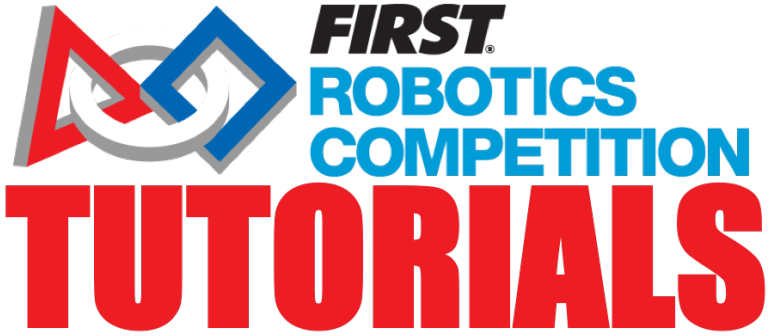
Computer-Aided Design (CAD)

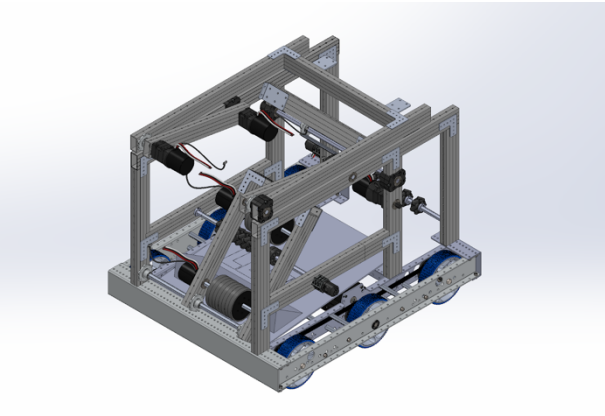
TEAM 8027

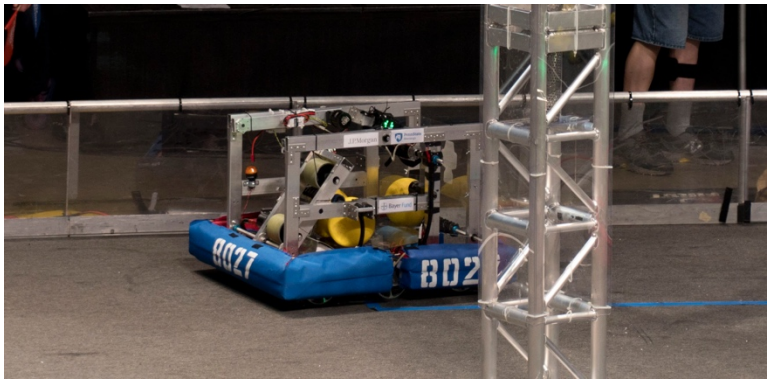
Instructions within this presentation are for the CAD software SOLIDWORKS only



Importance of CAD - FRC

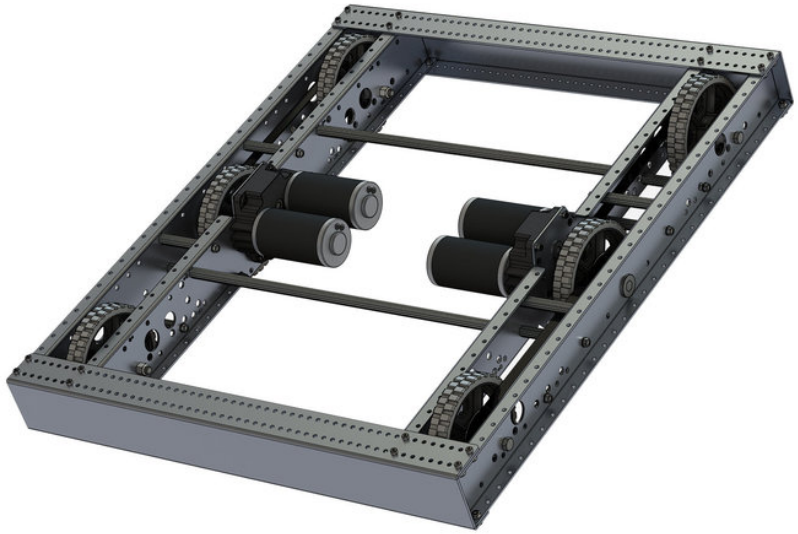
- CAD – Computer-Aided Design is an extremely important and useful tool in the creation of an FRC Robot
- Creating a CAD version of your robot prior to building allows the CAD to serve as a template for when you begin building
- It can help you organize ideas and parts into your deisgn to easily come back to later when you are building





