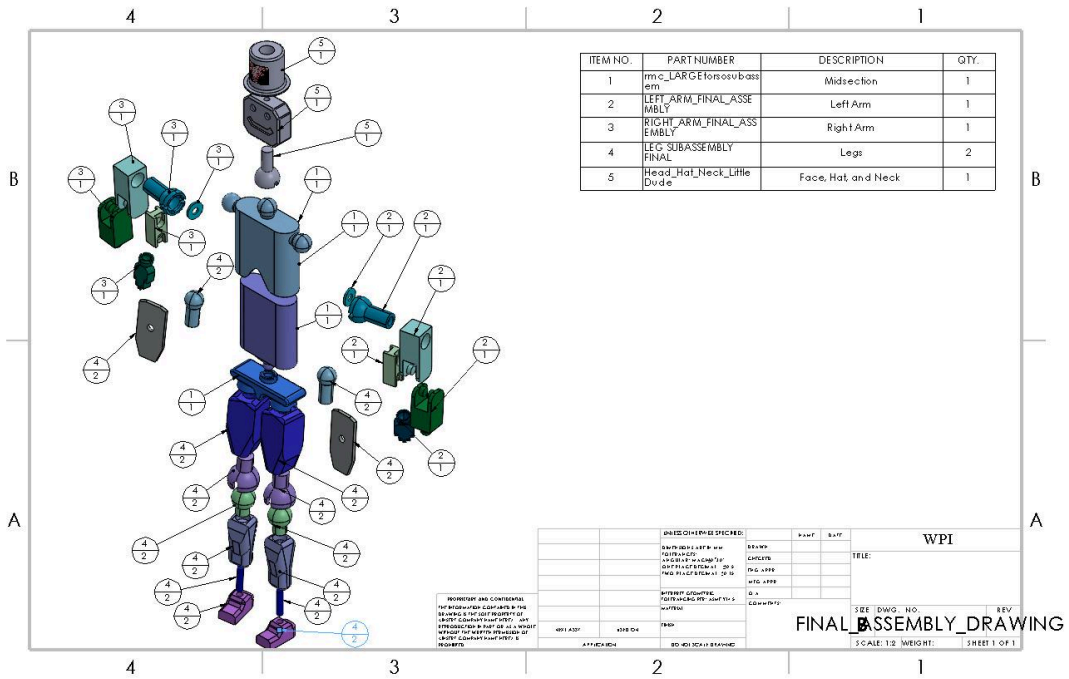


Figure 1.1: Little Man Jr. Isometric Exploded View Drawing

Sectioned View of the Assembly

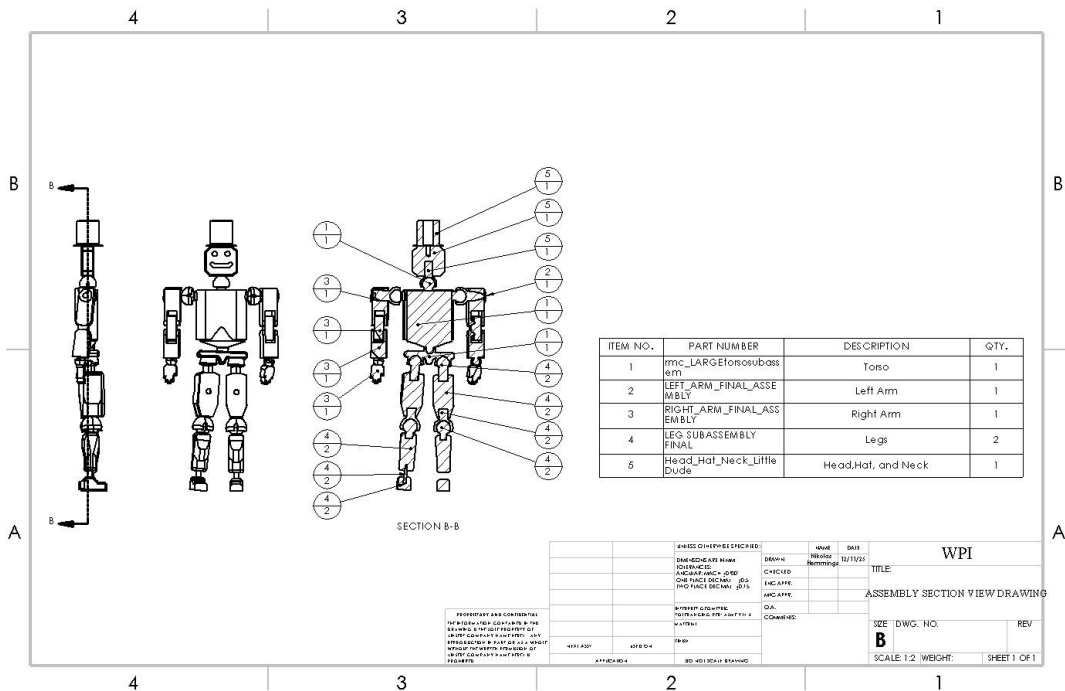


Figure 2.1: Little Man Jr. Sectioned View Assembly Drawing

Head, Neck, and Hat

Isometric Exploded Pictorial View

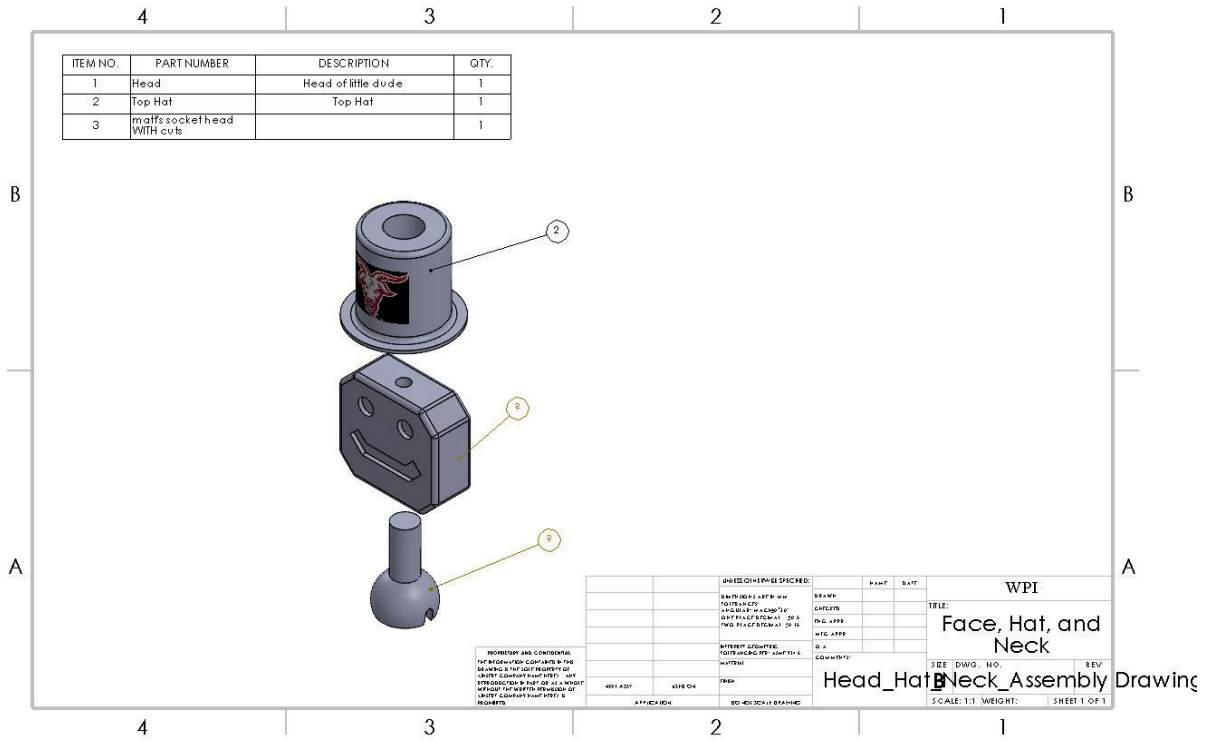


Figure 3.1: Head Isometric Exploded View Drawing

SolidWorks Engineering Drawings

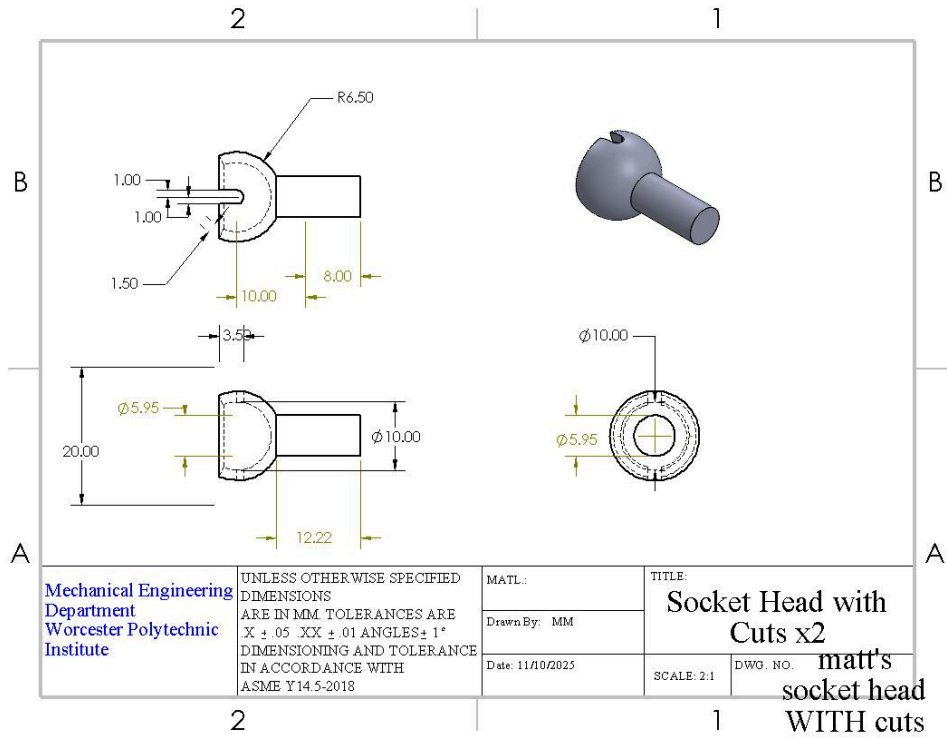


