

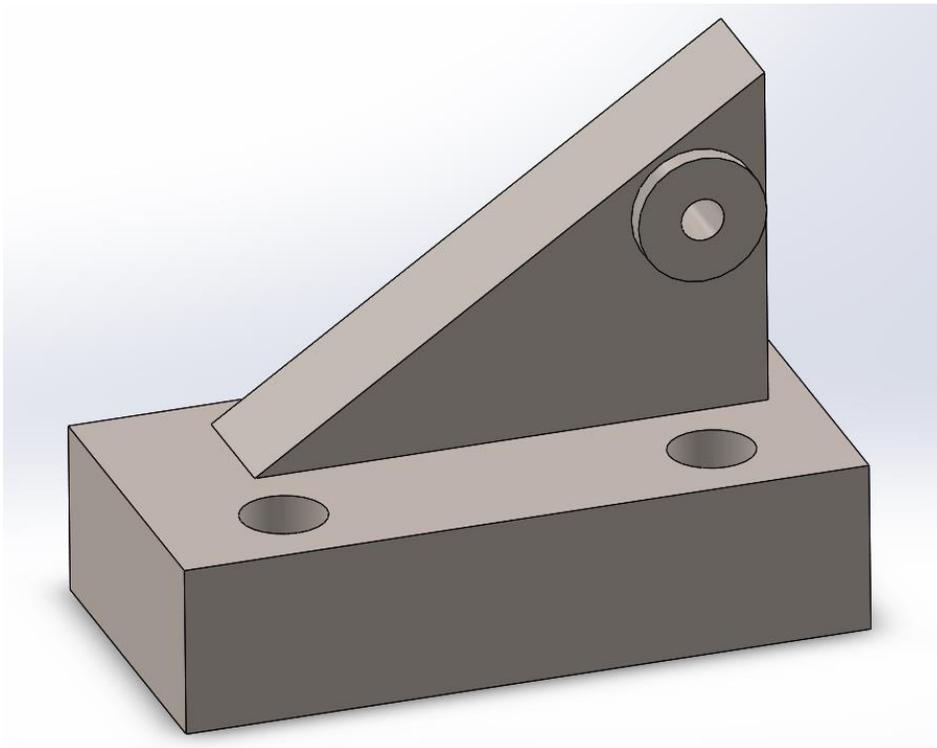
Iterative Part Optimization Using Trend Tracking

Tracking trends in SolidWorks allows you to detect trends in results from different iterations of a static study. You optimize part geometry for weight, stress, and displacement. I will take you through how to enable and utilize trend tracker features.

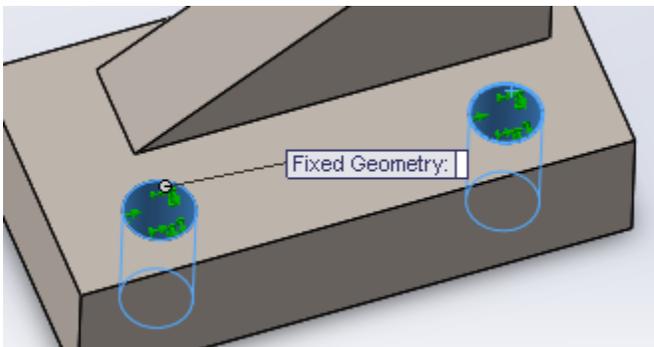
The goal of this tutorial is to view how properties such as mass, maximum stress and displacement change when the geometry of the part is altered. It displays how each iteration of the part responds to the static study the user creates.

Running the Initial Study

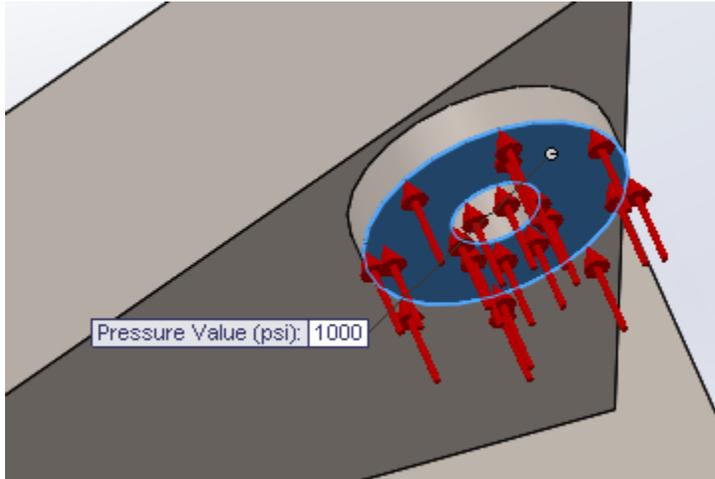
1. Open the “trendpart” given with the tutorial shown below



2. Start a new static study and apply the fixtures shown below



Next apply the pressure shown below

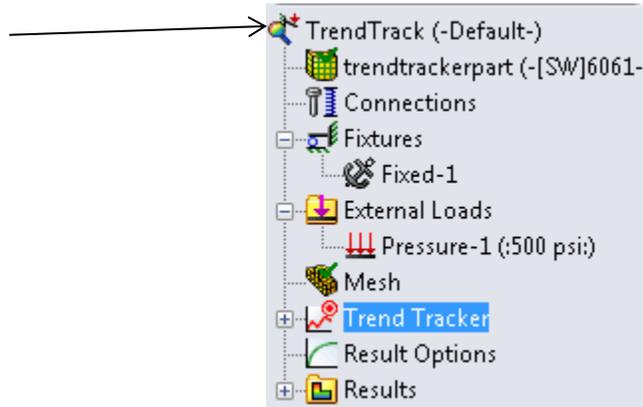


3. Run the initial study and once it is complete define a von Mises stress plot and a URES displacement plot. You can define any result plot you want information from, but for this tutorial I will just use von Mises stress and URES displacement.

