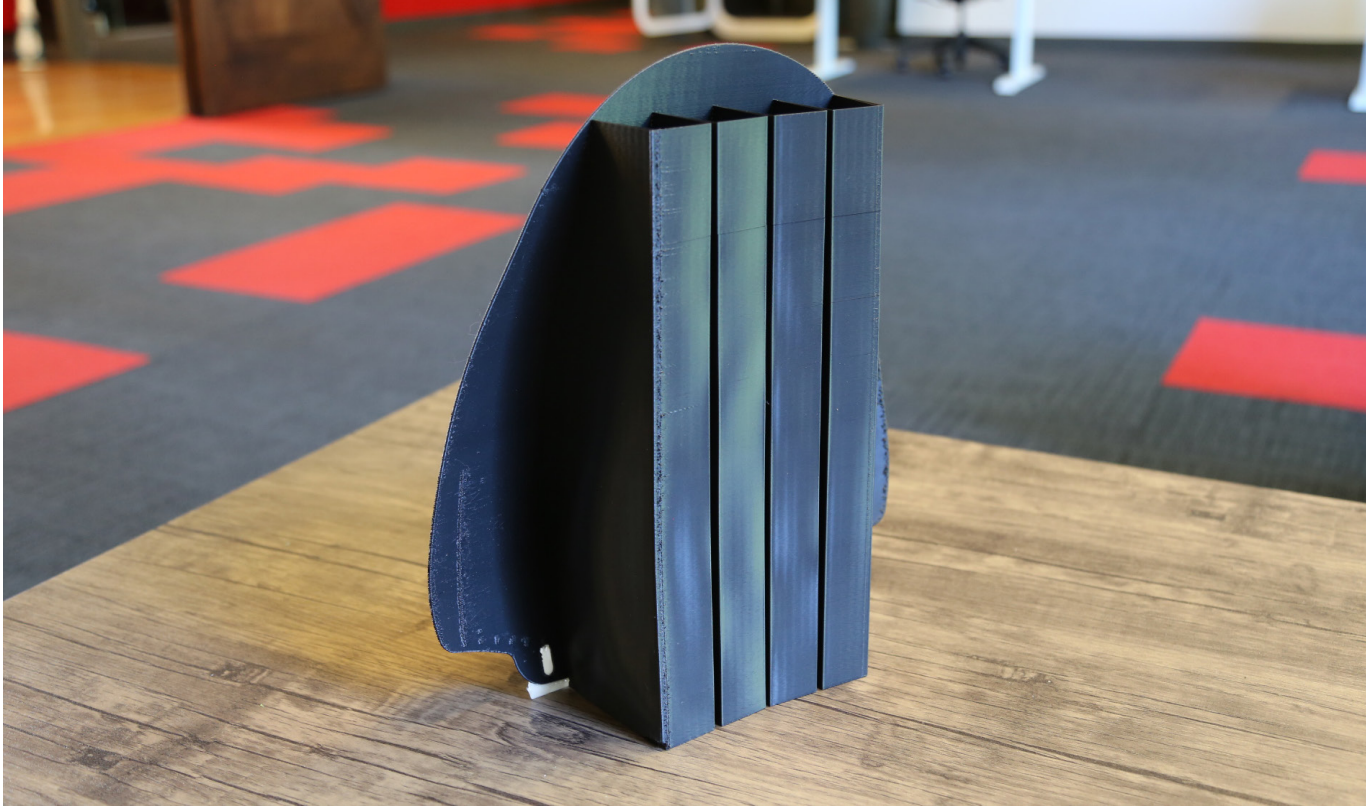


# Stabilizer Walls

## Overview

For most additive manufacturing jobs, structures are generated automatically to support model geometry that falls below a materials self-supporting angle. This support is sufficient for most jobs- but sometimes, when a model is tall and thin, this style of support is not necessary. These models are still susceptible to the forces of gravity, and forces applied by the print head as it deposits material. To provide structural support beyond what the model provides itself, the Stabilizer feature is introduced.

If you've programmed Stratasys Printers before, you might have used Insight software, and be familiar with the Stabilize walls feature.  The new Stabilize feature uses Insight as its Engine, but with the improved user interaction common to today's software applications.

## BEFORE YOU CREATE YOUR STABILIZER

Stabilizers are part of the process plan for programming your job, so make sure you do these things to prep your job:

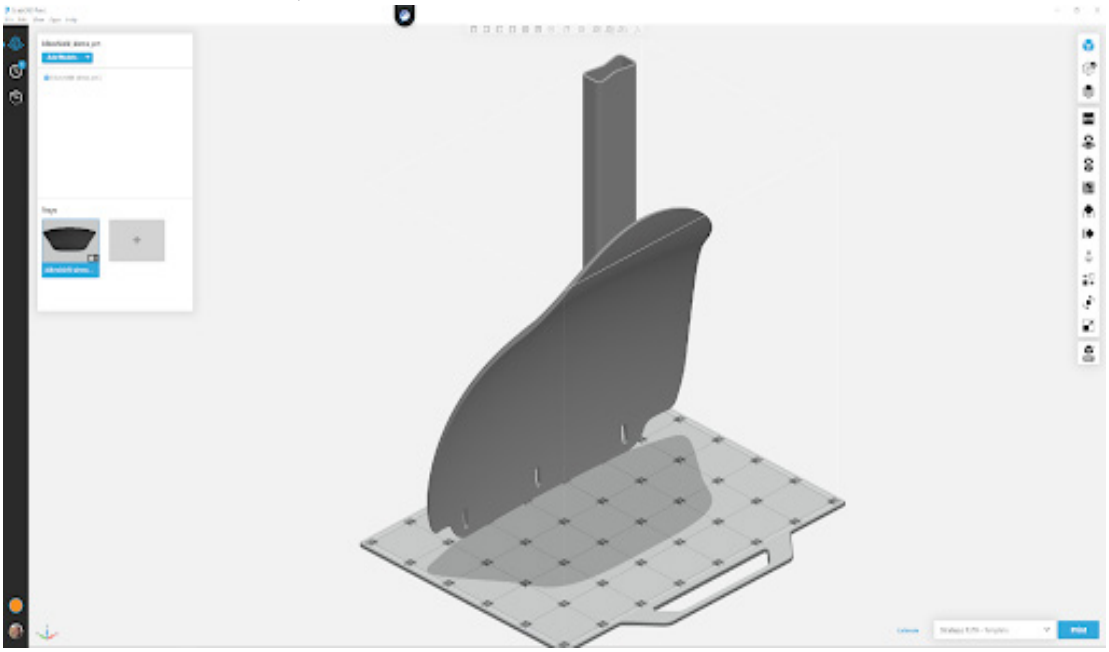
- Analyze and repair your model
- Orient your model in space
- Scale your model if you need to
- Set your slice height and slice style