Figure 4.1: Head Socket

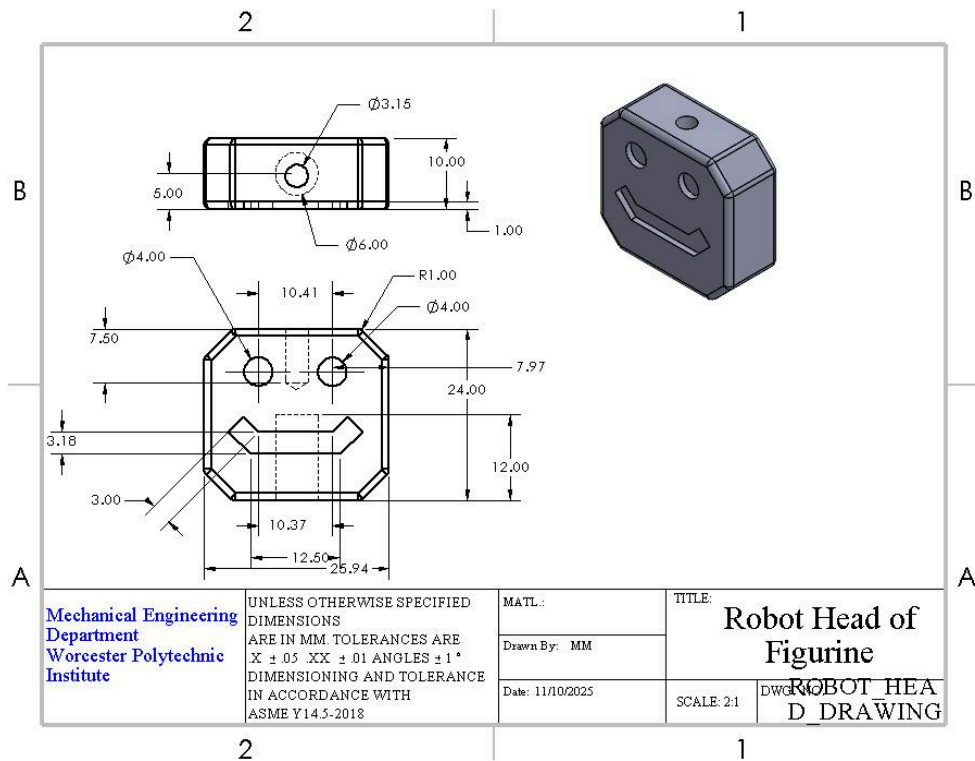


Figure 4.2: Head

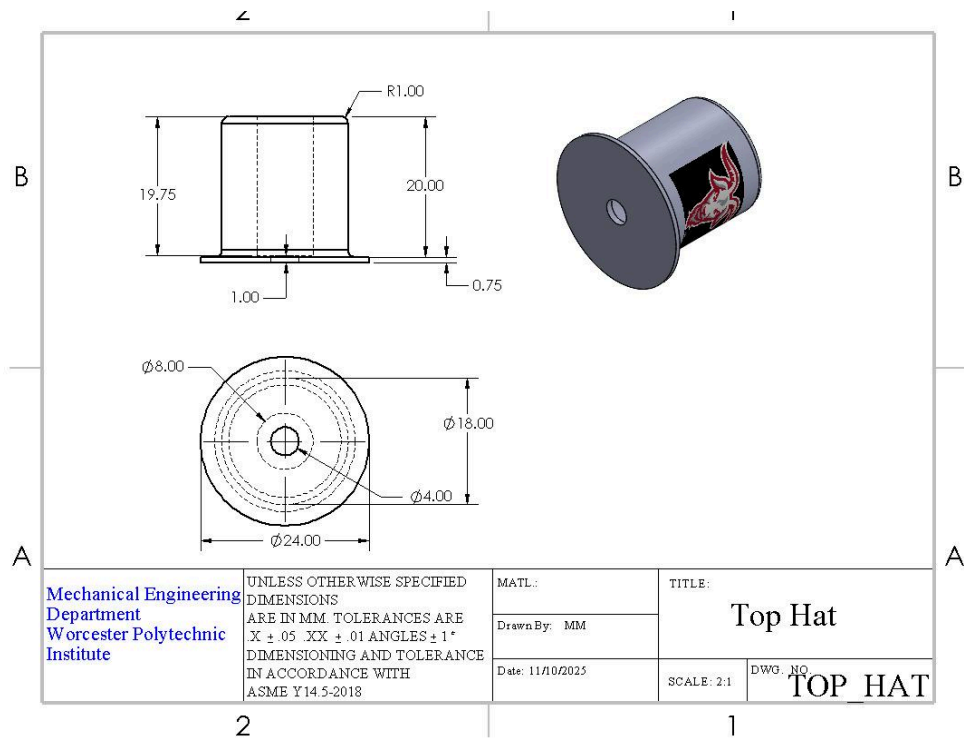


Figure 4.3: Hat

Arms and Hands

Isometric Exploded Pictorial View

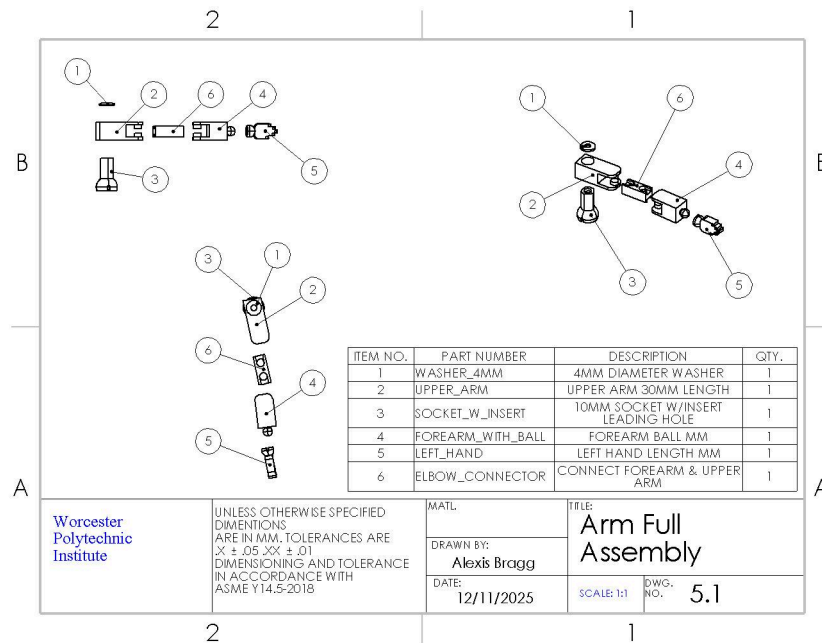


Figure 5.1: Left Arm Isometric Exploded View Drawing

SolidWorks Engineering Drawings

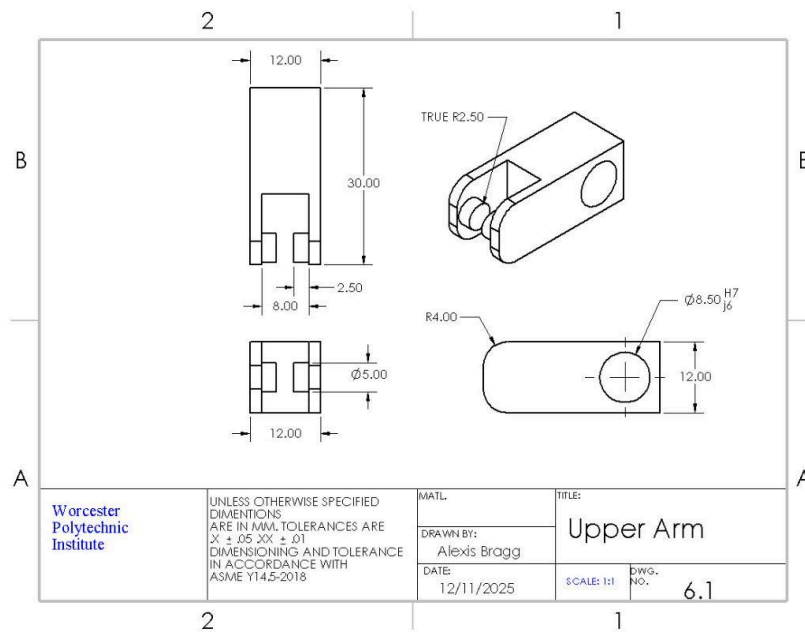


Figure 6.1: Upper Arm Drawing

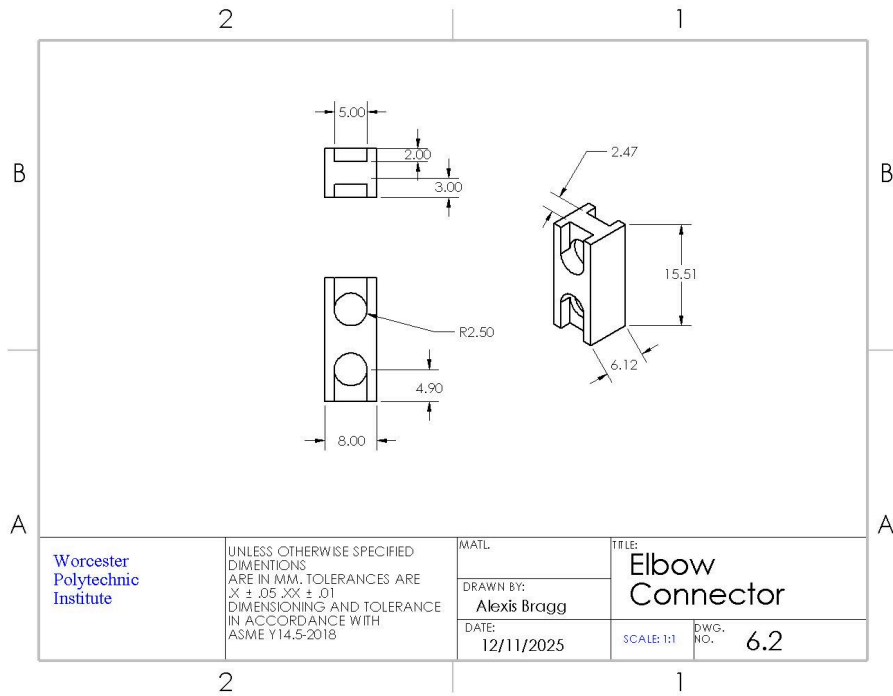


Figure 6.2: Elbow Connector Drawing

