Automated Gear Design

If you have SolidWorks 2020 installed on your computer, skip to Step 0.

Getting Started:

1. Please use a remote desktop application and connect to **elabs.wpi.edu** using your WPI email and password.
   a. Windows instructions: [The WPI Hub | Article | Connecting To The Windows Terminal Servers Using Windows](#)
   b. Mac instructions: [The WPI Hub | Article | Connecting To The Windows Terminal Servers Using Macos](#)
2. This program works with SolidWorks 2020 only.

Step 0: Survey

1. Before continuing, please go to http://tiny.cc/GearConv-Pre and complete the pre-survey. This will ask some basic questions about you like your major and your experience with gears.

Step 1: Download and Install

1. Go to http://tiny.cc/GearTrain_x64_20210311 and download the zip file.
2. Once downloaded, **extract** the contents of the zip file into a folder.
3. Then, click on the GearTrain.exe file. If you have application extensions hidden, it will just show as GearTrain.

4. You will see a notice shown below:

Click on "More Info" and then Select "Run Anyway." You will see the following screen. **Note: Due to ongoing development, screenshots may look slightly different than the actual program.**
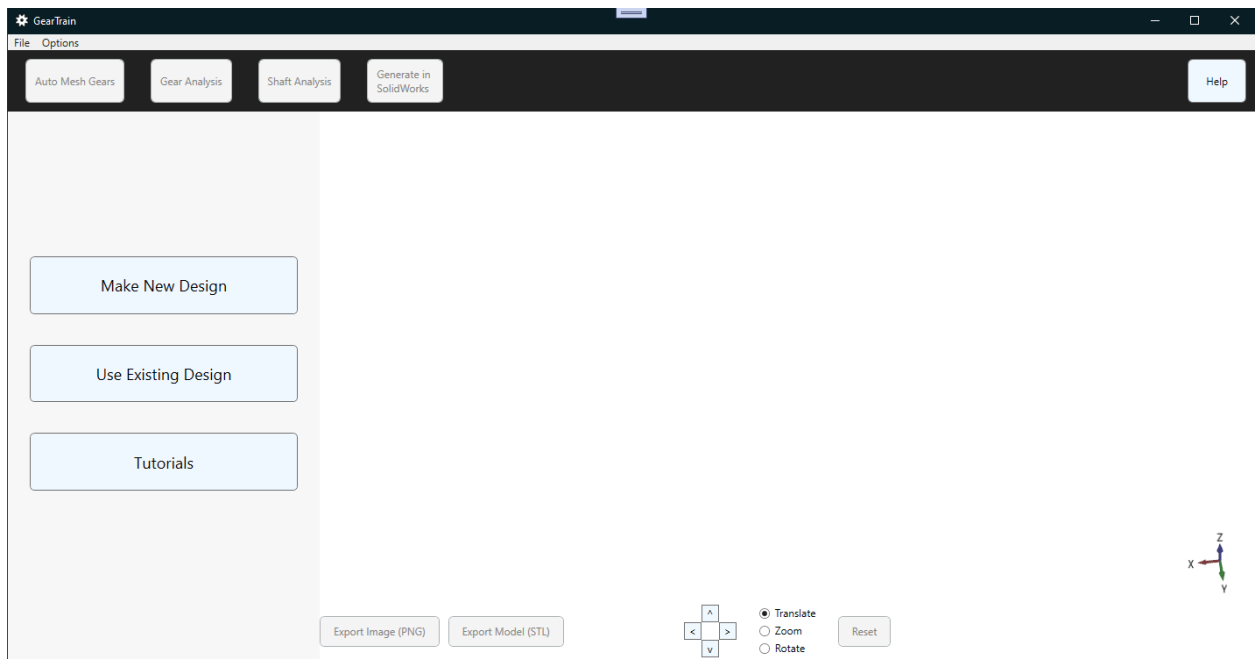
Step 2: Guided Design of a Gearbox