## CREATING YOUR STABILIZER

To create your stabilizer:

- Select the model you want to stabilize
- Select the Stabilizer icon on GrabCAD Print's process toolbar

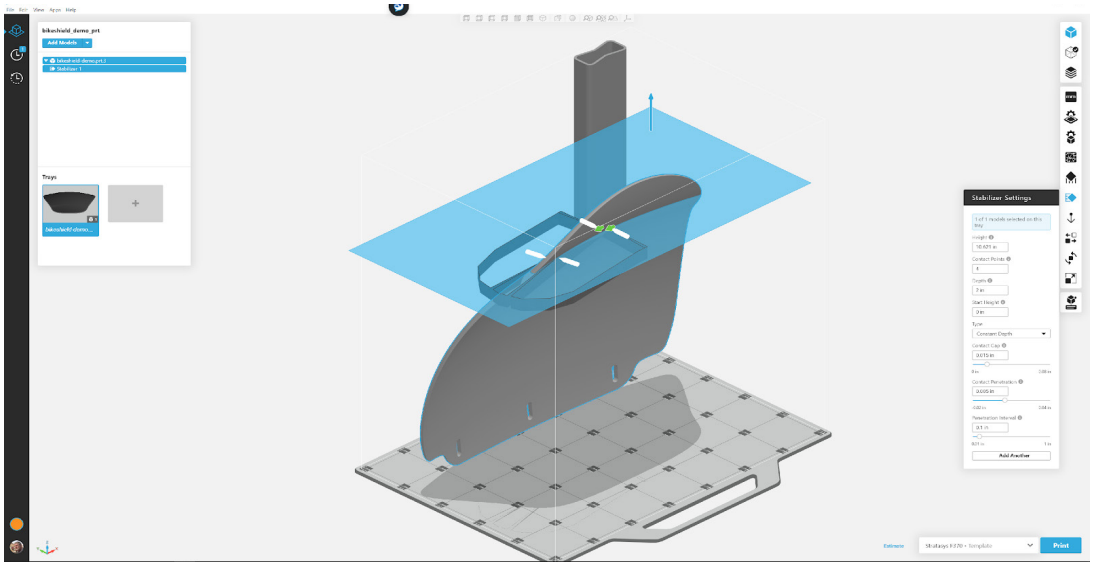
You can do these steps in either order- it does not matter. But once you've completed both, GrabCAD Print uses the slice height to determine possible stabilizer locations and places a default stabilizer at a level about 80% of your model's height. GrabCAD Print also creates a stabilizer feature as a child of your model. When you need to edit the stabilizer, find it in the tree and double click it- this will open the Stabilizer pane so you can make updates to its design. If you decide the Stabilizer is no longer necessary, right-click on the stabilizer and choose Delete Stabilizer(s). This removes the stabilizer from your process plan forever.



NOTE: The demo model is bikeshield_demo.prt.3

This model is used in the Insight training for Stabilizers. It's a good example model, not overly complex, that generates predictable results.

## EDITING YOUR STABILIZER IN THE MODEL VIEW



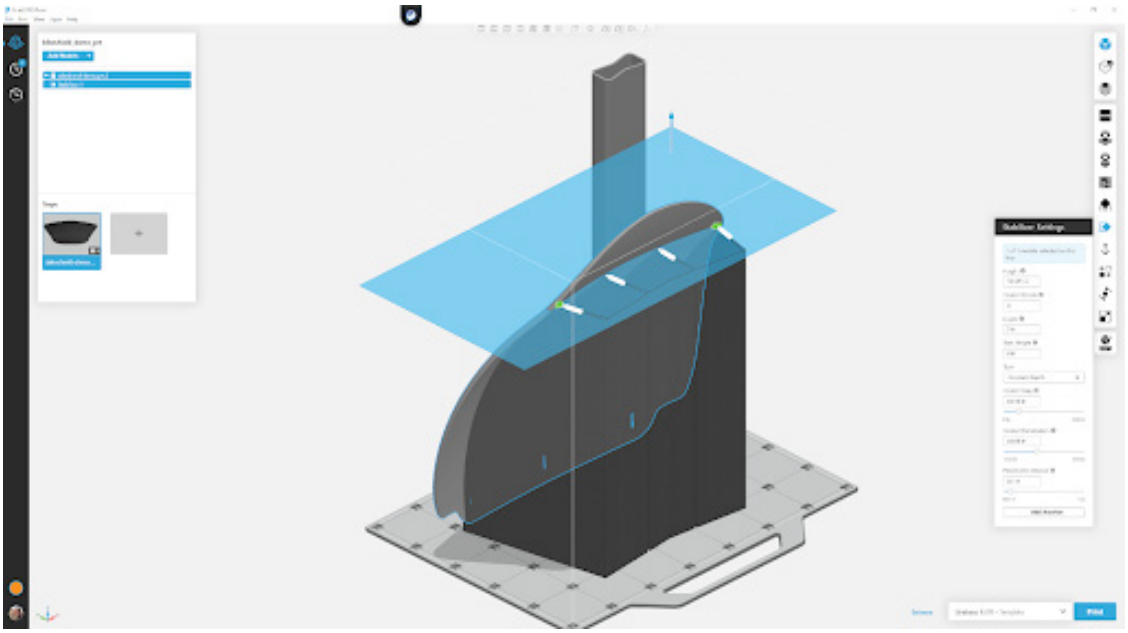
You can also see that Print has provided three ways to manipulate the stabilizer in the model view:

- A plane perpendicular to Z identifying the stabilizer height. Drag the blue arrow up and down to change it.
- An intersection curve, representing the geometry to stabilize. This curve adjusts as the stabilizer height changes.
- Two arrows (green) indicating the end positions of the stabilizer. The arrows point towards each other, indicating where the stabilizer will be built.
- The white pins indicate places where the Stabilizer contacts the model. By default, a Stabilizer contacts a model in four places.