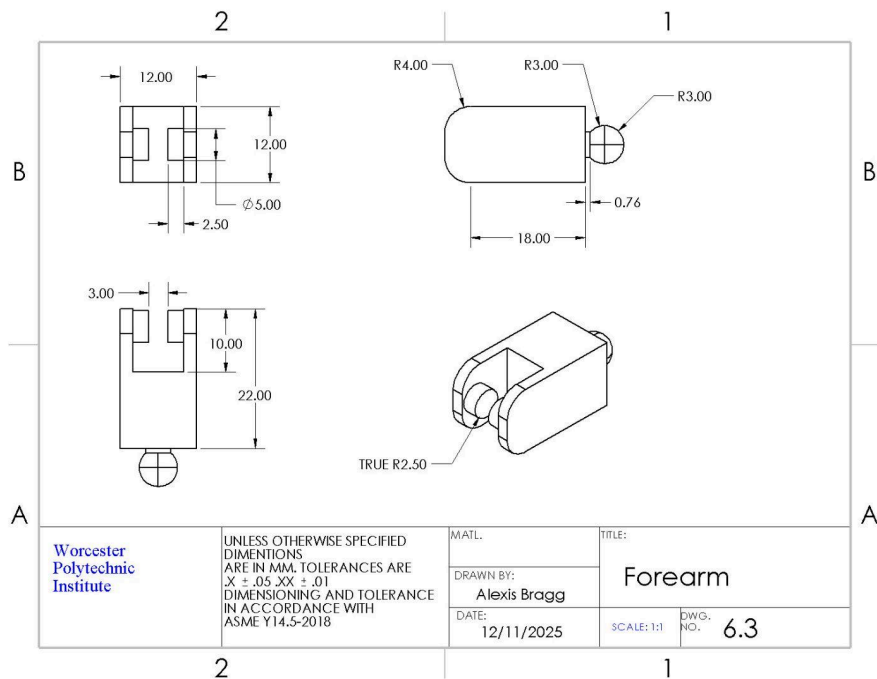


Figure 6.3: Forearm Drawing

Abdomen

Isometric Exploded Pictorial View

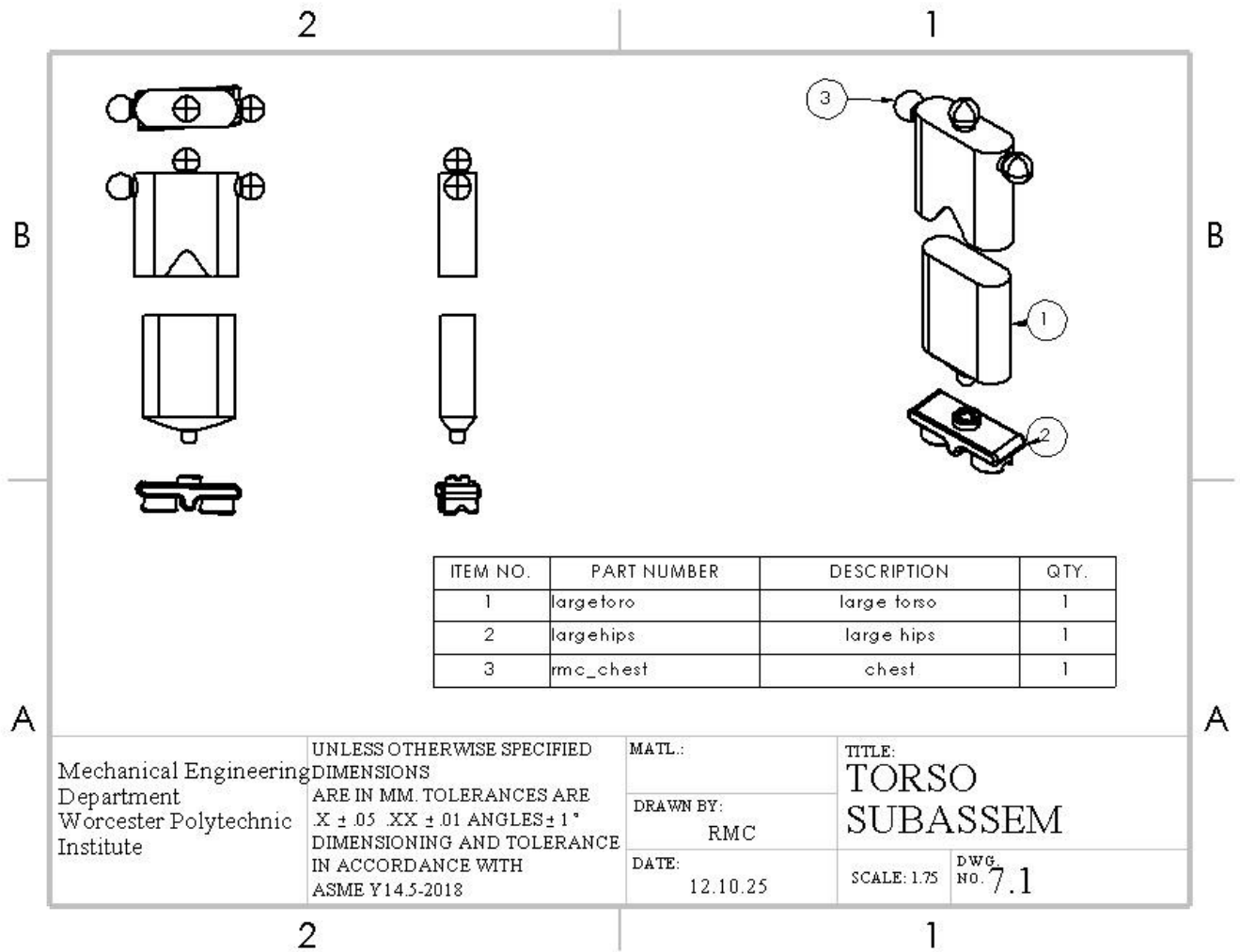


Figure 7.1: Abdomen Isometric Exploded View Drawing

SolidWorks Engineering Drawings

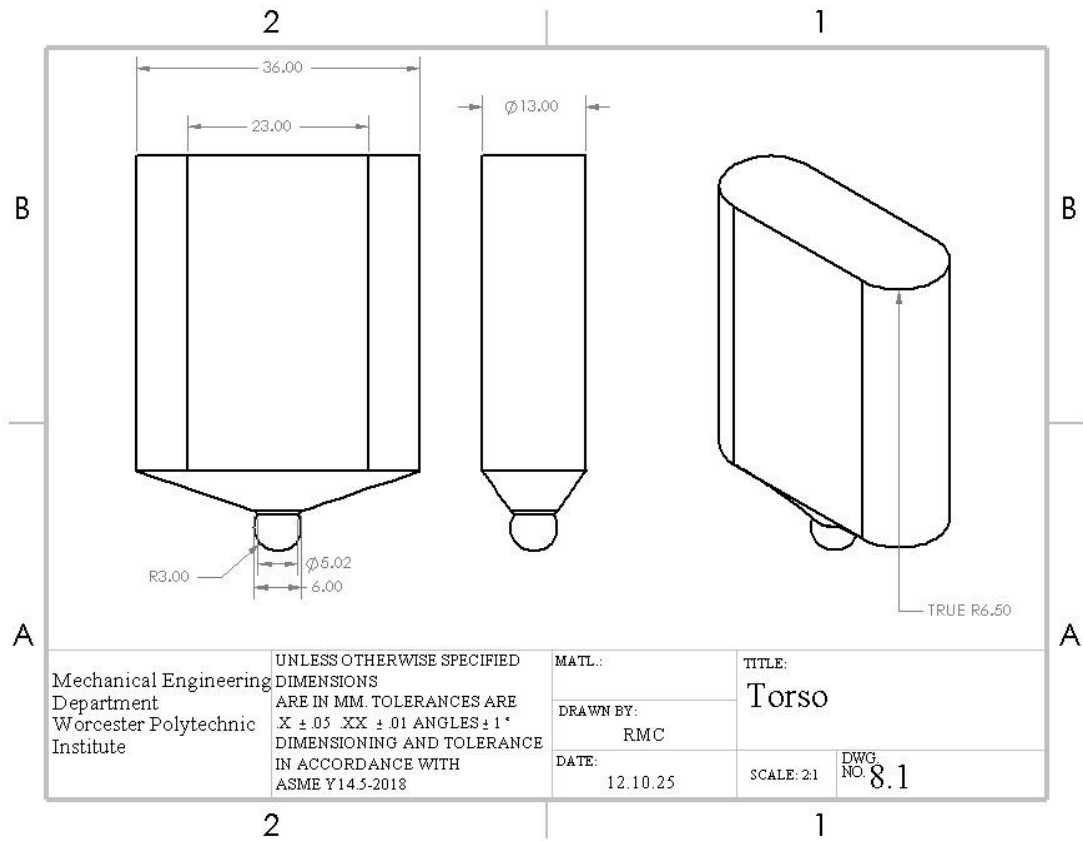


Figure 8.1: Torso Drawing

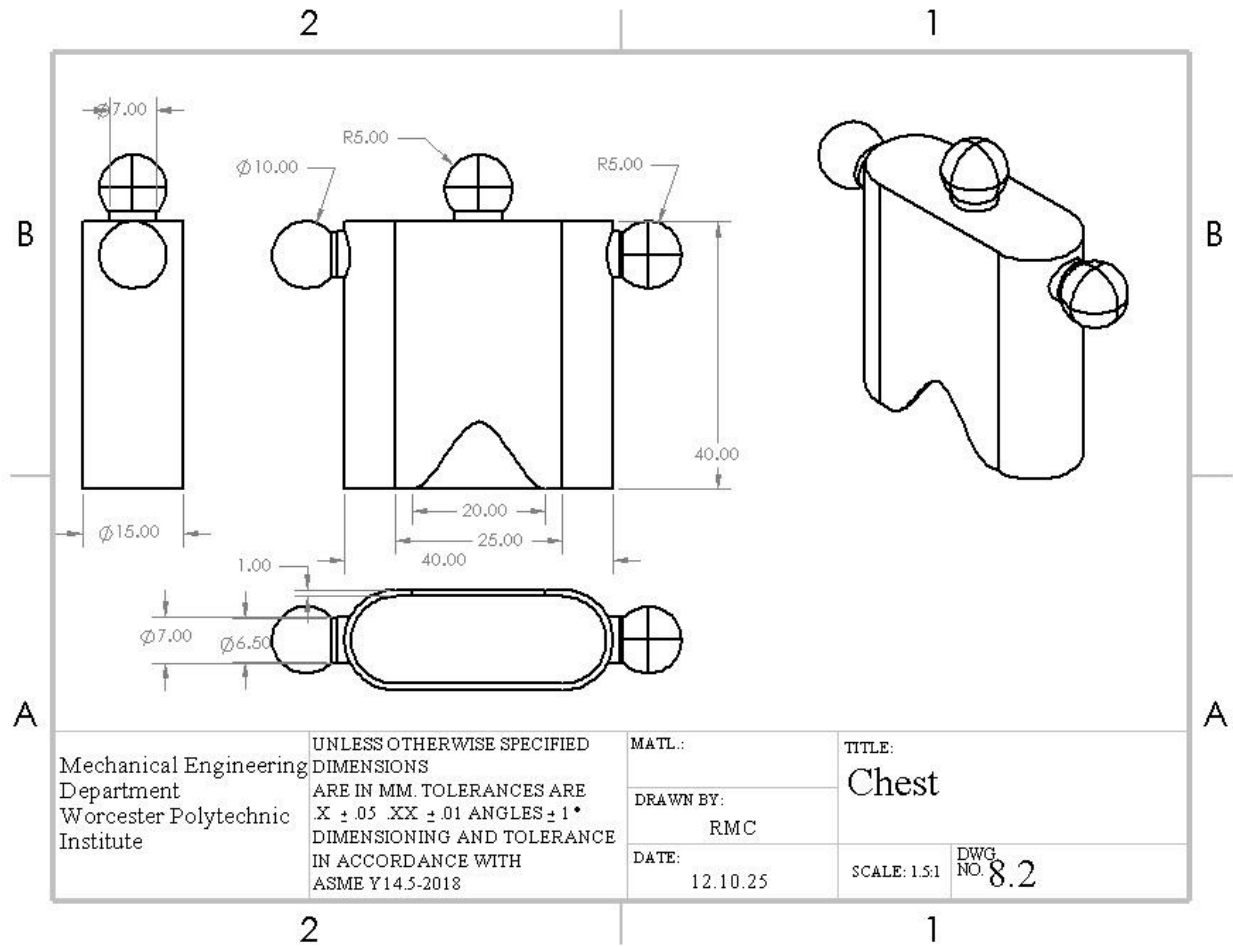


Figure 8.2: Chest Drawing

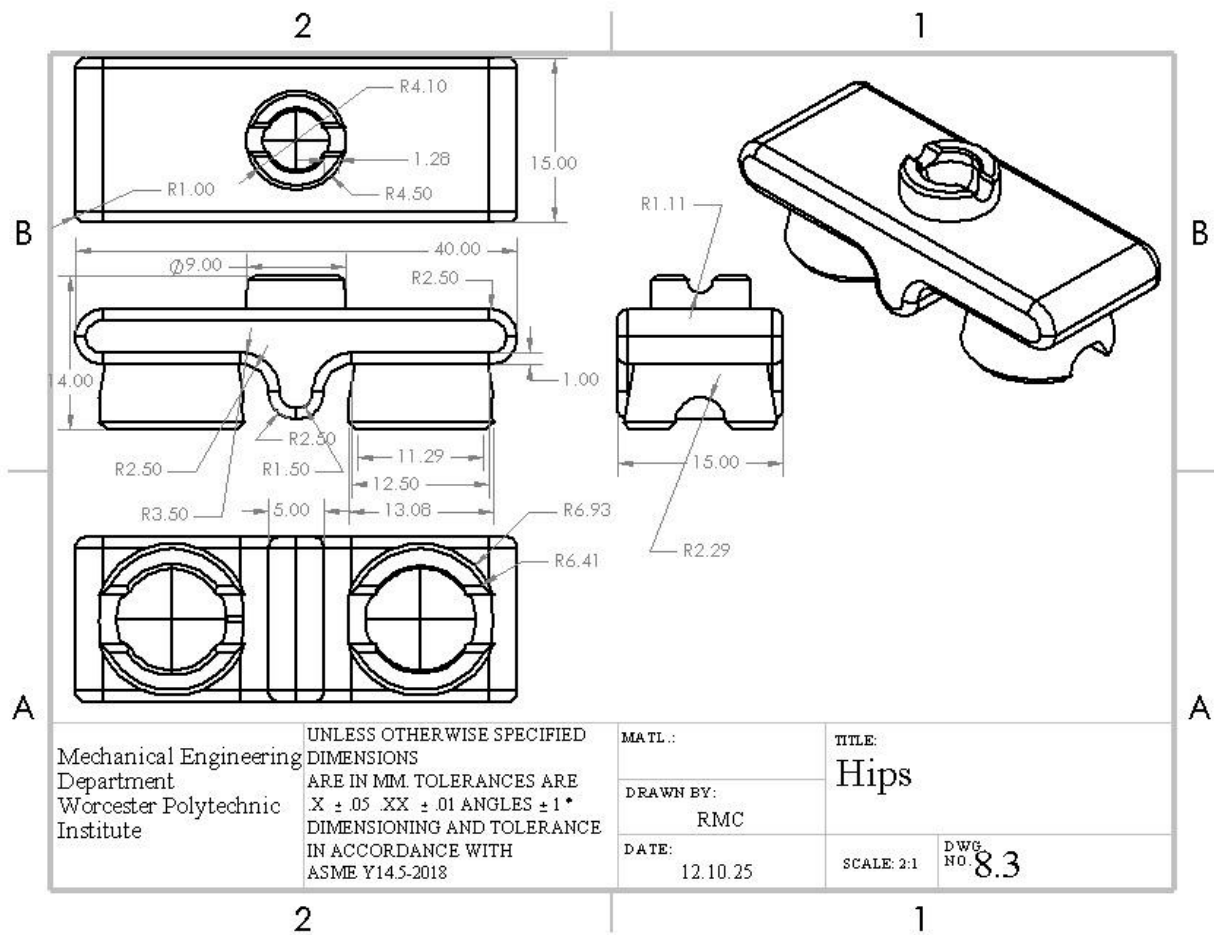


Figure 8.3: Hips Drawing

Legs and Feet