1. You will be designing the following gearbox.

   a. With the program open, create a new design and you will see the screen update to the one below:
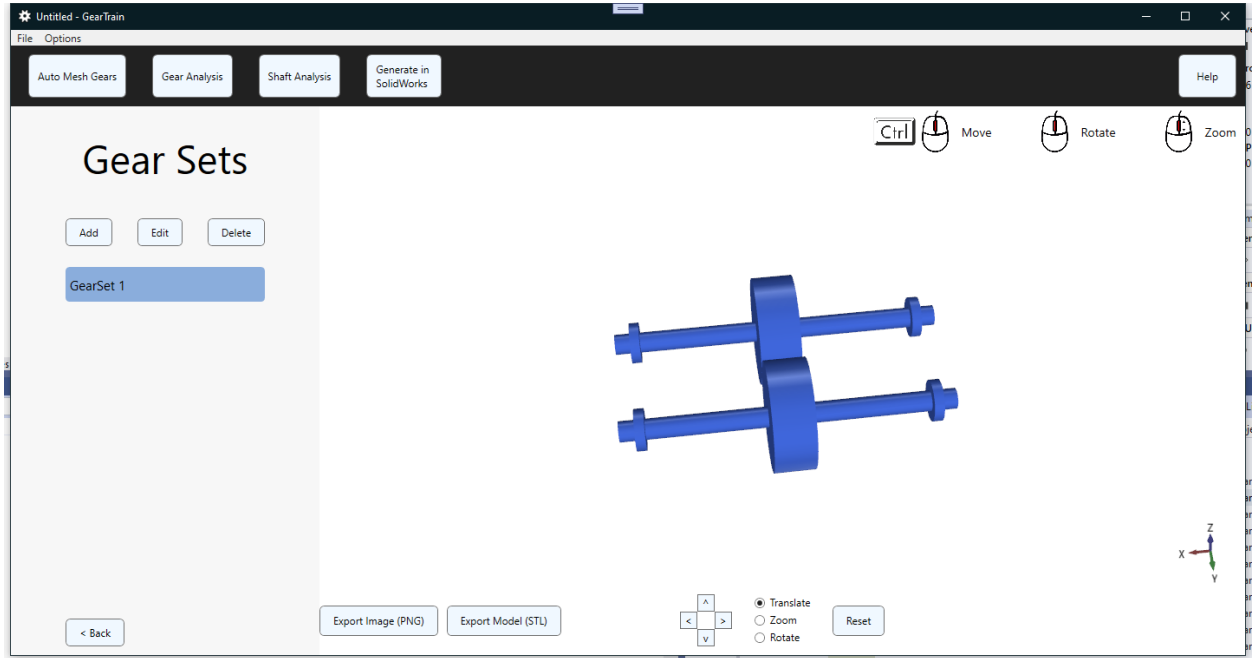
   b. Using the information in the table below, edit each gear set in the following steps. Gears A and B are in GearSet 1 and Gears C and D are in GearSet 2.

Gearset	Gear	(X, Y, Z)	Orientation	Shaft	Num of Teeth	Bore Diameter	Face Width
1	A	0, 0, 1.45	Z	Shaft 1	12	0.125	0.125
	B	0.72, 0, 2.93	Z	Shaft 2	56	0.125	0.125
2	C	0.72, 0, 2.93	Z	Shaft 2	24	0.125	0.25
	D	0.72, -0.75, 2.93	Z	Shaft 3	48	0.125	0.25

     i.   **Note: If a property is in the program but is not in the table above, please do not modify it (e.g., "Pitch").**