There's a workflow to define the stabilizer as well:

- Adjust the stabilizer to the desired height
- If there's more than one intersection curve, choose the one you want to stabilize, if it's not the one GrabCAD chose for you.
- Adjust the start/end of the stabilizer.

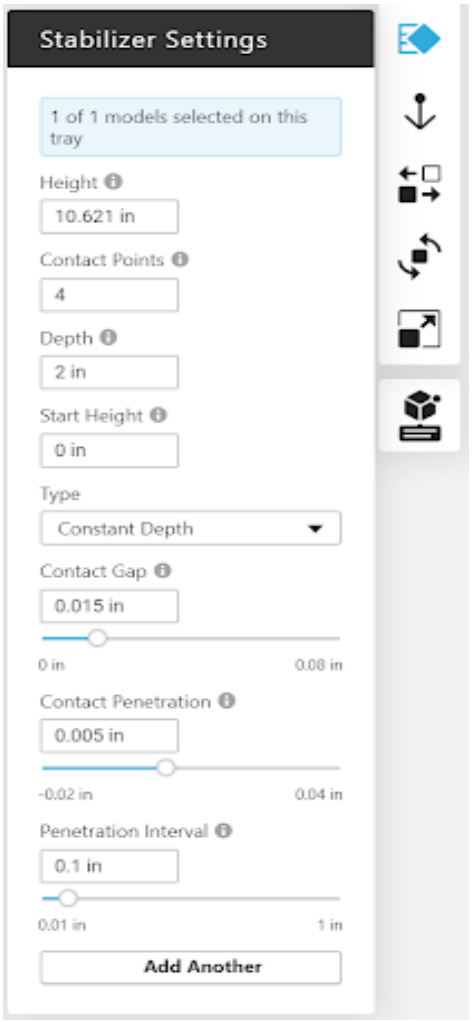
For this stabilizer, I'm okay with the height, and there's only a single curve, so I'm going to move the start and end arrows so the stabilizer supports the underside of this model:



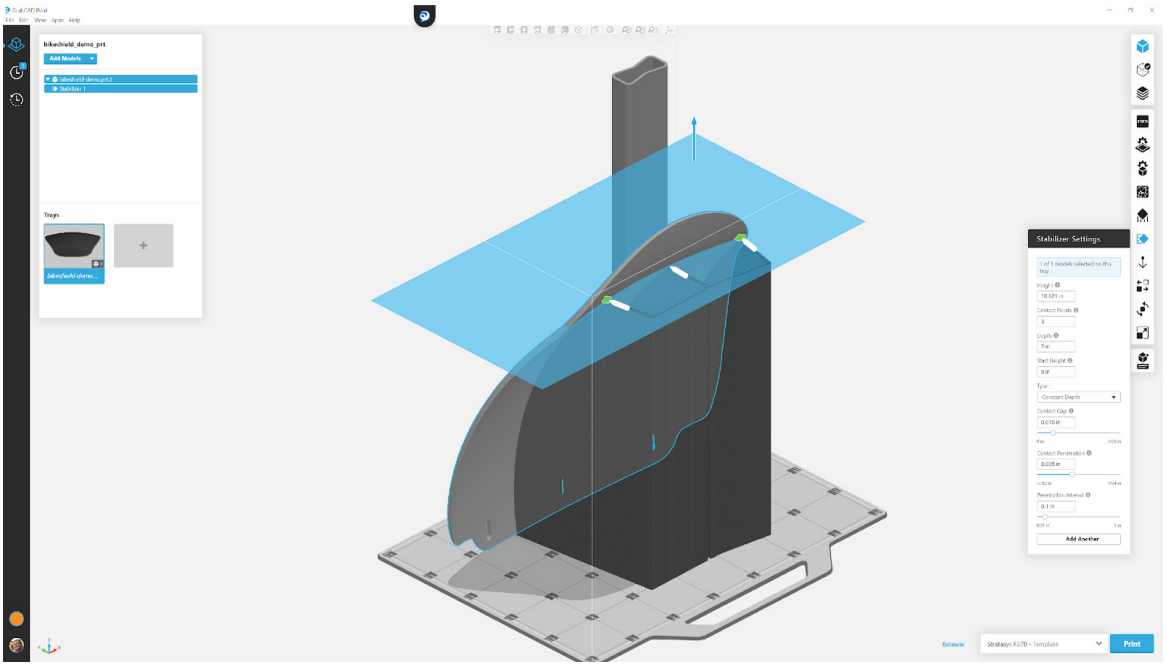
When I release the first arrow, the preview starts to update. Notice I didn't wait till the update was complete to move the second arrow- I started immediately. GrabCAD Print stops computing the preview until I release the second arrow. This way, I can keep refining my stabilizer until I get it exactly as I want.

When the preview completes, you see the actual shape of the stabilizer, how it adjusts in Z to maintain contact with the model. We'll come back to this a little later.

