Setting Up Fusion 360 for VEX IQ

Download and Open Fusion 360 (this can be done by registering for a free student license or paying for Fusion 360). Create a team or join a team. Once the team is created in Fusion 360, share the details with the rest of your team members. Open the assets project. Create a new folder labeled VEX IQ parts. Download and upload all VEX IQ parts from this website: https://kb.vex.com/hc/en-us/articles/360044338912-CAD-Resources-for-VEX-IQ. Now create projects, folders, and files to CAD robots. Stay organized!

Note, before inserting pieces to manipulate and CAD with, the file must be saved. Insert a piece by using secondary click and “insert into current design.” NEVER DOUBLE CLICK A PIECE TO INSERT IT!

Finally, edit the document settings and switch to inches. VEX IQ pieces align with inch increments.

Lesson 1: The Basics

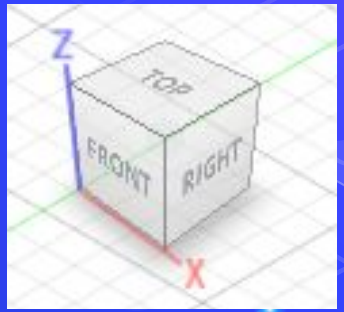
Navigation: Panning, Zooming, and Orbiting

What to do:

- Panning for trackpads: 2 fingers dragging
- Zooming for trackpads: Pinch or spread 2 fingers
- Orbiting for trackpads: Shift + 2 fingers dragging
- Panning for mice: Hold middle mouse button and drag
- Zooming for mice: Use the scroll wheel
- Orbiting for mice: Hold shift and middle mouse button then drag

What not to do:

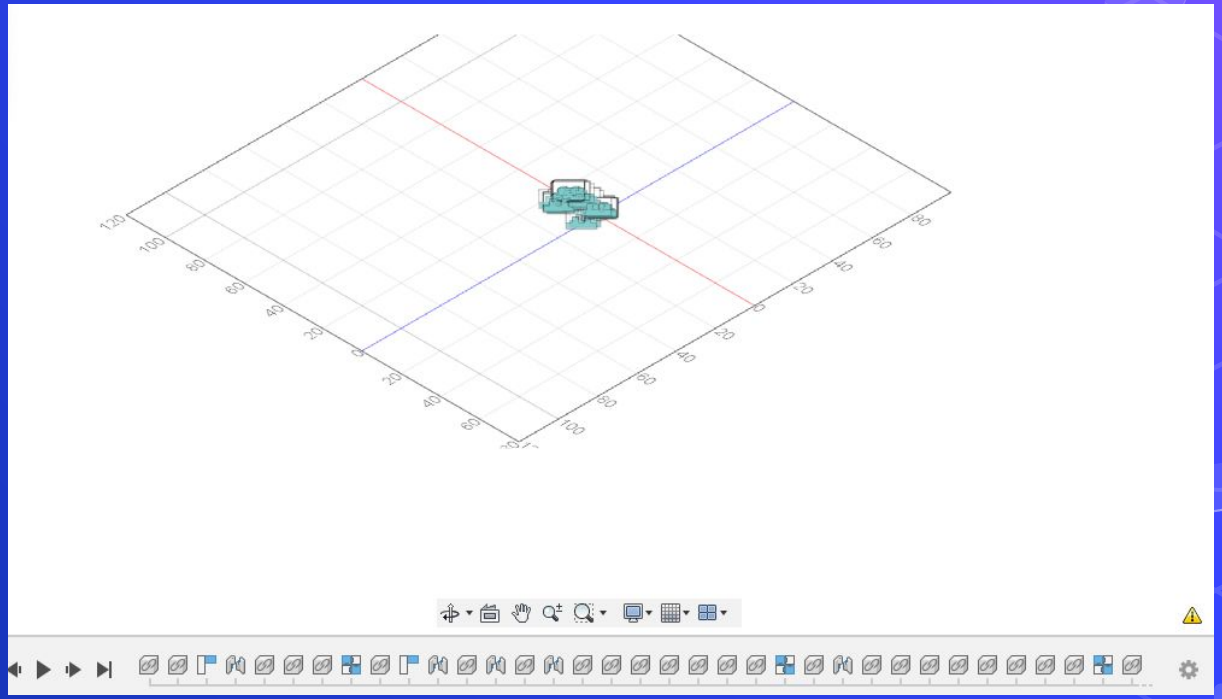
- Don't rotate with the cube in the top right (inefficient).
- Don't use the tools in the toolbar at the bottom (also inefficient).



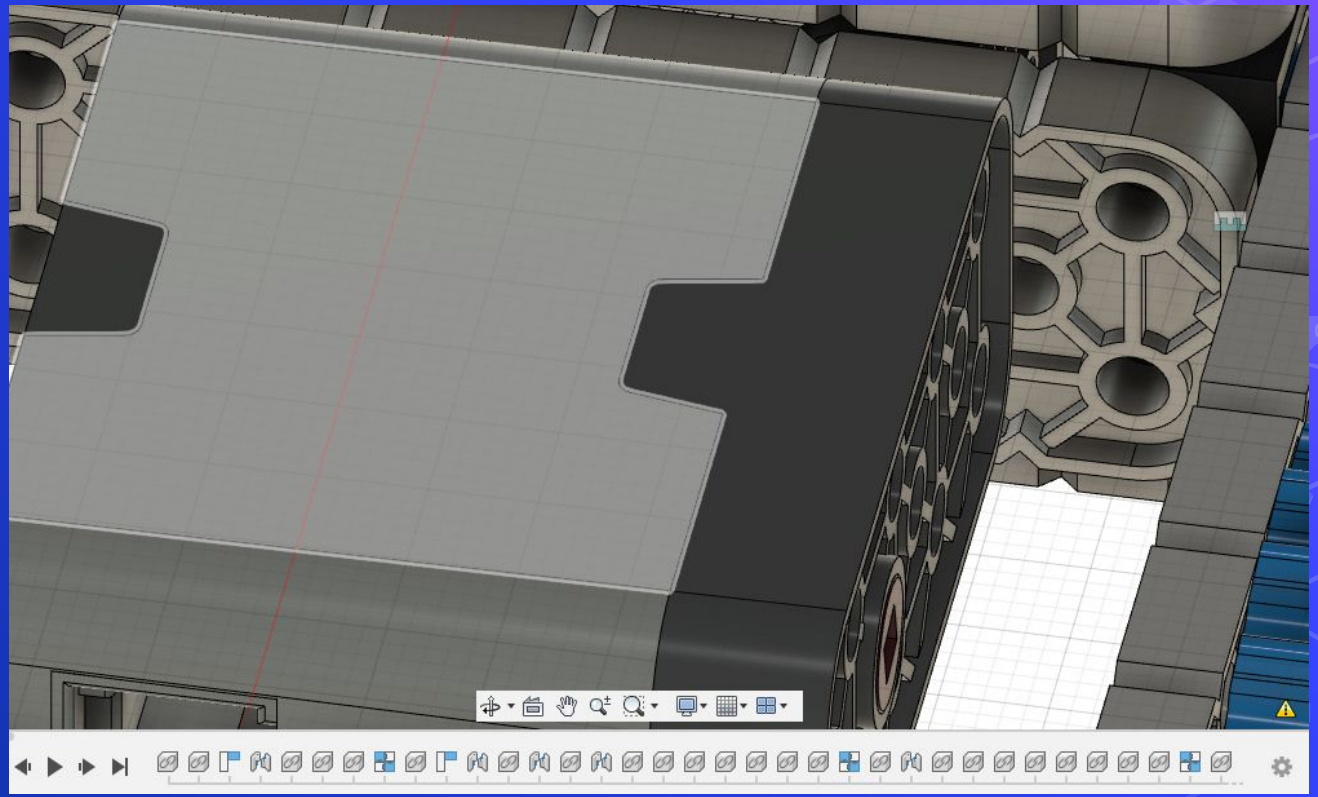
Navigation Activity

- You will start a distance from the robot.
- Using the skills you just learned, reach the orientation that is instructed by the teacher.
- Once you are done and you think you did it properly, ask for the teacher to check your work.

From Here:



To Here:

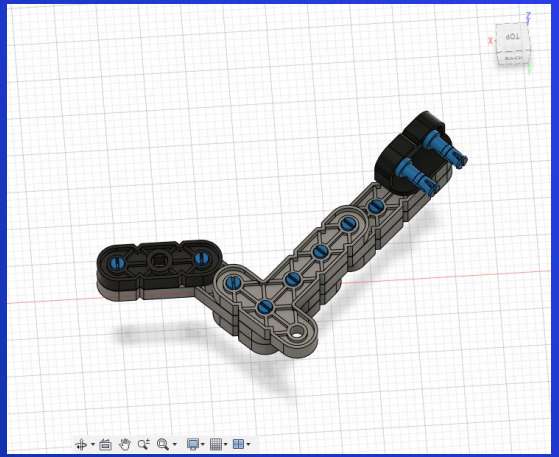


Navigation Activity Rubric

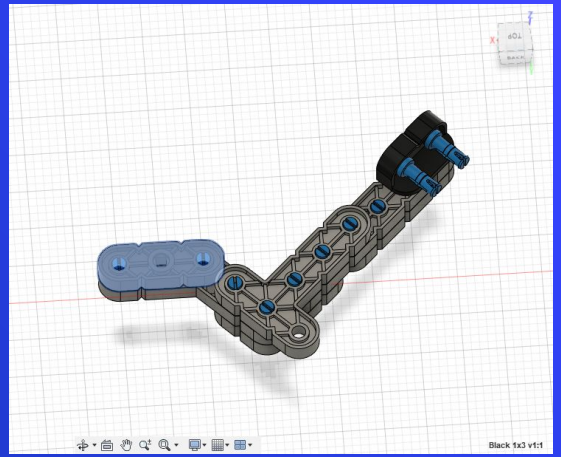
Below Expectations	Approaches Expectations	Meets Expectations	Exemplary
The robot is not oriented in the correct position and the required element(s) cannot be seen.	The robot is oriented in the correct position in more than 20 seconds.	The robot is oriented in the correct position in less than 15 seconds.	The robot is oriented in the correct position in less than 7 seconds.

How To Select an Object to be Moved

Option #1:

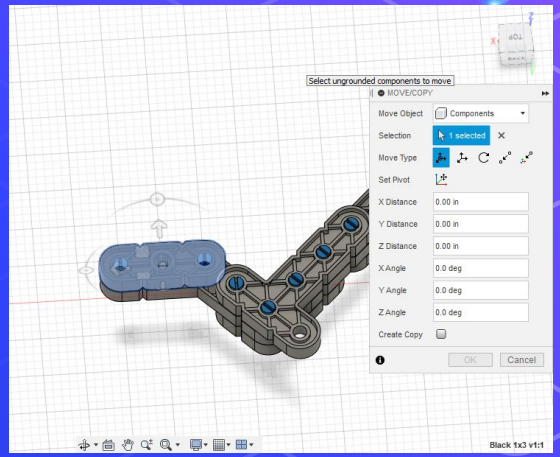


First, have a piece to move. (Here is a group of pieces jointed together.)



Select piece by double clicking on it.

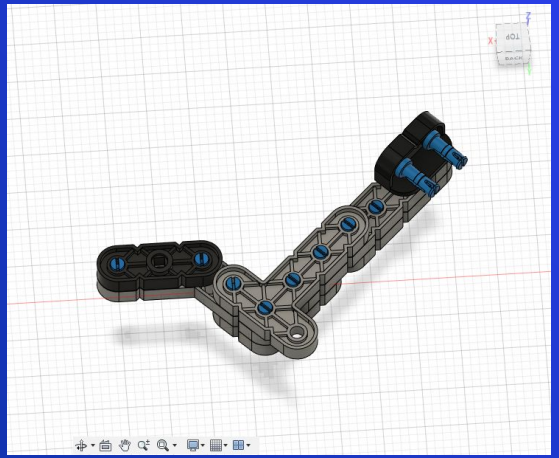
(You can also select more than one piece by holding shift and double clicking on many pieces.)



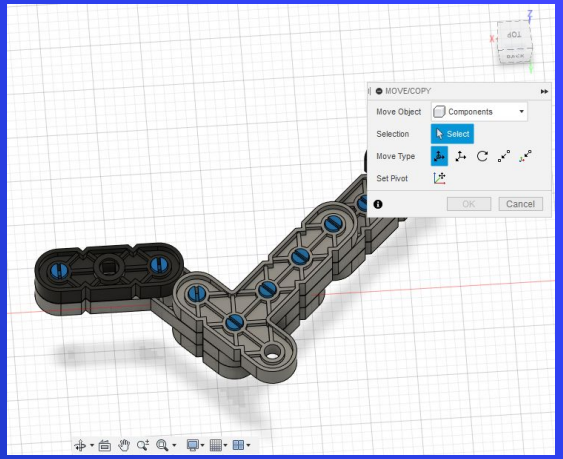
Click M (hotkey for move) to access move bar.

How To Select an Object to be Moved

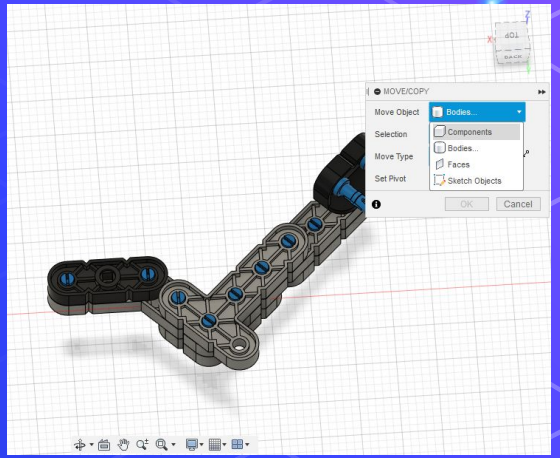
Option #2:



First, have a piece to move. (Here is a group of pieces jointed together.)



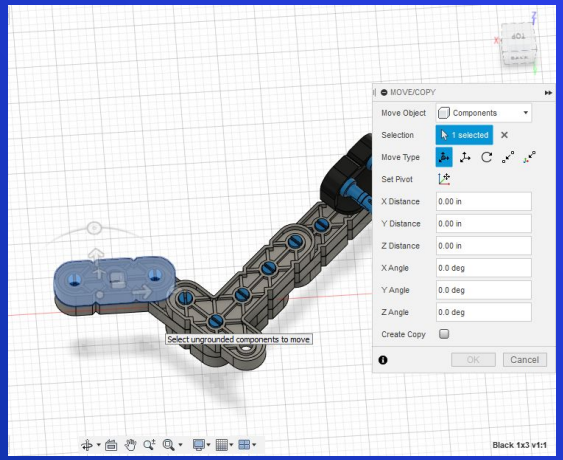
Click M to pull up move bar.



When doing this for the first time, change move object type to components

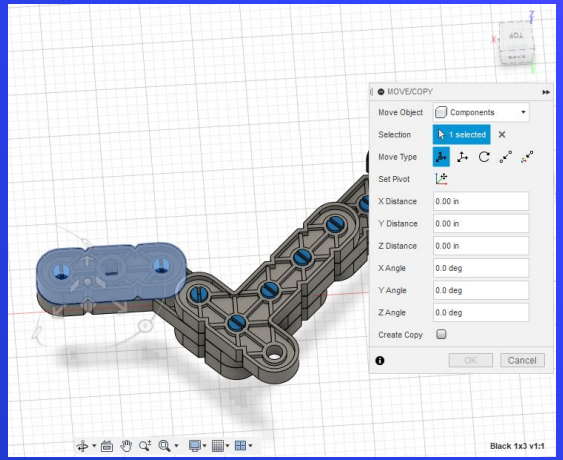
How To Select an Object to be Moved

Option #2:



Click on the piece to be moved.

(Select more than one piece by clicking on more pieces if needed.)



Note, it matters where you click on the piece. Compare the direction the arrows point on these two images.

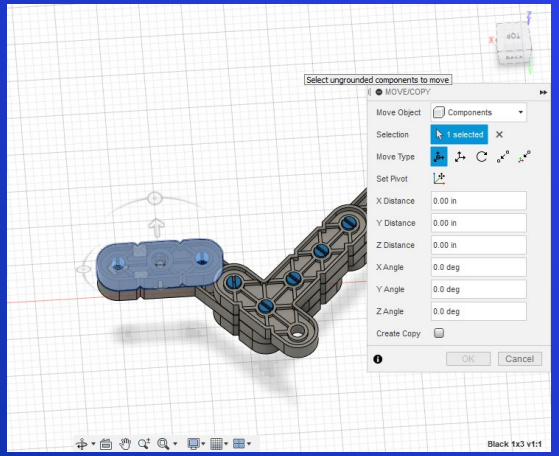
Additional Notes:

It is suggested to use option #1 since it is simpler than option #2. When first CADing you will probably run into issues when you try to move objects with option #2. However, there are situations where you might choose to go with option #2 instead of option #1.

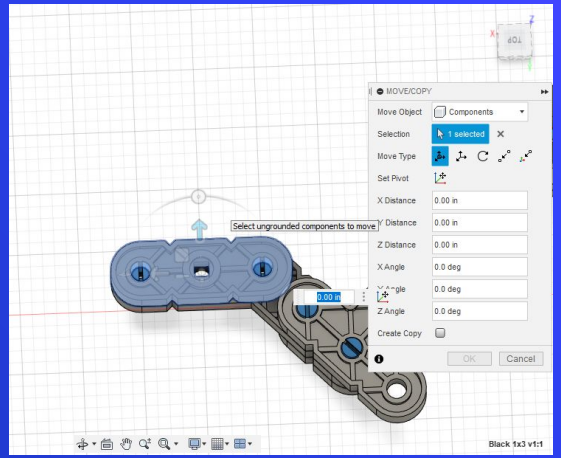
When you import or paste a piece the move menu is automatically brought up.

What Moving Allows You to Do

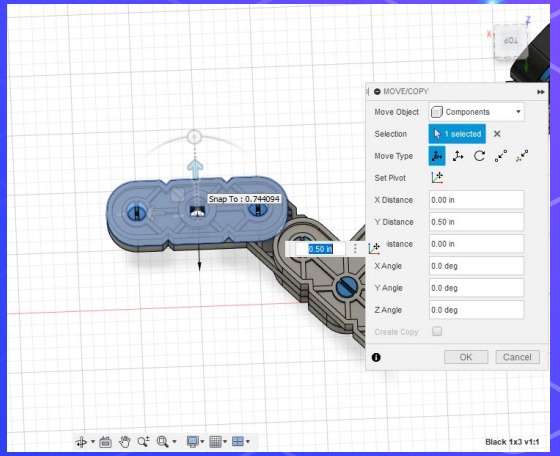
Move:



Go through the “How To Select an Object to be Moved” steps to open the move menu for a piece.



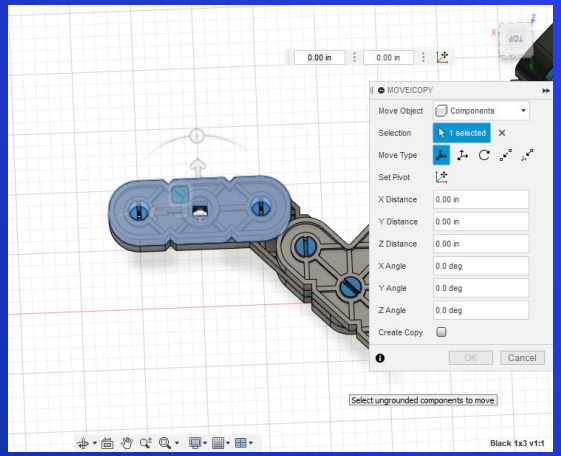
Click on the arrow in the direction you want to move the piece in. (There are 3 arrows one by X, Y, and Z.)



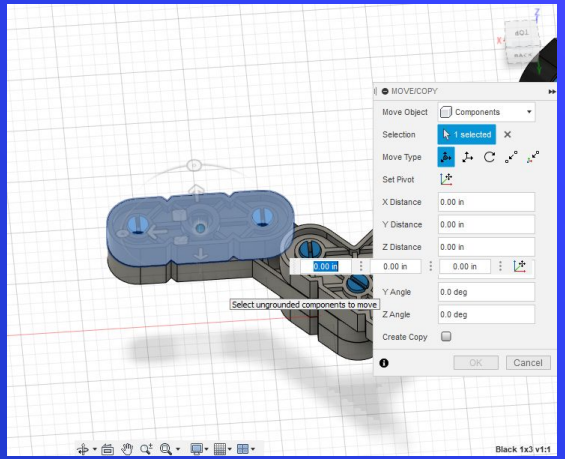
Drag the arrow to move in increments or type in a specific value to move by.

What Moving Allows You to Do

Additional Move Options:



You can click on the plane icon to drag and move a piece in two directions.



You can click on the dot to drag a move a piece in all three directions.

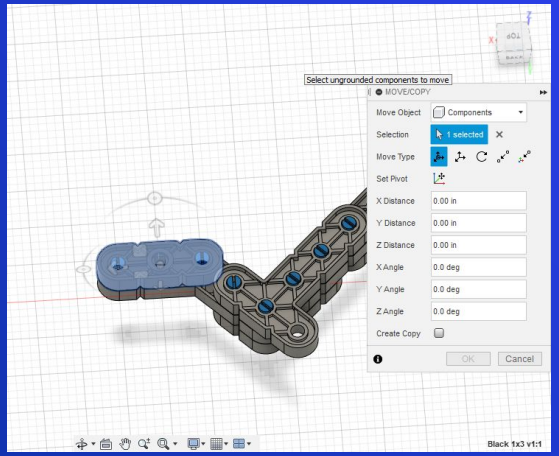
Additional Notes:

Only by dragging a piece with arrows will the piece move in increments, the other two options move the piece freely. In most CADing done for VEX IQ, it makes more sense to use arrows over the other options.

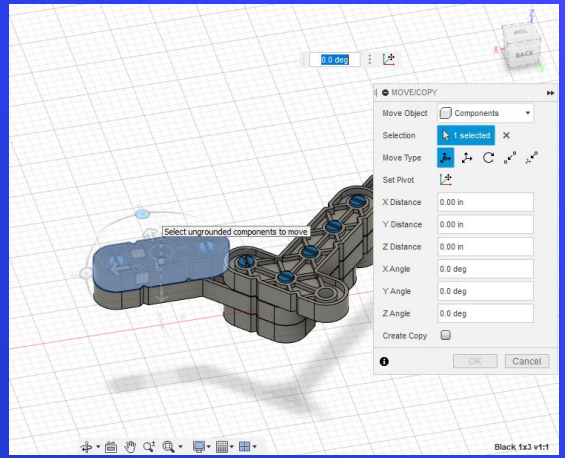
When using the plane or dot move options, to cycle between the different directions to key in, use tab or shift + tab.

What Moving Allows You to Do

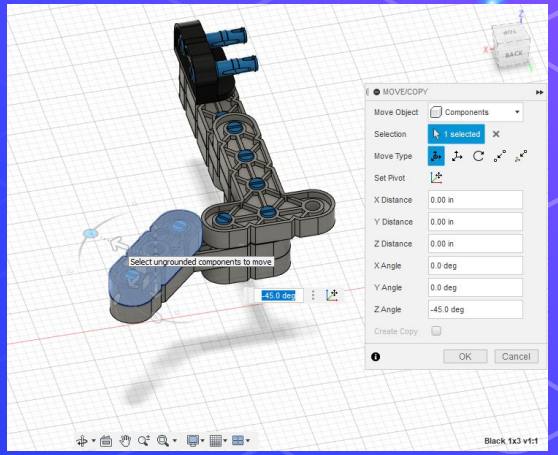
Rotate:



Go through the “How To Select an Object to be Moved” steps to open the move menu for a piece.



Click on the scroll wheel in the direction you want to turn the piece in. (There are 3 planes to turn across, one by X, Y, and Z.)



Drag the scroll wheel to move in increments or type in specific values to move by.

Moving Activity

- You will start with a peg, a 2 by 4.
- Move the peg into one of the 2 by 4’s holes exactly by manually typing in values.
- Copy and paste the peg into 8 of the 2 by 4’s holes.

Moving Activity Rubric

Below Expectations	Approaches Expectations	Meets Expectations	Exemplary
The activity is not completed.	The activity is completed in more than 5 minutes.	The activity is completed in less than 5 minutes.	The activity is completed in less than 4 minutes.

What are Joints and Rigid Groups and how can they be used?

Joints

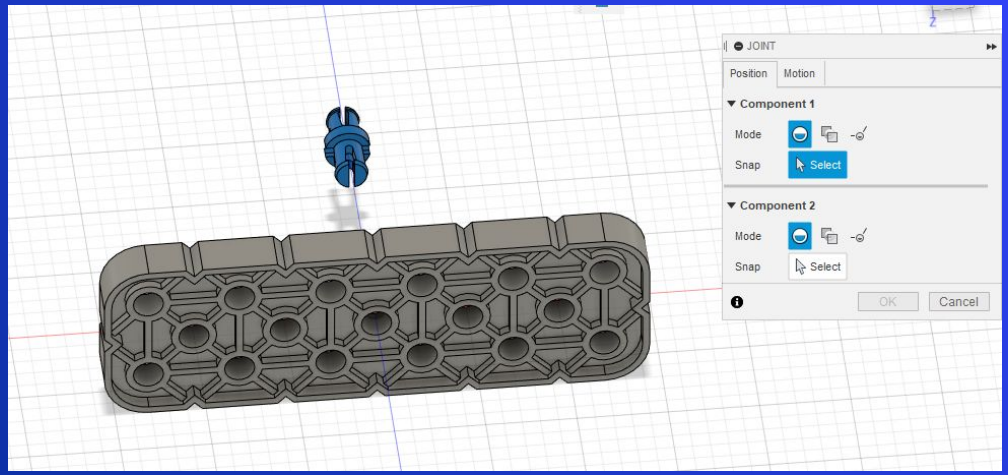
- Keep pieces together.
- Allow for different types of joints.
- A lot faster than moving pieces individually
- Can eventually lead to motion links.
- If used properly, can animate the whole robot.

Rigid Groups

- Keep pieces together
- Maintain the position of different pieces
- Can be used in more than one piece
- Does not allow for motion links

How to Create a Joint

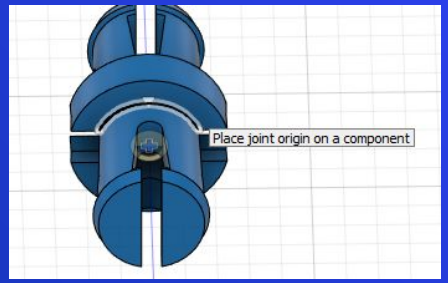
First, press the j key to pull up the joint function - this is the keybind for starting the joint function



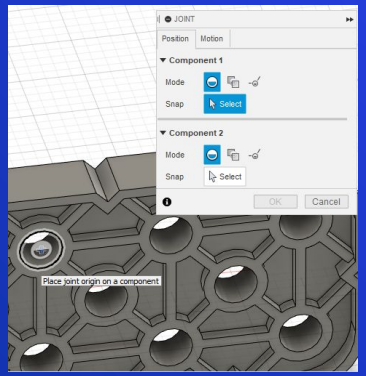
Next, this menu should show up with the two components showing up. For now, do not spend time in the “Motion” tab. Continue to then select where to joint the two pieces.

How to Create a Joint

This part is very important, as it is critical to joint the pieces from the right points.

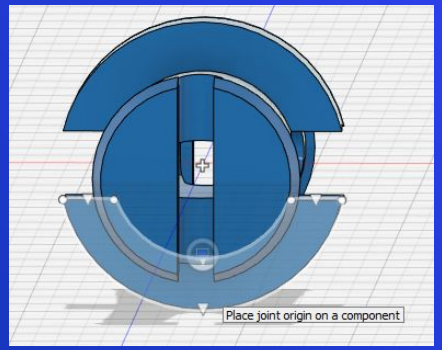


For the peg, place your cursor or mouse on the edge of the semicircle so a yellow circle with a blue cross appears in the middle of the peg.

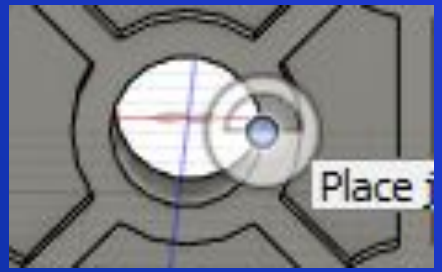


For the beam or any other piece that you wish to join the peg to, click so the same circle + cross appears in the centre of the circle. Once you click on the second point, the two components should automatically snap together.

Common Errors for Joints

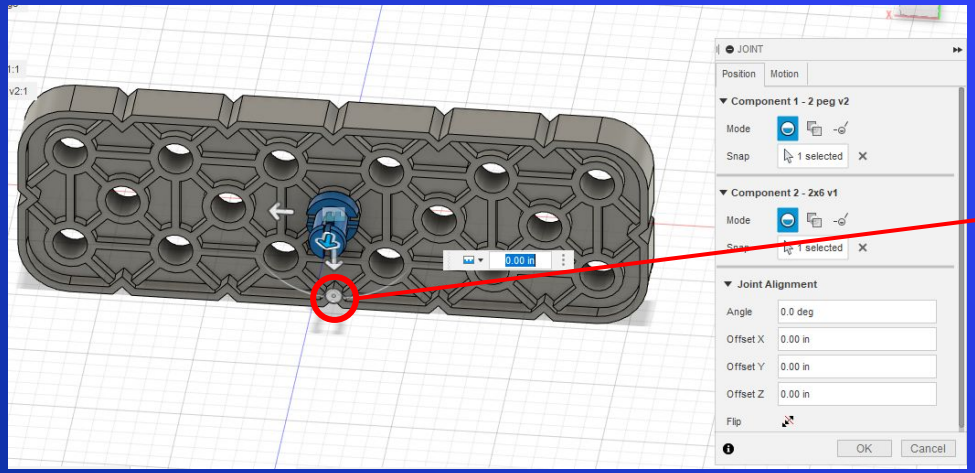


In this case, it is the face, not the point that is being selected as the joint origin. This means that the face would be jointed to the beam, but the peg would likely be inside the beam.



The joint origin here is on the corner of the hole. This means that the peg will usually be inside the beam when jointed, something that would never happen in real life.

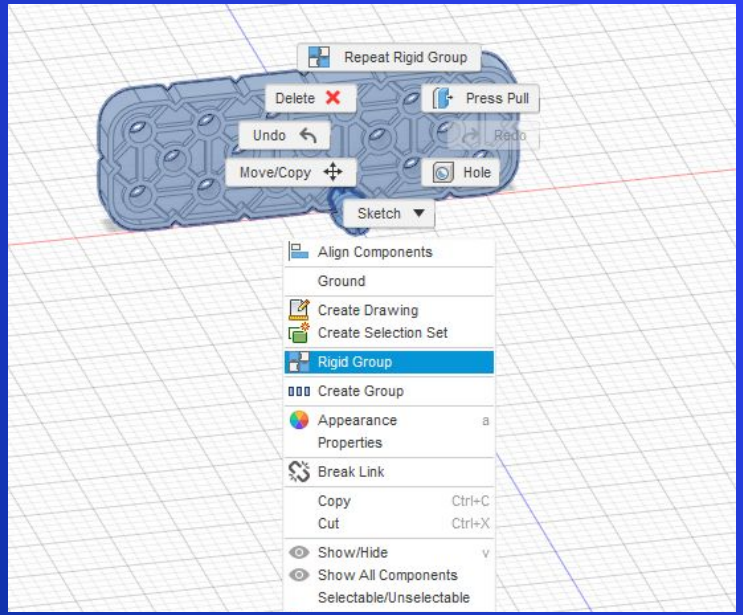
Rotating and Moving Joint Origins



Once the two pieces have been jointed together, the orientation and position of the pieces can still be changed. To change the orientation, use the circle at the bottom of the joint to rotate the piece. To shift it around, either use the arrows present next to the joint origin or manually set offset values for each axis. However, for efficiency's sake, try to accurately click where to join pieces and use these orientation tools only when absolutely necessary. This will take practice...