c. First Edit the gear set 1 to match the table. It should look like this
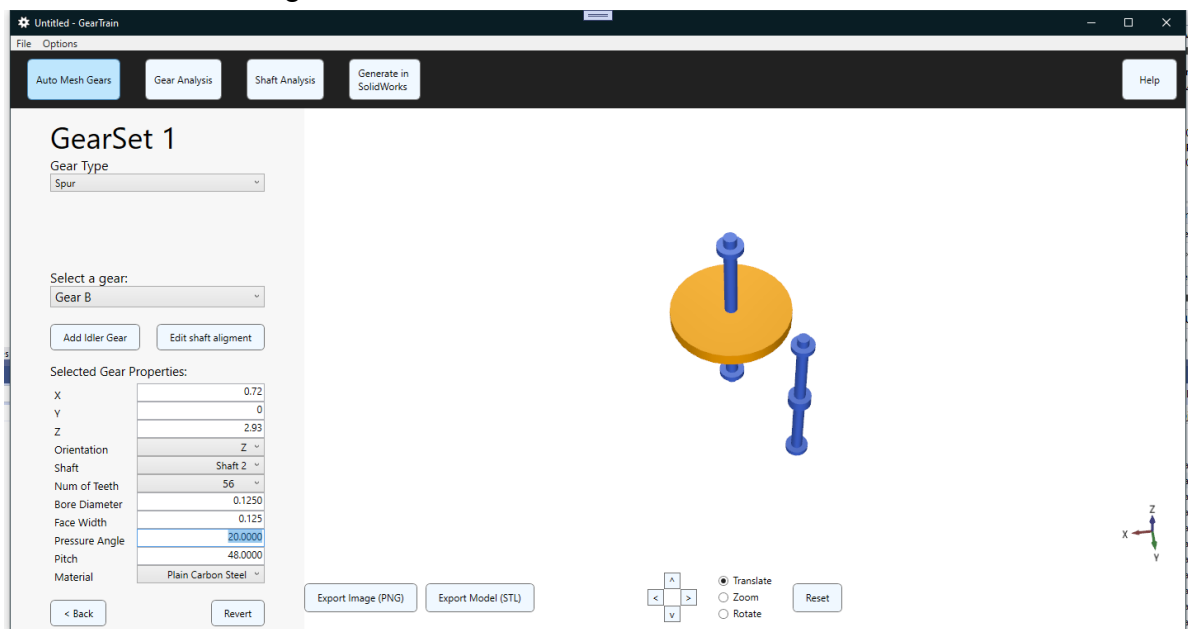
d. Now you will add the second gearset. Go back and add another gear set. It should be called "Gear Set 2"

e. Edit GearSet 2 and fill in the data from the table

Gearset	Gear	(X, Y, Z)	Orientation	Shaft	Num of Teeth	Bore Diameter	Face Width
1	A	0, 0, 1.45	Z	Shaft 1	12	0.125	0.125
	B	0.72, 0, 2.93	Z	Shaft 2	56	0.125	0.125
2	C	0.72, 0, 2.93	Z	Shaft 2	24	0.125	0.25
	D	0.72, -0.75, 2.93	Z	Shaft 3	48	0.125	0.25

f.   Click on Auto Mesh Gears. Auto mesh will adjust the gear positions so that the gears are touching each other. Now your design should look like this:
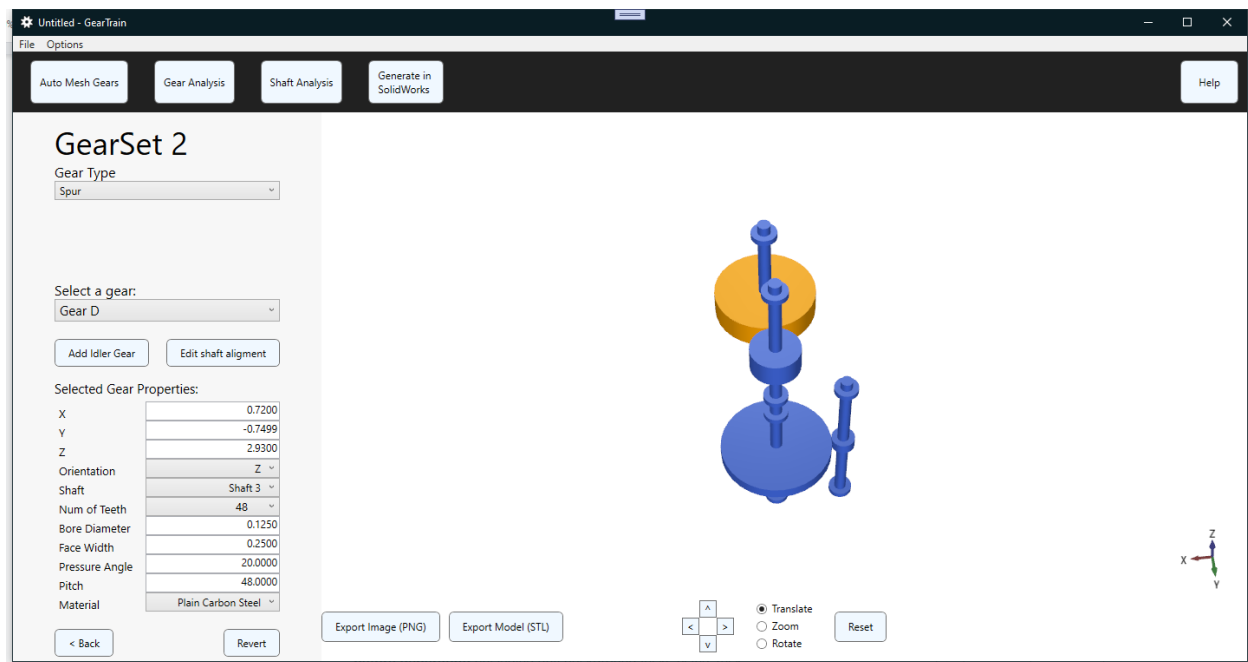