Stabilizer Settings

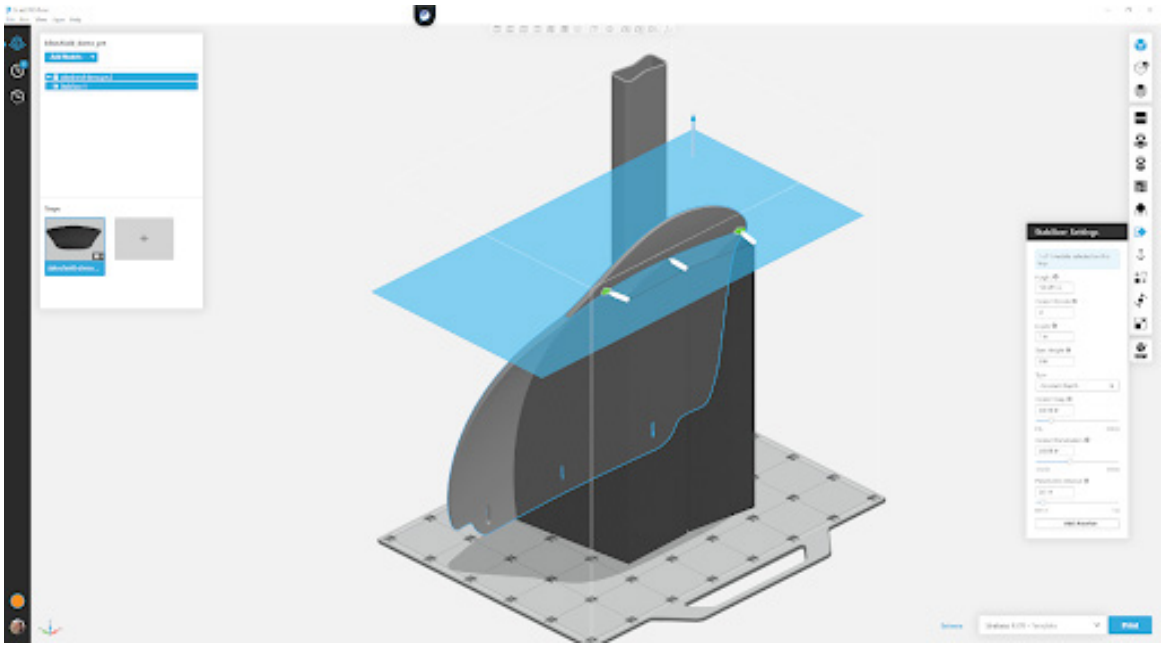



One way to edit an existing stabilizer is by dragging controls in the Model View. You can also change stabilizers by editing settings in the Stabilizer Settings panel. The most common setting to change is the number of Contacts, where you can have as few as two, or as many as 20. Once you make the change, the Stabilizer preview updates.

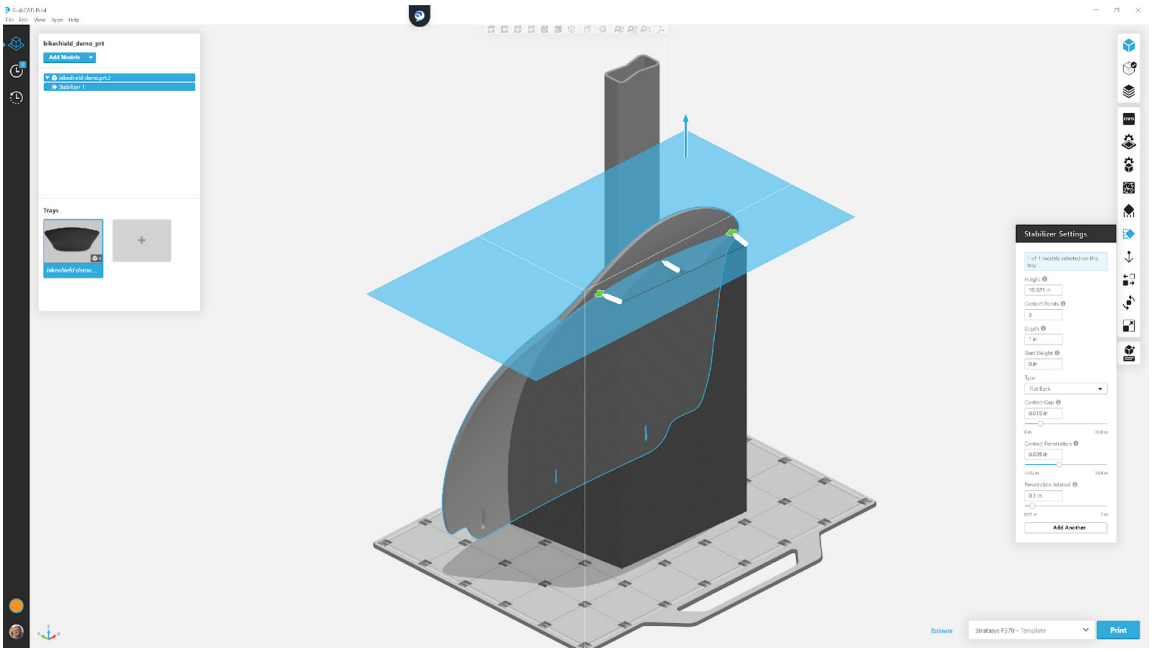



You can also change the depth of each contact. The Stabilizer Depth is the distance an individual contact extends away from the model at the Stabilizer Height. In this case, the Stabilizer Depth has been set to an inch.

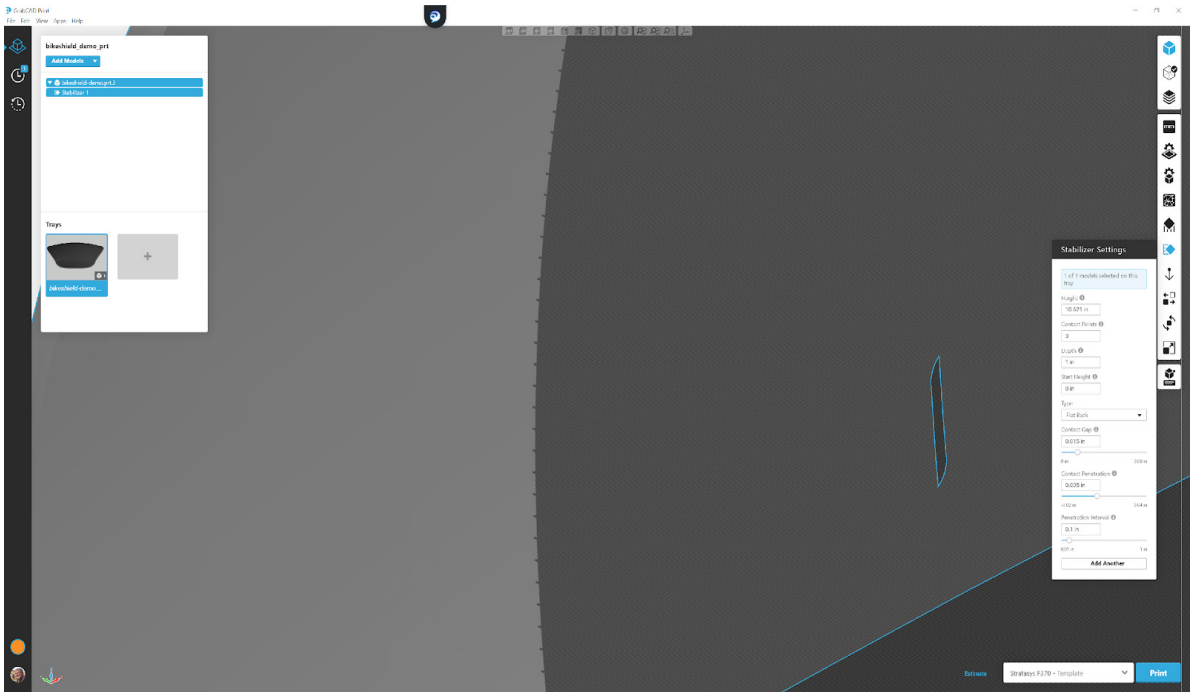
When the change is made, the preview updates.



