The Trumpet

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I decided to create a trumpet for several reasons. Although I am not extremely involved in the actual playing of a trumpet, I find the design and structure of instruments to be quite intriguing. Every detail in the creation of an instrument is critical to the sound it creates. For example, the lengths of the pipes, the size of the bell, and even the types of mouthpieces vary across the types of trumpets which changes the sound that the instrument makes. This same basic principle of sizes and differing sounds can be applied to most instruments, but I chose the trumpet because I find its design to be quite simple but also very intricate. The pipes bend back and forth over each other and there are only three buttons on the structure that can actually change the sound (along with different lip formations on the mouthpiece). I found this to be more fun to create than a saxophone for example, which I played for many years, because the saxophone’s design is a single tube with many, many buttons that change the sound.

To start, two parts were created that were fairly similar. The first was the tube that starts with the mouth piece and then curves down into a second straight into another curve upwards into a straight. The second part is the other side of the trumpet that starts at the bell and curves down into a straight. Both of these parts were made using the sweep feature and then shelled completely through to make them hollow. They were connected together by a curved part that was made separately using the sweep and shell features. The curve had to be dimensioned perfectly so it could connect the two ends of the pipes while at a tilt. This curve was then mated to the first part’s end and rotated to meet the other part’s end which was at an angle from the other part.

Next, I made the bell of the trumpet by using four planes and the loft feature. The part was then shelled and the edge of the wide opening was filleted. Then, text was added to the edge of the wide opening by using the boss extrude feature. I had never done this before, so this was a
new use that I had to learn online. Finally, I mated the end of the bell to the end of the second tube part that was created.

The next part created was the mouthpiece. The long end had to be made using the boss extrude feature and the extruded cut feature. The neck was then made using two planes and the loft feature. The final section of the mouthpiece was made using another plane, the boss extrude feature, and another cut extrude feature. The edges on this part of the mouthpiece, as well as on the neck, were all filleted to make the part look more smooth as well as to make the inside of the mouthpiece look more like an authentic mouthpiece that flows into the neck of the mouthpiece. The long section was then mated to the inside of the mouthpiece end of the original tube, and can slide in and out of the tube but it is currently fixed inside of the tube.

The key tubes were three identical parts. The main tube section was made using the sweep feature and the bottom and top edges were filleted for an aesthetic purpose. The stem leading up to the key pad as well as the key pad were made using the boss extrude feature. They were separated by a plane and made by sketching two different sized circles on top of each other. I then inserted three of the key tubes into the assembly and placed them in between the two main tube parts. This was probably the most difficult part of the entire project because of how hard it was to rotate and move the tubes to be perfectly aligned to each other and in between the tubes. I then fixed the two original tubes and the key tubes so they could not be moved or rotated accidentally.

The last part created was the finger hole. This part is for the pinky to hold the trumpet. It was made by sketching a circle, boss extruding the circle a small amount, and then shelling the circle completely. The outside edges were filleted for aesthetic reasons and then the ring was inserted into the assembly and placed on the correct tube.
The majority of the trumpet’s appearance is in polished brass, as that is the material used for trumpets. The rest of the trumpet is polished steel, which is used sometimes for the mouthpiece and for aesthetic purposes on some edges.

SolidWorks taught me a lot of patience. I am usually quite good at picking up computer programs and learning them, but SolidWorks is on another planet of programs. It can be slow, complicated, and generally frustrating but I learned to relax and be patient.
References

- Model: http://www.3dcadbrowser.com/download.aspx?3dmodel=10545
- Learning to use text: https://forum.solidworks.com/thread/38711