SolidWork personal project - Space shuttle

Figure 1: Isometric view of SolidWork project

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In this personal project, since my intended major is aerospace engineering, I decided to create the space shuttle in SolidWork software. Space shuttle is a milestone on the road of exploring outer space. In this project, I had look at several picture on internet to figure out the dimension and the outlook of space shuttle. However, there is no specific design graph and specific dimension that I can use, some part or dimension I can only use some approximate value.

Figure 2: E-drawing of SolidWork project

Process:

(1) Solid rocket booster

First, I sketch a circle and use extrude to make a cylinder, which is the meddle part of solid rocket booster. Next, I create several plants and sketch circle on it, use four lofts to connect with cylinder, to make it look like the figure below. Last, I use filter to make the edge sleek.
(2) External tank

First, I sketch a slice of outlook and middle line. Then I use revolve to finish outlook. Last, I use filter to make the edge sleek.
(3) Space shuttle main body 1-nose

First, I sketch a slice of outlook and middle line. Then I use revolve to finish the outlook.

![Figure 5: Space shuttle main body 1-nose](image)

(4) Space shuttle main body 2-middle part

First, I sketch a circle and a straight line across lower part of circle (to make it connect with wings), create another plant and sketch a small circle which can fit with the bottom of nose, then use loft to connect those two circle together, which is the front part of space shuttle main body (cockpit).

Next, sketch a circle with straight line across upper part of circle on the bottom of our front part of space shuttle main body and another straight line across lower part of circle (to make it connect with wings), and extrude it, then use extrude cut to cut a cuboid in the extrude body I just made, which is the storage of space shuttle.

After create the storage place of space shuttle, I start make the door of storage place. I sketch a smaller semicircle on the bottom of space shuttle main body front part and above the straight line on upper circle I sketch previously. Then extrude the space between big circle and small circle, which is the door of space shuttle storage place.

Last, create a plant at the end of main body and sketch a same size big circle and extrude a little bit to close the end of space shuttle main body part.
(5) Space shuttle main body 3-wing

First, I sketch the top outlook of wing. Then I extrude downward, and use filter to make the edge sleek. I sketch a middle line at last to make a strand line to help me when I am going to mate the part at the end.

(6) Space shuttle main body part 4- engine

First, I sketch the bottom of main part without main engine nozzle and extrude, then sketch semicircle on the side of main part body bottom to make the small nozzle engine place and extrude it. Next, create the engine nozzle by sketch a circle on the bottom of the part I just made.
and create a plant backward, then sketch circle that is slightly bigger and loft it to make the engine nozzles. Use same step to create the small nozzles which are above the main engine nozzles. Last, create a plant at front, sketch a little circle on it and loft it between small engine (sketch other half of circle)) and point to make a tapered which is the front of small engine.

Figure 8: Space shuttle main body 4-engine

(7) Back wing

Sketch the right side view of back wing and extrude it. Then sketch the line at top and both side and connect two point at the bottom of side to the middle point of top, and extrude cut to make the wing have a single edge at top.

Figure 9: Back wing of space shuttle
(8) Tube 1 – middle (connect space shuttle and external tank)

Sketch a straight line on right view, and sketch a circle and a straight line across lower part of circle (to make it connect with wings on front view at origin). Then use sweep to make a tube. Last, use filter to make the side sleek.

Figure 10: Tube 1 – middle (connect space shuttle and external tank)

(9) Tube 2 – triangle tube (connect space shuttle and external tank)

Use 3D sketch to sketch a triangle and sketch a circle and a straight line across lower part of circle (to make it connect with wing), then sweep it on the line of 3d sketch to make the triangle tube.

Figure 11: Tube 2 – triangle tube (connect space shuttle and external tank)
(10) Use assembly to mate all part together

Figure 12: Left side view of SolidWork project

In this project, the Hardest part is to mate all part together, since when we add it in assembly, the direction of each part are totally different, and I need to found the way to make it in order. The new feature I learn in project is 3d sketch, it is pretty cool to use 3D sketch and it cost less time on sketch than the original which is very helpful. In class I had learn the basis of SolidWork and the tools of it, but still not enough to be the professional one, I would probably learn more when I have extra time.