g.   With gears automeshed, click on "Generate in SolidWorks".

i.   If a window appears asking you to specify the location of the SolidWorks executable, the file should be located in "**C:\Program**
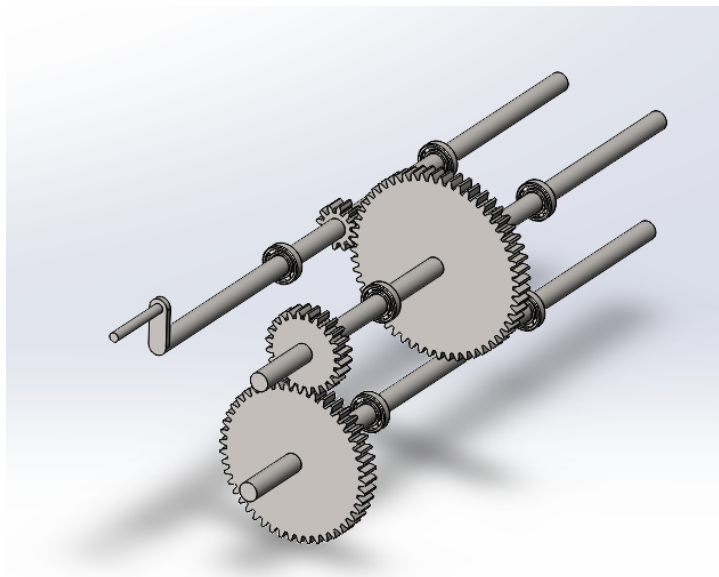
Files\SOLIDWORKS Corp\SOLIDWORKS\SLDWORKS.exe". If it is not there, please select where your SOLIDWORKS was installed.