Isometric Exploded Pictorial View

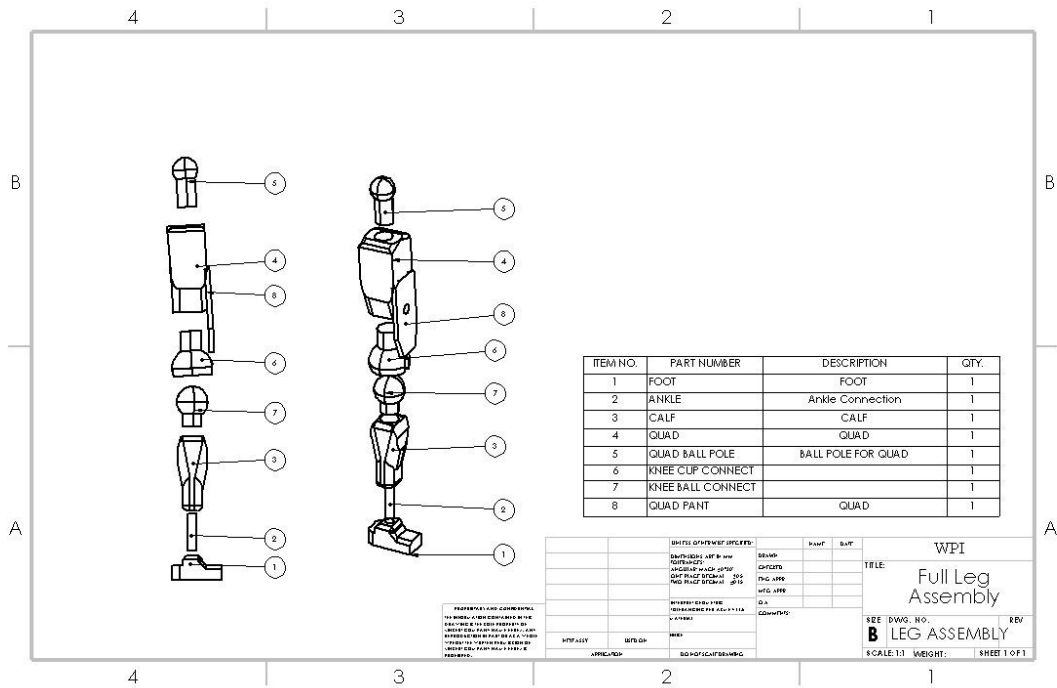


Figure 9.1: Leg Isometric Exploded View Drawing

SolidWorks Engineering Drawings

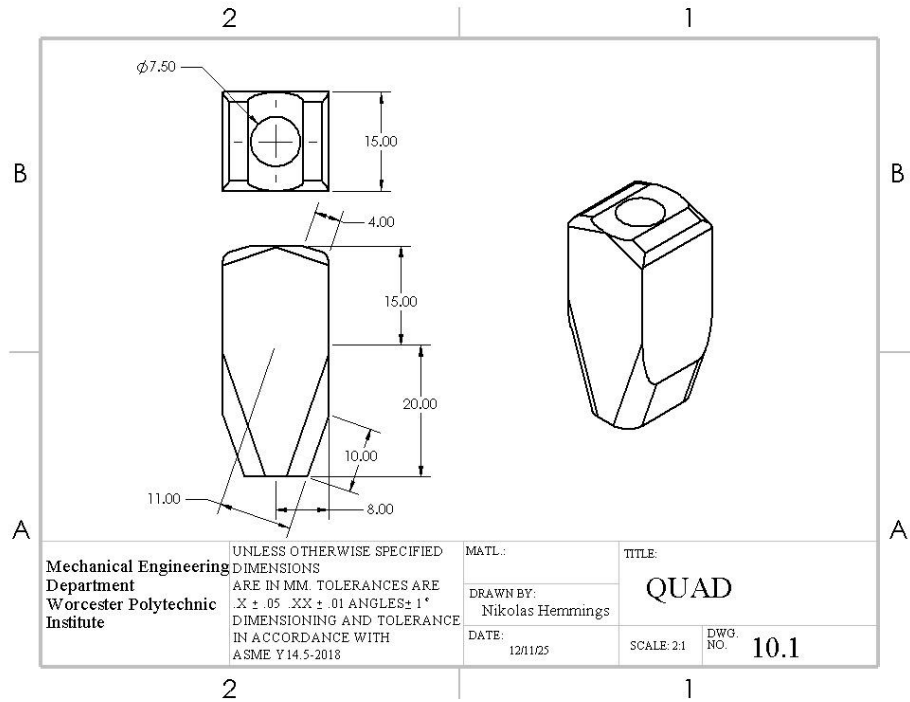


Figure 10.1: Quad Drawing

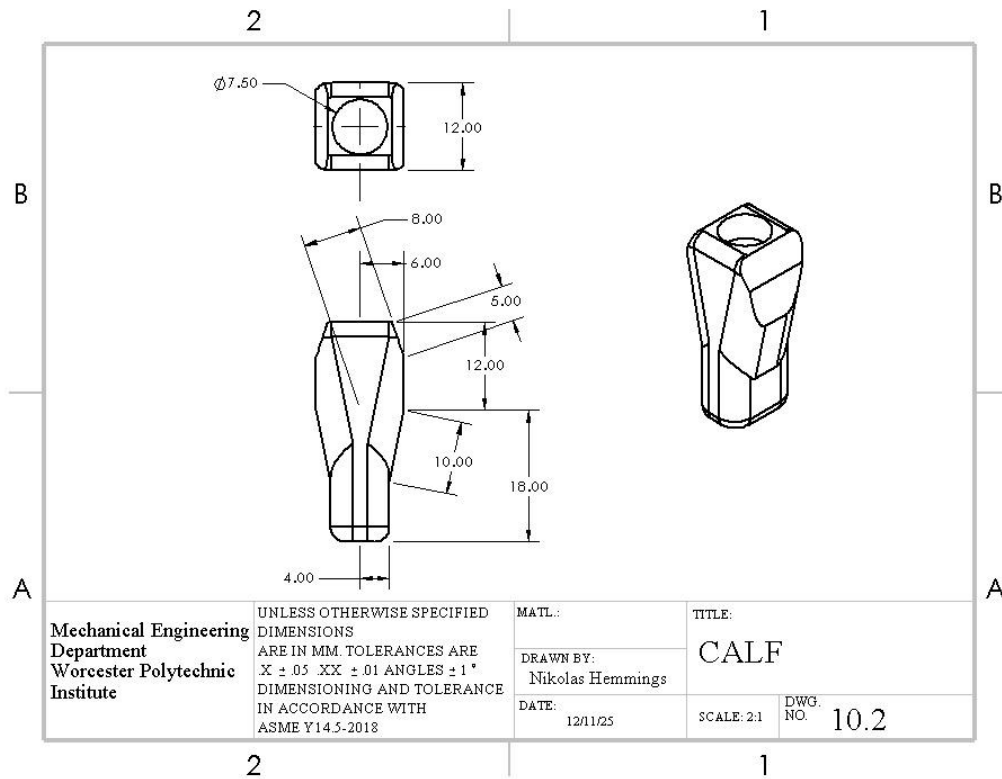


Figure 10.2: Calf Drawing

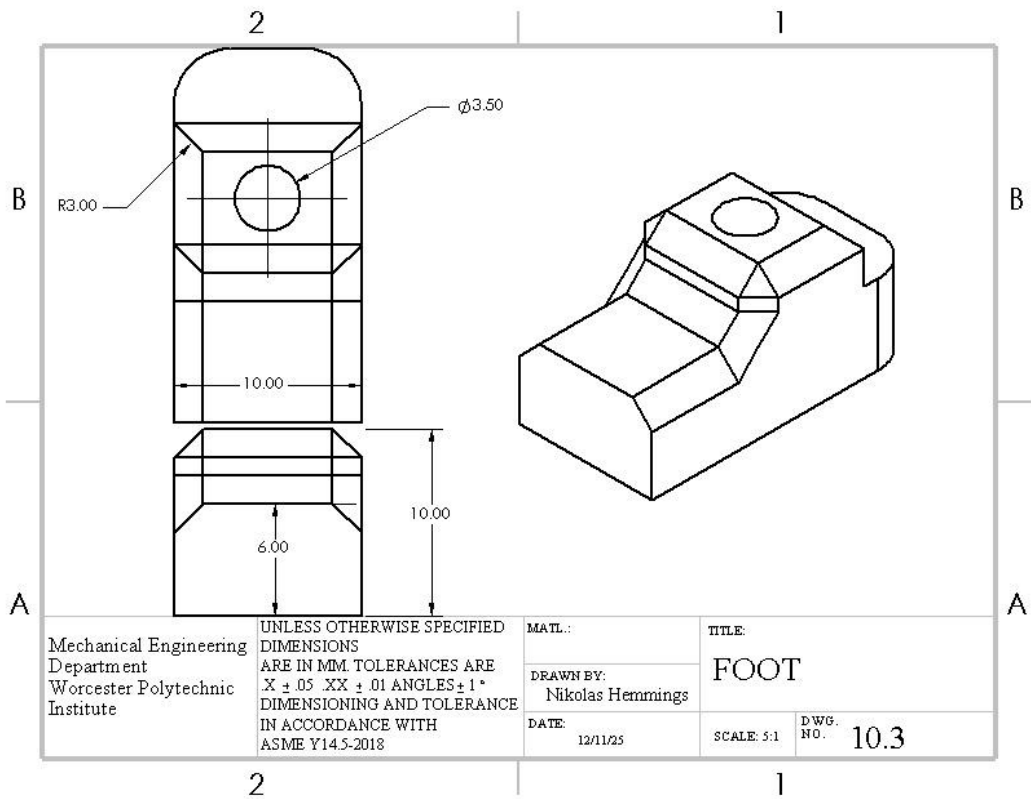


Figure 10.3: Foot Drawing

Animation

[Animation Link](#)

This animation shows the assembly in an exploded view and assembled view, changing