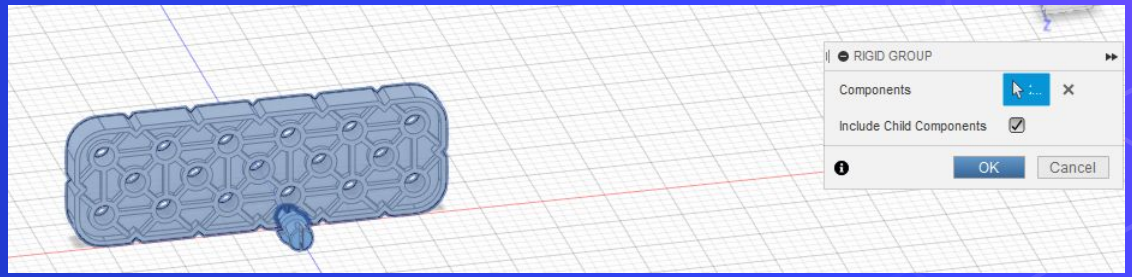
How to Create a Rigid Group

First, hold shift and double click on all components you wish to be part of the rigid group and right click. Alternatively, select the pieces from the parts menu on the left.



Next, choose rigid group out of all the possible options.

How to Create a Rigid Group



Finally, click OK to confirm the rigid group. Now these two components (rigid group can be used to group more than 2 pieces) can still be moved, but they will always be in the same position relative to each other.

Joint + Rigid Group Activity

- You will start with a peg, a 2 by 4.
- Joint one of the pegs into one of the 2 by 4’s holes.
- Copy and paste the peg until 8 of the 2 by 4’s holes are filled.
- Rigid group the pegs and beam together.
- Checked all of the pieces are constrained to each other by moving the beam around.

Moving Activity Rubric

Below Expectations	Approaches Expectations	Meets Expectations	Exemplary
The activity is not completed.	This activity is completed after 3 minutes.	The activity is completed in less than 3 minutes.	The activity is completed in less than 2 minutes.

Lesson Extensions

Component vs. Bodies Explanation: Components can be jointed together and are the type of body of all imported VEX IQ pieces. Joining components together is possible since components have their own origin and axis, (and so can be related to each other). Components are able to contain components (will be discussed in the next lesson with omni wheels), and/or bodies. On the other hand, bodies are shapes usually created within Fusion 360. They don't have their own origin and axis, so they can't be jointed.

Motion Joints: While the base lesson only covered the basic type of joint, the rigid joint, there are in fact many more. These include Revolute, Slider, Cylindrical, Pin-Slot, Planar, and Ball. All of these joint types can be animated, causing the jointed parts to move in a certain pattern. Later on, to animate multiple joints at once, motion links can be used to link these joints together.

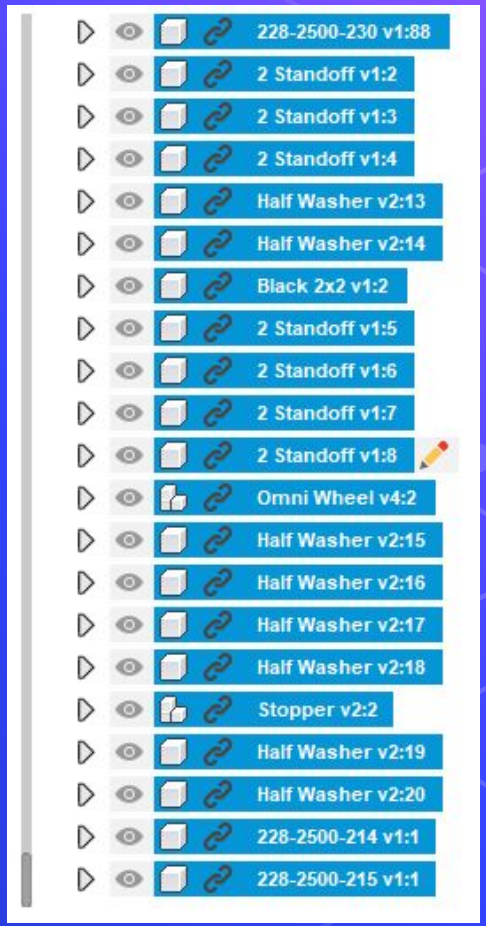
Mirroring: An extremely helpful function, mirroring allows a CADer to duplicate a certain set of components and mirror them. This is useful when working with wheelbases as only half the wheelbase needs to CADed and the other half to be duplicated.

Mirroring Extension

Once one side of any body is done, there is a way to mirror that body and produce and exact, mirrored replica of it. This is especially helpful when CADing wheelbases, as half the work is then required.

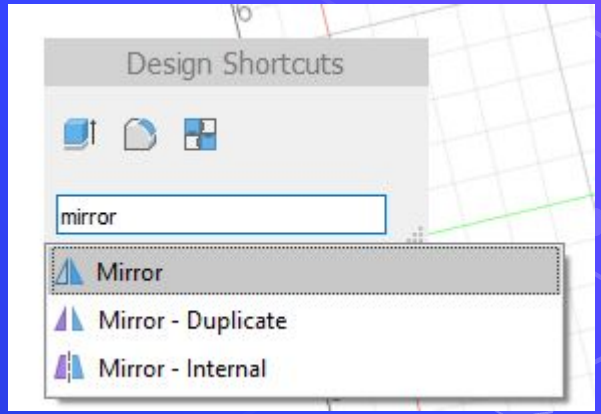
Mirroring Extension

First, select all the components that need to be mirrored. This is most efficient and effective way to select all desired components.



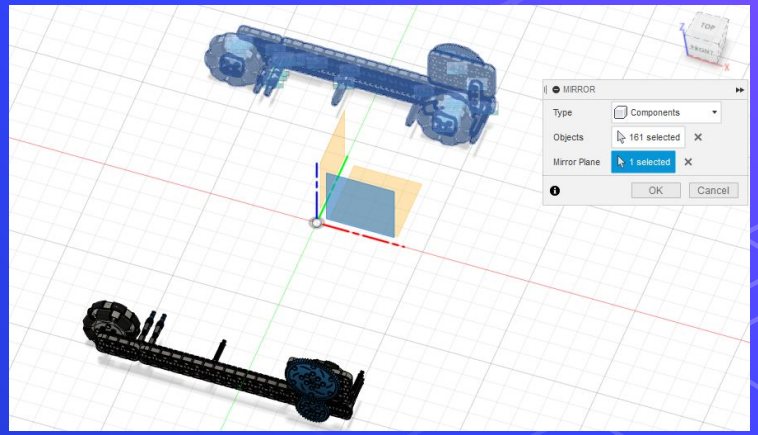
Mirroring Extension

Then, use the S key to open up the shortcut menu. Once that is done, type in “Mirror” and select the first option.



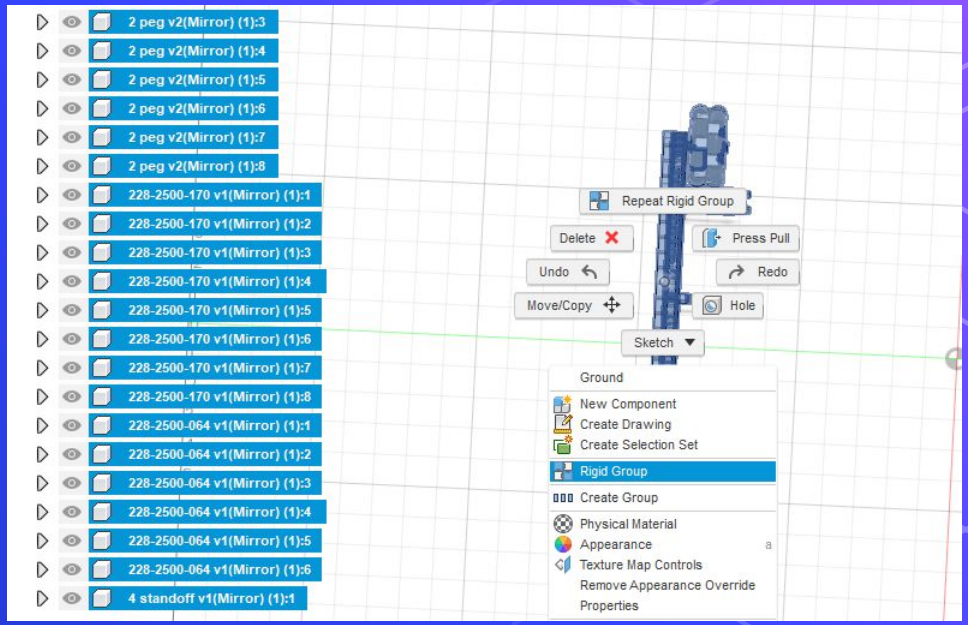
Mirroring Extension

When selecting the plane for mirroring, select the Y-Z plane. This should produce a mirrored copy of whichever components had been involved. In this case, the wheelbase.



Mirroring Extension

Finally, going to the timeline, select all pieces that have the “Mirror” tag next to them and rigid group them. Congratulations! You now have two sides of a wheelbase.



Lesson 2:
A Wheelbase

Creating Files

What to do:

- Save all files for one robot in one folder.
- Title files properly.
- Need to save files before inserting piece.
- CAD the robot in sections. Having a file for each individual part of the robot (wheelbase, tower, arm, etc.) and a master file that combines all files together.

Suggested not to do:

- Double clicking on files, accidentally opening them.
- Being unorganized.

Creating Files Activity

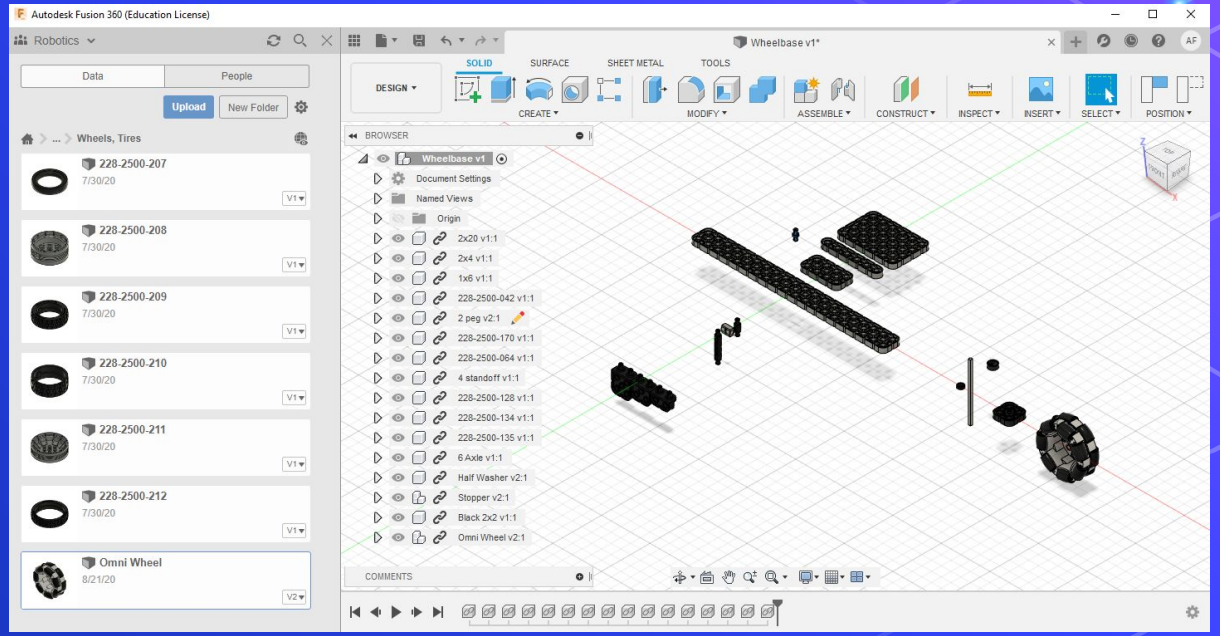
- Follow along and create a file for your own wheelbase.

CADing a Wheelbase

Note, CADing a Wheelbase has many steps, so this is a more condensed overview, with highlighting of certain points.

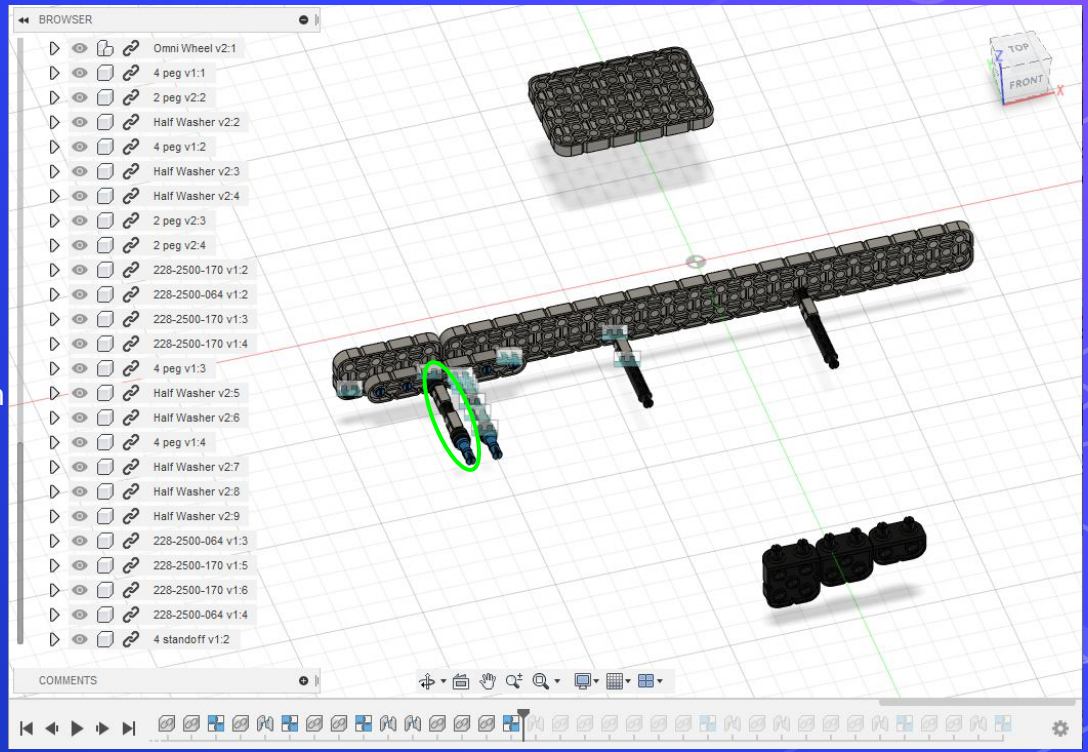
Import all of the pieces that are needed for this section from the assets library.

Imported Pieces:



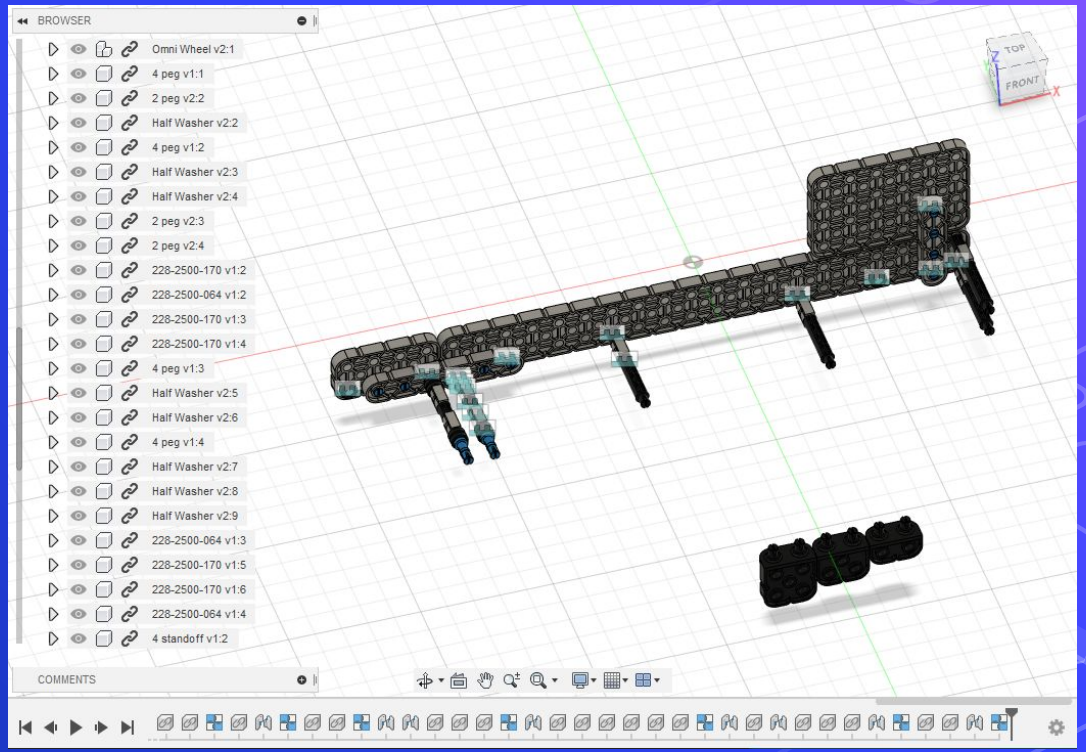
CADing a Wheelbase

Here one side of a wheelbase side was CADed. Note for that standoff circled, it was simply copied and pasted from the other set. Then it was rigid grouped together, after that jointed to the structure. You need to find the balance between saving time by rigid grouping pieces already in place, and leaving enough joints so if you need to delete something the robot will still stay together. (Experimenting with this will give a clearer picture of what this means.)



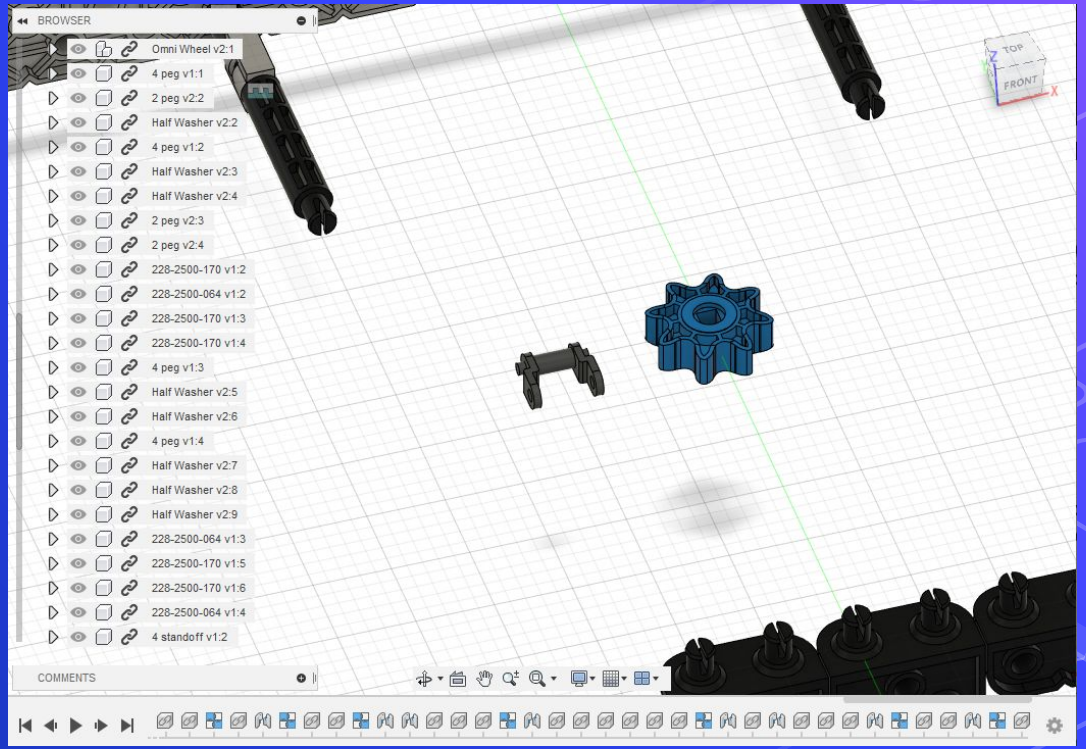
CADing a Wheelbase

Another bit of the robot CADed. Again, copy pasting and rigid grouping were used to save time.



CADing a Wheelbase

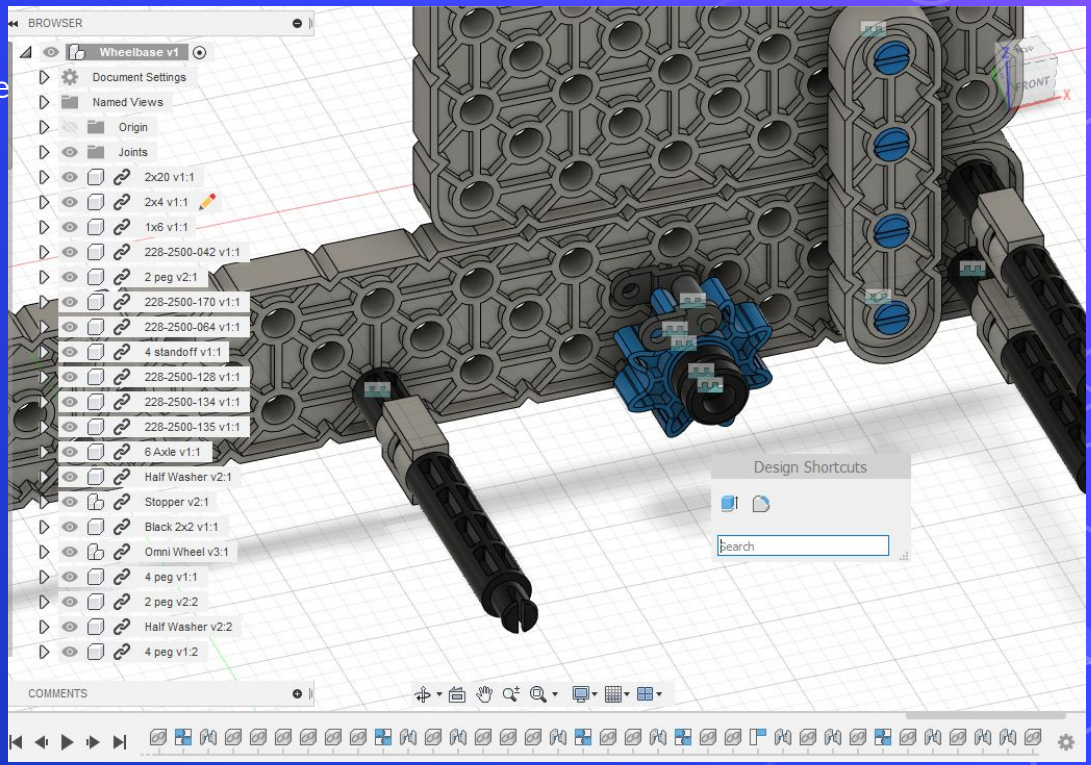
Import a sprocket (or more) and chain.



CADing a Wheelbase

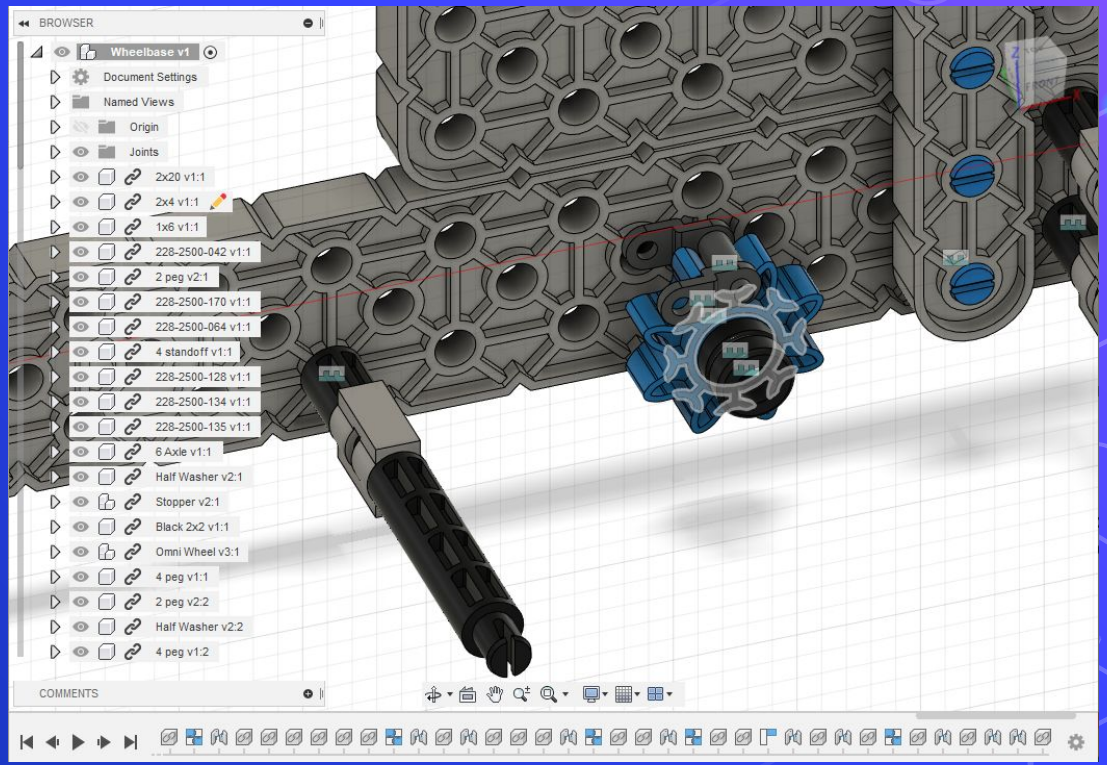
Here the sprocket was jointed to the structure and the chain jointed to the sprocket. While in real life normally you would put an axle there, it is advised to insert the axle later and “CAD from off of the structure.”

Instead of copying and pasting the chain link many times, here is an advanced trick to save time. First, open the shortcut menu, (by clicking s).



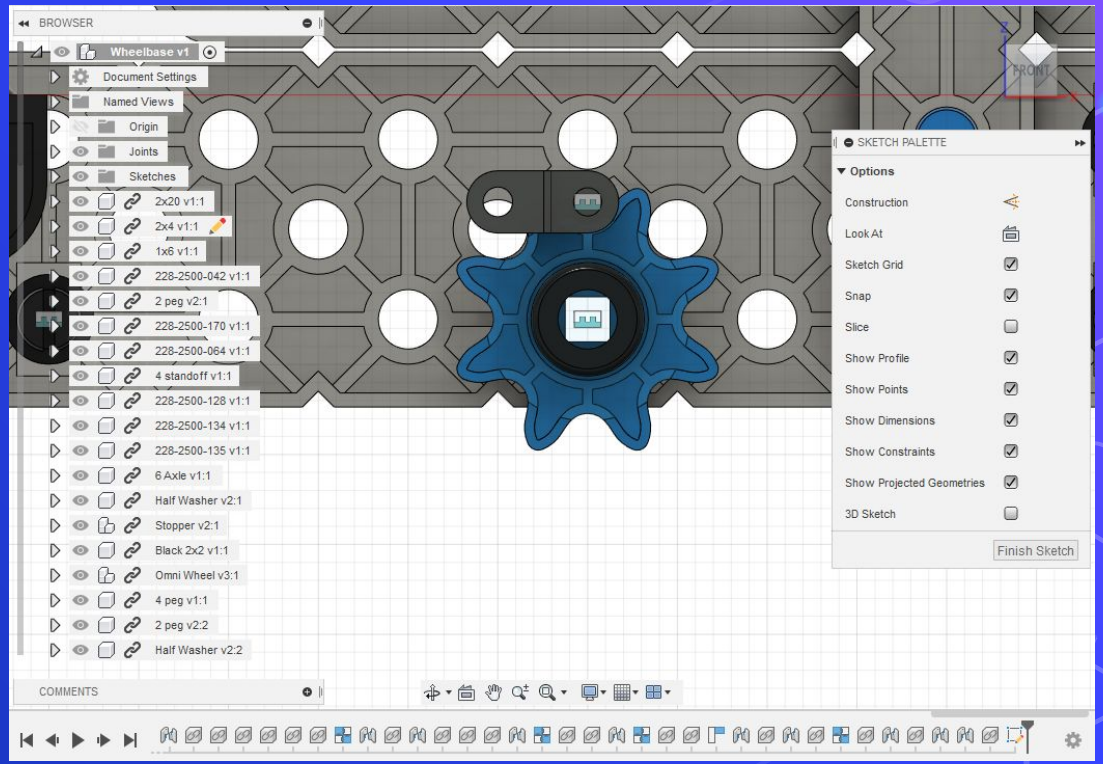
CADing a Wheelbase

Type in “create sketch” in the shortcut menu and select the option to get into sketch mode. Click on a plane parallel to the direction the chain needs to go. (In this example the flat surface of the sprocket will be clicked on.)



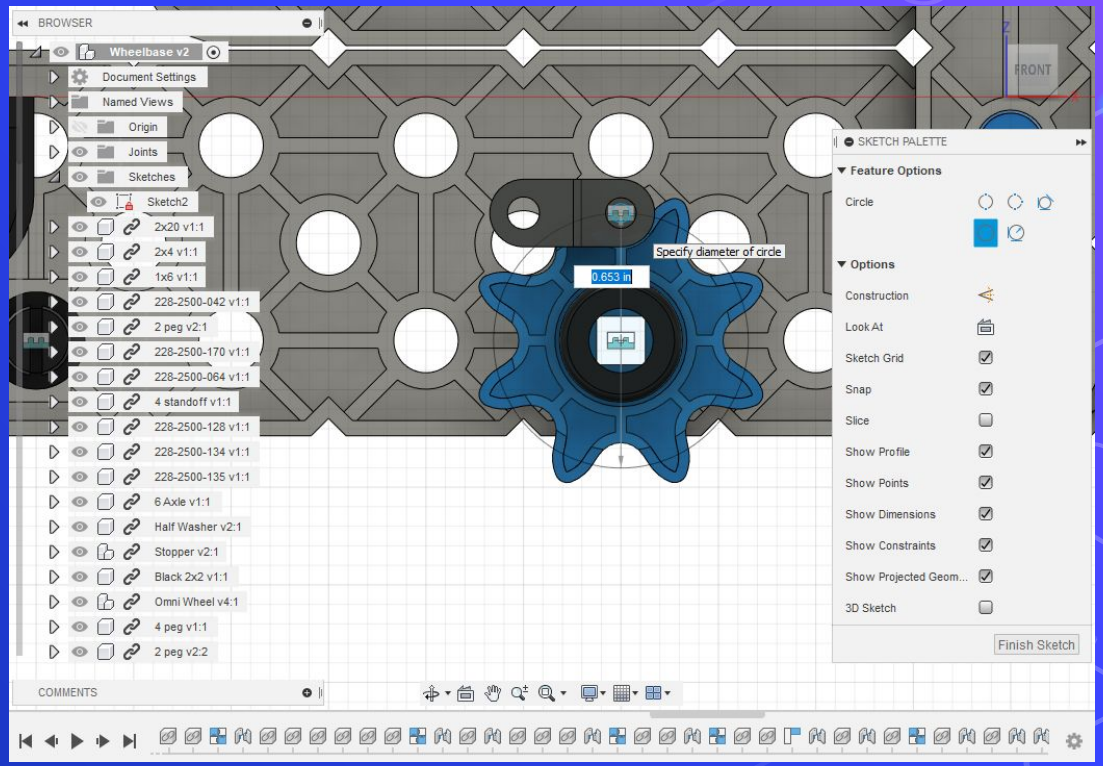
CADing a Wheelbase

This is what sketch mode looks like.