ii. There are sometimes problems generating if SolidWorks is already open. For this tutorial, **please ensure any SolidWorks application is fully closed before generating** (including any background tasks using Task Manager)**.**
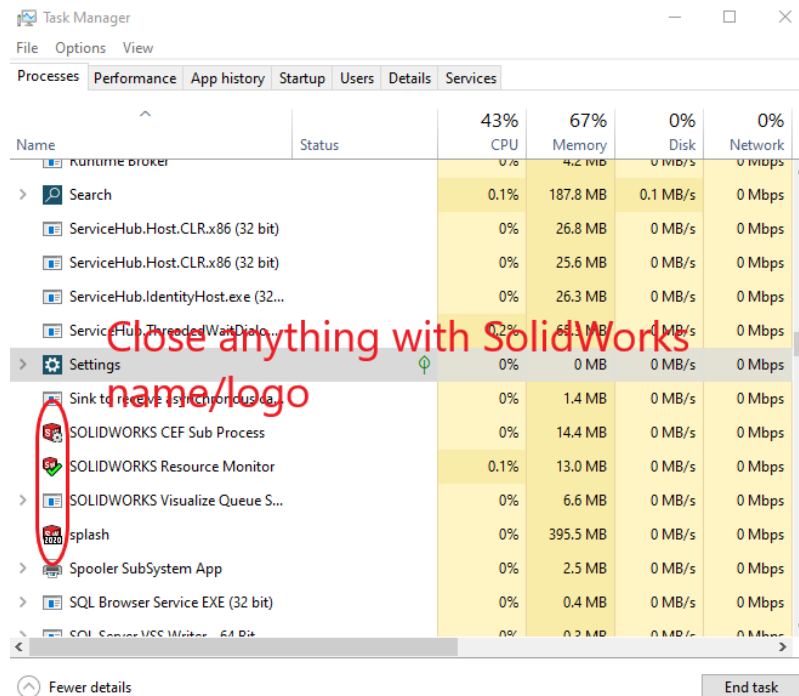
h. A menu will pop up asking to specify additional options. Select to have an input shaft crank

i. The program will open SolidWorks and a popup will appear. Please press "OK" once SolidWorks has finished loading (i.e. when the splash screen is gone and the editor is open). Depending on the computer, SolidWorks may take a long time to open.

i. **Note: If SolidWorks creates any popups, make sure you close them otherwise SolidWorks will never open.** Do not close the popup titled **"Waiting for SolidWorks to Start"** until SolidWorks is fully loaded and looks like this:
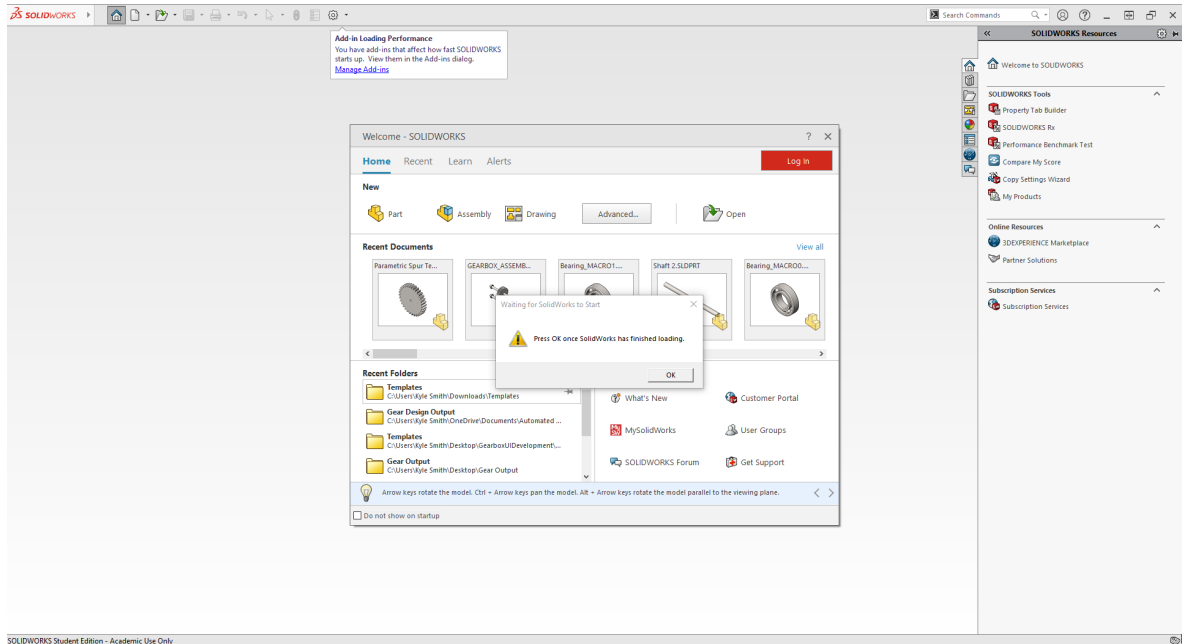
j. Once SolidWorks is done generating, please take a screenshot of your resulting gearbox (Windows+PrtSc, Snipping Tool, etc) to be uploaded in the survey once the tutorial is complete (**"Please upload a screenshot of your resulting design from SolidWorks (guided design)."**). The final design should look like this:

    i. By default, the files generated by SolidWorks for each part (gear, bearing, shaft) are located in your documents folder (C:\Users\<your username>\Documents\Automated Design\Gear Design Output). You can access this folder by selecting File → Open output directory.