orientations and camera views to allow the viewer to see each part of the assembly.

Appendices

Contributions

Alexis Bragg: Responsible for designing the arm components in SolidWorks. Created figures 5.1, 6.1, 6.2, and 6.3. Went through lengthy testing through SolidWorks and 3D prints to ensure joints worked together and provided the team with an example ball and socket. Troubleshooted issues with leg inserts, socket for the head connection, and designed the quad shield pieces. Created the report layout and contributed to the writing of Introduction and Background. Provided assistance with the animation.

Rosalinda Christopher: Responsible for designing the abdomen components in SolidWorks. Created figures 7.1, 8.1, 8.2, and 8.3. Collaborated with each member of the team to ensure that all four sections fit together. Contributed to the writing of Introduction and Background. Created the full little man jr. assembly and two minute animation in SolidWorks.

Nikolas Hemmings: Responsible for designing the leg components in SolidWorks. Created figures 2.1, 9.1, 10.1, 10.2, and 10.3. Collaborated with teammates through rigorous Solidworks and 3D prints. Specifically, troubleshooting the leg inserts and various 3D prints for the socket head connection, quad shield pieces, and the reconstruction of the ankle component.

Matt Morvillo: Responsible for designing the head components in SolidWorks. Created figures 1.1, 3.1, 4.1, 4.2, and 4.3. Collaborated with teammates through rigorous Solidworks and 3D prints. Specifically, troubleshooting through many failures involving the neck ball and socket portion, as it kept cracking during assembly due to incorrect fits.

Contribution Percentages

- Alexis Bragg: 25% - *Alexis Bragg*
- Rosalinda Christopher: 25% - *Rosalinda Christopher*
- Nikolas Hemmings: 25% - *Nikolas Hemmings*
- Matt Morvillo: 25% - *Matt Morvillo*