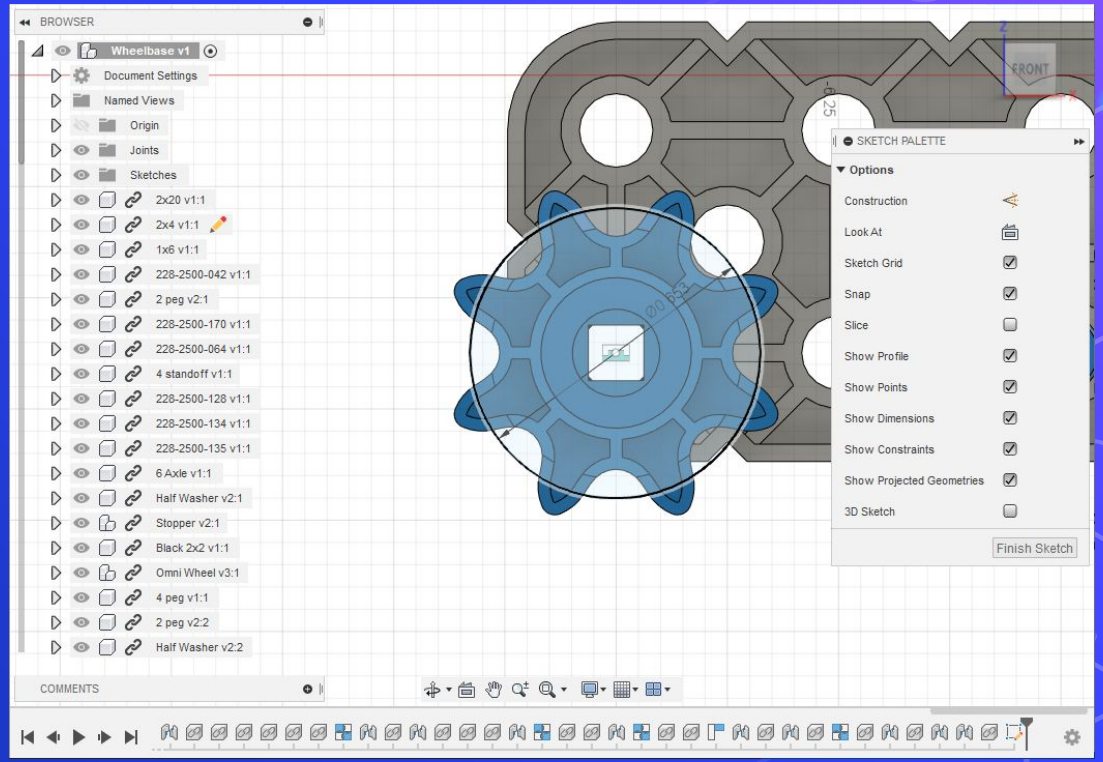
CADing a Wheelbase

Create a circle, (using the circle tool), going from the center of the sprocket, to the middle of the chain link as shown in the image.



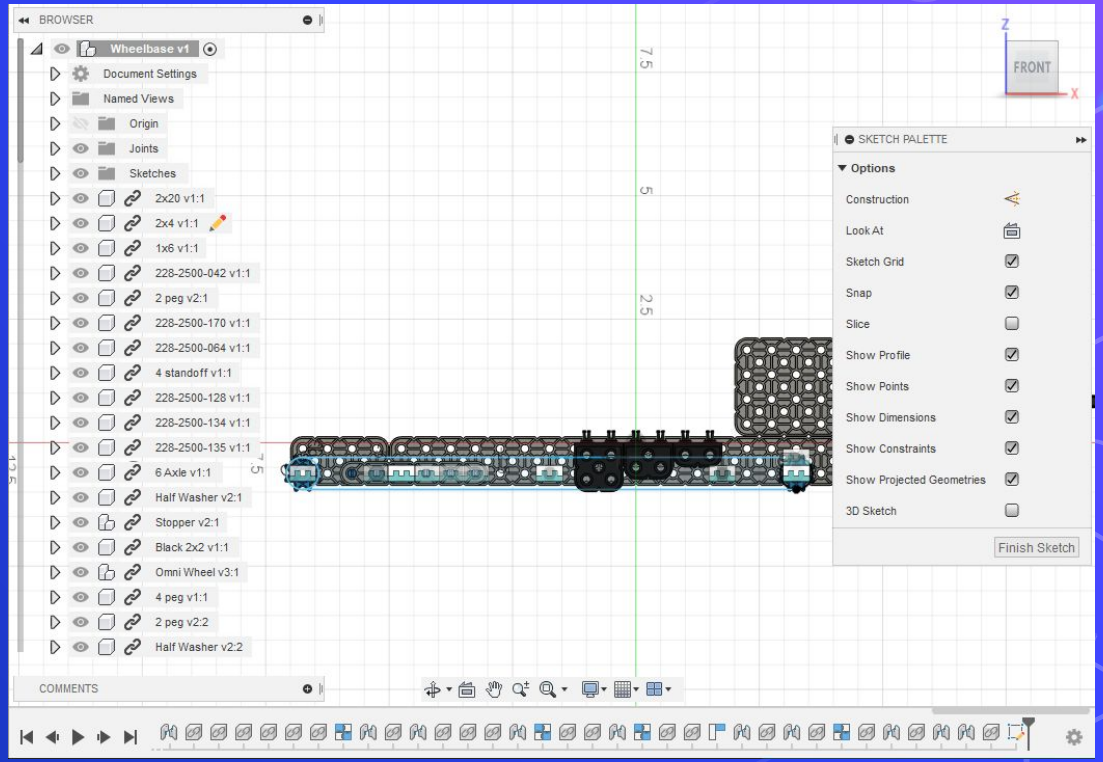
CADing a Wheelbase

Create this same circle, with the same diameter, at the other sprocket.



CADing a Wheelbase

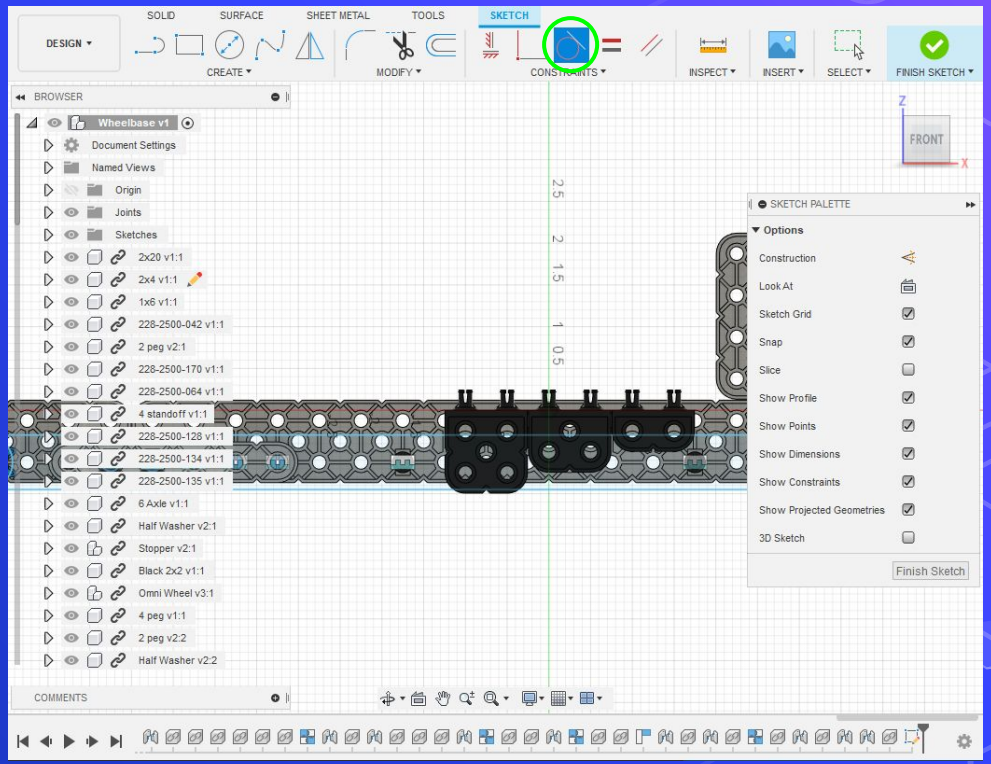
Using the line tool, draw lines approximately tangent across the two circles. (Top and bottom.)



CADing a Wheelbase

Then use the tangent tool (circled in the picture) to align the line and circle properly. Do this by clicking on the circle then the line.

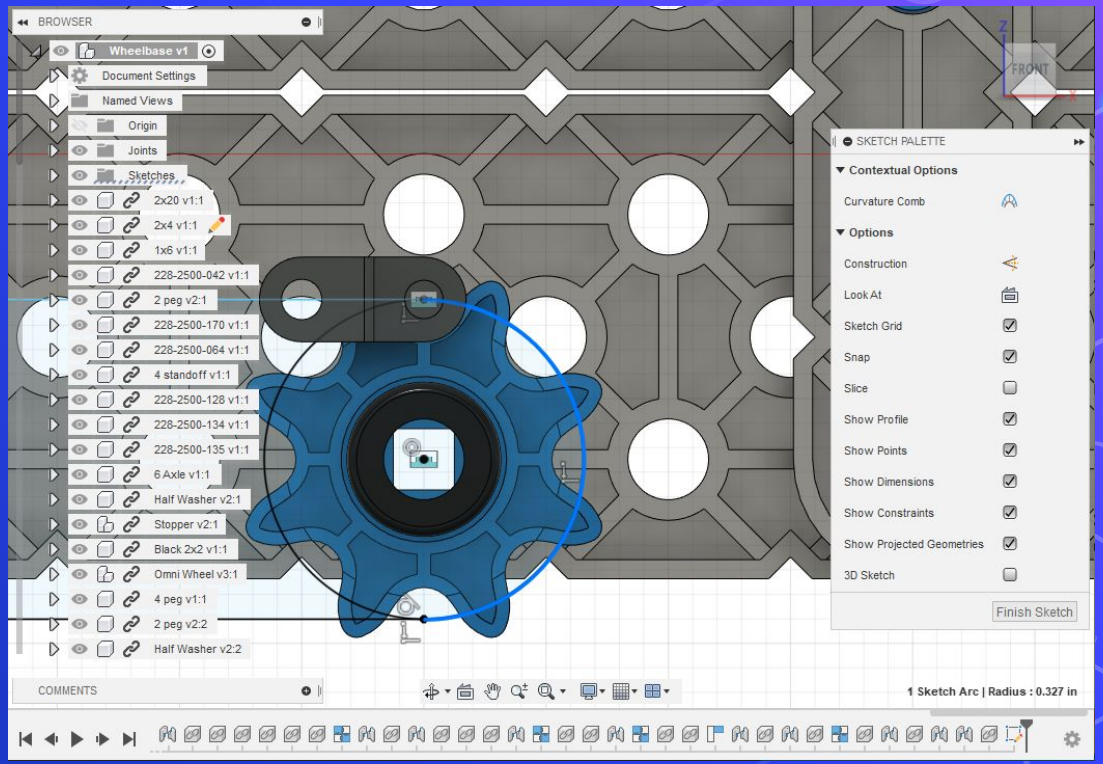
Note, sometimes when doing this for the sprocket the sketch was started on, the circle for that sprocket will move. In that case, move it back into position.



CADing a Wheelbase

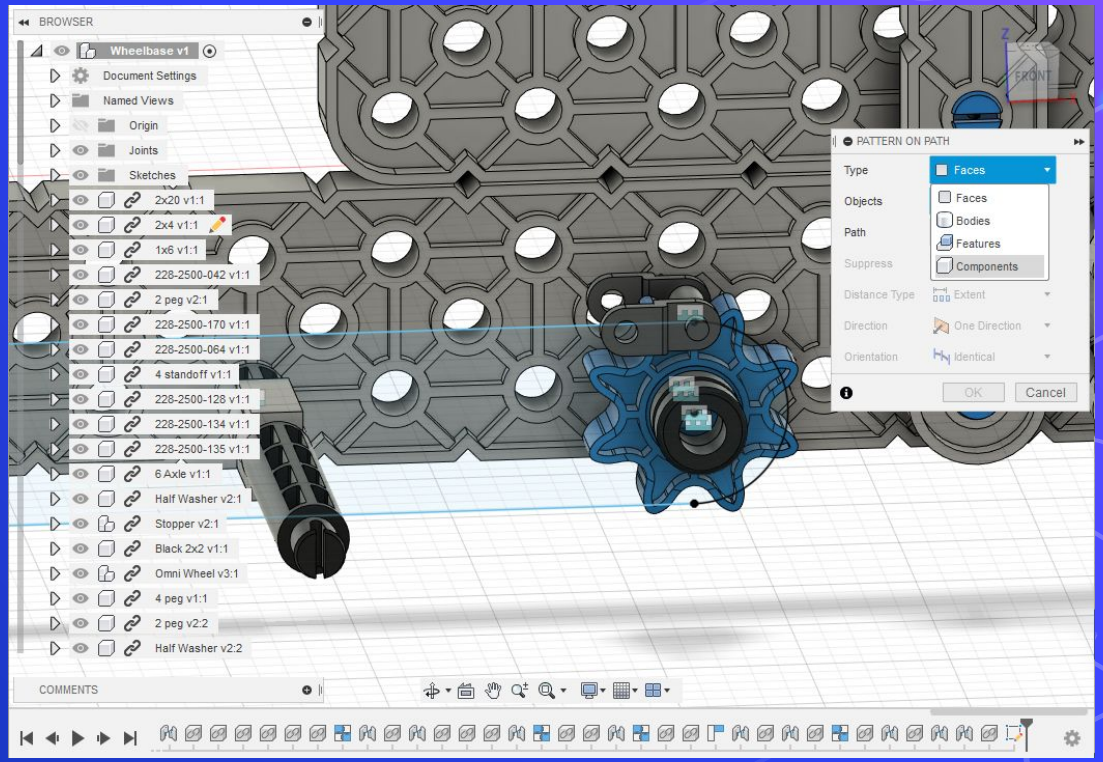
Now create an arc over the section the chain will actually go over on the sprocket. Use the arc tool by clicking create, and going down to arc, then choosing three point arc. Make sure the arc is on top of the circle.

Then do this for the other sprocket too.



CADing a Wheelbase

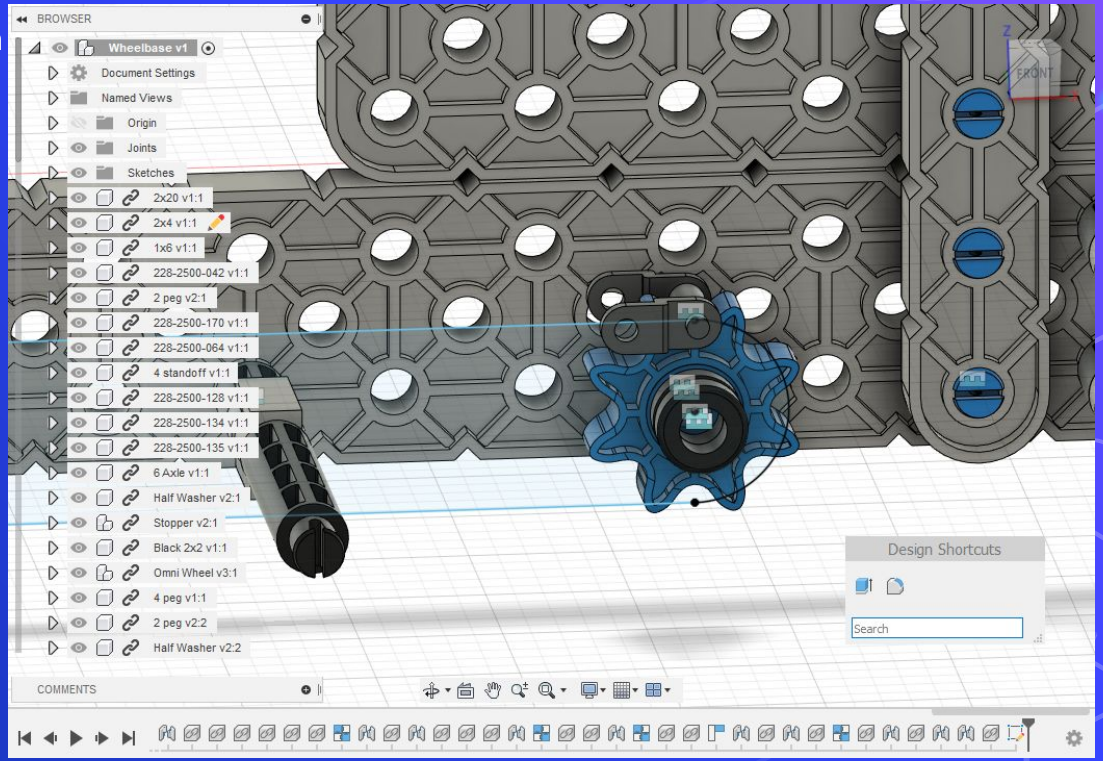
Type in “pattern on path” and select the tool. Change type to components.



CADing a Wheelbase

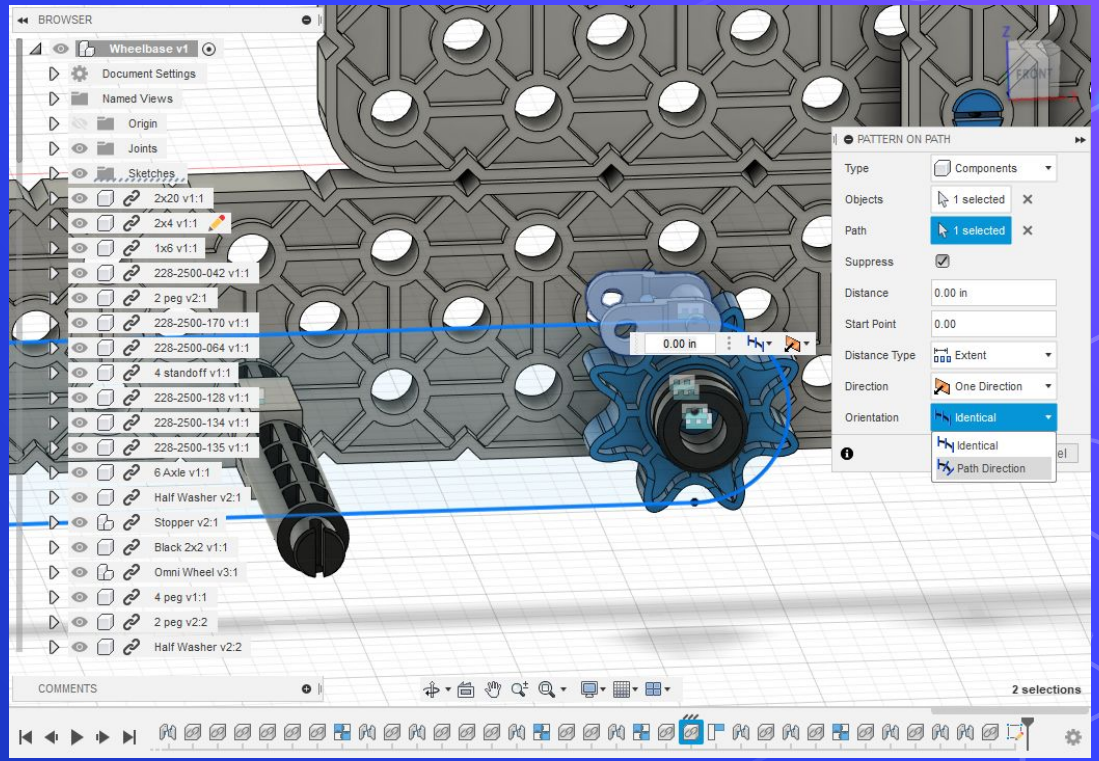
Next, click finish sketch to exit sketch mode. To edit sketches later go to the sketches folder and secondary click on the sketch. An edit option will then appear.

Now pull up the shortcut box again.



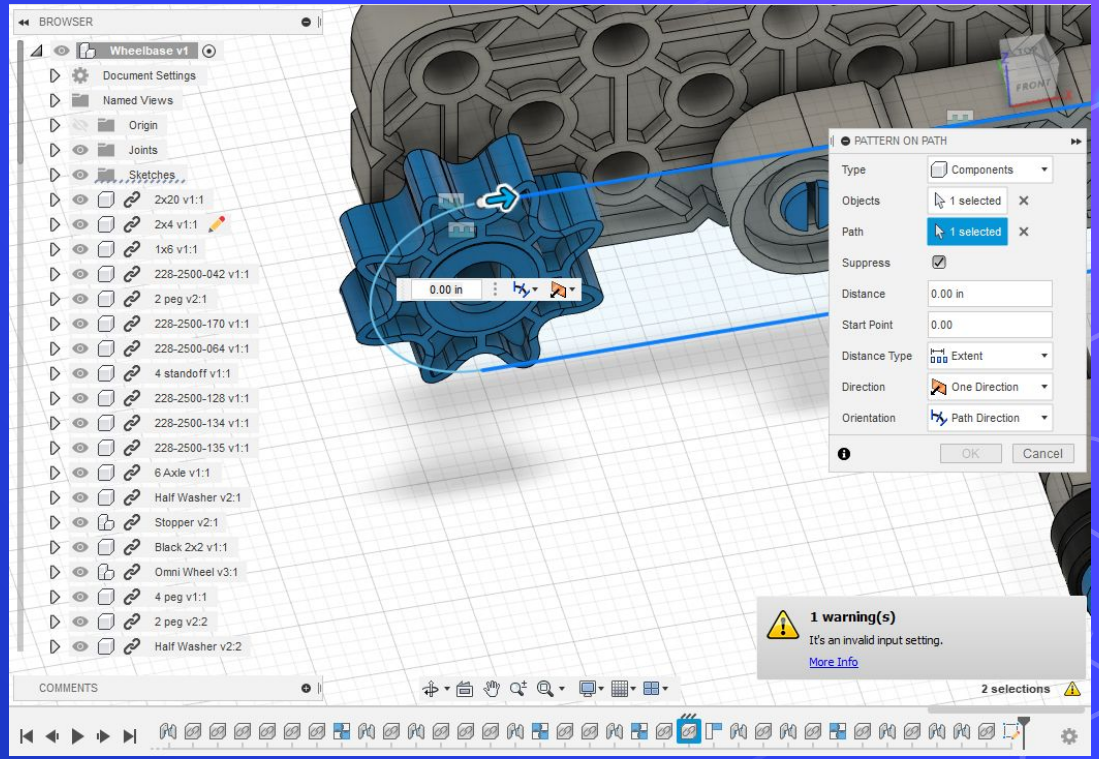
CADing a Wheelbase

Select the chain link for objects, and the sketch for path. Change orientation to path direction.



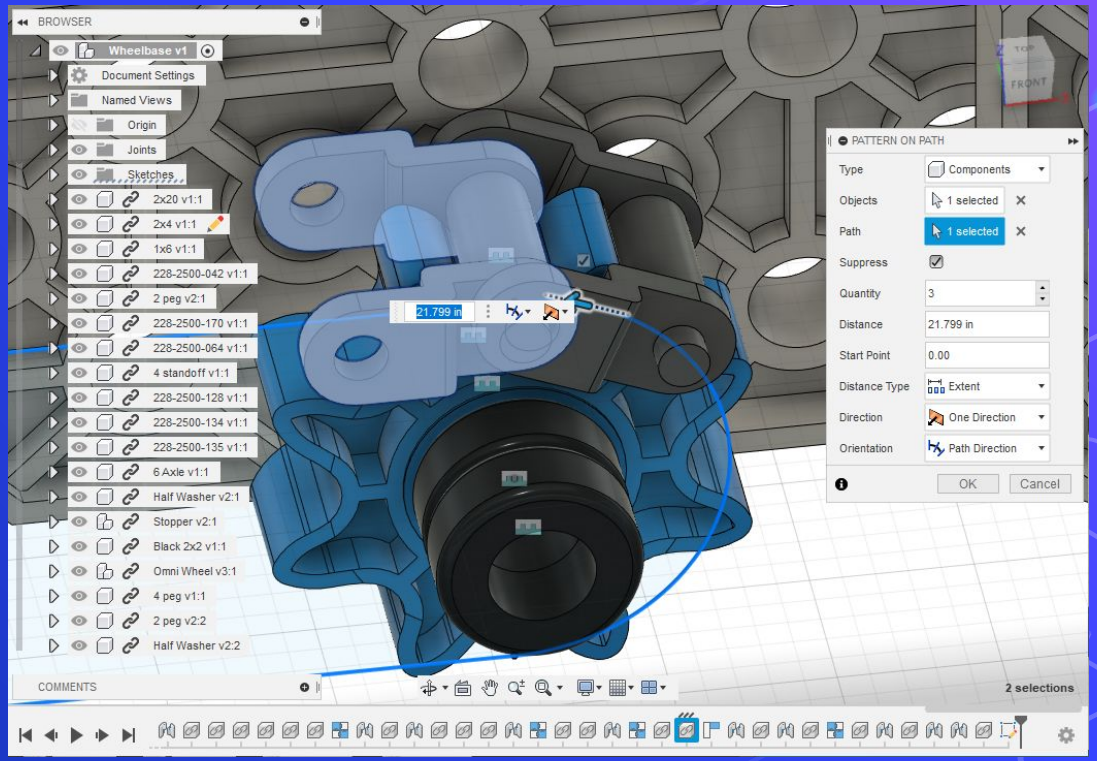
CADing a Wheelbase

Make sure to select all of the path. (Currently, the arc around the other sprocket isn't selected.)



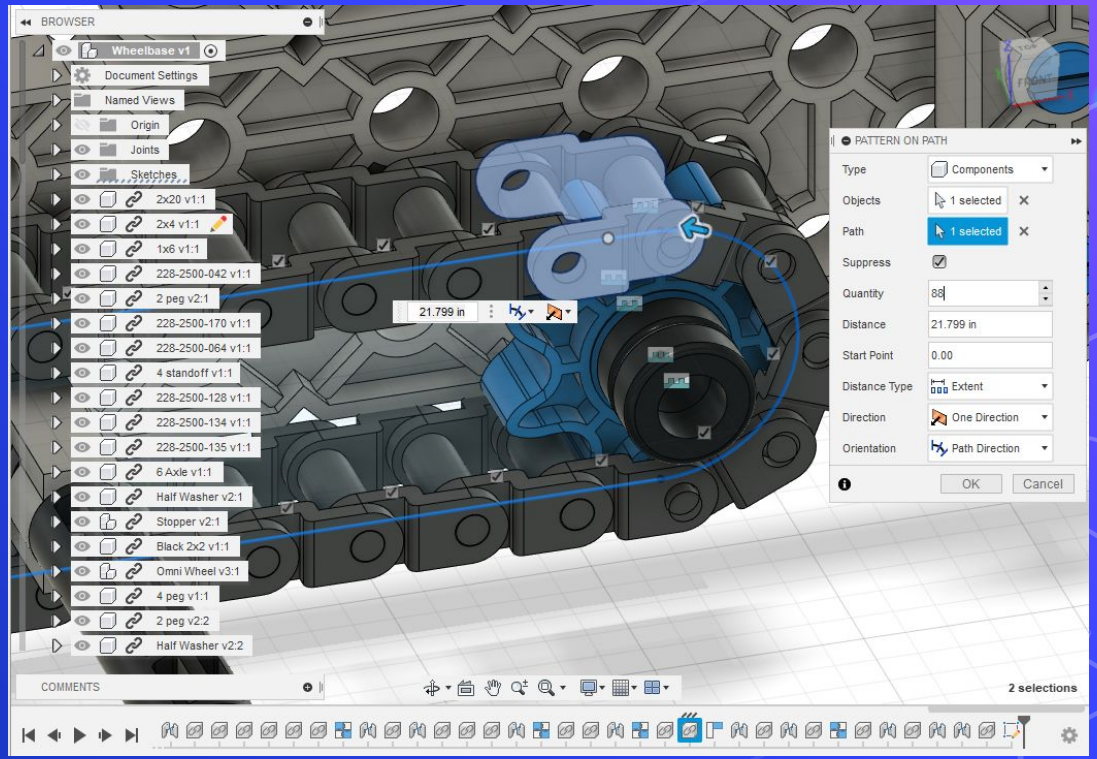
CADing a Wheelbase

Drag the arrow backward, to where the nearest chain link in that direction should be.



CADing a Wheelbase

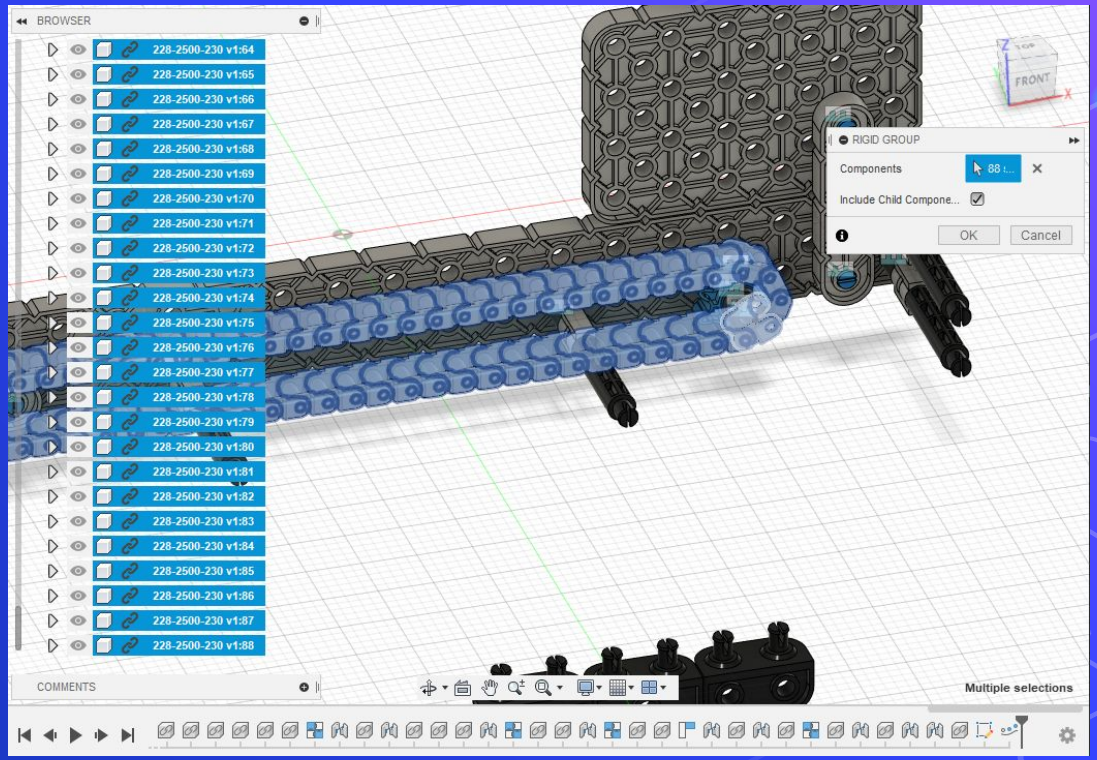
Increase the quantity value until it looks like the chain fits nicely on the straight section. Usually the chain won't fit perfectly around the sprocket. This can be corrected, by jointing the chain bits together or to the sprocket at the correct angles, but is optional.



