Part one: Base:

order of fillets on a rectangle. In this part I experimented with filleting corners before edges (vertical corners before their horizontal edges). I found that I got the asthetic I was looking for by doing it in that order, and in addition the fillet operation was simpler. However its likely that these two methods would end up the same, and I should go back and try it.

I also had to remember linear/circular patterning for features. I used this on the gear wheel seen in the base, and the vents on the bottom side.

Interesting “bug”/user-error. When mirroring an extrusion that used the “up to surface” mode, the mirrored features will also use that SAME surface, which often isn’t what you were going for. The quick fix for me was to use “up to next” instead. This came up when doing the vents.

Part 2: thigh

holy crap this part was a lot of work. The main reasons is the way the lower thigh chunk intersects with the spherical part, AND the etchings in the sphere.

The lower thigh was thankfully 2 equal halves that extruded from the center plane, which was nice because that was the same center plane as the sphere. Meaning this part COULD’VE been as easy as a 2 direction extruded sketch. But the way the lower thigh intersects is non trivial (see original model picture). I spent some time getting this to look right, and eventually had to do the extrusion across 2 different features.

Etching onto a spherical surface is non trivial in soldiworks 2014. The wrap feature refuses to place a sketch onto a sphereical surface (as opposed to a conical one for example). The work around is summarized as this:

1. Create an offset surface from the spherical surface
2. Use a sketch to split the face of that surface
3. delete the parts of the face that aren’t your sketch
4. “thicken and cut” that face into the original sphere

Although it feels hacky, and is unwieldy for a large number of unconnected etchings, it did work. One of the main issues with this method is that to modify the original sketch you used to etch is very awkward. Often it means you basically have to delete the child features and redo everything. Because this was unacceptable to me, I used a simpler method. I simply used a sketch to do a revolved cut, and then added a circular pattern of “ribs” back in. This method allowed for much easier editing of the shape of the ribs, and ultimately had a fraction of the feature count. (It also used less complicated features).

assembly part 1:

Interesting mirror techinique. This should also be called proper technique? I previously made another part and used a feature mirror to mirror everything in the part. This is a sort of hacky mirror that I knew wasn’t right, but wasn’t sure how to do. After all if the right leg is “mirrored” at the assembly level, it often had the right hand left hand asymmetry thing going on.

So the assembly mirror feature has a “create right hand version” or something like that. It Probably functionality does something similar to my hack, but it felt much cleaner. The problem was that now these mirrored parts were locked into the same orientation, such that if I had 2 legs mirrored, they would also be at the same rotation angle. I went to fix this, by “dissolving” the mirror, which seemed to just place the mirrored component into its own file, and put that into your assembly. Mirroring components in assemblies is probably worth looking into more, and will come up again since this model has mirrored everything except the core of the robot.

leg part 1:

I had to make this odd shape: (show leg of mech). It isn’t a clean arc, so I immediately thought of modifying the standard method of revolving an arc, and went for revolving a spline. The normal spline tool seemed awkward to use, it kept just adding more spline points when I wanted to stop adding points and modify the existing curve.

Style spline turned out to be very intuitive and exactly what I was looking for. (show picture of curve sketch).

Another gratifying time saver was the ribs, using “extrude up to surface”, the surface in question was an offset plane from the back of the foot, and then using a linear pattern which achieved the ribs climbing the foot, but also staying consistent thickness on the way up. (show picture of rib model and photo).

This is also the first model I ever brought in a real life photo for reference. I brought this photo into the sketch so I could get the angles correct on in this sketch (show sketch with ref photo). In general this seems very useful for getting the profile of a real object, especially when there are hard to measure angles (I didn’t have any tools to do so, so they were all hard to measure for me).