As you can see, this Stabilizer has a bit of a break to its back. By default, Stabilizers use a constant depth Stabilizer. You can change the Stabilizer Type to have a flat back, making it more rigid:



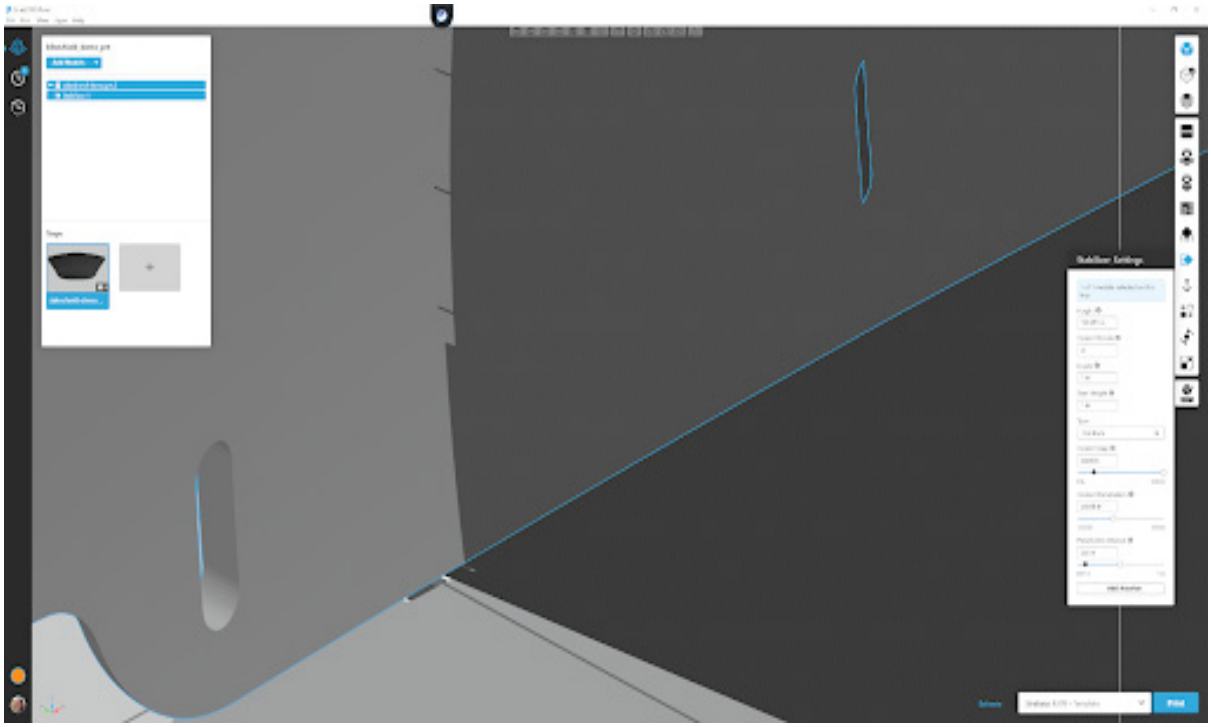

If I zoom in on the stabilizer, you can see that one of the contacts is longer than the others, and this happens at a regular interval:



Stabilizers support your model by allowing the contact tip to penetrate its outer shell a small distance. This distance is controlled by the Contact Penetration setting, for which GrabCAD Print provides a default value. Likewise the Programmer can control the distance the contact tip stays away from the model shell. This setting is controlled by the Contact Gap setting.