CADing a Wheelbase

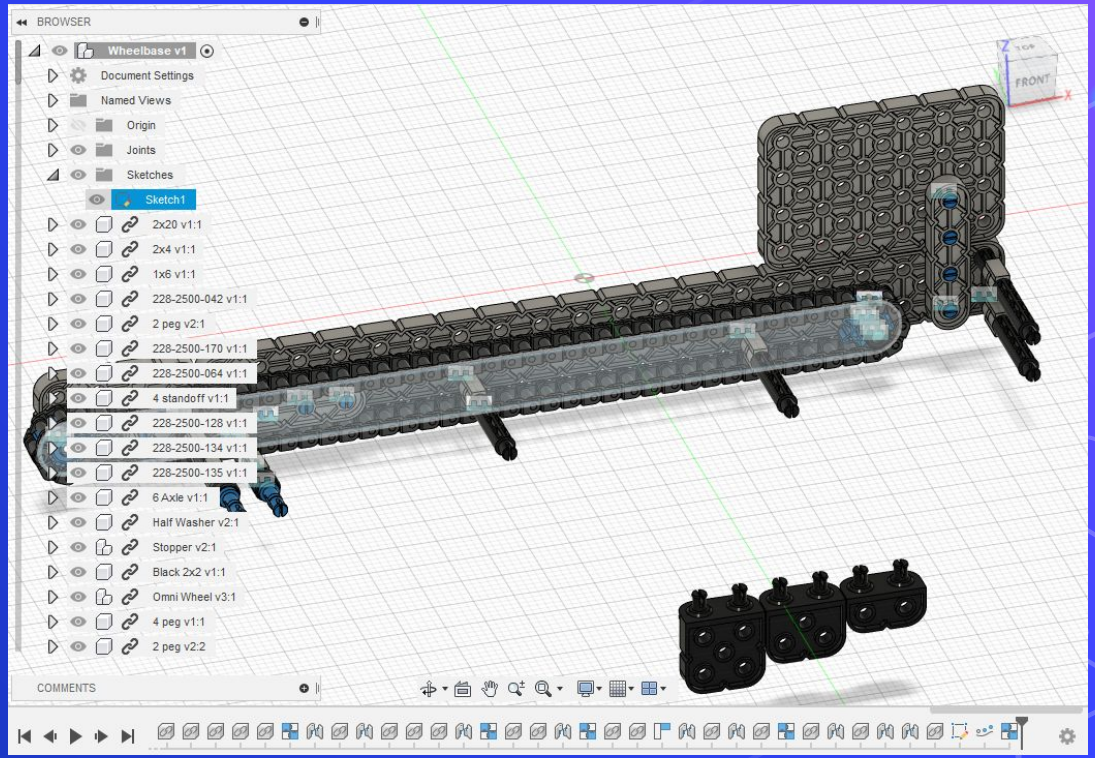
Now rigid group all of the chain links together, so the chain is constrained with the structure.

Note, this will have to be undone for the motion link extension.



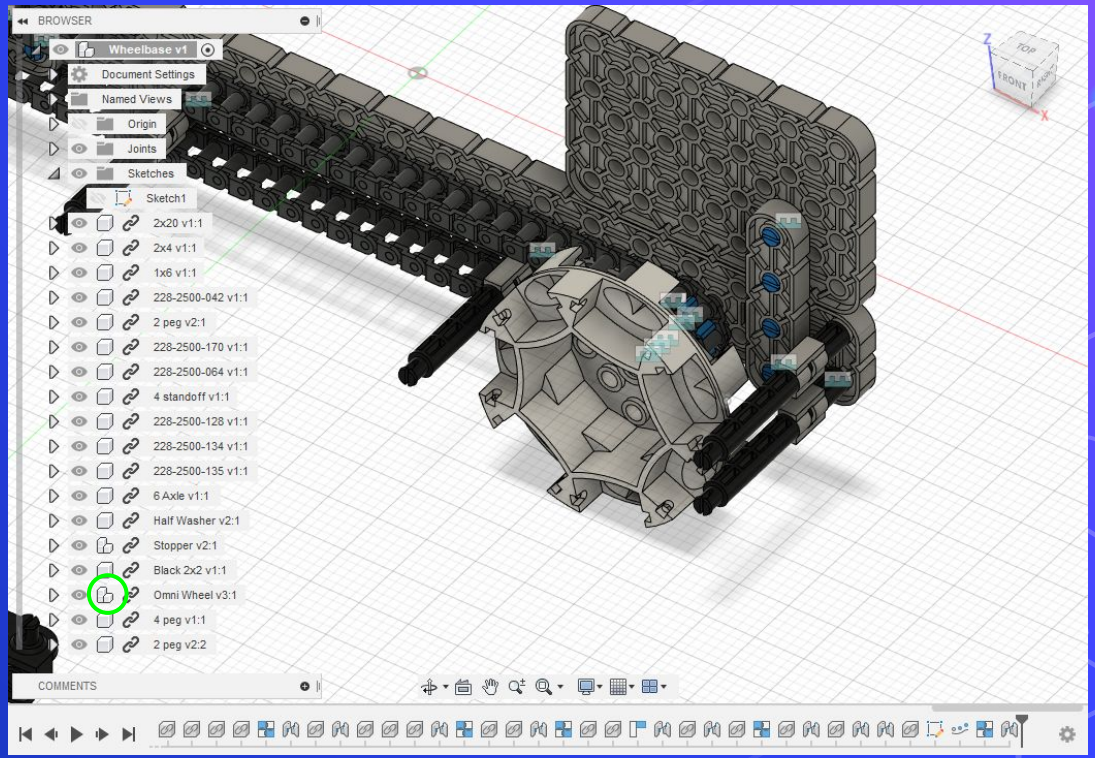
CADing a Wheelbase

Now hide the sketch by clicking on the eye button beside the sketch in the list.



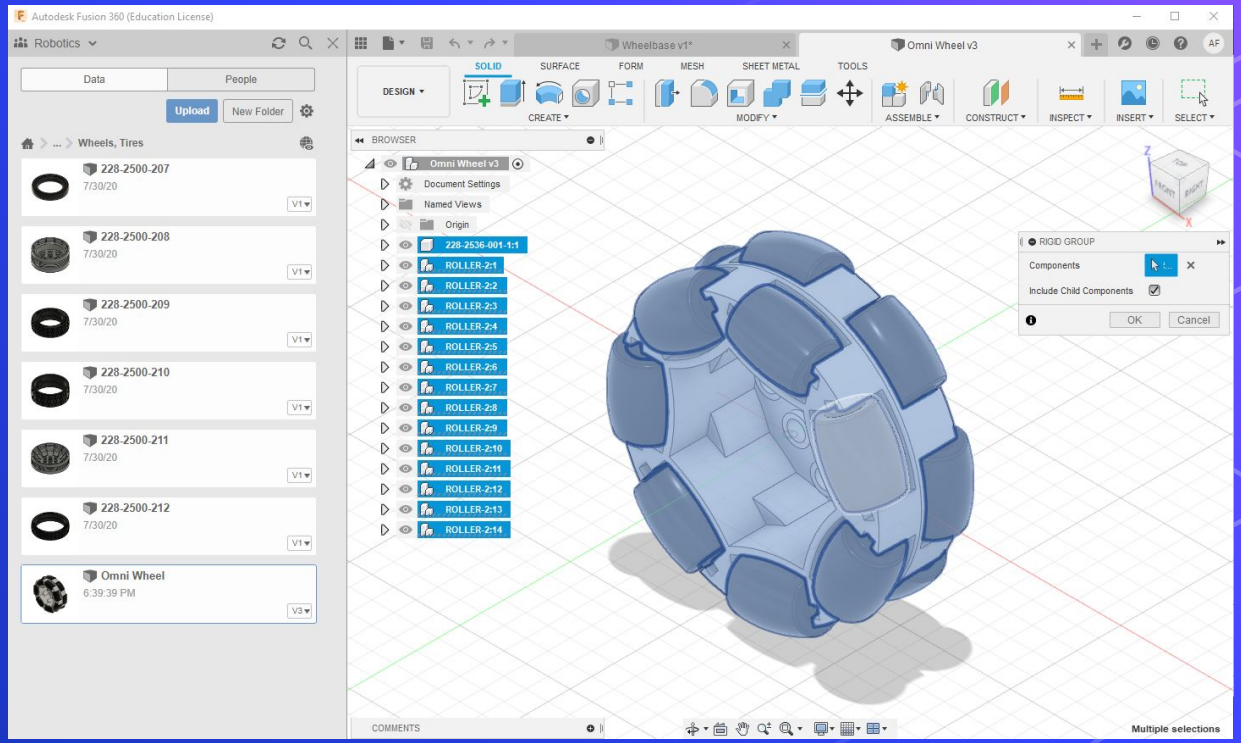
CADing a Wheelbase

When first using a multi-component piece like an omni wheel, all of the pieces won't move together. To tell if pieces are multi component pieces, look at the symbol beside their name.



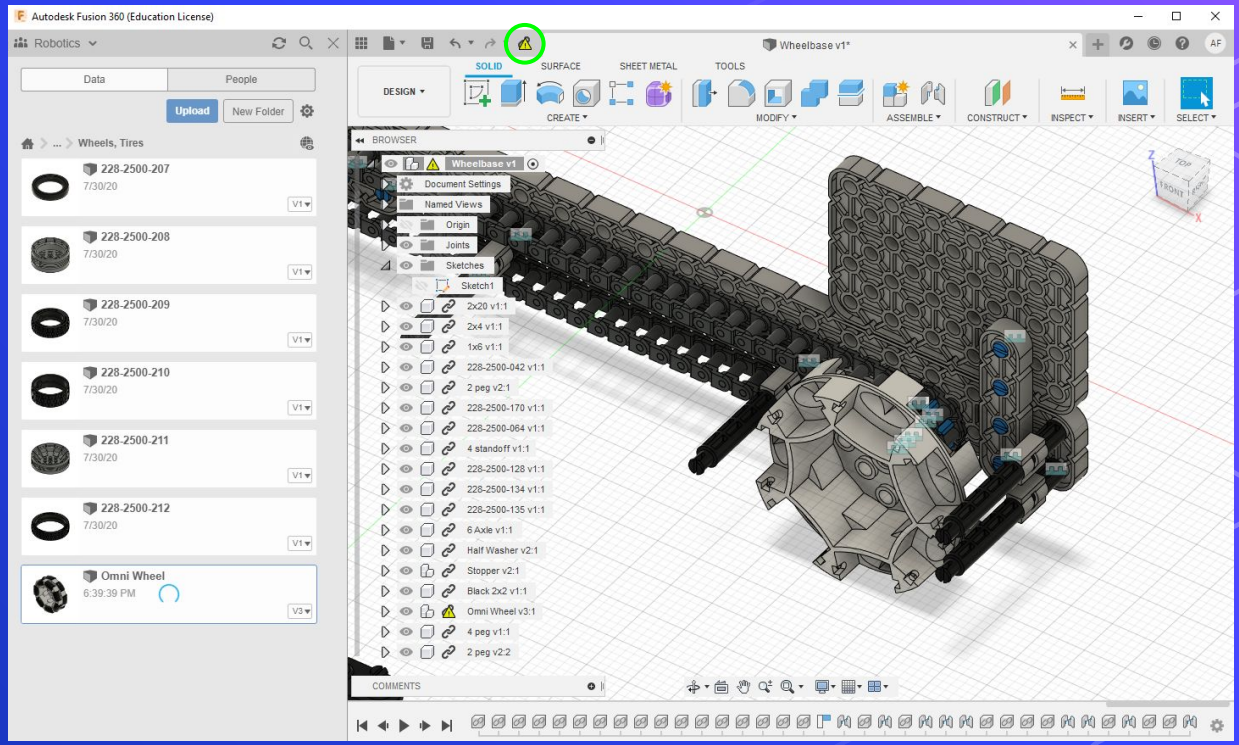
CADing a Wheelbase

To fix this, go to the original file by double clicking on it. Then, rigid group all of the components in that file. Finally, save the file.



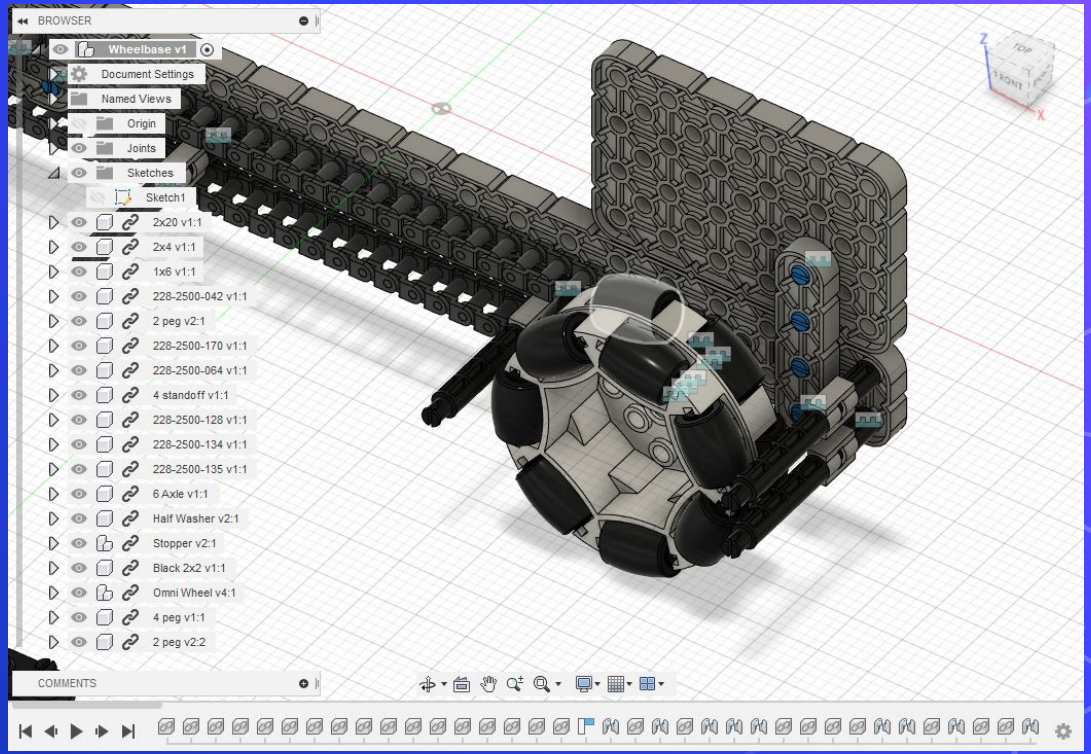
CADing a Wheelbase

Go back to the previous CADing file. Click on the link update button at the top of the screen, (circled).



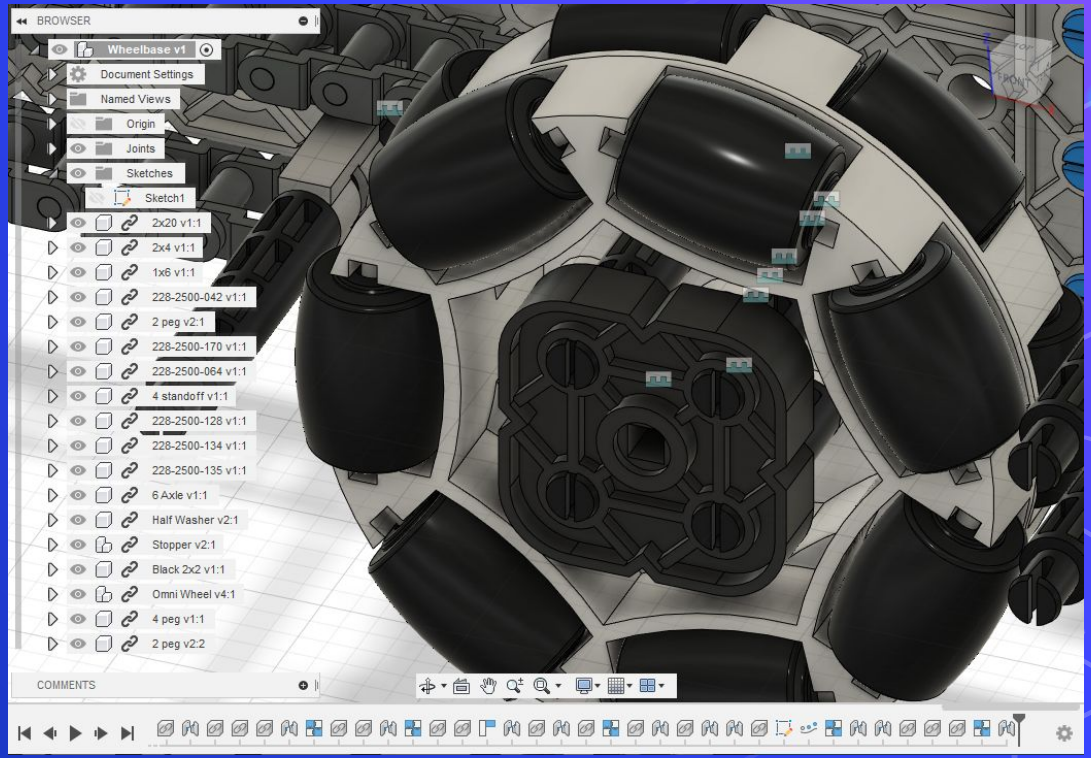
CADing a Wheelbase

Now all omni wheels imported will be updated and rigid grouped together.



CADing a Wheelbase

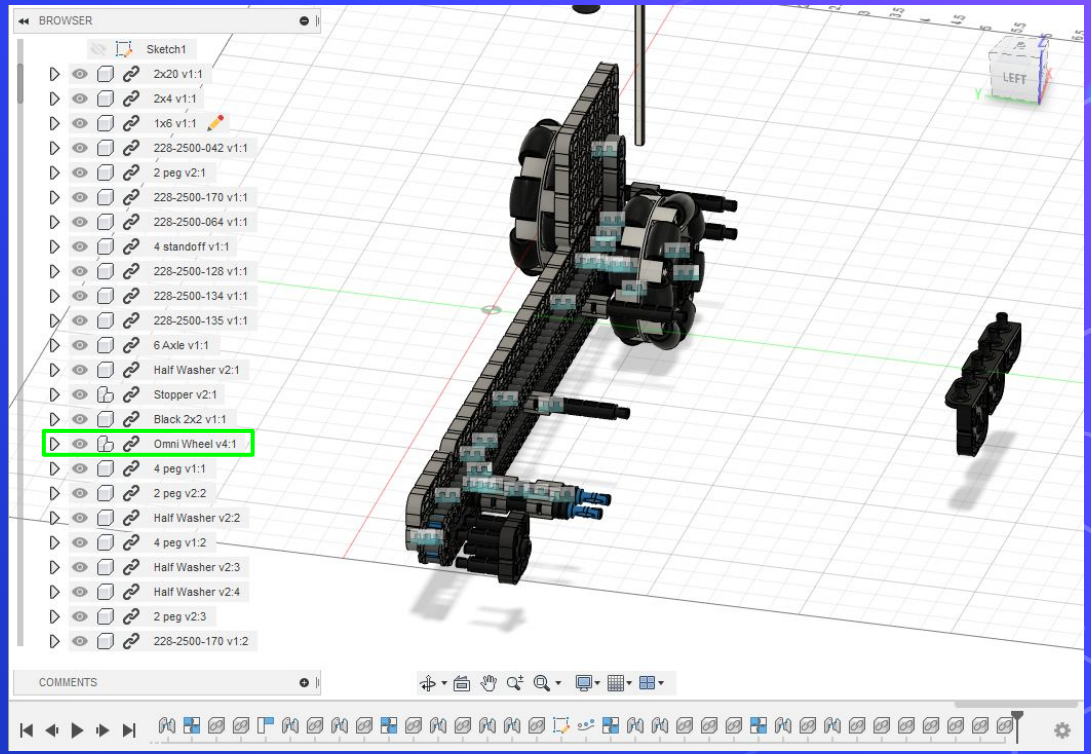
The wheel section is finished.



CADing a Wheelbase

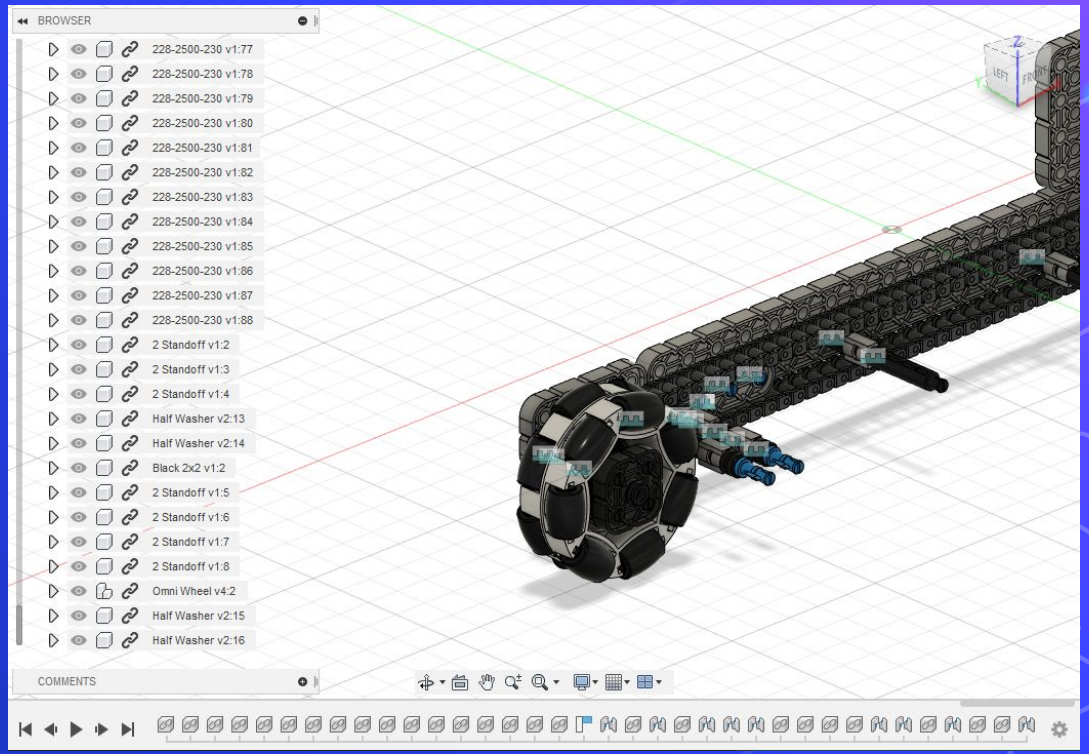
Now copy and paste the wheel section to the other sprocket. When selecting a multi-component piece to copy, do so from the menu, as highlighted in the picture. In this case, the wheel was first selected from the menu then the rest of the pieces were selected by shifting and double clicking.

Note, when pasting a multi-component piece sometimes it ends up at an unexpected position. In that case, just joint the piece to where it needs to be.



CADing a Wheelbase

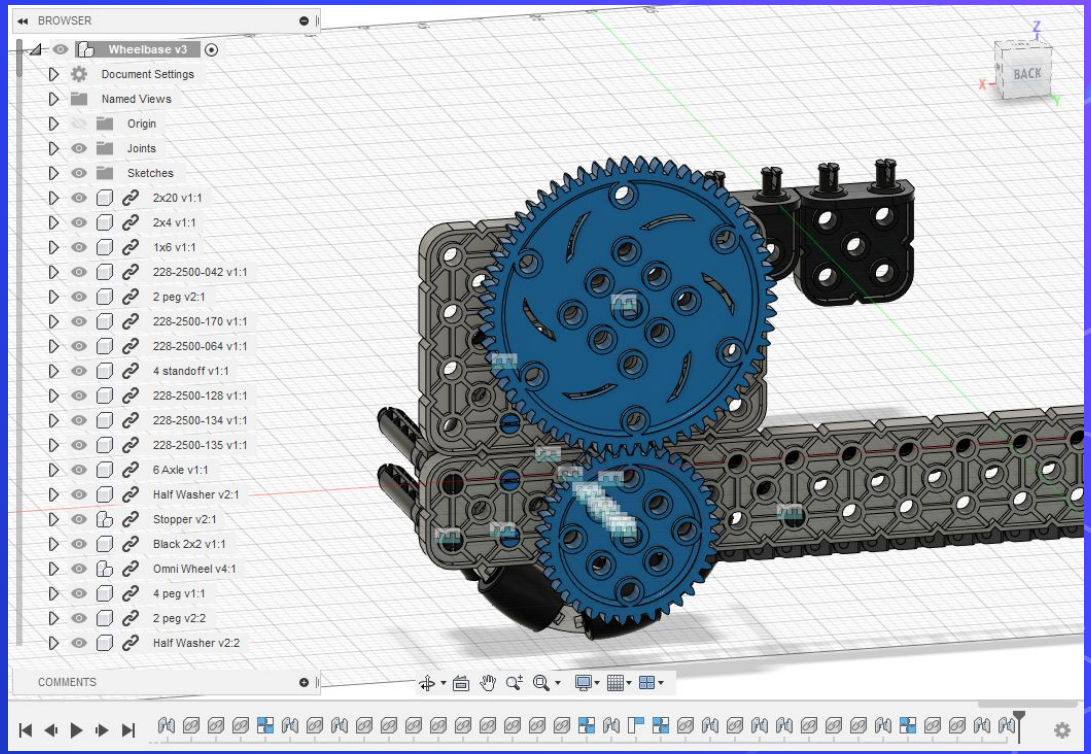
Here the piece has been correctly placed.



CADing a Wheelbase

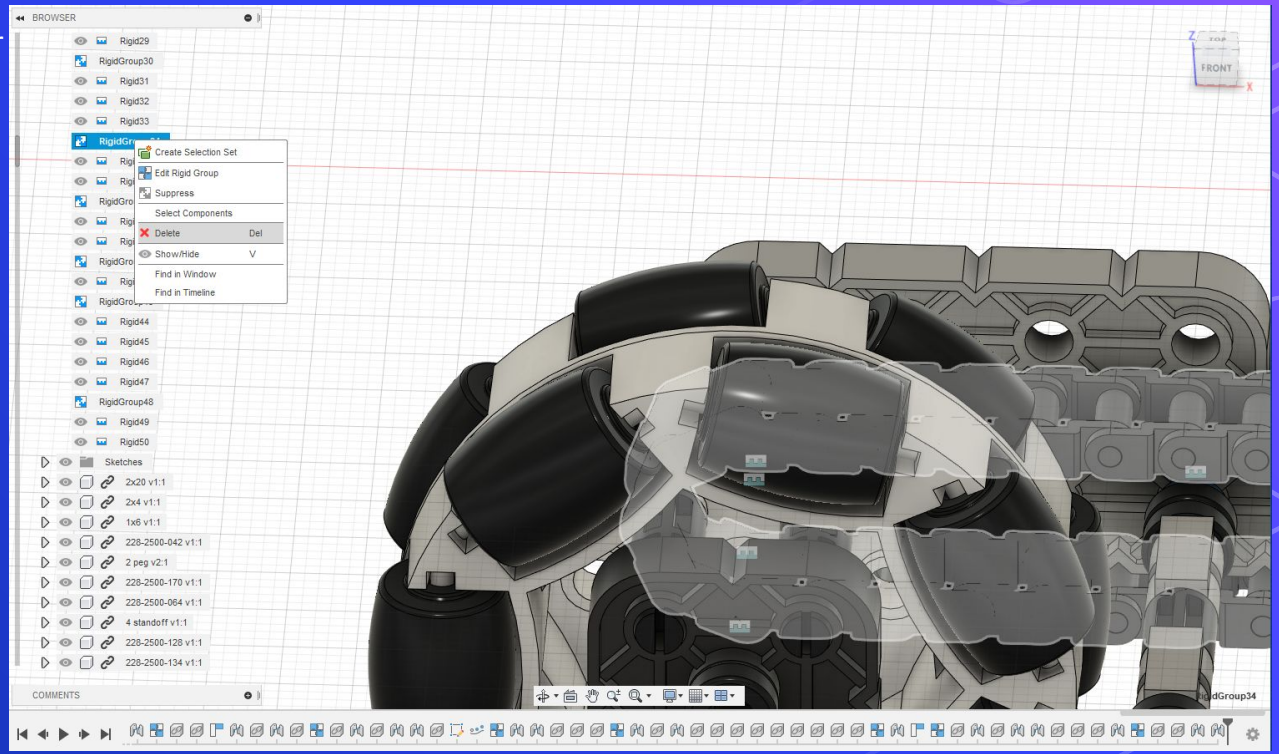
Here the gears for the wheelbase gearbox are CADed. The 60 tooth gear joint was adjusted by 3 degrees to make the gears mesh properly.

The rest involves many static joints, so it will not be shown.



Extension Learning: Motion Linking a Wheelbase

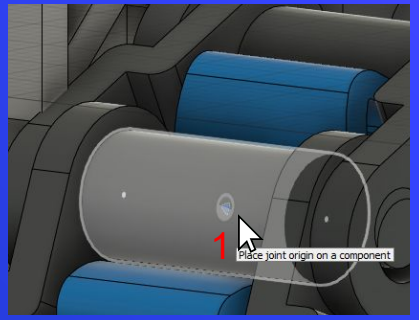
Like noted earlier, the rigid group for the chain has to be deleted for this extension activity.

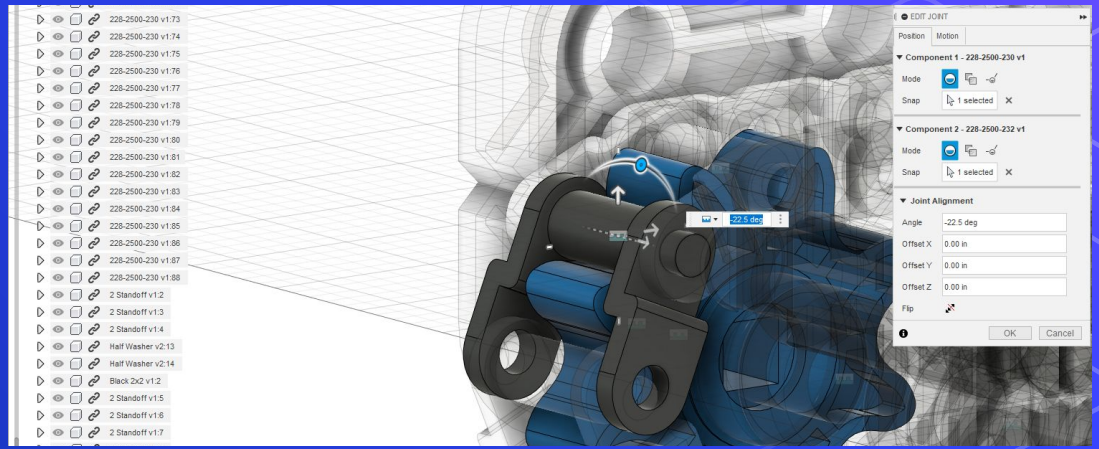


Extension Learning: Motion Linking a Wheelbase

For this exercise, the chain links around the sprocket has to be perfectly placed. Do this by jointing the chain links directly onto the sprockets. Click on the center of the chain link, then the center of the curved section of the sprocket (which should show a circle on top). Adjust the angles with the joint so the chain links are aligned.

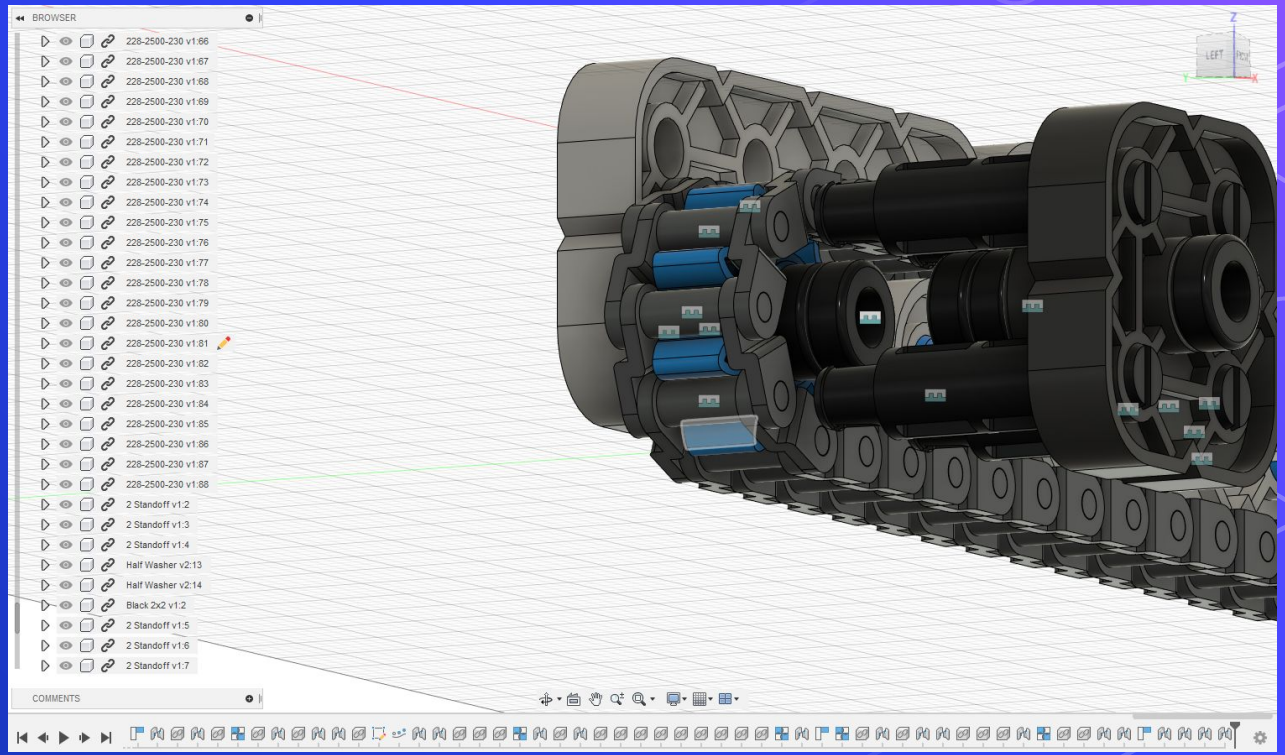
Do this for both wheels.