Starting Trend Tracker and Setting the Baseline

After running a static study, you set the baseline as a point of comparison for future results.

1. Right-click the **Ready** study and select **Trend Tracker**. This will add the **Trend Tracker** and **Trend Journal** icons to the Simulation study tree.



2. Right-click **Trend Tracker** and select **Set Baseline**.

- The von Mises and URES plots briefly appear in the graphics area when the software adds them to a gallery of result images.
- Graphs appear in the **Trend Tracker** folder. The Mass graph appears by default. Stress and Displacement appear because the von Mises and URES plots are defined in the **Results** folder.

Adding a Tracked Data Graph

Add a sensor to monitor the change in the 1st principal stress.

1. Right-click the **sensors** folder in the FeatureManager design tree and select **Add Sensor**.
2. In the PropertyManager, under **Sensor Type**, select **Simulation Data**.
3. Under **Data Quantity**:
 - Make sure **Stress** is selected in **Results**.
 - Select **P1: 1st Principal Stress** in **Component**.
4. Under **Properties**:
 - Select your units (I used psi in this example)
 - Select **Model Max** in **Criterion**.
5. Click the green check and a new sensor appears in the **Sensors** folder.
6. Right-click the **Trend Tracker** folder in the Simulation Study tree and select **Add Tracked Data Graph**.
7. In the PropertyManager, select **Stress2** for **Sensor List**.
8. Click the green check and a new data graph for stress appears in the **Trend Tracker** folder. (You can also add sensors to track displacement, connector forces, and free body forces).

Viewing the Trend Journal

The trend journal is compiled into a word document for you.

1. Modify the geometry of your part from the FeatureManager design tree.
 - For example, change the diameter of the connection holes, or fillet edges etc.
2. Exit the sketch and run the study again.
3. Repeat steps 1-2, each time changing the geometry of the part.
4. Right-click **Trend Journal** and select **Open**.
 - Notice the quantities and values of the tracked data for the baseline and subsequent iterations.

Viewing the Gallery

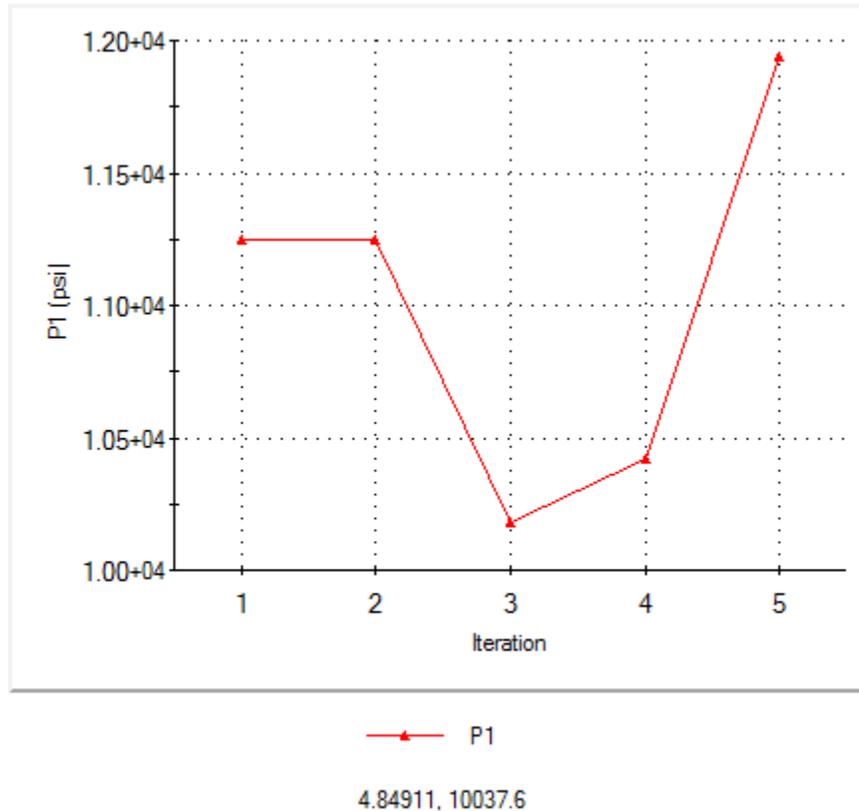
1. Right-click the **Trend Tracker** folder and select **View Gallery**.
2. Scroll through the images of the gallery.

Viewing the Graphs

These graphs that are viewed in this step show how quantities such as mass change with each iteration.

1. Double-click **Mass1** in the **Trend Tracker** folder.
2. Double-click **Stress1** corresponding to von Mises stress.

Here is an example of a stress graph:



3. Close graphs when done.

Restoring the Model to an Iteration

If the last geometry did not accomplish the desired results, you can restore the model to a previous iteration.

1. Right-click the **Trend Tracker** folder and select **Restore Model to Iteration**.
2. In the dialog box, select the iteration you'd like to restore the model to.
3. Click **Yes** when prompted to delete all the later iterations.
4. In the Simulation study tree, right-click **Trend Journal** in the **Trend Tracker** folder and select **Open**.
5. You can now view the results at the bottom of the document.