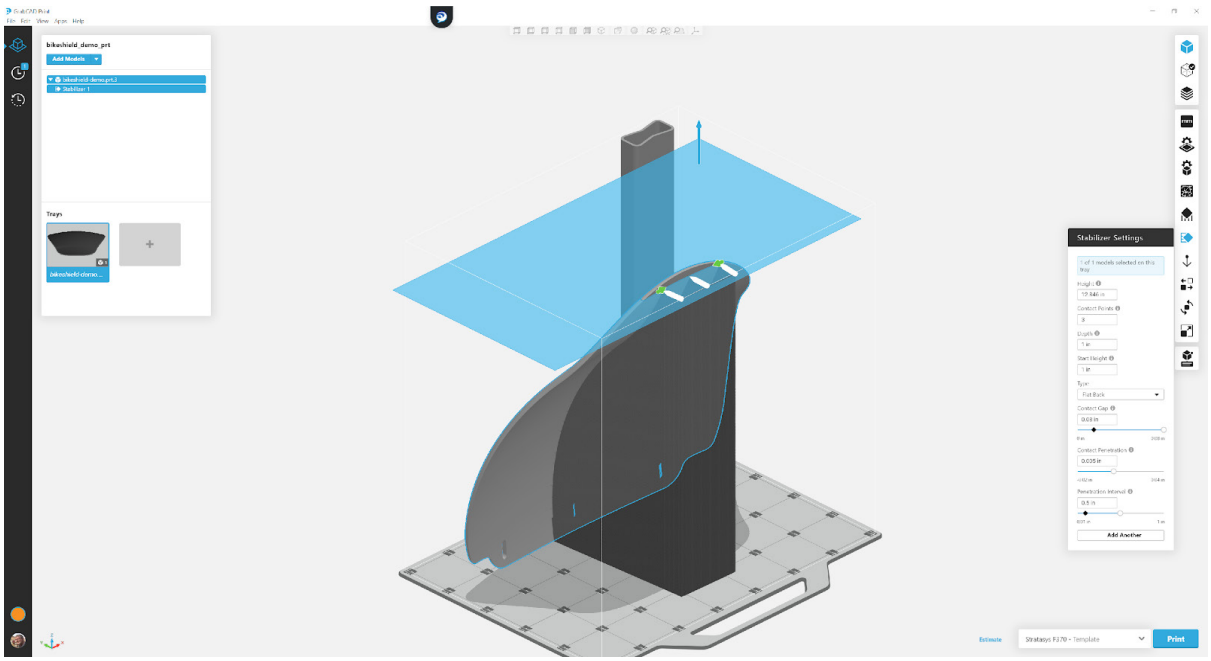
You can change how frequently the contact penetrates the model by changing its Penetration Interval. And last, You can change the height at which contact penetration and contact gap are applied by changing the Start Height.

To demonstrate these settings, the Contact Gap, Penetration interval, and Start Height have been changed.



## CREATING MULTIPLE STABILIZERS FOR A MODEl

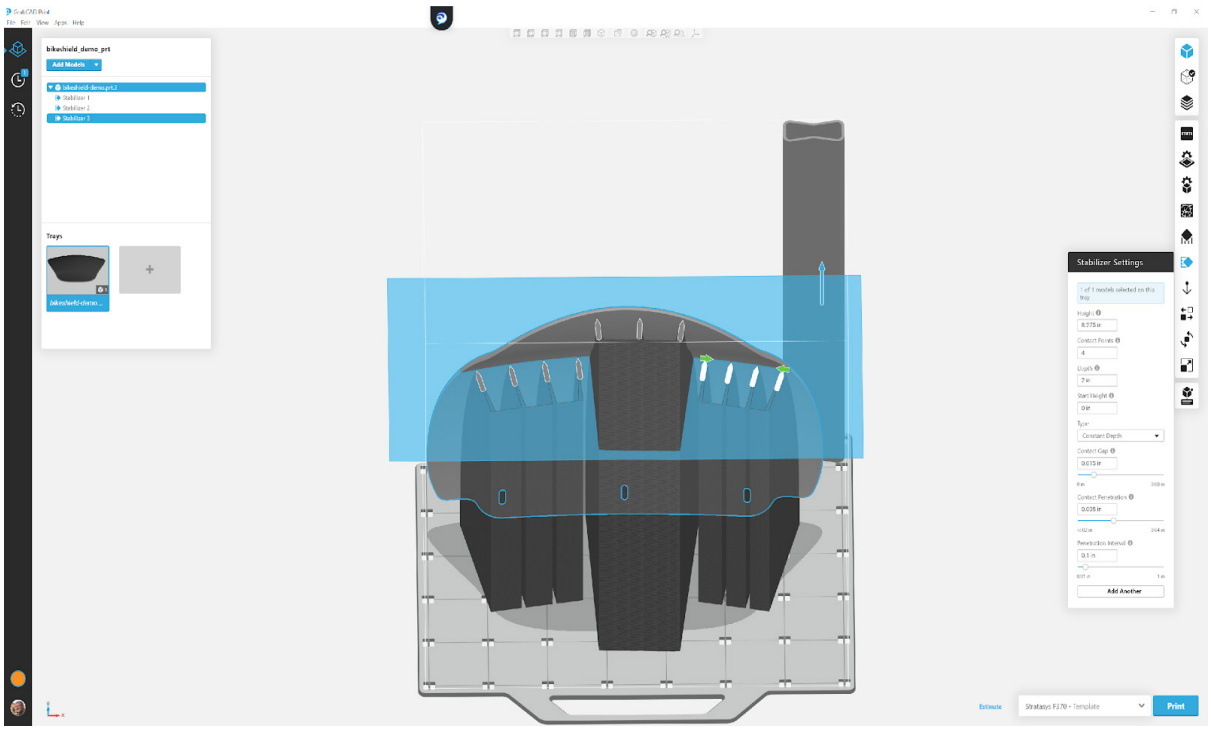
Suppose your model needs more than one stabilizer? To illustrate this, you can make the current stabilizer taller and narrower, only supporting the center of this model.

