Bender Bending Rodriguez

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EDSGN 100

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The Drawing of Bender
I chose to make Bender Bending Rodriguez as my project seeing as I am a big fan of the show Futurama. Bender one of the humorous characters in that show, and happens to be my personal favorite. I am a big fan of television shows, particularly animated and funny shows like Futurama, Family Guy, et cetera. In the show Futurama, Bender is a bending unit, or a robot specifically designed to bend metal. However Bender is different. He prefers to sit around all day and be lazy, cause mayhem, and drink all day (robots run on alcohol in this universe). I used the following picture to guide my design, but all the dimensions used in this assembly were relative seeing as I modeled a character in an animated show.

The Referenced Image
http://futurama.wikia.com/wiki/Bender_Bending_Rodr%C3%ADguez
I used quite a number of features to make this assembly. For the head I used a revolve. Basically I made a half of the shape of the head, including the antenna, and then revolved around the y axis. For the eye frame, I simply made an extrusion and then shelled it, and for the mouth hole, I made a cut. For the eyes, I revolved a quarter circle thus making a half-sphere, and then made a cut in the revolve giving the eyes an angry appearance. The mouth was very difficult, for that I made a cylinder slightly smaller than the head, and then cut off nearly everything around leaving a weird three dimensional, but still curved mouth shape. Then, making the indents for the teeth proved to be quite the challenge. After consulting both yourself and the TAs for guidance, the solution ended up being to raise a series of connected lines in the shape of a grid, and then make a circular cut giving the appearance that the teeth wrapped with the mouth. After all that trouble I finally began the assembly and mated the eyes and mouth to Bender’s head.

Next, I made the body. The body I made in the same way as the frame for the head. I made a sketch of half of the body and revolved it, to make a slightly upward expanding cylinder with an indent at the top to mate the head. For the arm holes, I made small spheres that overlapped with the torso, giving the body some “shoulders”, which can be seen in the pictures. Then I made two more cuts in each of the shoulders to make arm holes. For the legs, I simply made some cuts into the bottom of the body. I had to tweak the sizes of the holes to make the body look more proportional and thus visually pleasing, which was a large pain as I had to go back and redo the shoulders. The last piece I added to the torso was a cut for where Bender’s door would go. I did that by making a large upside down trapezoid on a plane a few inches in front of the body and then making a cut that ended up looking like the shape of the door, but the cut was uneven and would end up causing me a lot of trouble when I would move on to make the door.

The arms and legs were very simple, I merely used the same technique used with the head and torso: I revolved. I did much tweaking with the dimensions for proportionality again. The feet were done after that step. The arms only required an extrusion of three small cylinder for fingers. The door was a pain however. I was stumped initially but finally realized I could loft to account for the weird shape the door would need to be. To do that caused trouble. I cannot remember the name of the tool I used, but it took already existing lines on whatever body I was sketching on and added them, in the same position, to the new sketch. This worked for the top piece of the loft, but the bottom caused trouble due to the nature of the way I made the hole for Bender’s door. The cut I had extruded from a plane offset the torso had left some parts of the lower face of the door hole slightly curved, and the tool was having a great deal of trouble with trying to brings these lines to the new sketch. It finally worked however, and I copied and pasted both sketches in a new part file and managed to loft them. I finished with a little raised cylinder on one side of the door to act as a handle, and thus all the parts to Bender were complete. Assembly was easy from there, only requiring a few easy mates.

By far, the hardest parts of this project were the mouth and door. The mouth edges out the door in terms of difficulty, because both myself and Connor had a lot of trouble trying to get the lines that ended up being the teeth to work. We tried the wrap tool, but we could not figure out why that was an error. We tried making cuts, but decided on extruding. Even that was
difficult as I had to redo sketches until the grid would finally extrude properly, and finally making the circular cut to trim the teeth-grid down took some work to accomplish. I spent the better part of two class periods trying to get both these pieces to work. During this process I learned of the wrap tool and got familiar with the errors pertaining to it, and I also learned about that tool whose name escapes me, the one that adds lines on a body behind it to the current sketch. The latter tool turned out to be particularly helpful.

I learned quite a bit in the Solidworks portion of class. I learned about a whole new piece of designing software, one that can accomplish some pretty amazing things and was for the most part very intuitive. All the tools and functions were very basic to understand which allowed me to learn about many cool tricks for future design projects. I feel having a background in any form of design software is incredibly important for any future engineer, and the tools gained from being able to work with this software for an extended period of time were invaluable. I hadn’t used a piece of designing software since my freshman year of high school where I worked with Autodesk Inventor, a program similar in a number of ways to Solidworks, and this class was a great refresher on the importance of design software and how intuitive it can be.