Importing FRC Parts

- To begin building your FRC Robot in CAD, a useful and necessary skill is to be able to import CAD files of FRC parts from FRC vendors such as (Andymark, VEX Robotics, REV Robotics, etc.)
- This is important as it allows you to have the exact parts that you would be purchasing for your actual robot within your CAD
- Most parts on most of these robotics sites have CAD files – and even certain assemblies (such as the base chassis to the right) have available CAD files



Instructions to import parts are on the next slide →

Importing FRC Parts

- In order to import CAD parts from certain robotics websites, you must first find the file for your part on the webpage – this is usually located on the bottom of the page with your parts -- (SEE IMAGE 1)
- After you have downloaded the file, click the tab for it and open the part within the SOLIDWORKS software -- (SEE IMAGE 2)
- Following this, save the file of this part onto your computer with a name that you will remember, and then leave the solidworks page

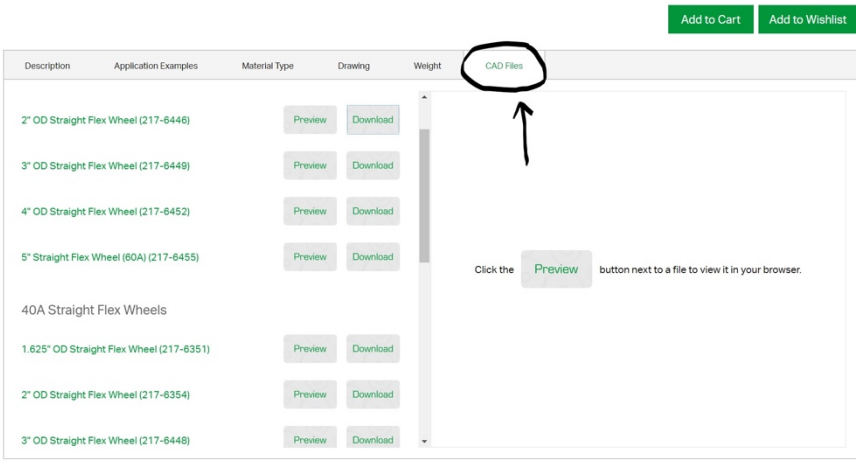


Image 1

Image 2

Importing FRC Parts – Cont.

- After this, if you wish to create an assembly with the part, you can open the new assembly tab in the SOLIDWORKS homepage, and click on the insert components button – you can then choose the correct part you wish to import -- (SEE IMAGE 3)
- To open the part as just a part, not into an assembly, click the open button on the homepage and then choose the correct file -- (SEE IMAGE 4)

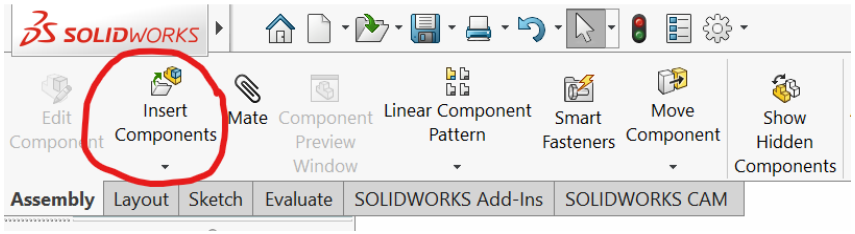
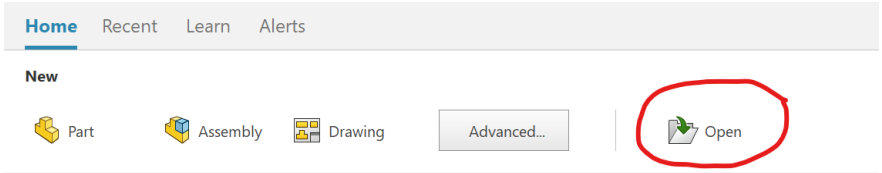


Image 3

Image 4



Creating Planes (Step 1 of Cutting Parts)

- Cutting parts is also a very useful skill if the parts you download are not the right length
- To show the software where you want to cut a part, first you have to make a plane
- To make a plane, you must click one of the right, top, or front planes and make it visible (choose the plane that is parallel to the plane where you want to cut)
- Then, to make the plane where you want to cut, you must go to the search commands bar and search "plane" -- (SEE IMAGE 5)
- After you click this, a menu should appear on the left of the screen - (Image 6) - where you can select the plane that you created eariler and adjust how far you want your plane that will cut to be