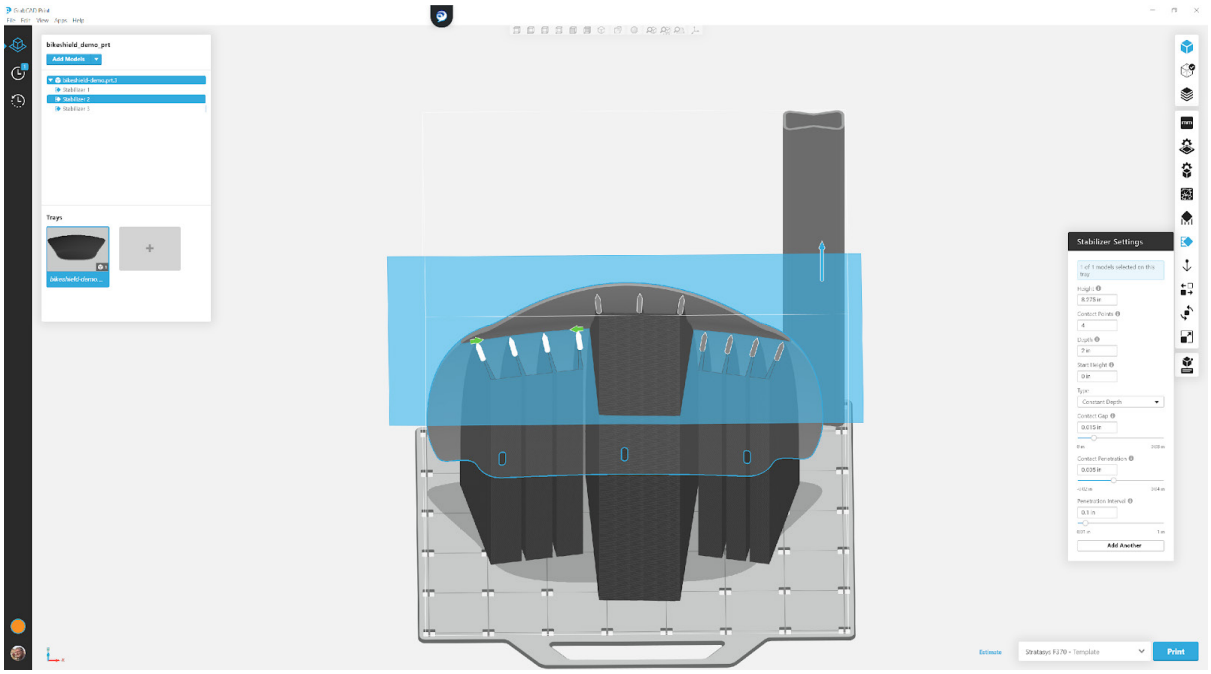



Simply click the Add Another button on the Stabilizer Settings panel. The preview for my first stabilizer is retained but its contact markers become gray, indicating that you are no longer editing it. Retaining the preview gives you a visual reference for defining my new stabilizer. And you can create new stabilizers in the same way as the first set:

- Set the Stabilizer height
- Set the start and end points
- Adjust its settings

For this model, 3 stabilizers have been created. If you want to tweak the other two stabilizers after you finished the third, select the Stabilizer Feature in the Project Pane, activating it, which allows you to tweak it while retaining the other two Stabilizer previews to inform you of adjustments.



## MY MODEL IS STABILIZED; WHAT NEXT?

I've stabilized my model; what next? I programmed this model for a Stratasys F370 printer, But suppose I programmed my model on a printer with a larger build volume, like a Stratasys F770?

## WHAT I CAN DO TO MODELS WITH STABILIZERS

Drag to position it on the tray.  Click the model and drag it, or use the 3D manipulator to adjust only in X or Y.

Use Copy/Paste and Duplicate to increase the number of models on in my job. Features like Stabilizers are included in the paste.

Rotate about Z to change the models' orientation in the tray. Rotate using the Z input field on the Orient panel, or dragging the Z rotator on the 3D Manipulator

Stabilizers are only visible when they are being edited. This makes them harder to arrange manually. That said, GrabCAD Print is aware of the Stabilizers, so use the Arrange tool to successfully place the model on the tray.

