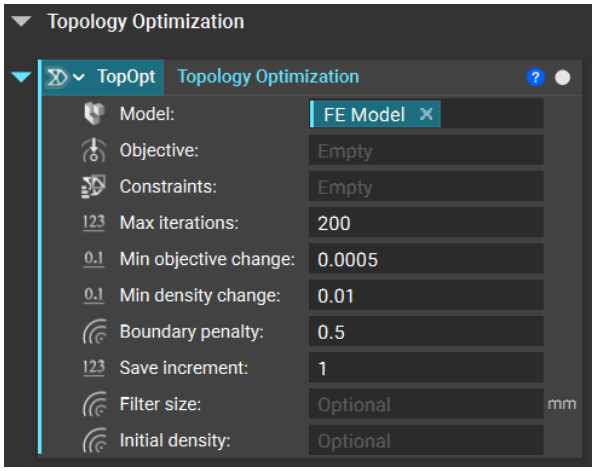
Follow Along: Objectives and Constraints

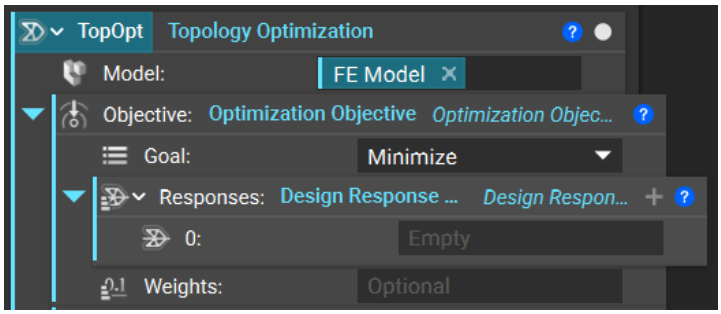
Now that we've created an FE Model and set Boundary Conditions, we can start filling in our **Topology Optimization** block with our optimization **Objectives** and **Constraints**.

Step 1: Create a new section titled *Topology Optimization*. Add a **Topology Optimization** block to the Notebook, and for the FE Model input, insert the FE Model created in the previous lesson.



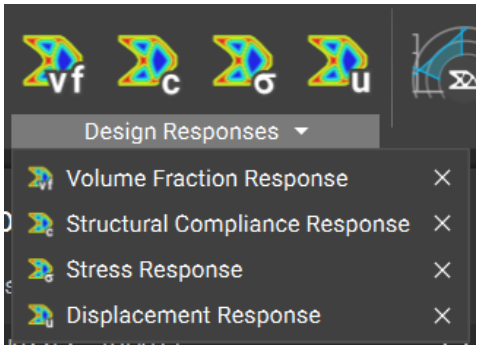
Step 2: The Objective input is where we define what we want to gain out of this Topology Optimization. Often, we'll assign multiple design responses to give various load cases. This is more realistic, as most parts aren/t subjected to only one load case.

Double-click in the input line and choose **Optimization Objective** to add an Objective to the block.

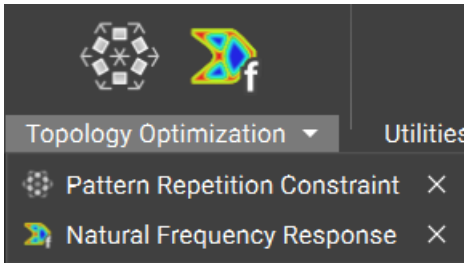


When applying multiple Objectives, we can use the Weights input to assign different weightings to each Objective. If the Weights input is left blank, all Objectives will be given the same weighting.