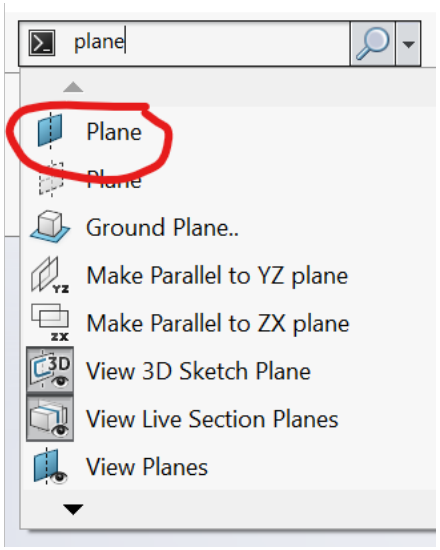


Image 5

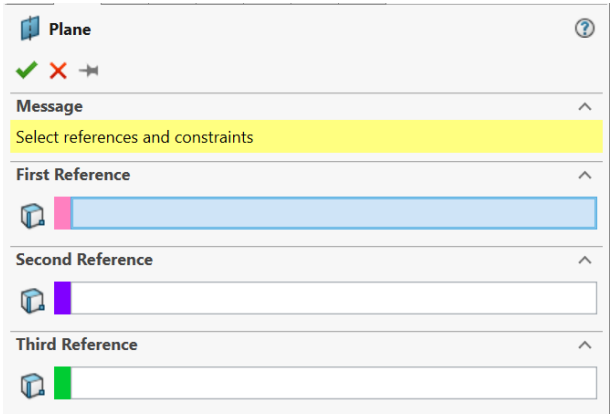
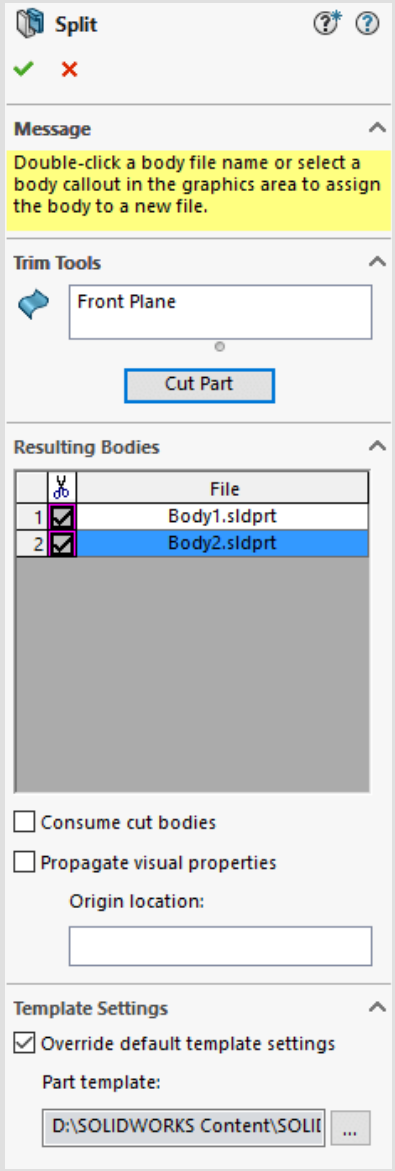


Image 6

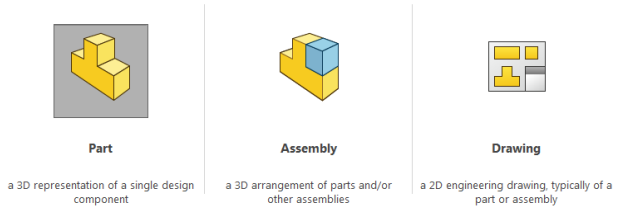
Split Feature – (Step 2 of Cutting Parts)

- Once the plane is positioned into the right spot, go to the search commands bar once more and search "split" - the menu from the image to the right should appear on the left of the screen
- Click the plane that you created in the right spot earlier, then click the cut part option
- To finish, it should label both of the cut parts, and you can double click the correct "body" to save it as a separate part



Creating Parts & Assemblies

- Often times your robot may require a part that you cannot get from a robotics vendor – in which case you would make your own part
- You can create both assemblies and parts in Solidworks by choosing one of the options from the menu similar to the one to the right
- There are many different features in SOLIDWORKS that you can use to create almost any part such as boss extrude, hole wizard, etc.



Useful Links – CAD Softwares & Sites

Onshape:

https://www.onshape.com/

Solidworks:

https://www.solidworks.com/sw/support/downloads.htm

GrabCAD:

https://grabcad.com/

Credits

- This lesson was written by FRC 8027 for FRCTutorials.com
- You can contact the author at team@droidsrobotics.org

- More lessons for FIRST Robotics Competition are available at www.FRCtutorials.com