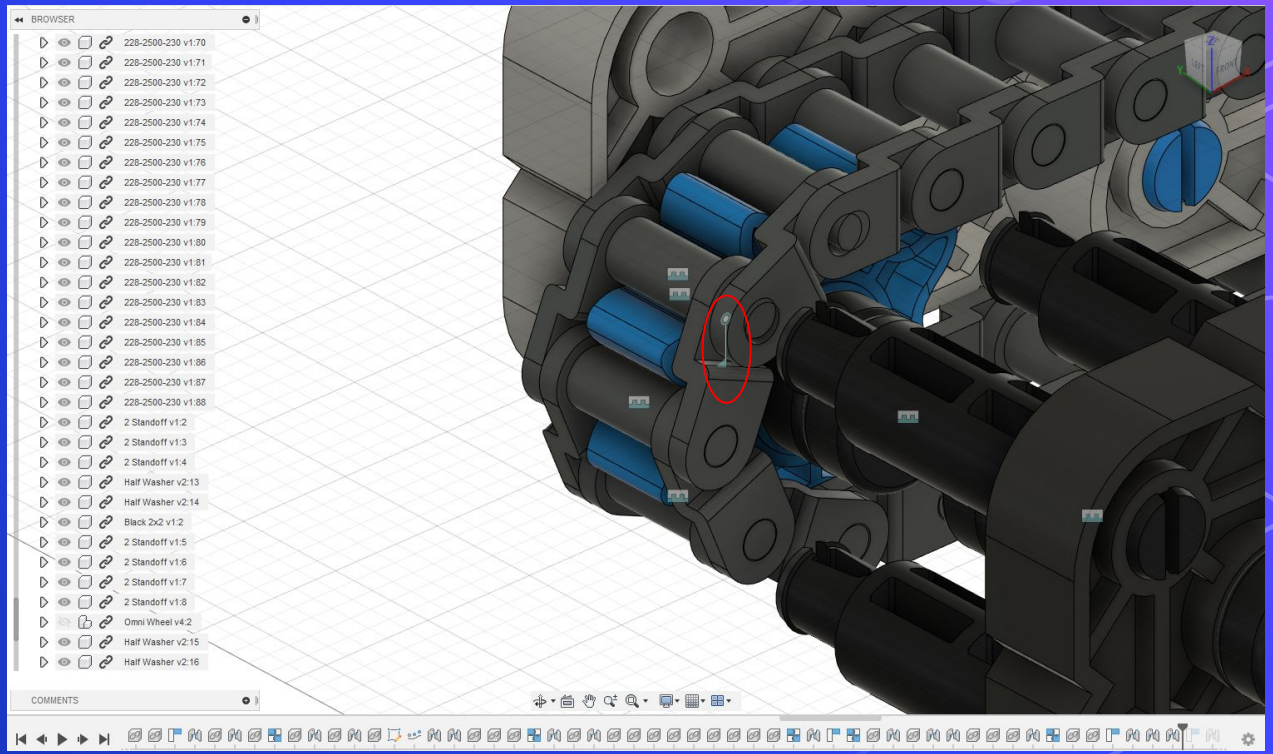
Extension Learning: Motion Linking a Wheelbase

At this point, it is suggested to hide all the pieces of the wheel. This is best done by clicking the eye button on the wheel piece in the left bar since a wheel has multiple components in it.



Extension Learning: Motion Linking a Wheelbase

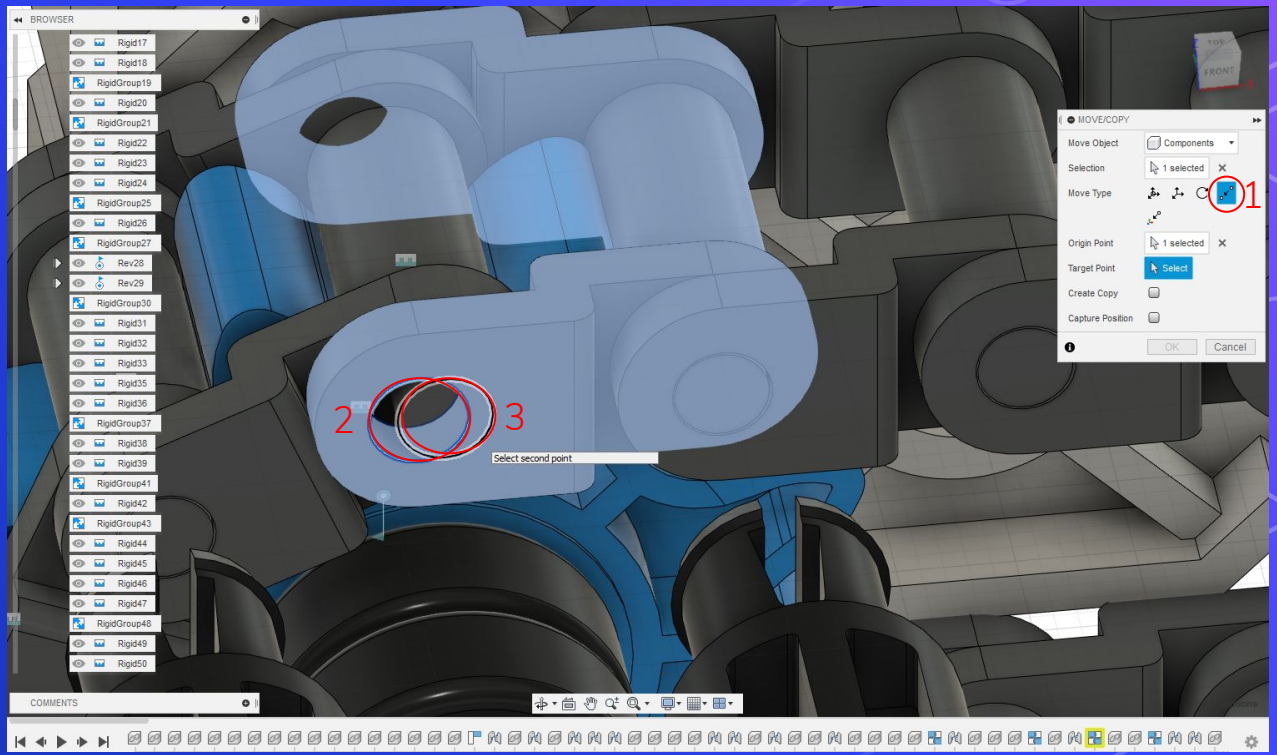
Now change the joint between the sprocket and washer to a revolute joint. Do this by clicking to edit the joint, go to the motion bar, and change the joint option from rigid to revolute.



Extension Learning: Motion Linking a Wheelbase

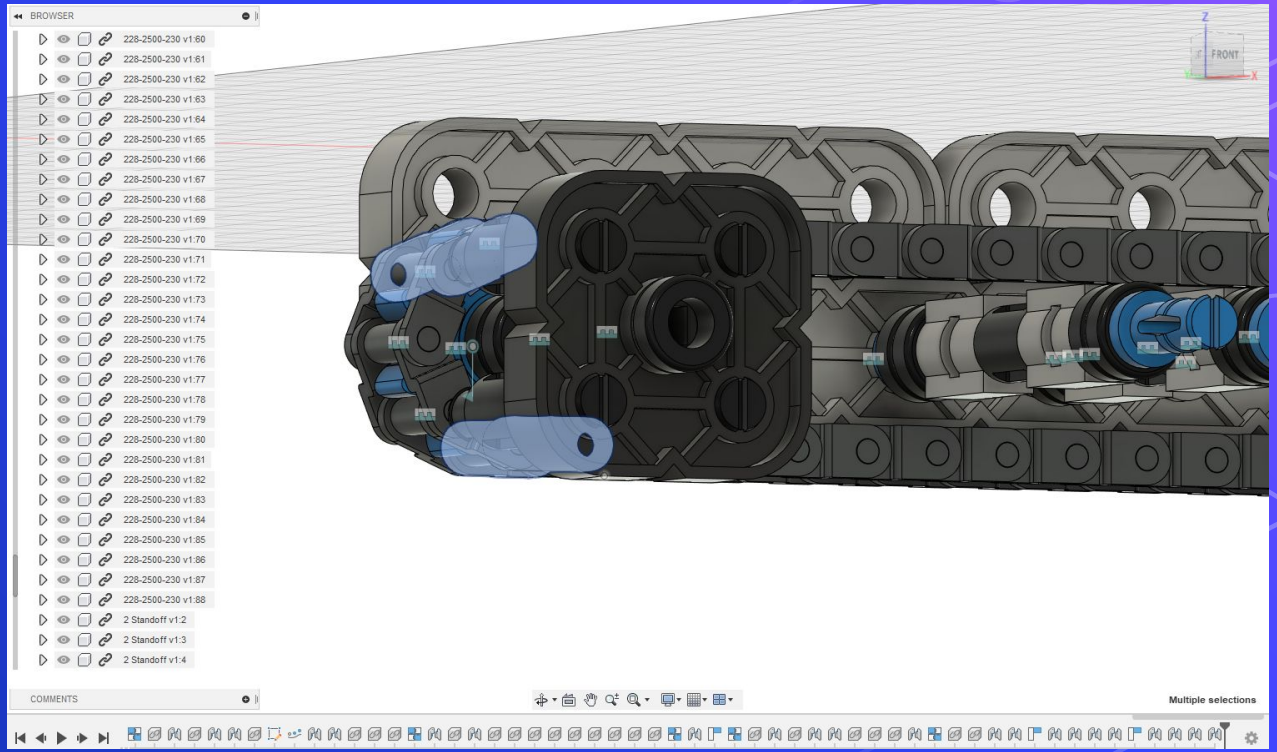
Now use the move tool, but in a new mode. First, switch the move type to point to point. Second, select the circle part of the sprocket not in line for the origin point. Third, select the sprocket circle in line. This will move the piece, much like a joint, except it won't constrain it.

The piece must be in line properly for a future joint. The chain will be rigid grouped later, so it will be a pain to correct.



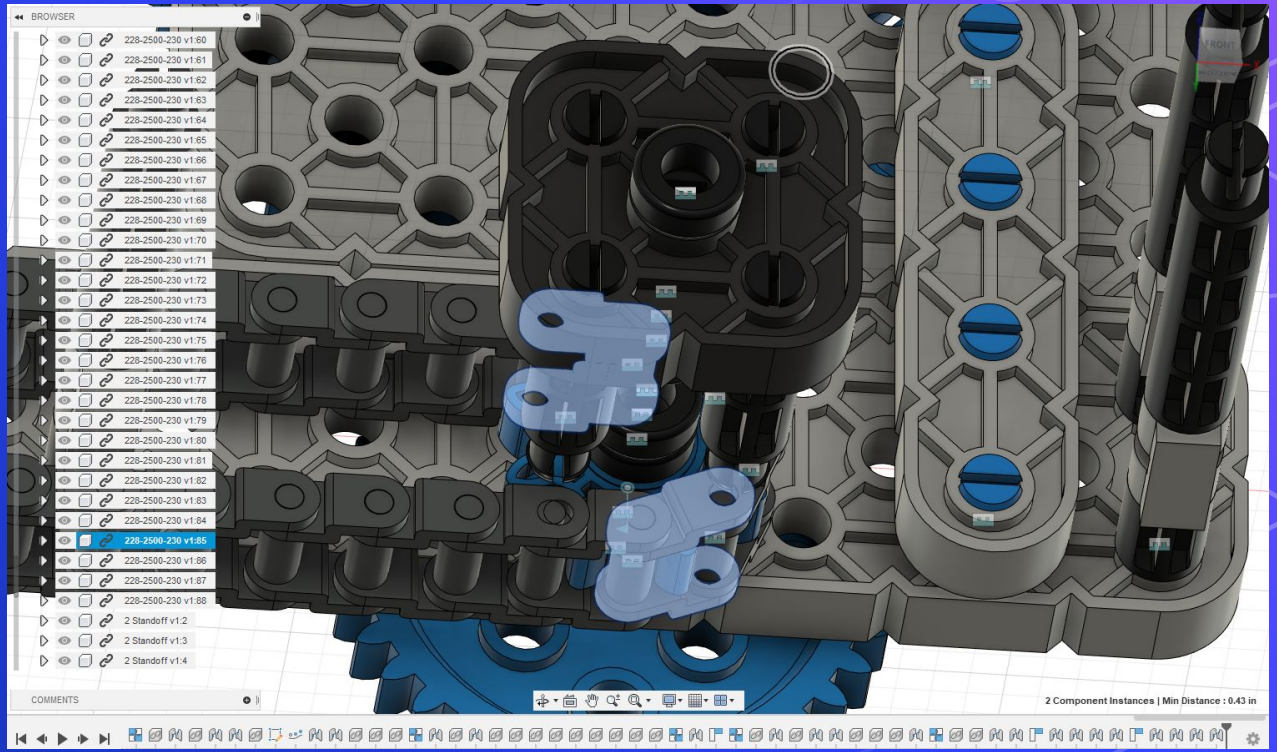
Extension Learning: Motion Linking a Wheelbase

Depending which direction you want to animate the chain depends which links to hide. Here the chain will be driving clockwise, so these specific links will be hidden.



Extension Learning: Motion Linking a Wheelbase

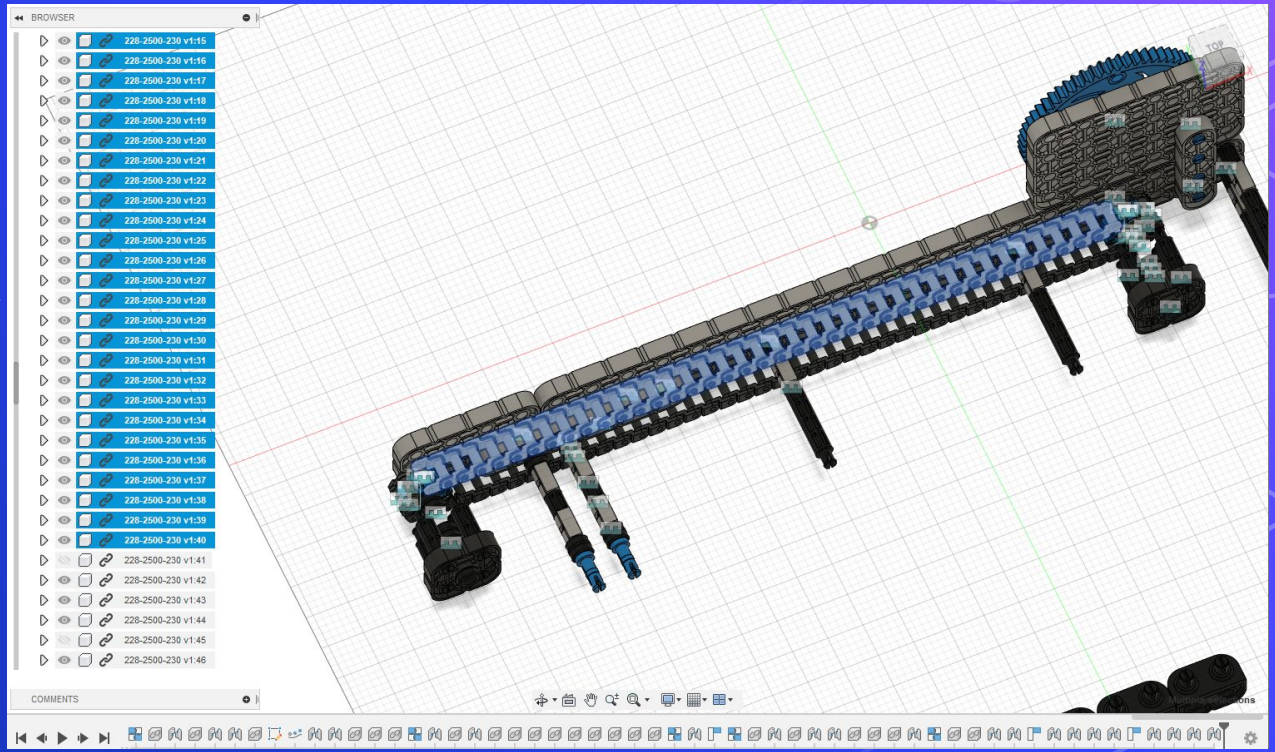
Make sure this is done for the other sprocket too.



Extension Learning: Motion Linking a Wheelbase

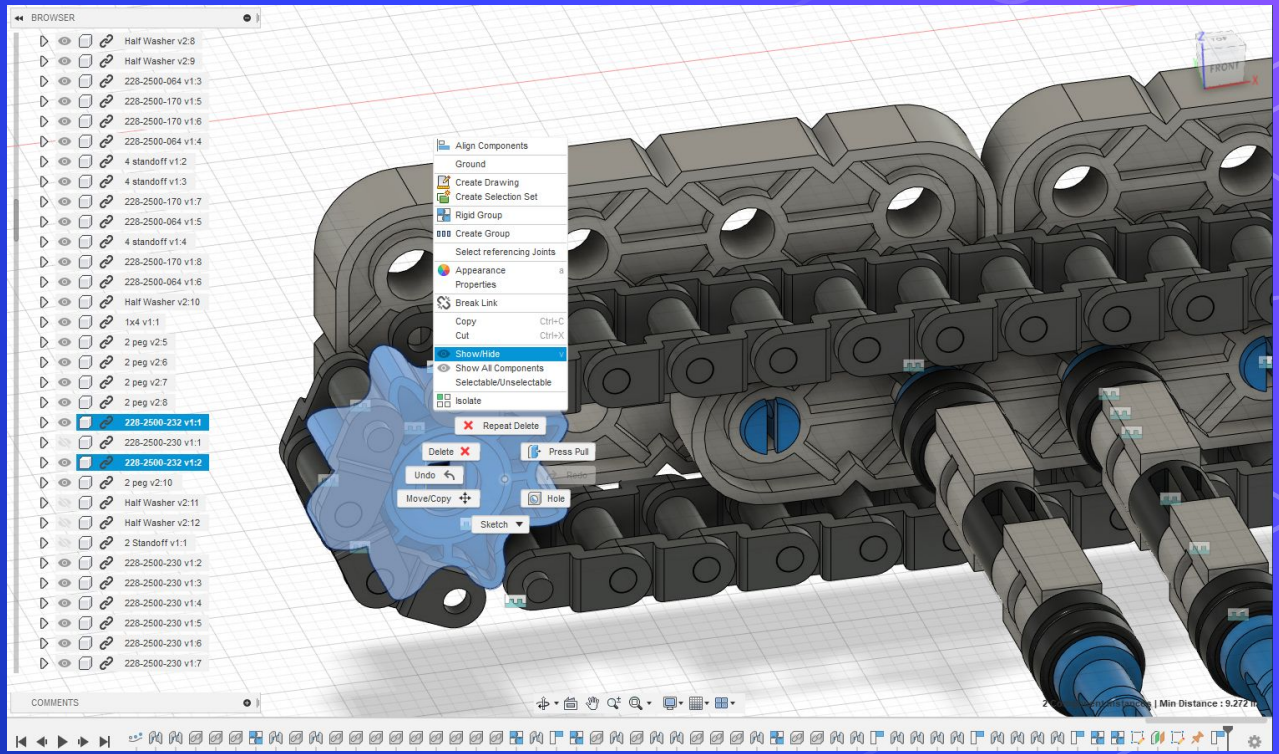
Now select all of the chain links in a straight line. Rigid group them. Make sure not to include the links that were hidden earlier. Selecting this number of pieces is probably best done by selecting them in the bar on the left instead of individually clicking on all of them.

Do this for both lines of chain.



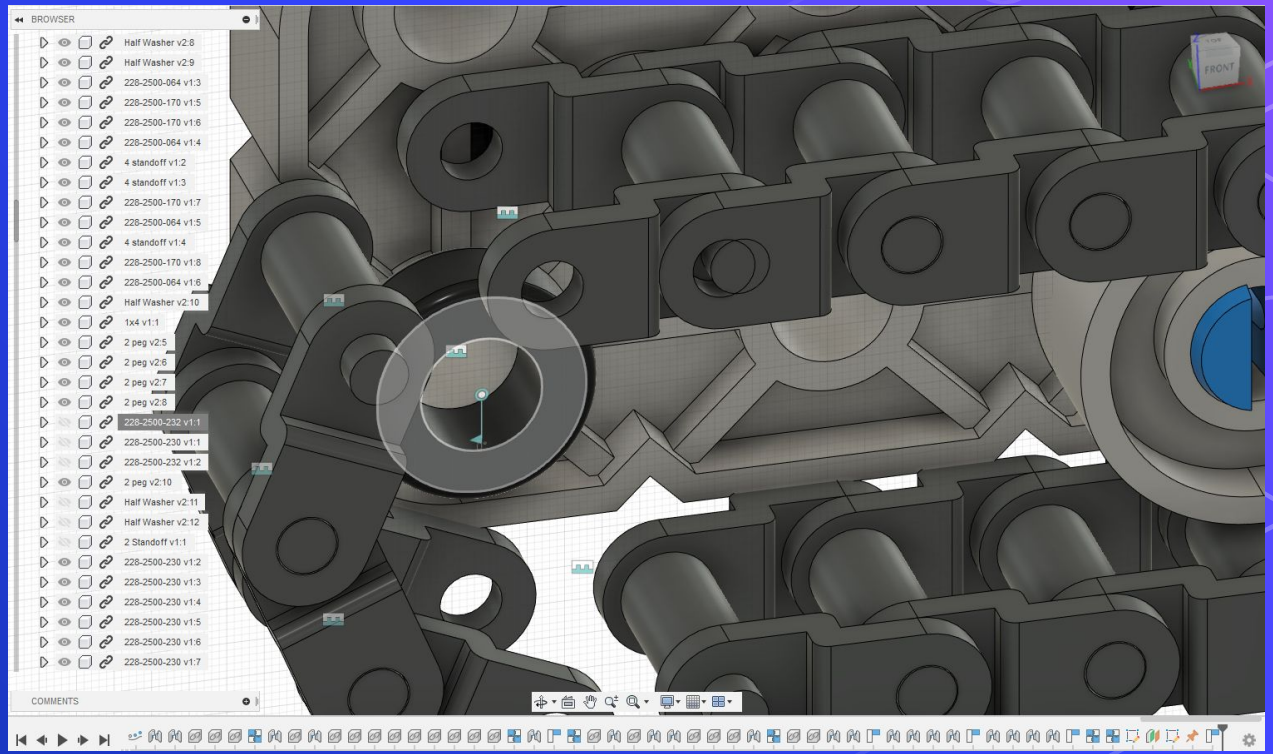
Extension Learning: Motion Linking a Wheelbase

Now hide all the wheel pieces. Next hide the sprocket.



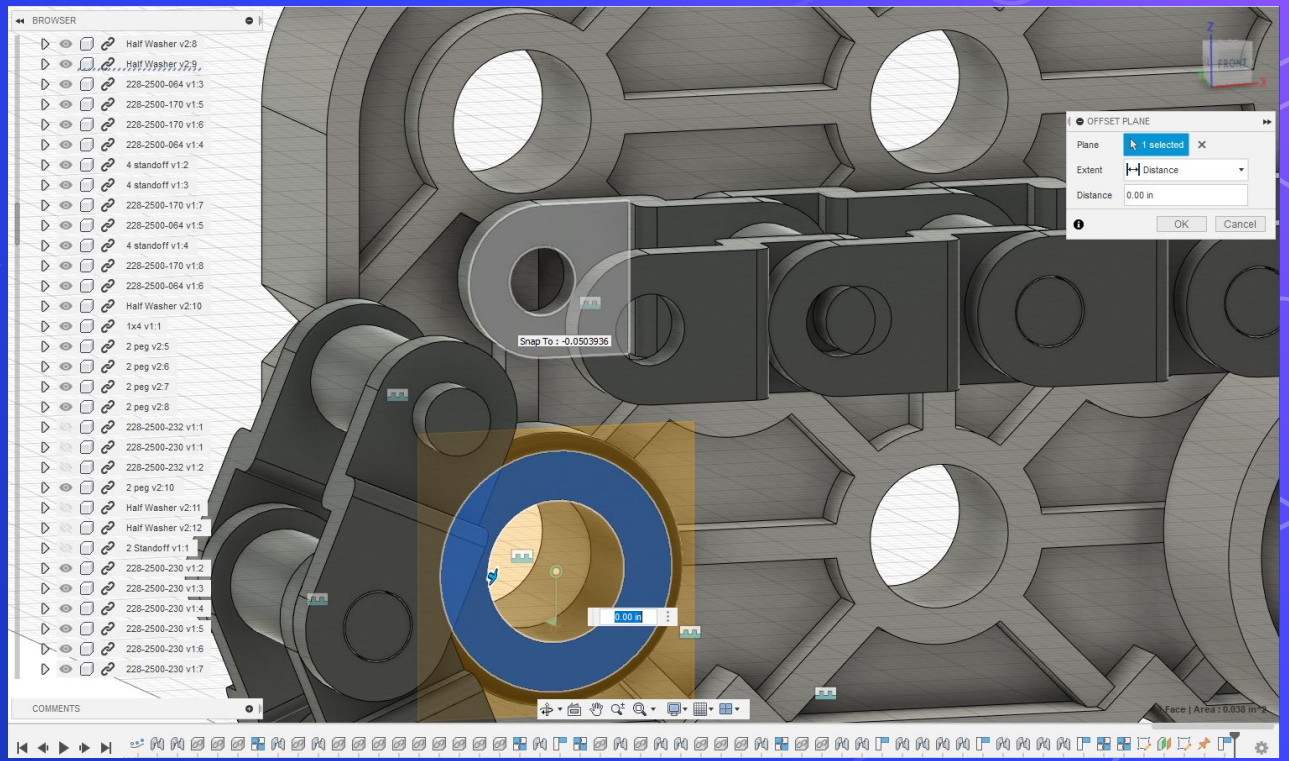
Extension Learning: Motion Linking a Wheelbase

These next few steps show how measurements are taken. They can be skipped if the same-sized sprockets are used.



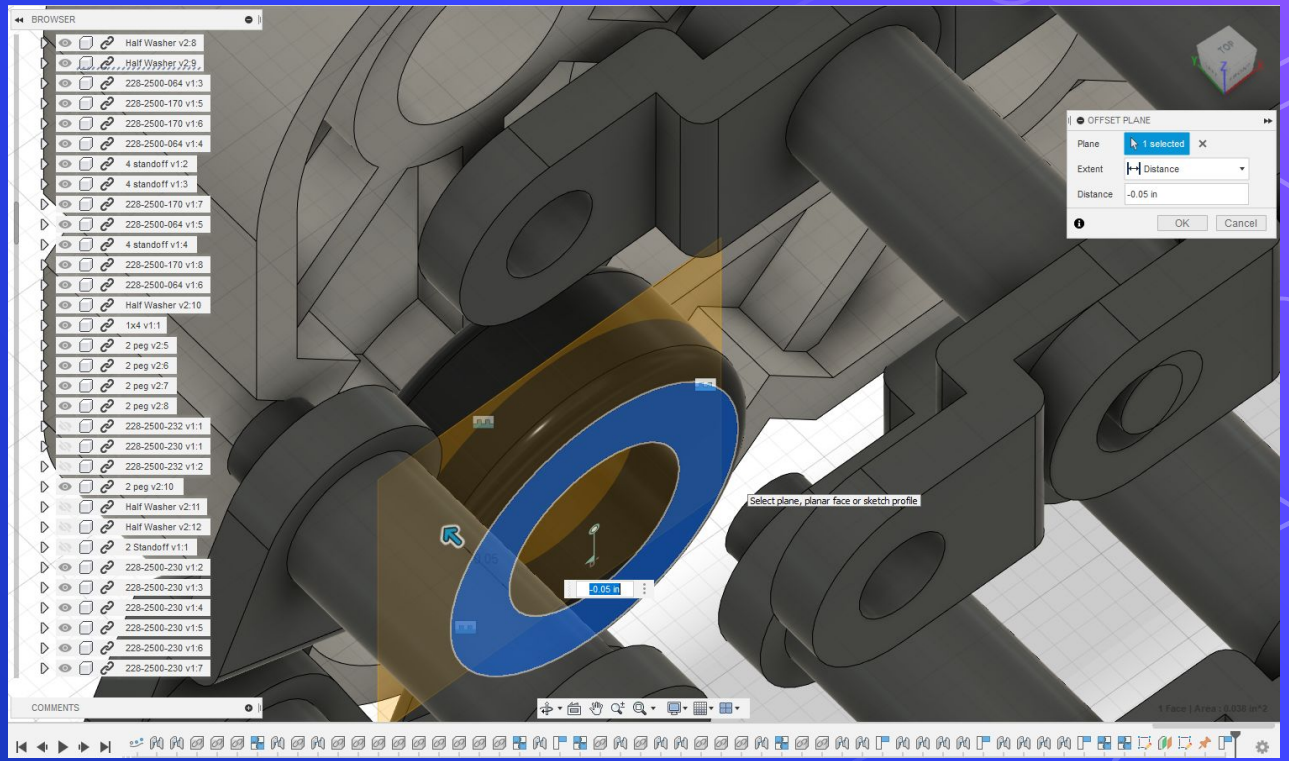
Extension Learning: Motion Linking a Wheelbase

Now, pull up the offset plane tool with the shortcut menu (by clicking s). Shift the plane from the washer to inside of the sprocket. Start from the washer, then shift the plane to the sprocket by clicking on the move arrow then clicking on the sprocket surface.



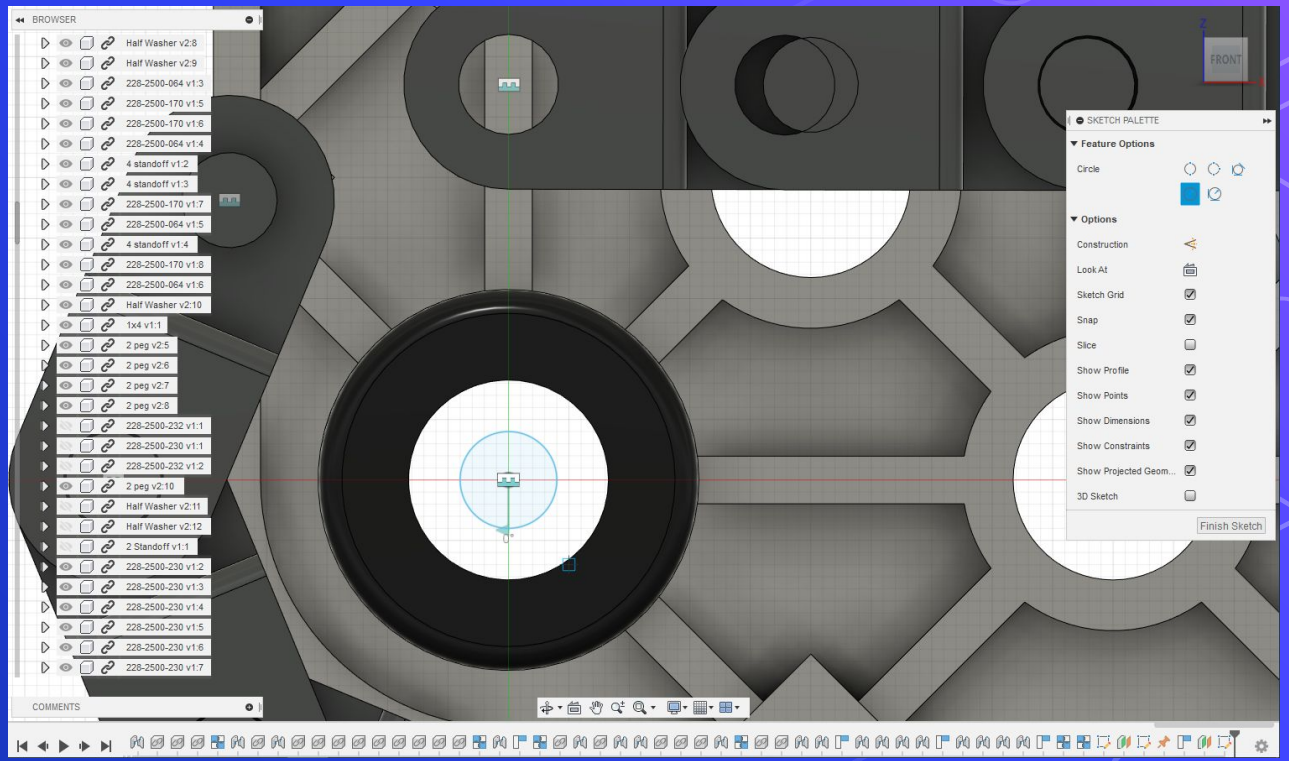
Extension Learning: Motion Linking a Wheelbase

Here the measurement shows shifted by 0.05 inches.