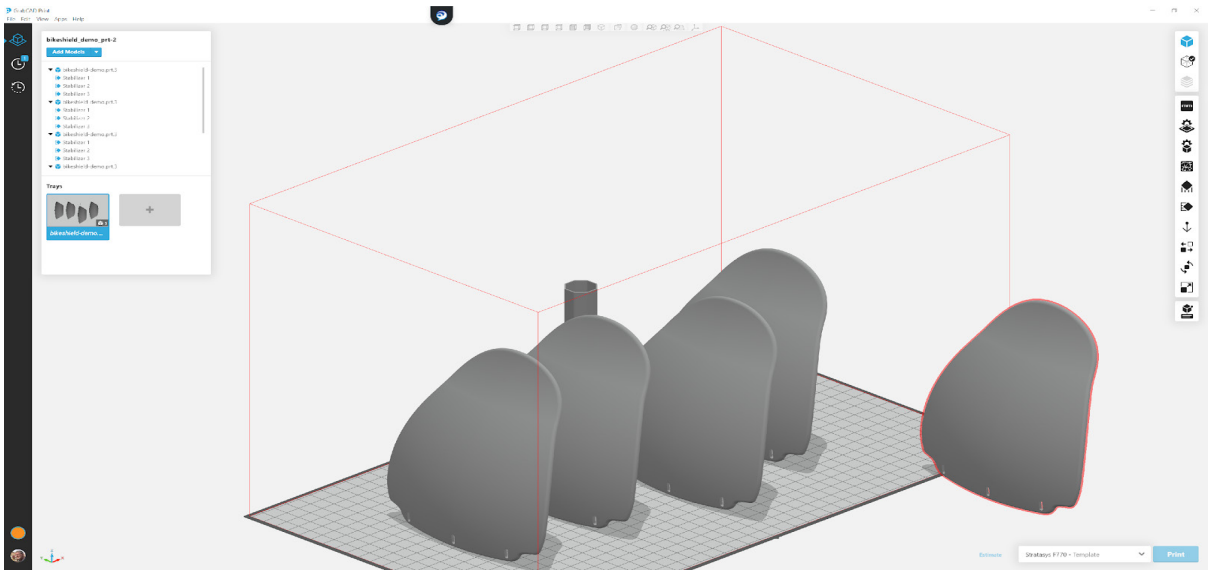


Image: Bike shield, rotated duplicated 4 times, prior to arranging the tray

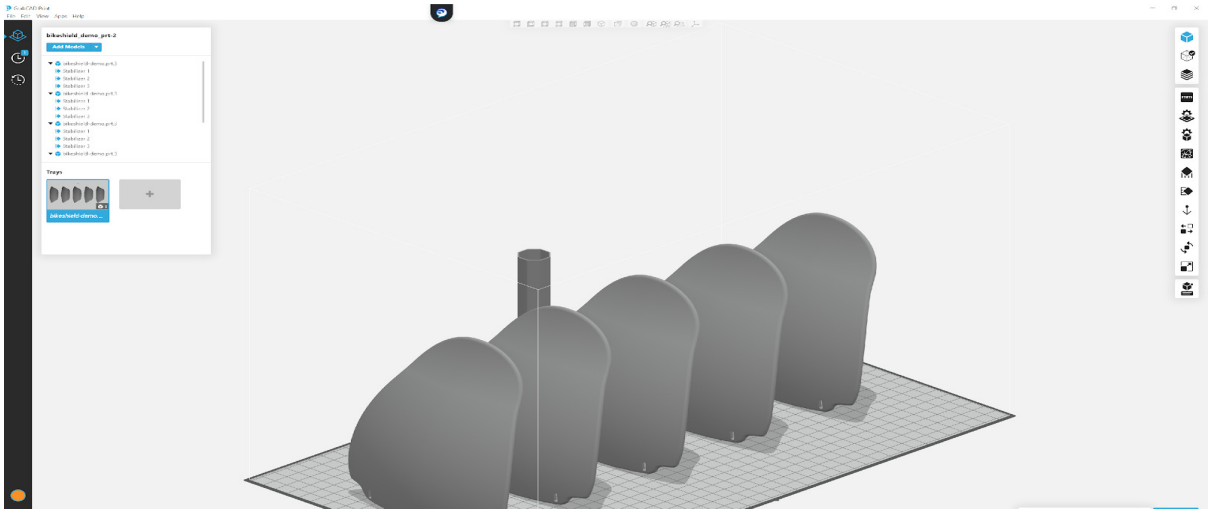


Image: 5 Bike shields after selecting Arrange this Tray

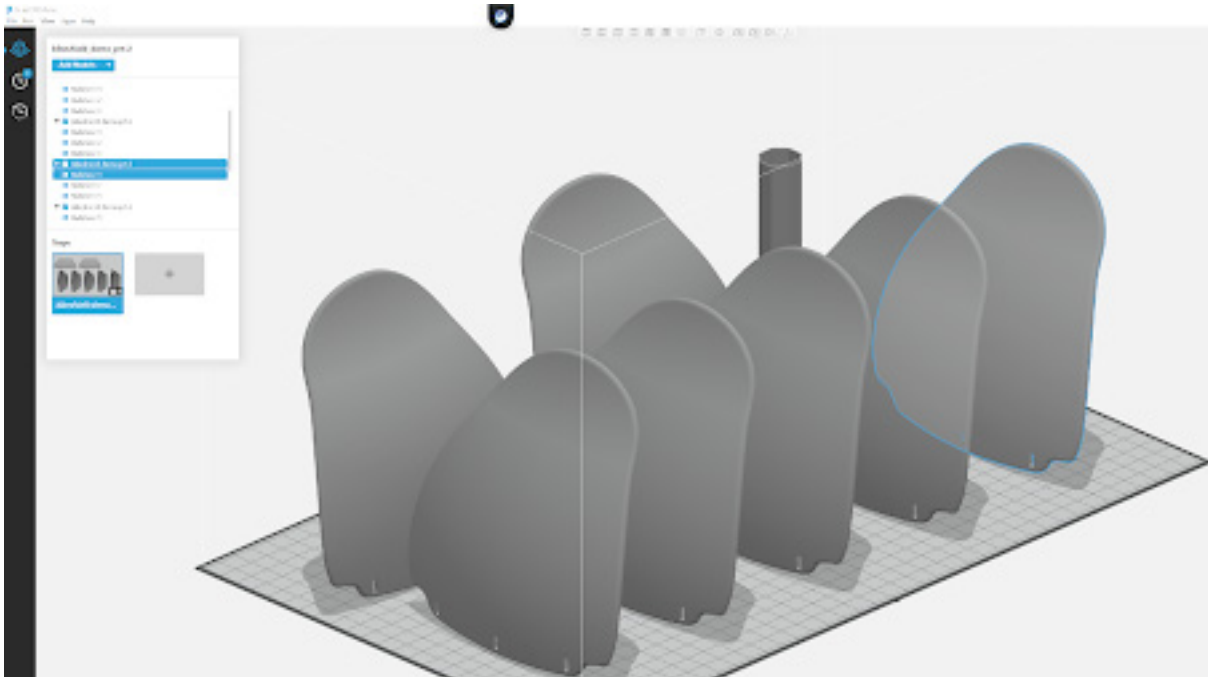


Image: 7 bike shields in different orientation after selecting Arrange this Tray

## WHAT I CAN'T DO TO MODELS WITH STABILIZERS

Some actions will delete Stabilizers or require them to be deleted.

- Any orientation other than rotation about the Z axis. This includes rotating about X or Y using the 3D manipulator or by entering values in the Orient Panel, Orient Face to Plane, Auto Orient, and Reset
- Scale a Model- Like other Advanced FDM Features (ex. Self-supporting Holes) Scaling is blocked when a model has stabilizers. Delete the stabilizers if you must rescale.
- Dis-assemble an Assembly or Group
- Show or hide a component in an assembly
- Create a Group

## AFTER WHAT CHANGES SHOULD I CHECK MY STABILIZERS?

Stabilizers are sensitive to slice height and printer changes. Stabilizer features will be preserved but check to make sure they still represent your process intent.

Slice height may change when:

- A different slice height is selected
- A different material is selected
- Importing a model to an different tray
- (The target tray may have a different slice height or material)
- Arranging a Project

## NOT HAPPY WITH YOUR CHANGES?

Use CTRL+Z to roll back to a point where you were satisfied with your Stabilizers, and edit from that point.

## OTHER USES OF STABILIZERS

Stabilizers can be used to tack down the corners of large flat models that may curl, or models made from materials that may curl. In this use case, create Stabilizers in locations that are likely to curl and send your job to the printer.

## IN CONCLUSION

We've reached the end of the tutorial. Let's recap what we've learned:

- When to use stabilizers
- How to add a stabilizer
- Changing the Stabilizer height
- Selecting the stabilizer reference curve
- Moving Stabilizer start and end locations
- Adjusting parameters in the Stabilizer Settings panel
- And Adding multiple stabilizers

Now it's time for you to take this information and create Stabilizers on your models that need it.

Stratasys Headquarters

7665 Commerce Way,
Eden Prairie, MN 55344
+1 800 801 6491 (US Toll Free)
+1 952 937-3000 (Intl)
+1 952 937-0070 (Fax)

1 Holtzman St., Science Park,
PO Box 2496
Rehovot 76124, Israel
+972 74 745 4000
+972 74 745 5000 (Fax)

stratasys.com
ISO 9001:2015 Certified