Step 3: Unguided Design of a Gearbox

Before starting this section, please ensure SolidWorks is completely closed as before.

After you have finished with the previous gear train, you will finish an incomplete one. This gear train will have two gear sets, one of which is complete and the other one is missing. Using the data in the table below, complete the gear train.

This section will be mostly unguided. If you need help with anything, please consult the help website https://alancuriel.github.io/GearTrainWebsite/ (in progress). You can access this website directly or click on the "Help" button in the program.

1. Download the partially completed gear train here:
   http://tiny.cc/GearDesign_Incomplete. With it downloaded to your computer, open the file in the software.
2. The data for the entire gear train that you are designing is here:

Gearset	Gear	(X, Y, Z)	Orientation	Shaft	Num of Teeth	Bore Diameter	Face Width
1	A	0, 0, 0	X	Shaft 1	48	0.125	0.33
	B	0, 0.667, 0.5	X	Shaft 2	24	0.125	0.25
2	C	-0.75, 0.667, 0.5	X	Shaft 2	24	0.125	0.25
	D	-0.75, -0.125, 1	X	Shaft 3	16	0.125	0.33

3. Using the information in the table above, create the second gear set and generate the design in SolidWorks. Include an input shaft crank for this design.Your design in SolidWorks should look like this:
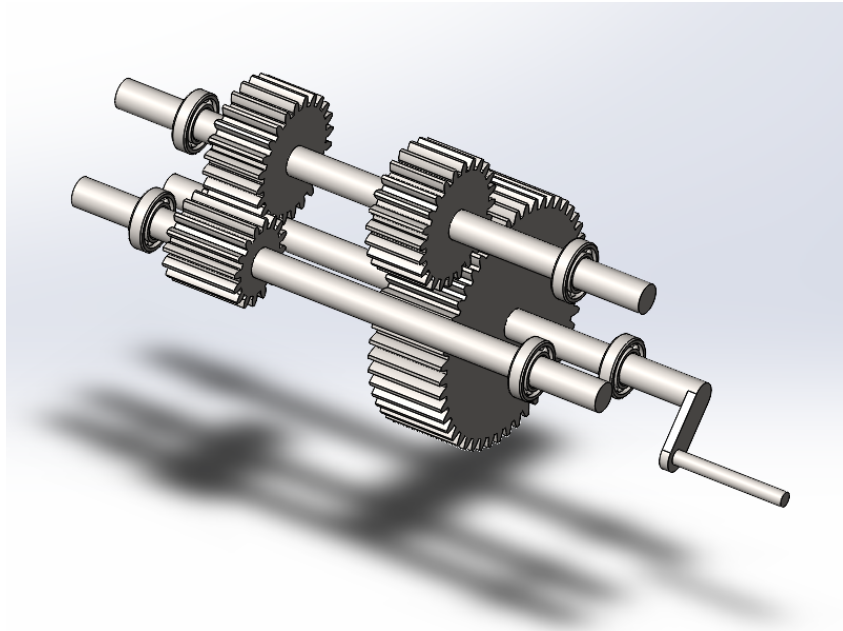
4. Please take a screenshot of your completed design in SolidWorks to upload in the following survey (**"Please upload a screenshot of your resulting design from SolidWorks (unguided design)."**).

Step 4: Survey

1. Once you have completed the task, please go http://tiny.cc/GearConv-Post and fill out the post survey. This survey will ask questions about your experience using the software and whether you have any feedback about the program. You will also upload the screenshots that you took of each design.