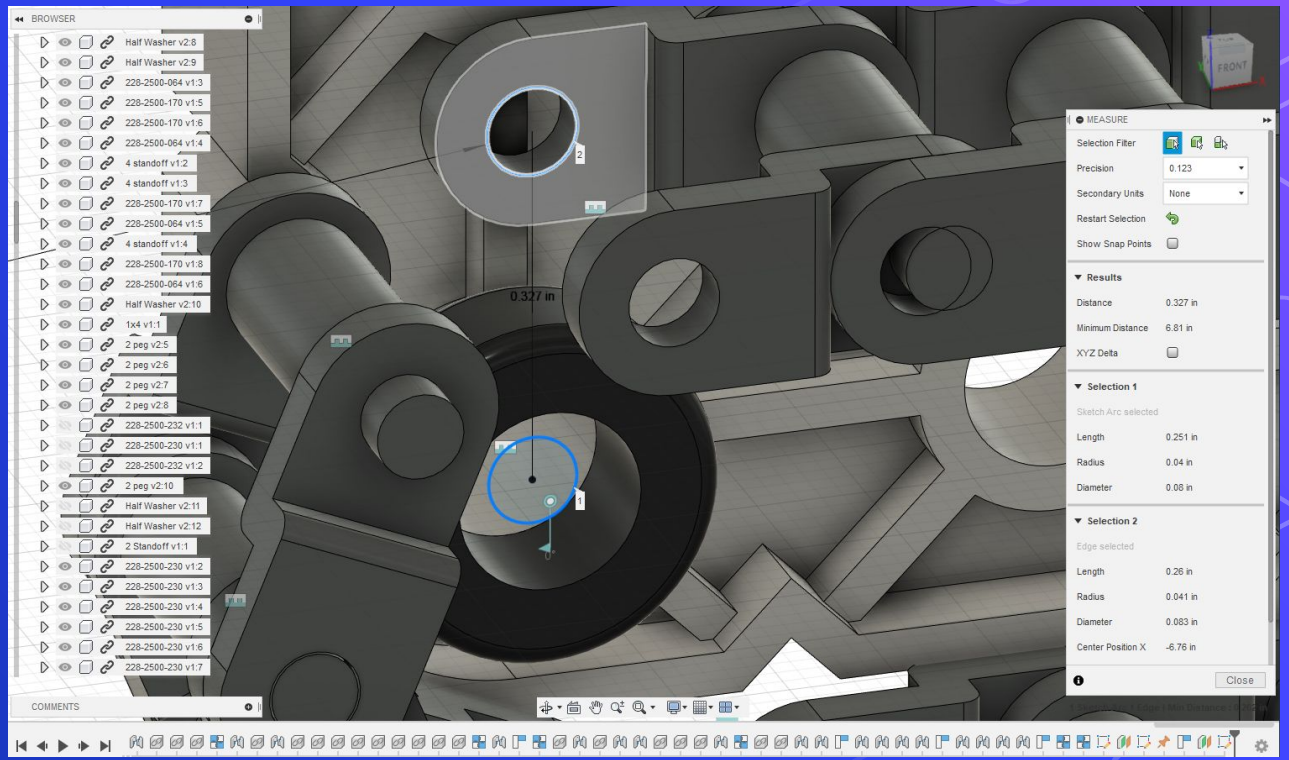
Extension Learning: Motion Linking a Wheelbase

Next, create a sketch on the plane just created. Find create sketch in the shortcut menu then click on the plane just created. Create a circle, any size, at the origin of the sketch.



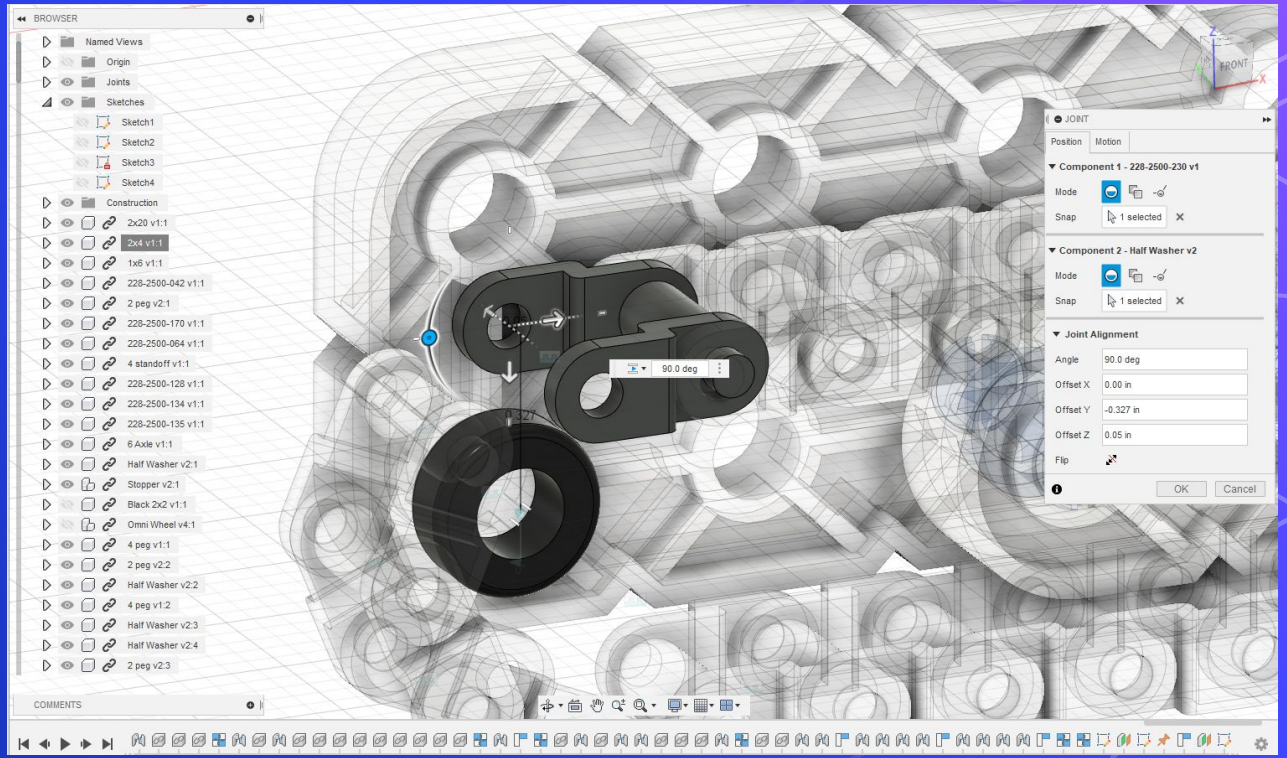
Extension Learning: Motion Linking a Wheelbase

Use the measuring tool (shortcut key i), and measure the distance from the center of the circle to circle. Do this by clicking on the edge of the circle instead of the centers. Here the measurement is 0.327 inches.



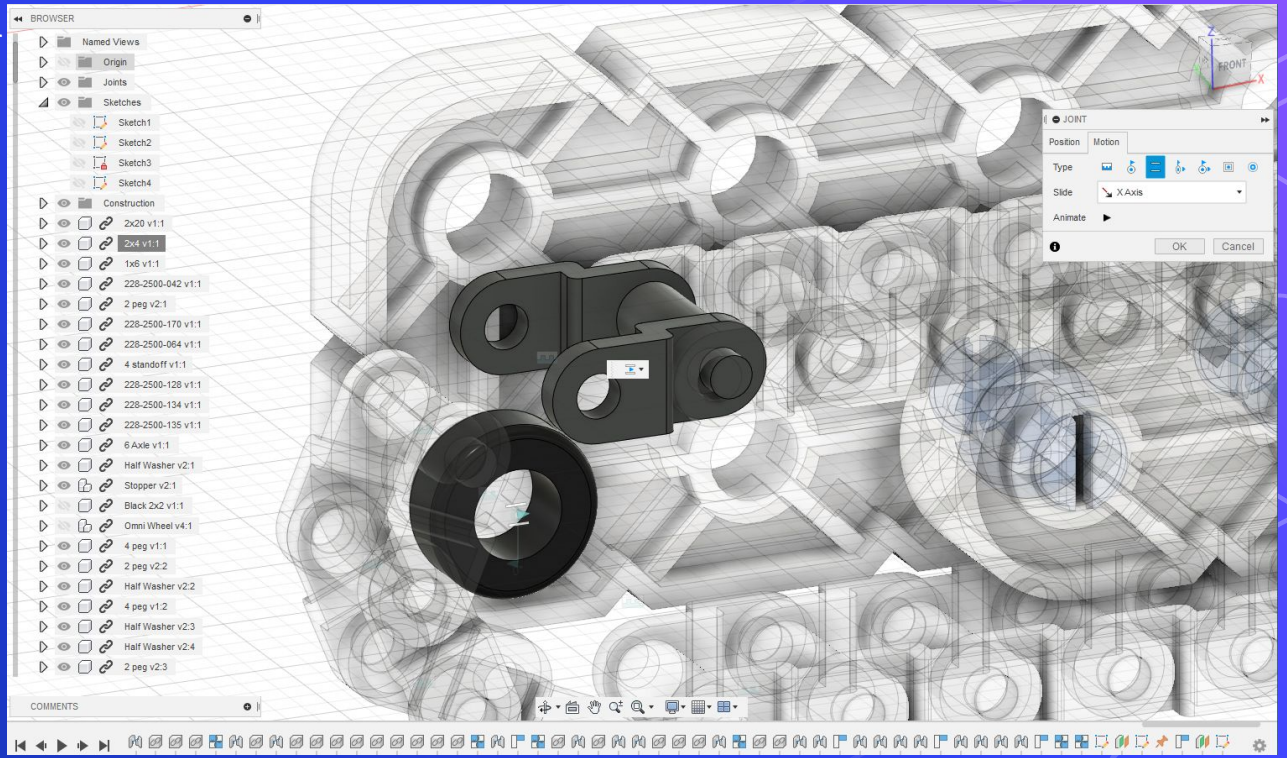
Extension Learning: Motion Linking a Wheelbase

Using those exact measurements, joint the chain link to the washer.



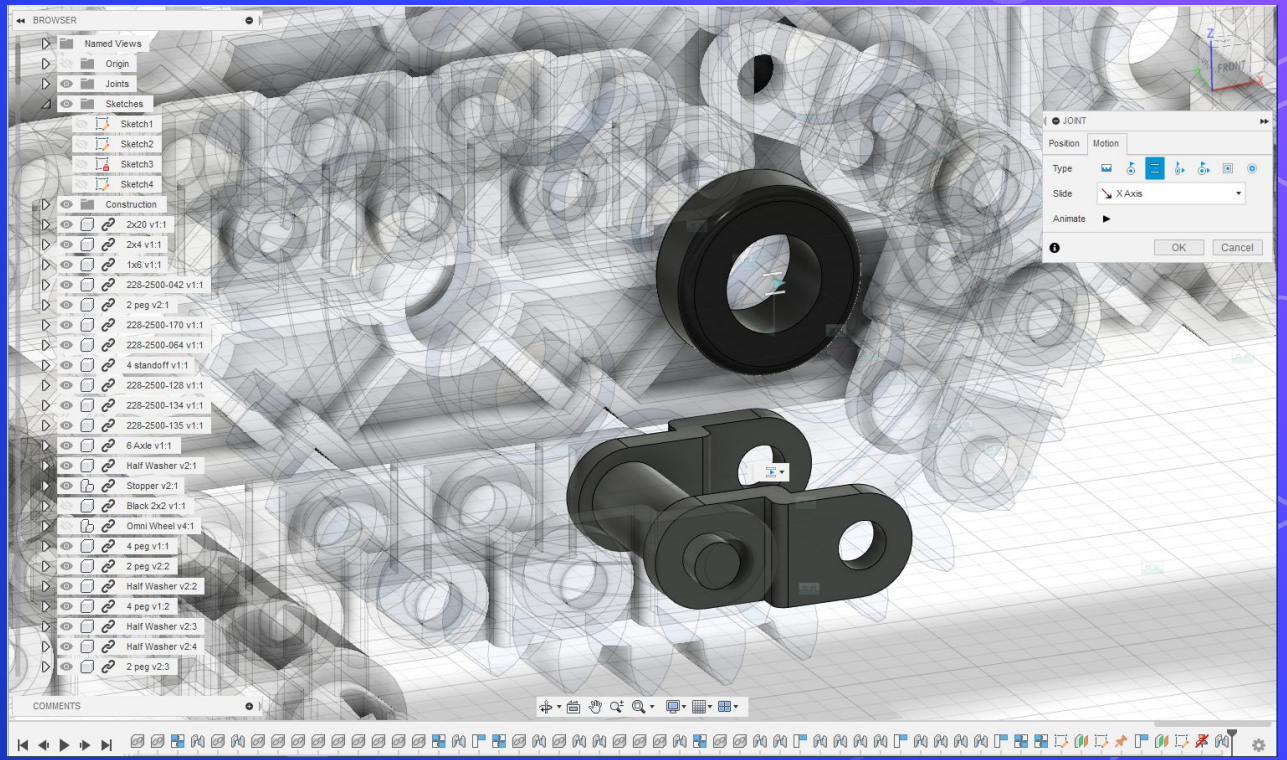
Extension Learning: Motion Linking a Wheelbase

Now switch this joint type to a slider joint.



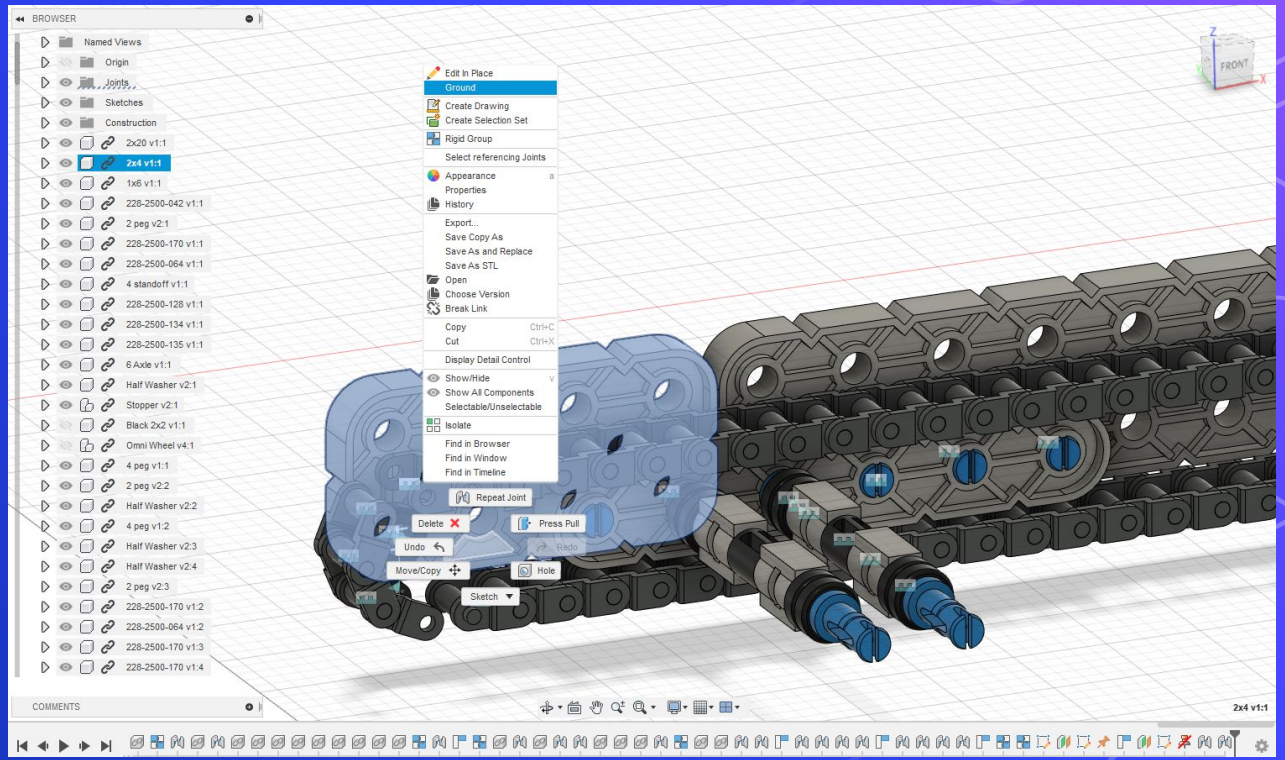
Extension Learning: Motion Linking a Wheelbase

Do the same thing for the other group of chain.



Extension Learning: Motion Linking a Wheelbase

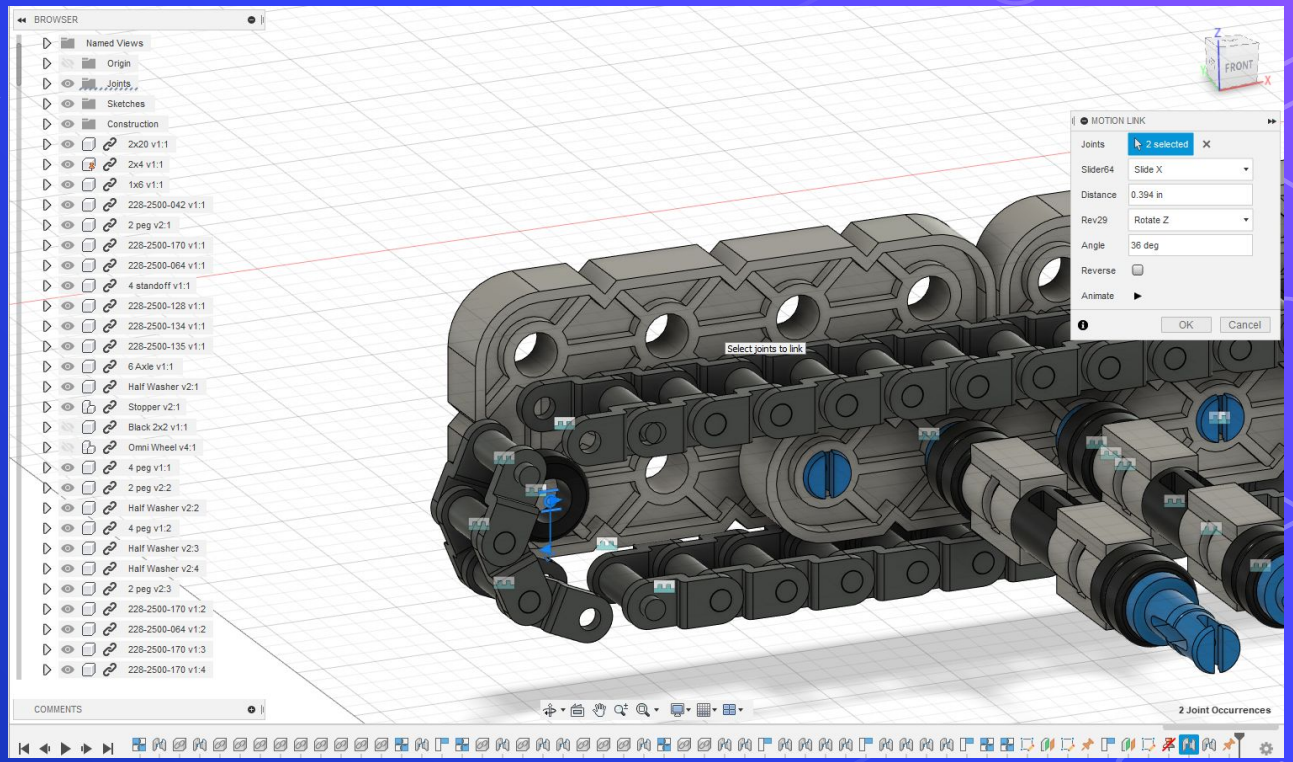
Next, ground a piece of the wheelbase that is supposed to be stationary. Grounding stops a piece from being able to move.



Extension Learning: Motion Linking a Wheelbase

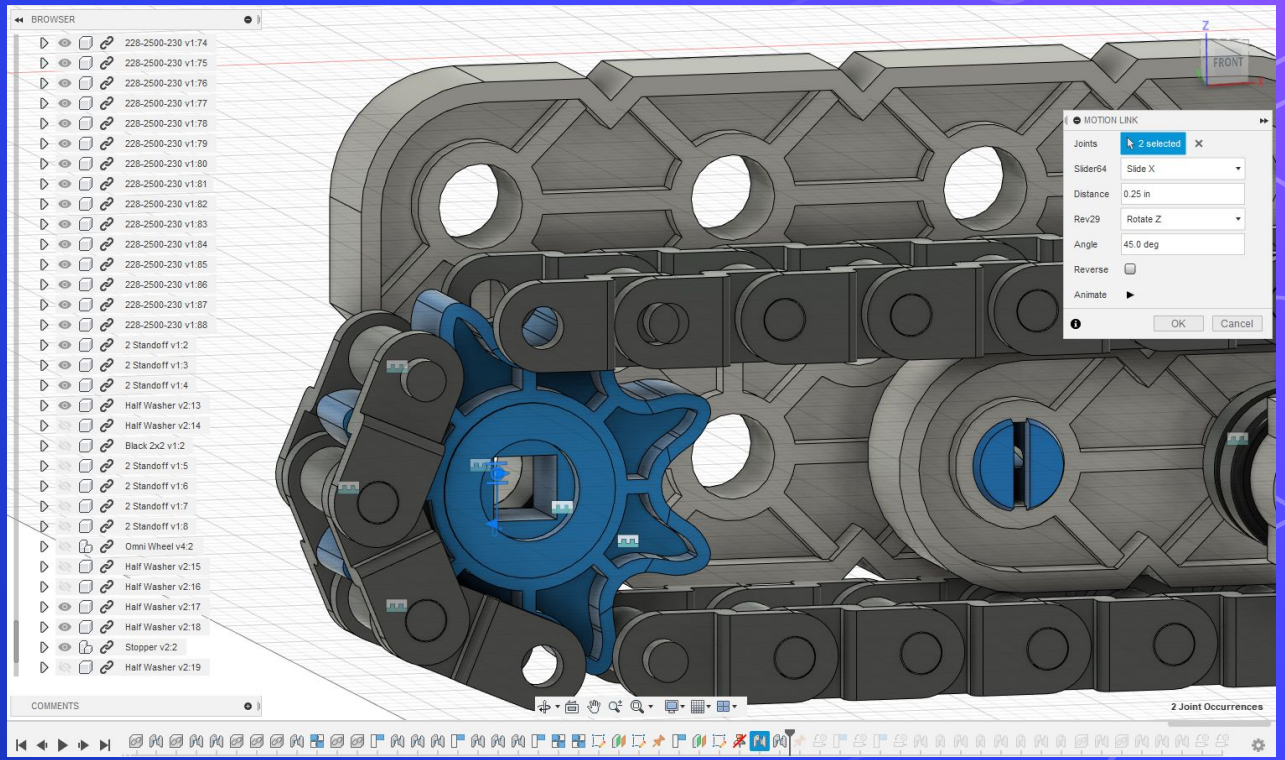
Next create motion link (find the function in the shortcut menu). Click on the slider and revolute joint at the washer.

You can click animate to see it play.



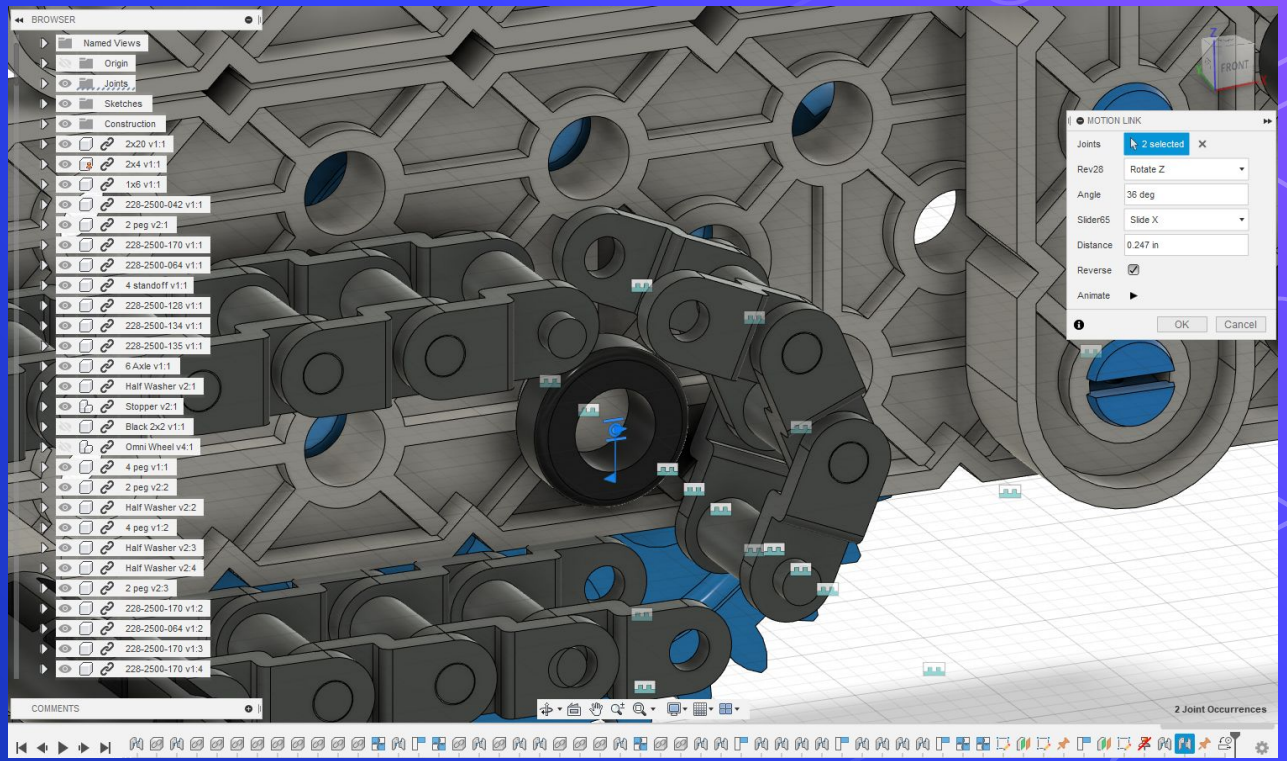
Extension Learning: Motion Linking a Wheelbase

Change the values in the menu for distance to 0.25 inches, and for angle to 45 degrees. This is to make the different parts move at the “same speed”, keeping the distance between the turning section and the sliding section constant for some time. This is because one chain link is 0.25 inches from connection to connection (which can be checked with the measure tool), and we can calculate that with 8 teeth, everytime the sprocket turns 45 degrees the links of chain are shifted by that same amount.



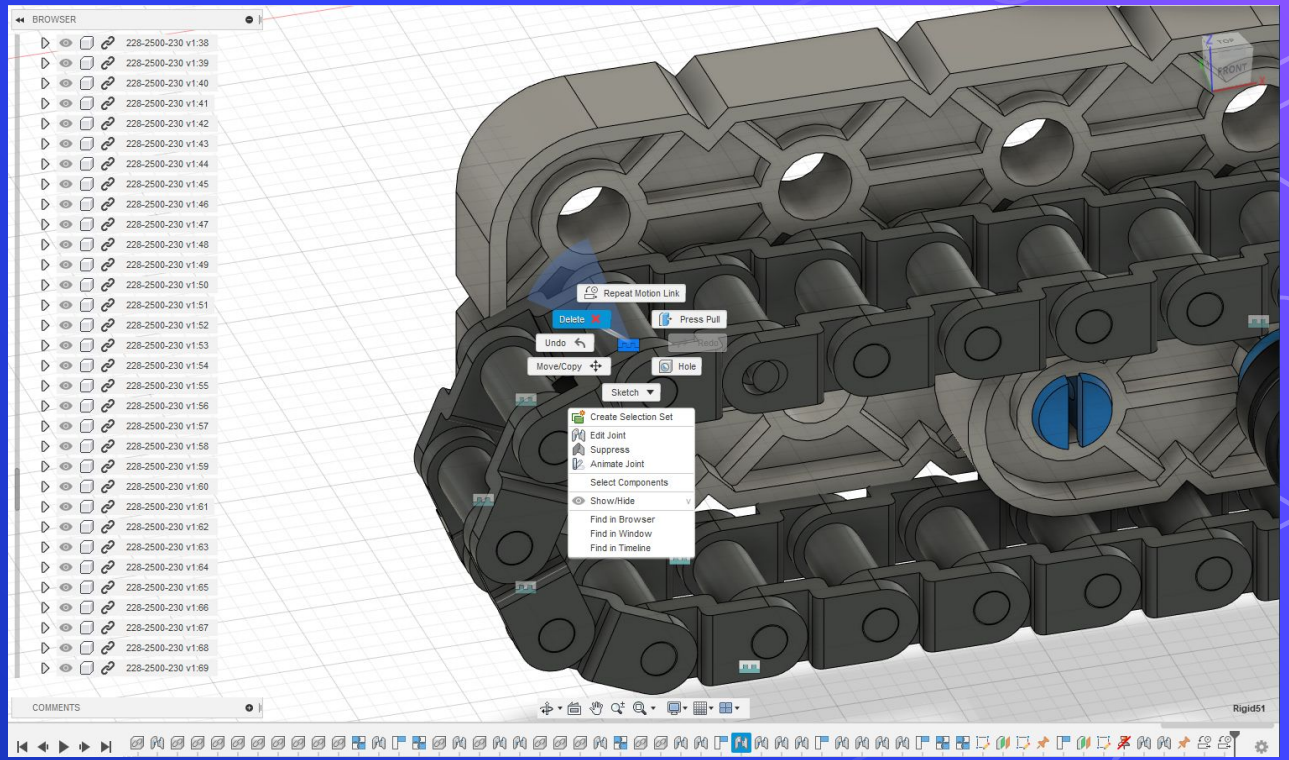
Extension Learning: Motion Linking a Wheelbase

Do the same for the other group of chain. (With the correct values inputted.)