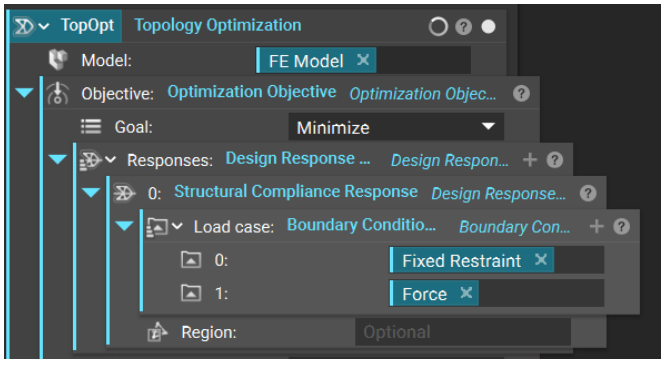
The Design Responses for the Optimization Objectives can be found in the Topology Optimization ribbon.



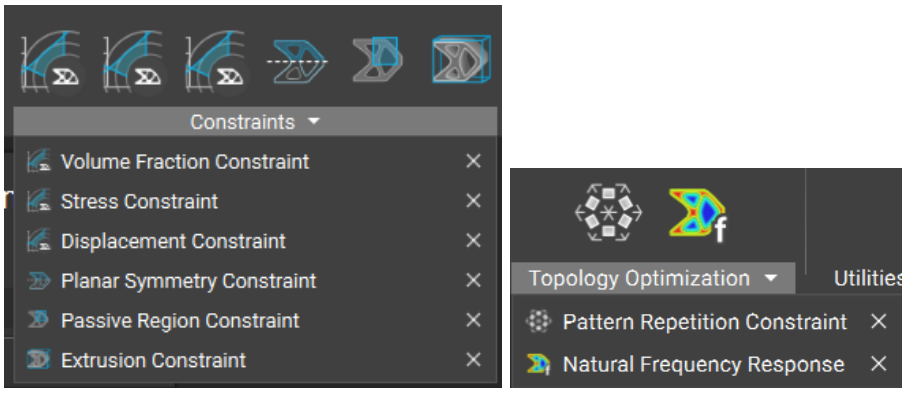
Additional Design Responses are in the Beta tab under Topology Optimization.



Add a **Structural Compliance Response** to the Notebook. Pull this into the Design Response input in the Objective block. For the Goal, select Minimize from the drop-down menu because we aim for minimal deformation in this part. For the Load case, assign the two Boundary Conditions established in the last lesson.



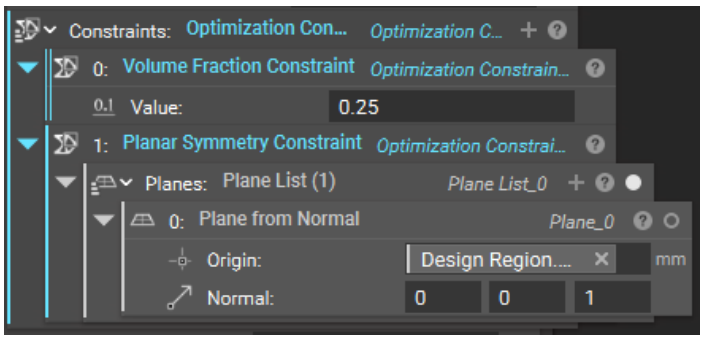
Step 3: The Constraints input in the Topology Optimization block will most commonly apply a minimum or maximum bound to a design response. Like Objectives, multiple Constraints can be used in the block.
Constraints can be found in the Topology Optimization tab and the Beta tab under Topology Optimization.



For this example, apply a **Volume Fraction Constraint** and a **Planar Symmetry Constraint** in the Constraints list of the Topology Optimization block.

Set the Value in the Volume Fraction Constraint to 0.25, indicating that the resulting geometry will have a volume 25% or less of our original volume.

We use the Planar Symmetry constraint to ensure that the resulting geometry is symmetrical across the mid-plane. For The Plane input, add a **Plane from Normal** block and set the origin at the centroid of the Design Region. Set the Normal to [0, 0, 1].



We've now applied our Objectives and Constraints, and the Topology Optimization will run. Move forward to the next lesson to take a closer look at the block and all its inputs.