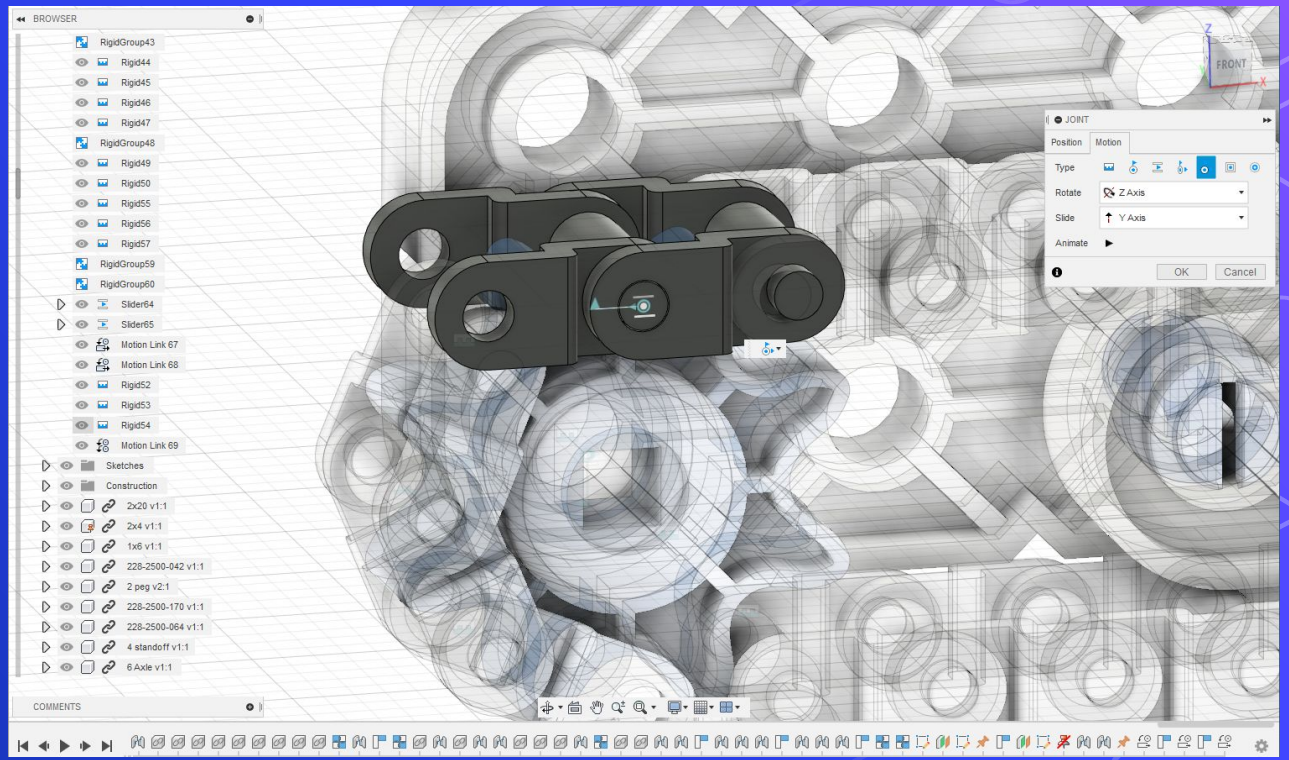
Extension Learning: Motion Linking a Wheelbase

Now show those hidden sprocket bits. Delete any joints that the hidden sprocket bits might have with other components.



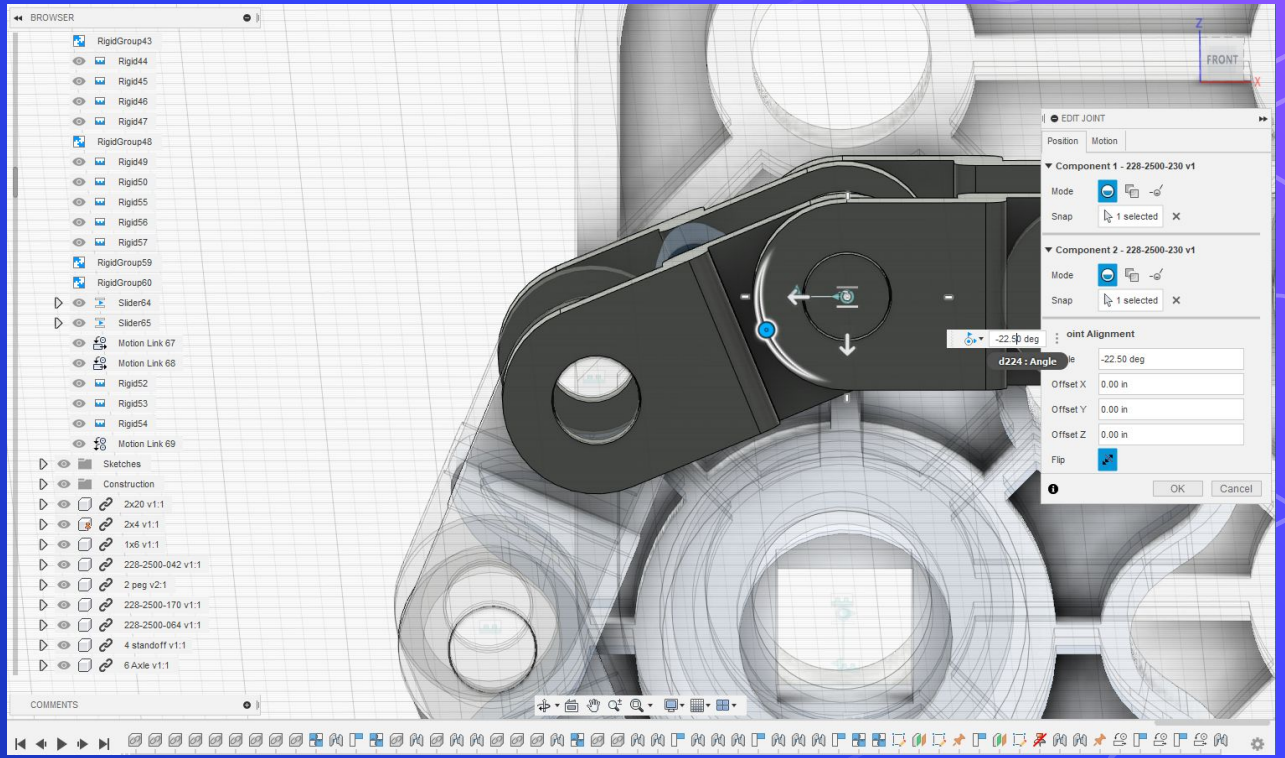
Extension Learning: Motion Linking a Wheelbase

Now create a joint between the previously hidden chain link and the straight section, at the point the joint will need to turn. Change the joint type to the pin-slot option. Click animate to check that the joint will slide and turn in the directions that make sense. If not, then adjust the settings.



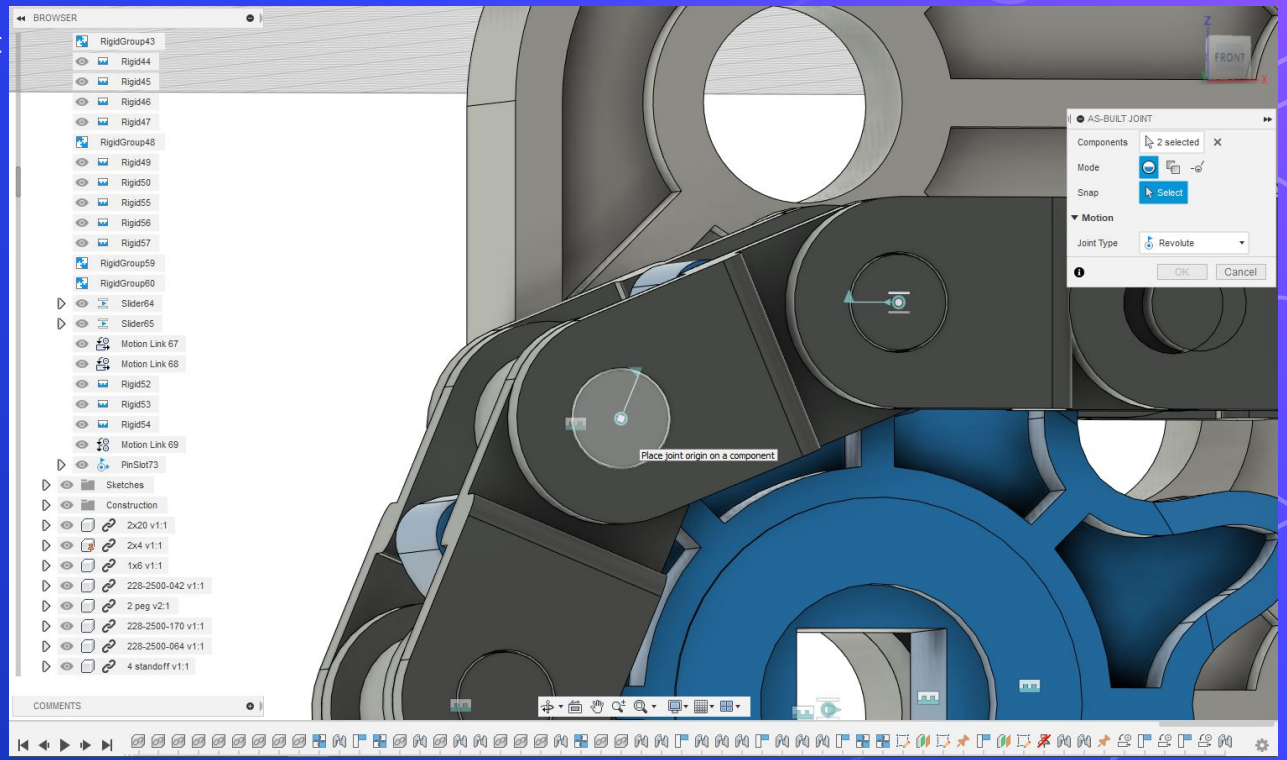
Extension Learning: Motion Linking a Wheelbase

Adjust the position of the joint so that the chain link will be in line with the other links.



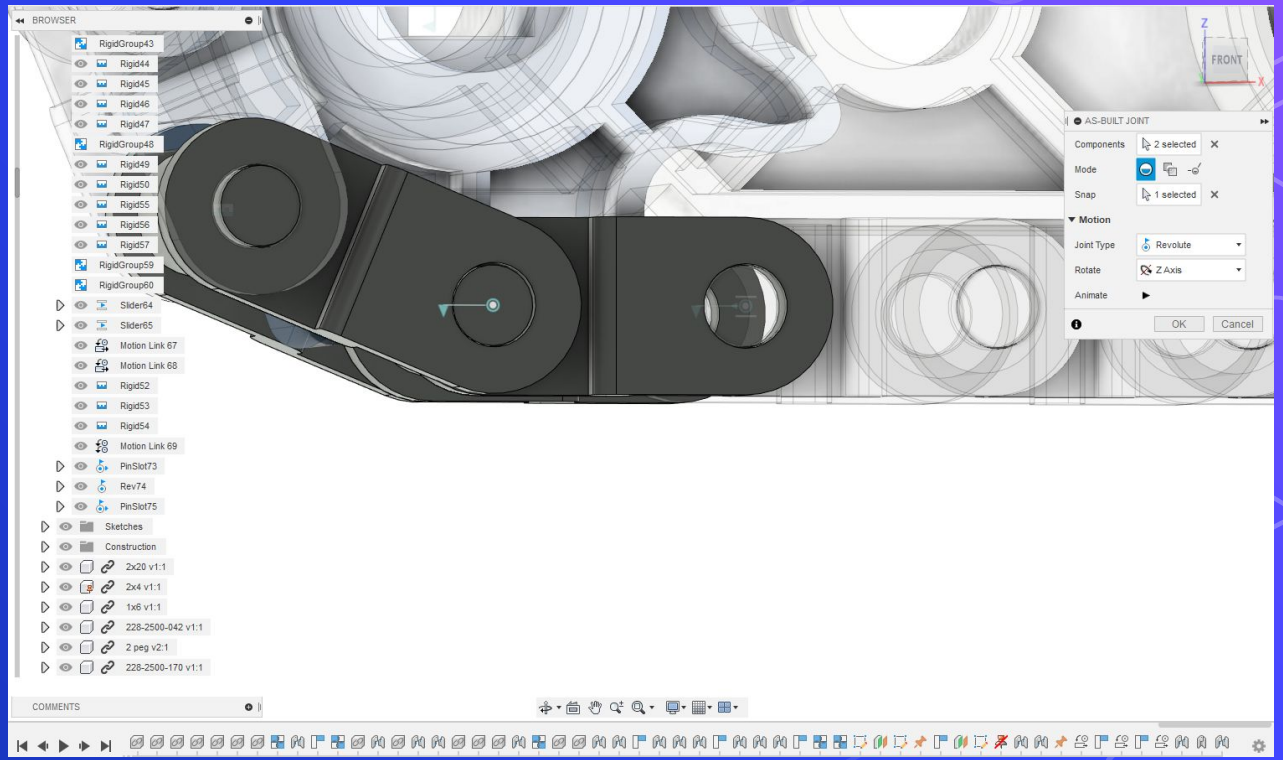
Extension Learning: Motion Linking a Wheelbase

At this point, the chain links may not be perfectly in line. In this sample they are off by less than 1/200th of an inch, but that is enough that a regular joint won't work. So, use an as-built joint, which kind of acts like a rigid group between two pieces but has all of the joint options. Select the two chain links. Change the joint type to revolute. For snap select the circle highlighted.



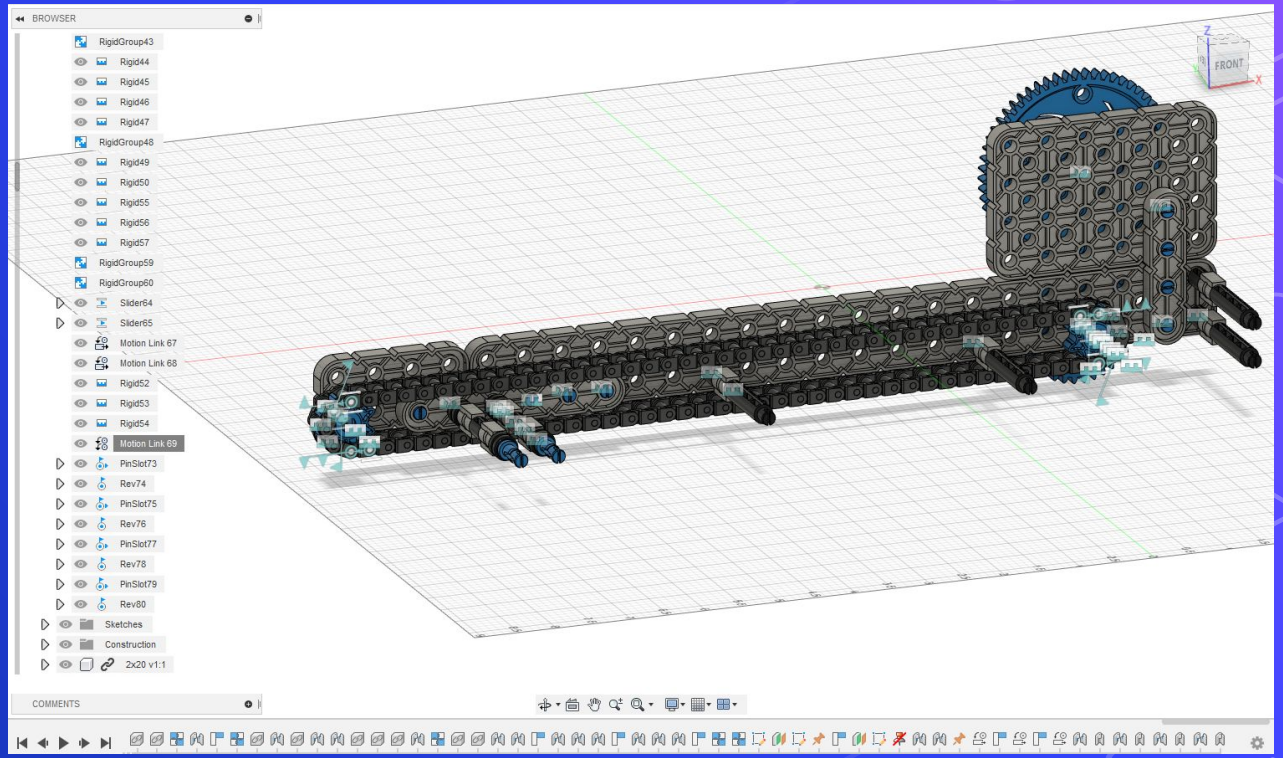
Extension Learning: Motion Linking a Wheelbase

Repeat this with the other link. The pin-slot joint will always be the one closer to the middle of the chain, and the revolute joint will be the other joint.



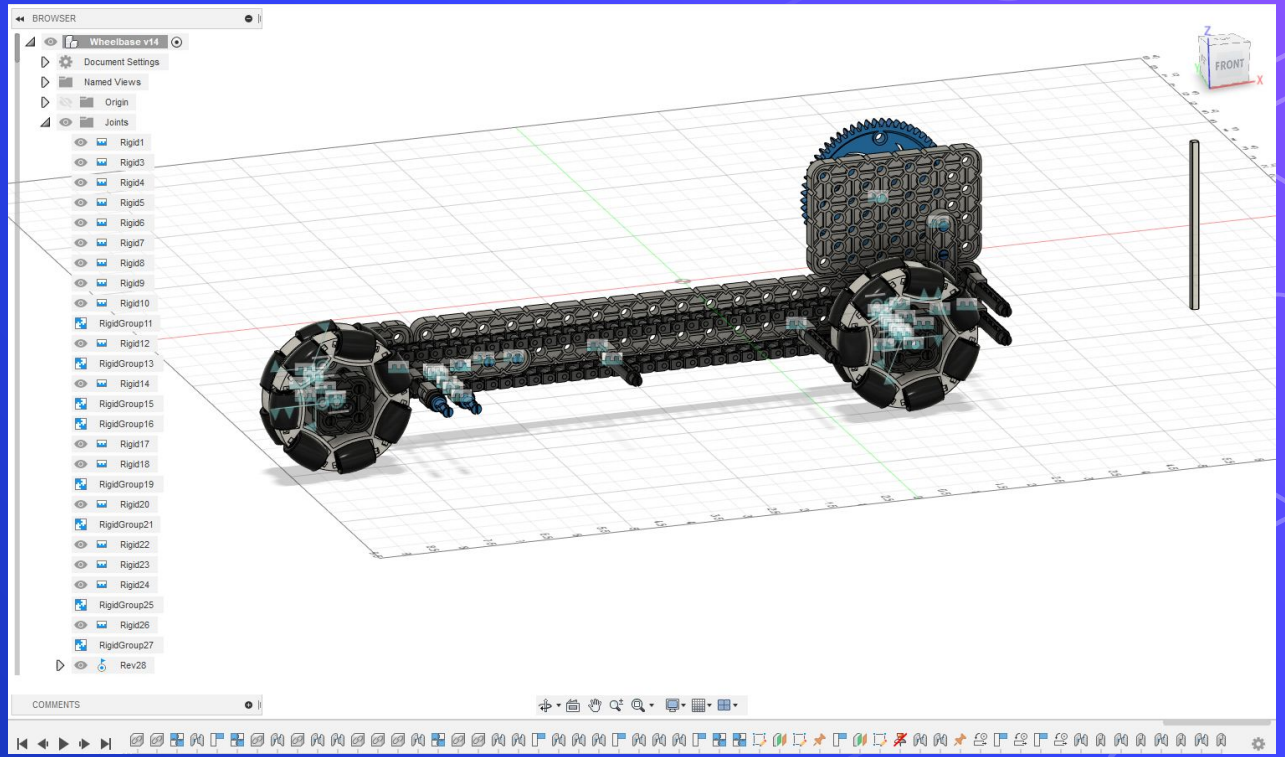
Extension Learning: Motion Linking a Wheelbase

Then, repeat for the other side of the chain as well.



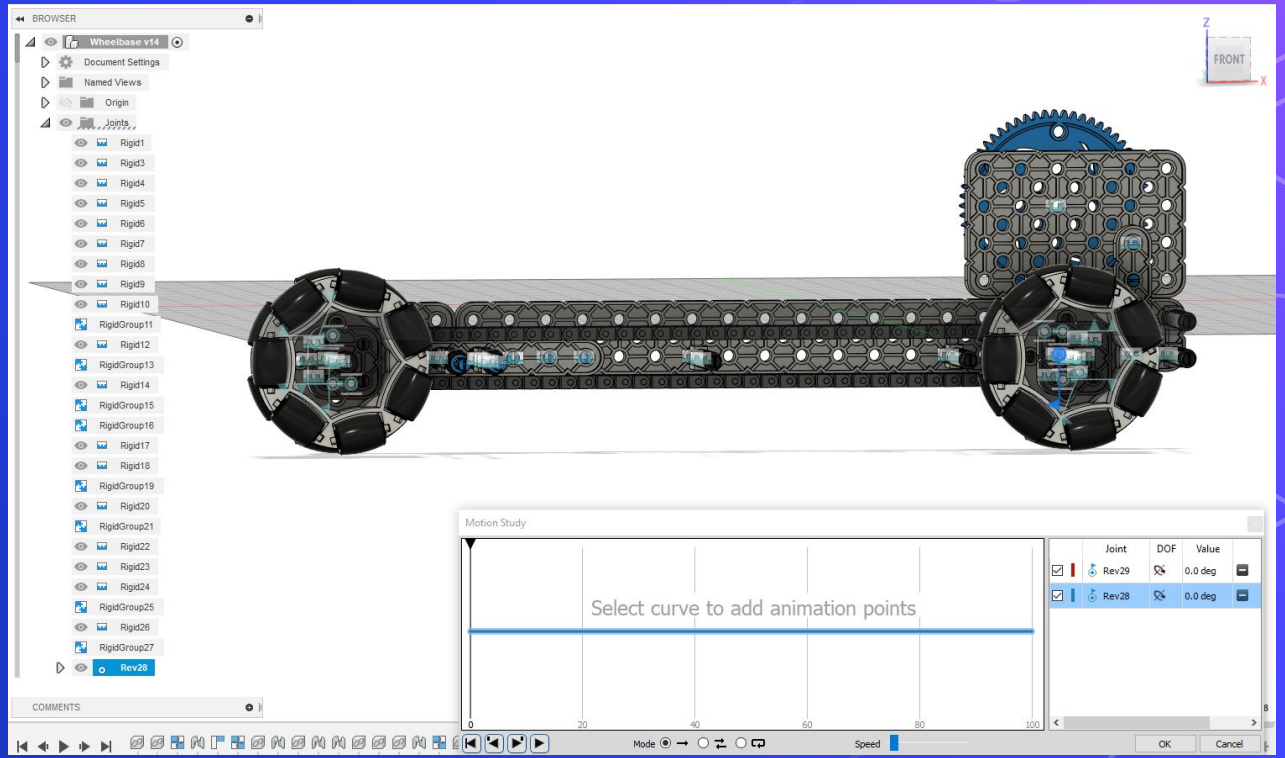
Extension Learning: Motion Linking a Wheelbase

Put all of the wheel bits back into view.



Extension Learning: Motion Linking a Wheelbase

Use the shortcut menu to access the “motion study” function. Select both of the revolute joints.

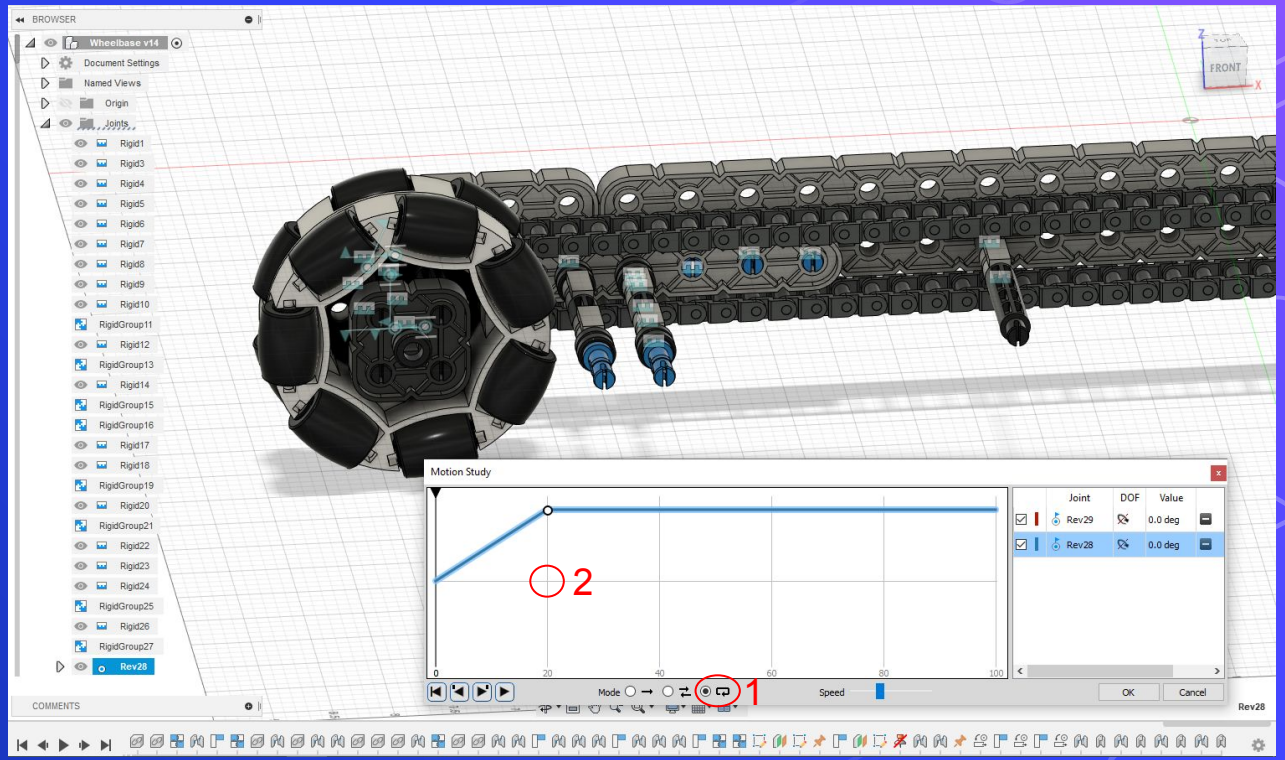


Extension Learning: Motion Linking a Wheelbase

First, change the mode to loop. Second, at mark 20 click on both lines (one at a time) and set the degree angle to 45 degrees.

Alternatively, instead of clicking on both revolute joints, motion link both revolute joints. Then only one joint has to be put into the motion study.

Adjust the speed to what you want.

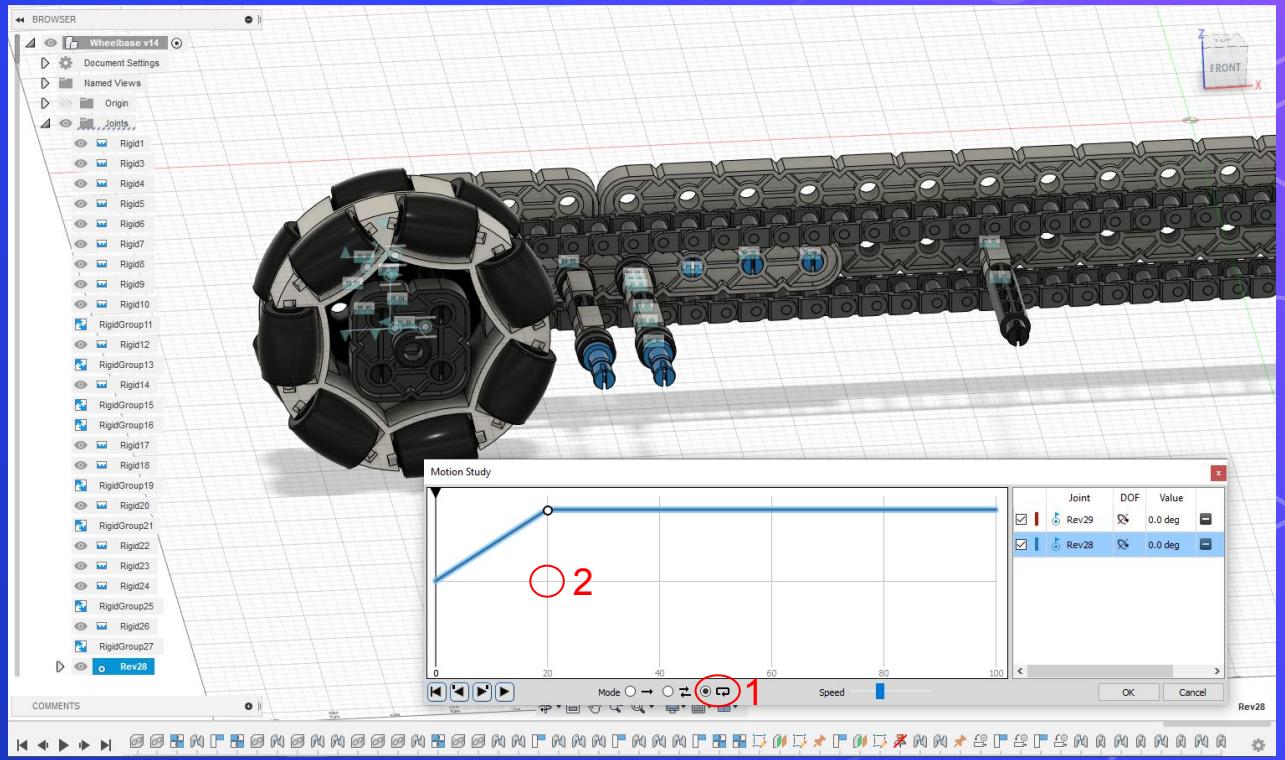


Extension Learning: Motion Linking a Wheelbase

First, change the mode to loop. Second, at mark 20 click on both lines (one at a time) and set the degree angle to 45 degrees.

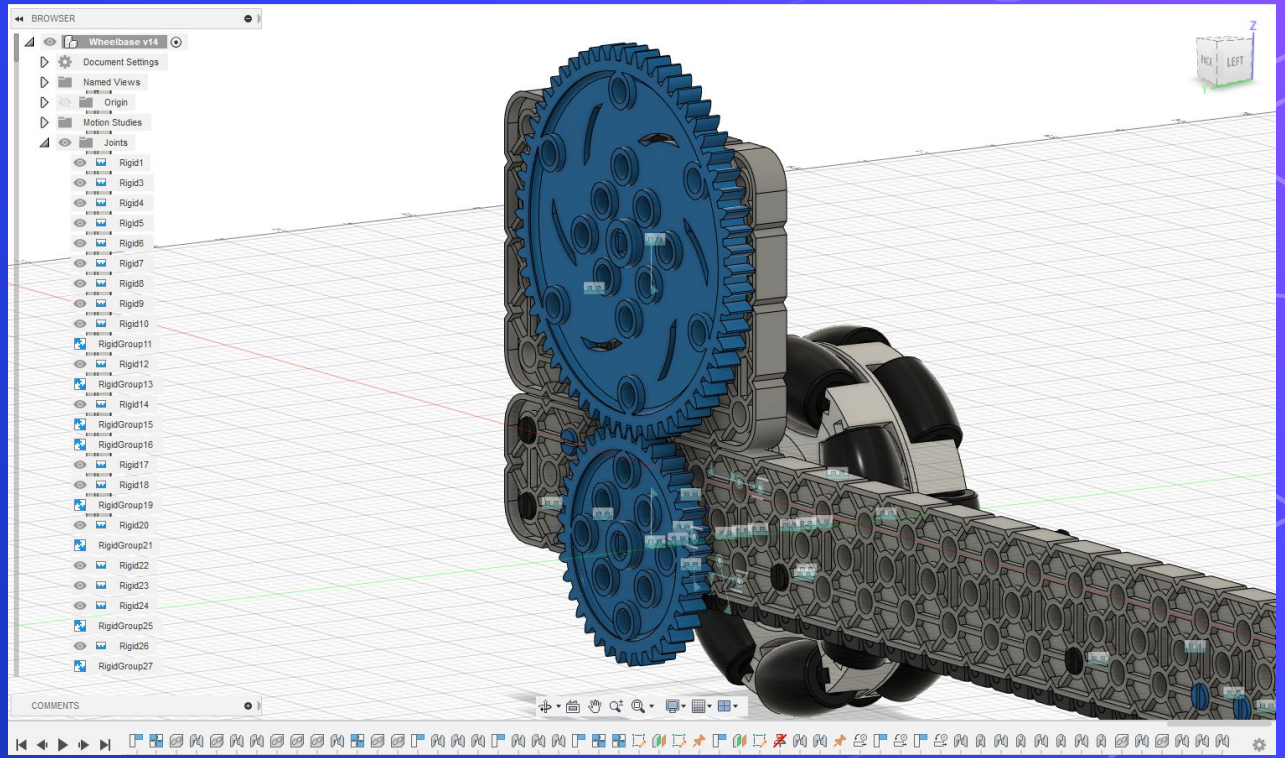
Alternatively, instead of clicking on both revolute joints, motion link both revolute joints. Then only one joint has to be put into the motion study.

Click the play button, and see the wheel and chains animated! Admittedly, the wheel can only turn 45 degrees, but this was a short cut way to quickly animate the chain.



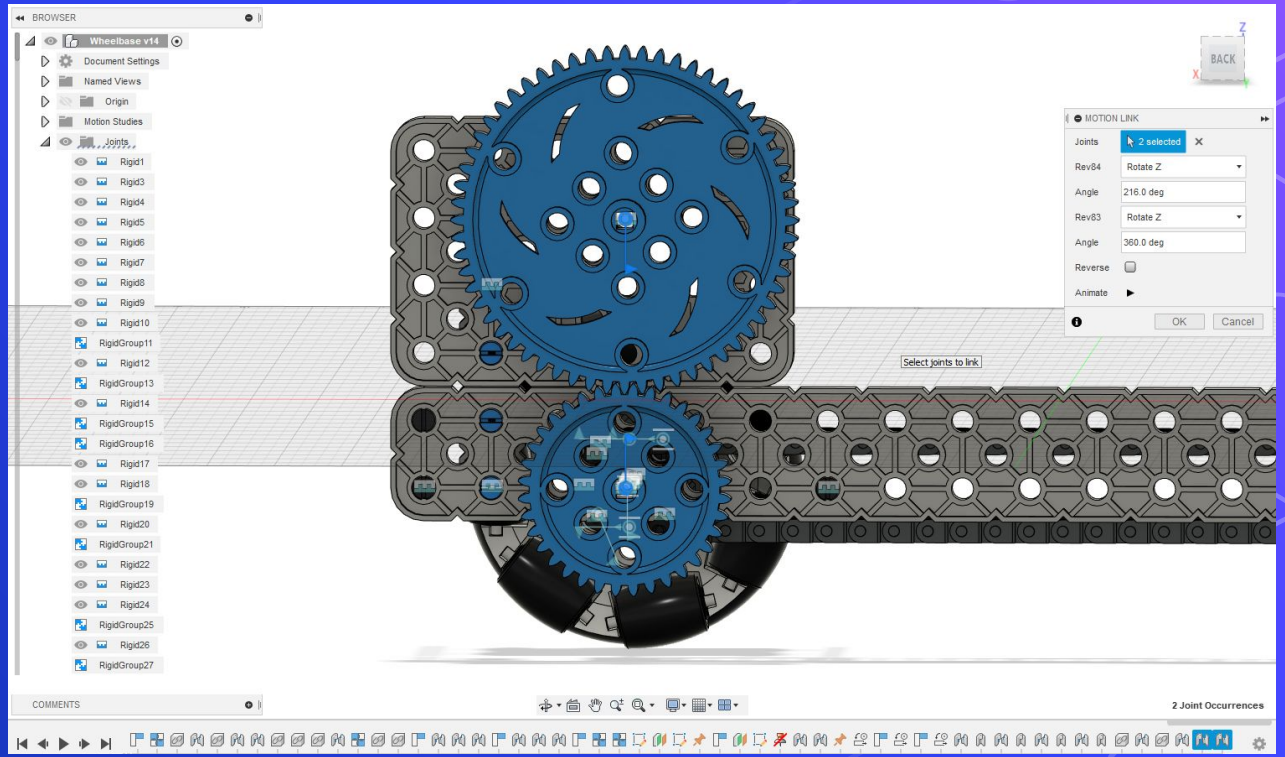
Extension Learning: Motion Linking a Wheelbase

Next, for animating the gearbox, change both joints between the washers and gears to revolute joints.



Extension Learning: Motion Linking a Wheelbase

Create a motion link between the two gears. Due to gear ratio, the top gear will spin slower compared to the bottom gear. The gear ratio between these gears is 5:3. So every time the bottom gear turns 360 degrees, the top gear must turn 216 degrees. Key these values into the motion link.



Extension Learning: Motion Linking a Wheelbase

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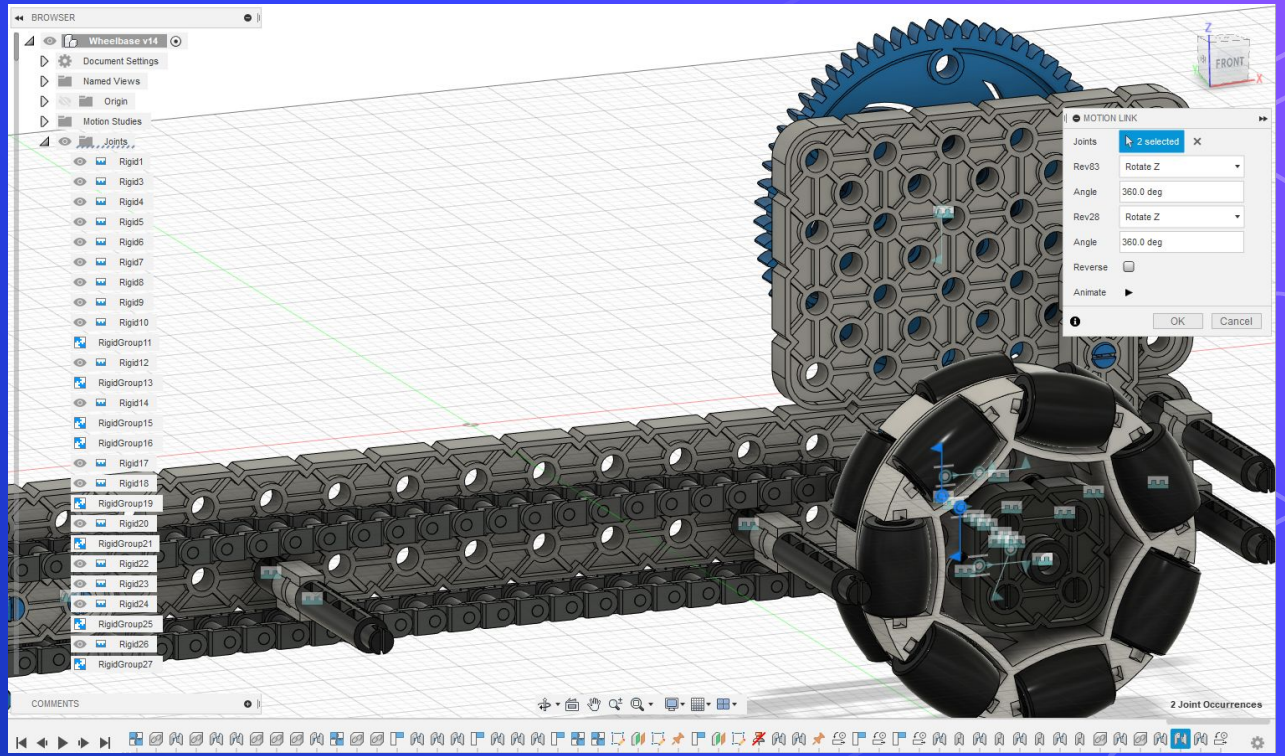
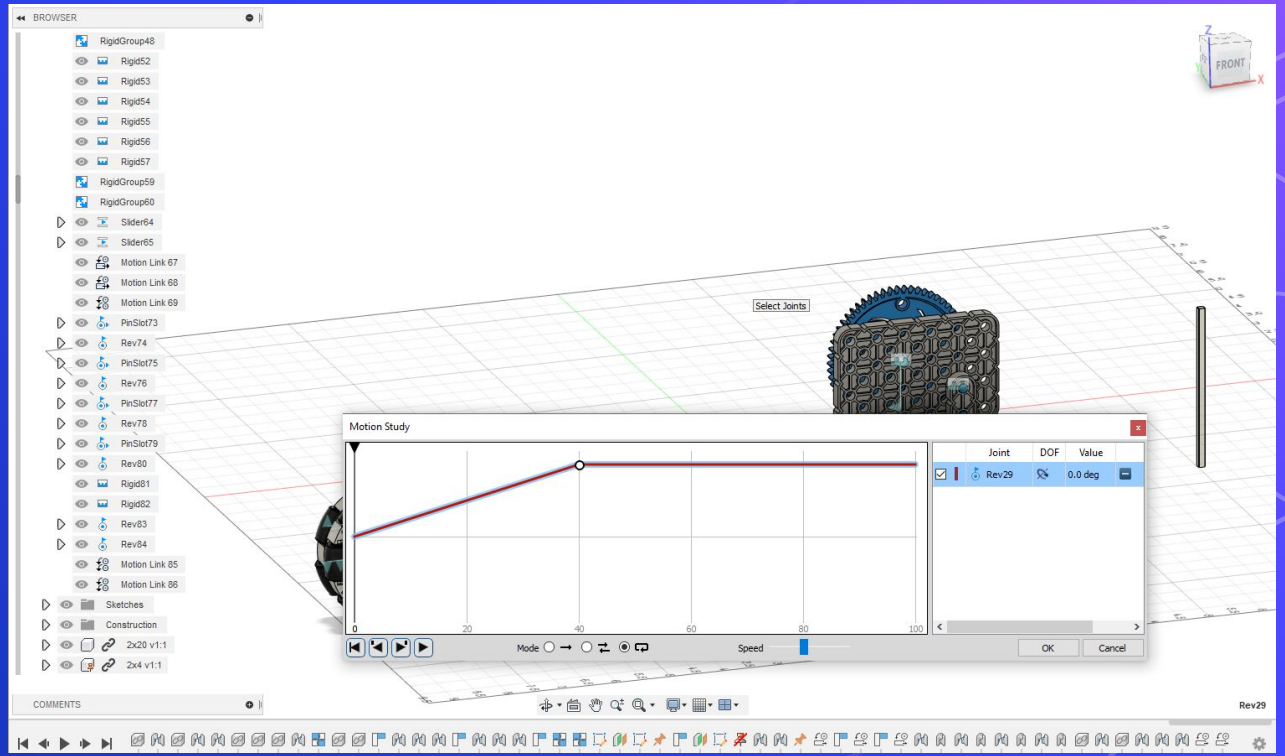


Extension Learning: Motion Linking a Wheelbase

Create additional motion links between the two sprockets and between one of the gears and sprocket.

Now create a motion study with all of the correct settings (the marker goes to 45 degrees at 40, but this particular settings doesn't really matter). Running the current motion study will show the gearbox and chain being animated.



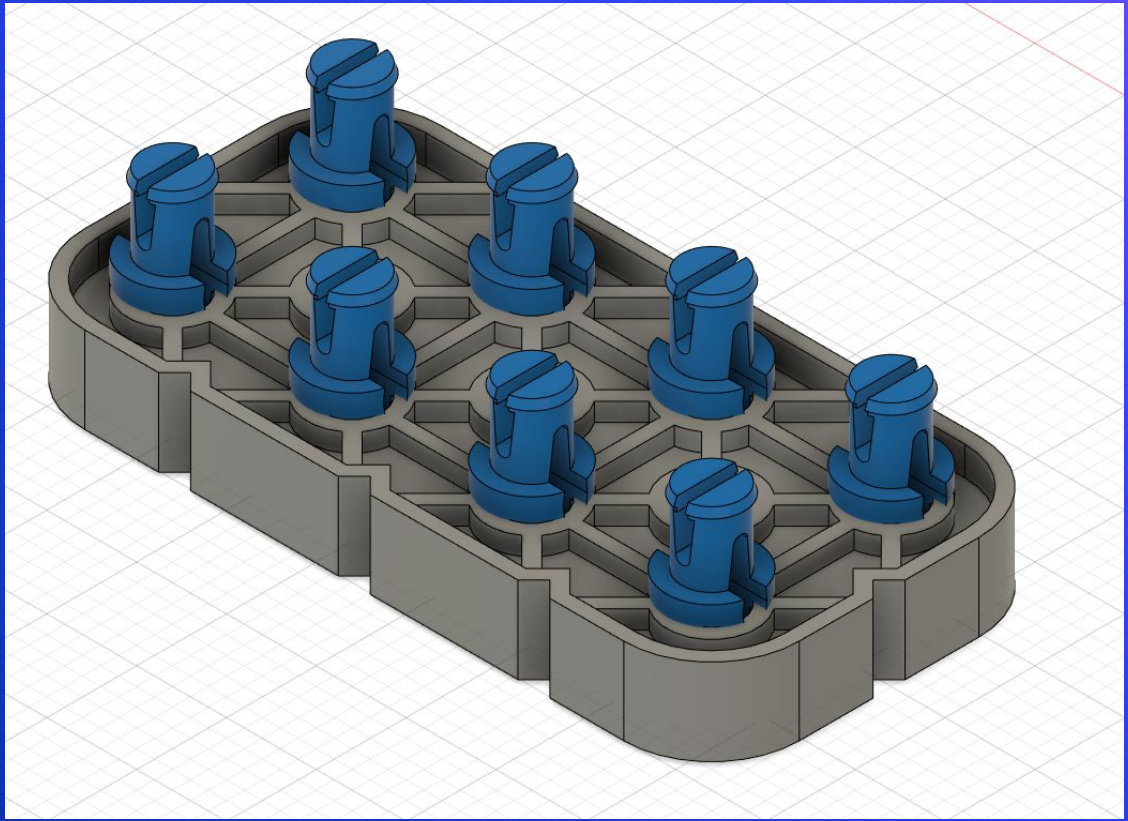
Final Project Activity

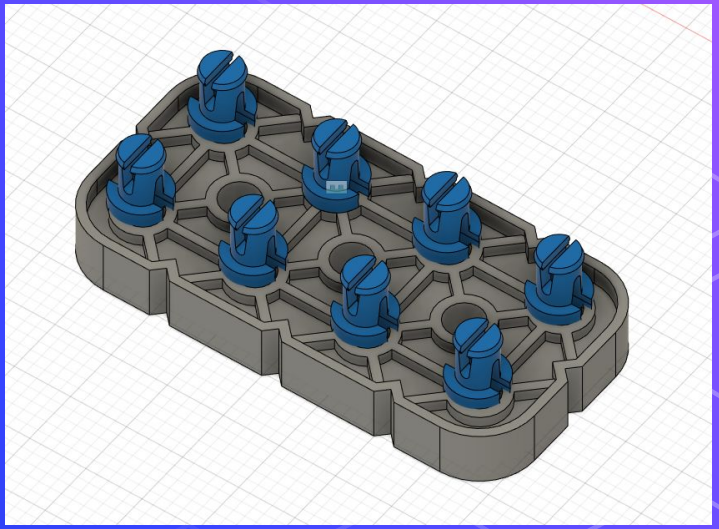
- CAD a complete wheelbase
  - Mirror one side of the wheelbase to save time (check out lesson 1's extension).
  - Try using motion links (check out lesson 2's extension).
  - Include a gearbox in your wheelbase.

Final Project Activity Rubric

Below Expectations	Approaches Expectations	Meets Expectations	Exemplary
Wheelbase is not properly CADed or big sections of the wheelbase are missing.	Wheelbase is mostly CADed, however, does not include gearbox and/or not mirrored.	Wheelbase is fully CADed and one side was mirrored to create the other.	Everything in the meets column and properly functioning motion links are included in the CAD.

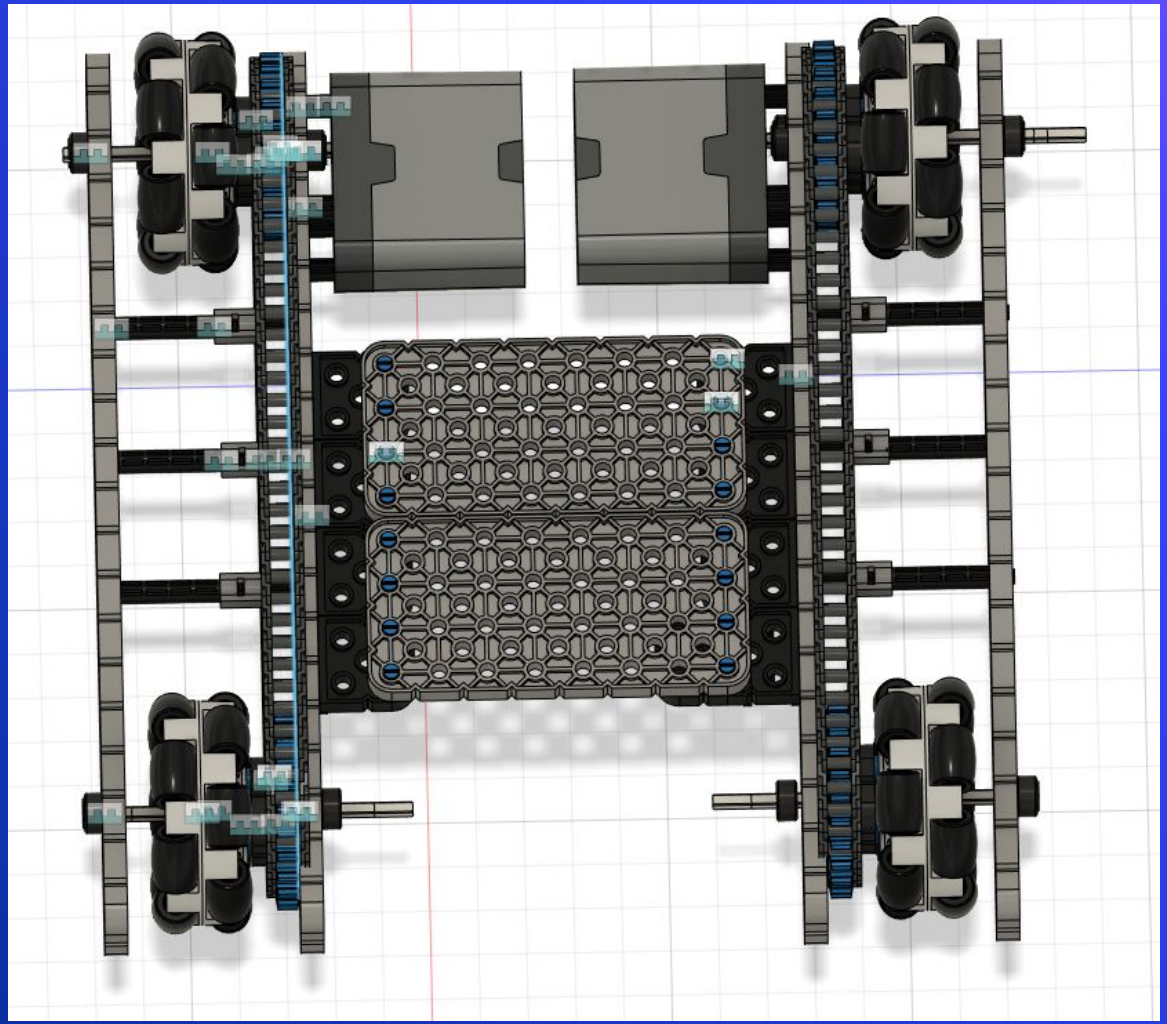
Student #1: Julien Lim





Joint Activity:
Meets Expectation-
(many pegs not aligned, but piece is rigided grouped….)

Move
Activity:
Exemplary

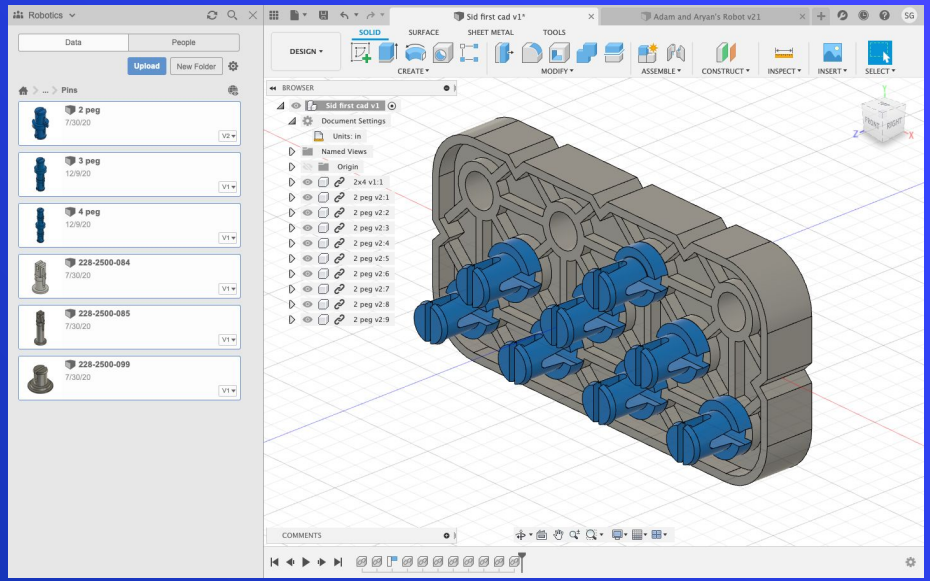


Final Wheelbase: Meets Expectations

Student Reflection

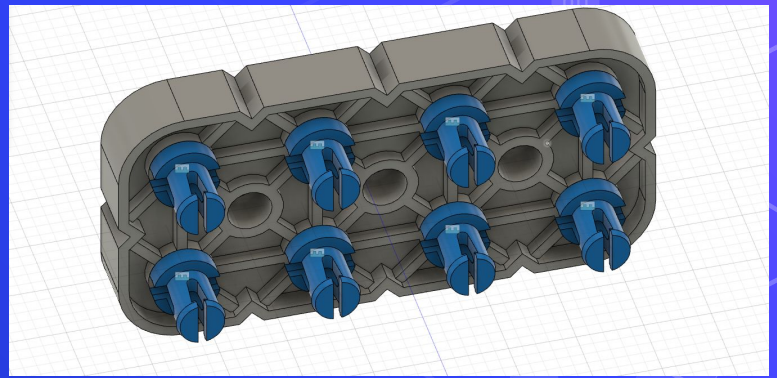
This CAD lesson on Fusion 360 taught me the basics of how to use the software and the different tasks that I could accomplish with the software. Basic functions such as jointing and creating a rigid group are vital to CADing. After the two lessons, I started to CAD my own wheelbase. Though I encountered some problems along the way, I was able to figure it out and create the wheelbase that I have. In the future, CADing could help me with planning different robots that I create before I get the pieces and create it.

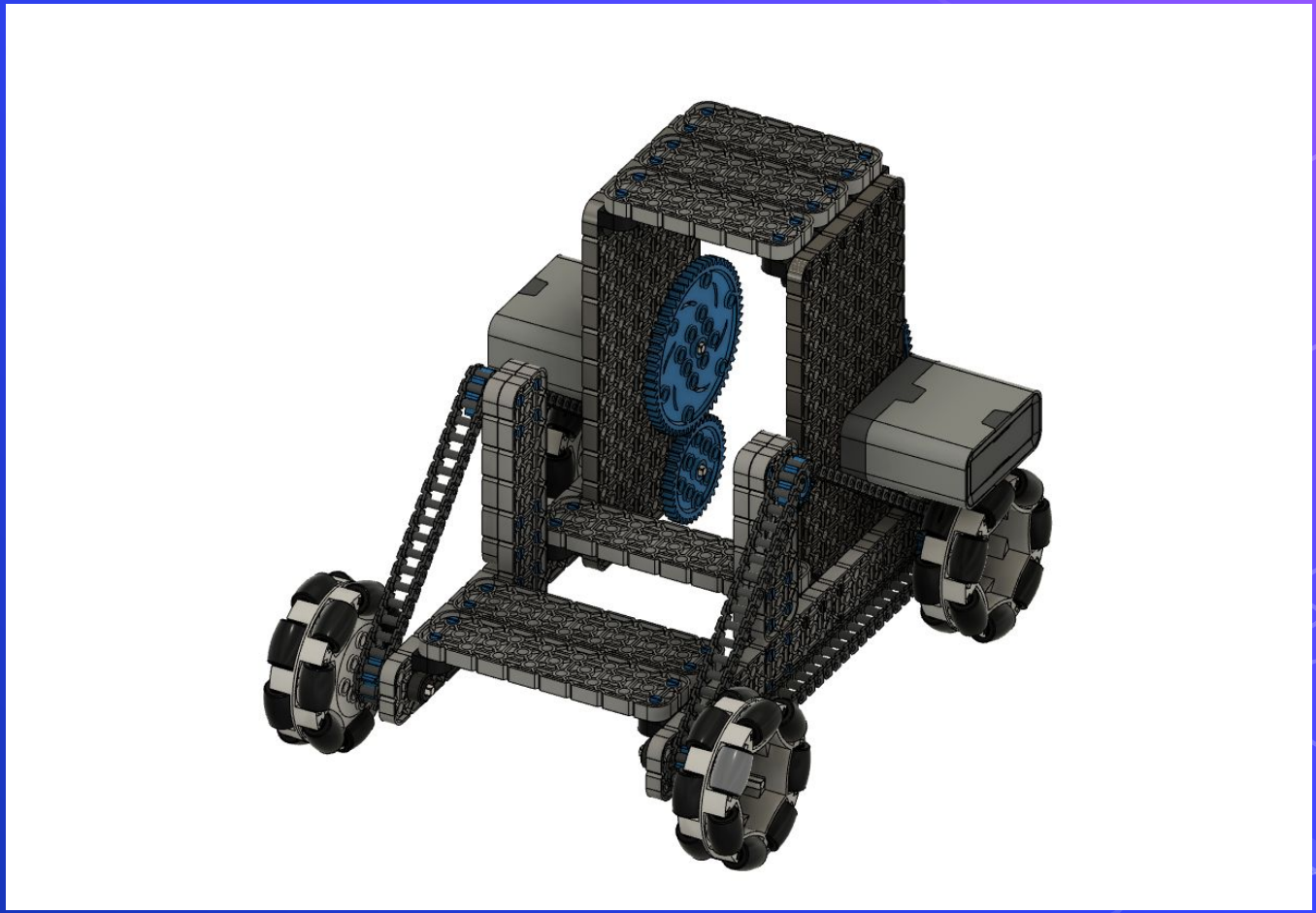
Student #2: Siddhant Gupta



Move activity: Meets Expectations

Joint activity: Exemplary
(Jointed and rigid grouped.)



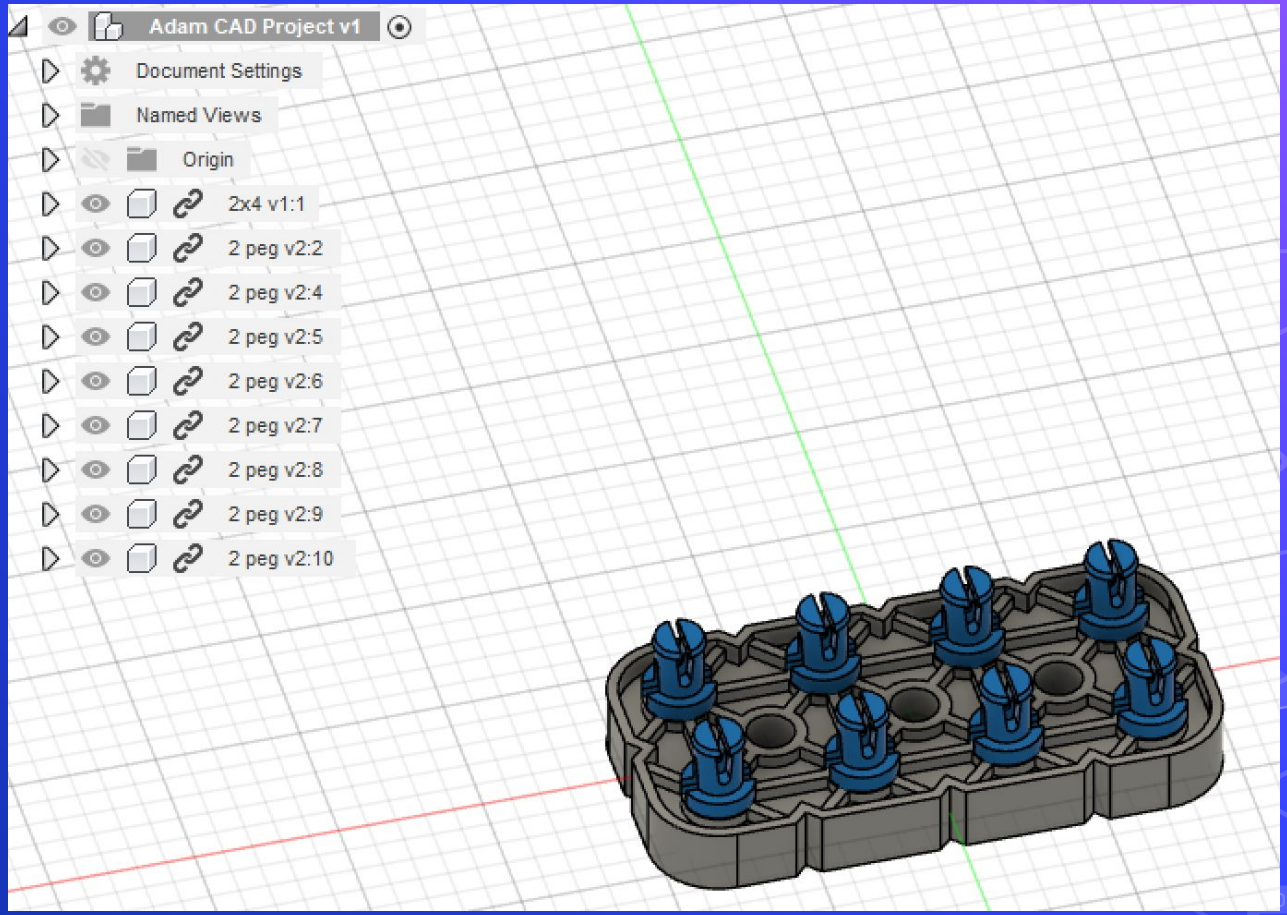


Wheelbase:
Approaches
Expectations +

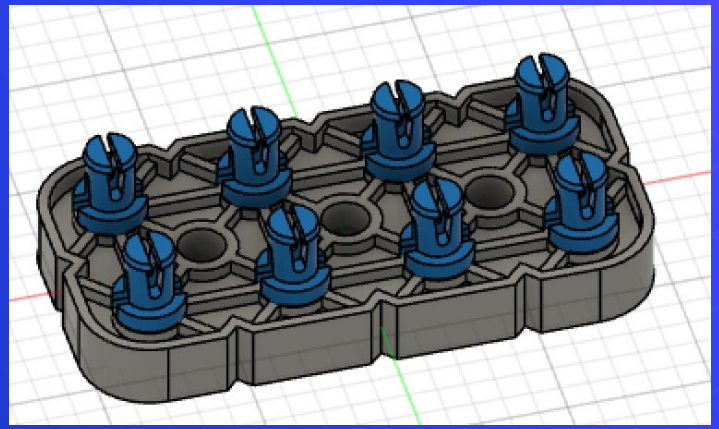
Student Reflection

This lesson was very helpful for me because, prior to it, I had barely any experience with CAD. The most helpful lesson was the one about CADing the wheelbase because it combined all of the skills that had been taught previously. Now I feel much more confident about my ability to use Fusion 360. This will help me in the future if I am required to CAD something else.

Student #3: Adam Brest



2x4 Beam + 8 Peg Movement



Rigid Group

Student Reflection

This CAD lesson from the HS Robotics mentors was very informative and will surely help me throughout my robotics career. I learned how to put together, group and manipulate basic Vex IQ pieces. Being able to CAD efficiently will allow our robotics team to draft designs and test them before building them.

Grades:

- Camera Movement Activity - Exemplary
- 2x4 Beam + 8 Peg Activity - Exemplary
- Rigid Group - Below Expectations (No joint?)
- Drivebase Project - N/A (No wheelbase submitted)