

Plate With a Hole Optimization - Design of Experiments

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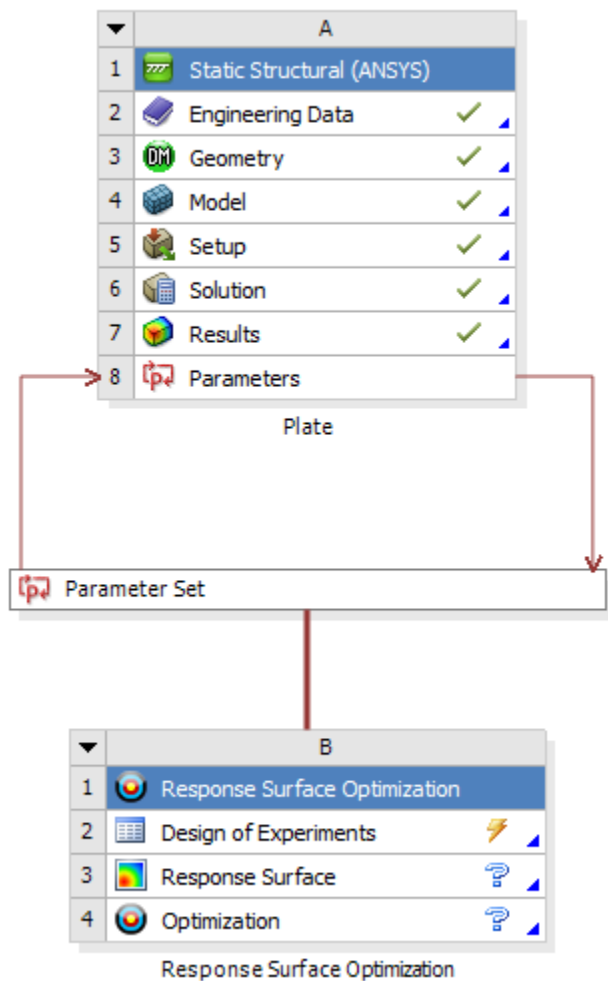
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Design of Experiments

This step samples specific points in the design space. It uses statistical techniques to minimize the number of sampling points since a separate FEA calculation (and associated stiffness matrix inversion) is required for each sampling point. This is the most time-consuming step in the optimization process.

Response Surface Optimization

First, Goal Driven Optimization needs to be placed in the Project Schematic. In the left-hand menu called "toolbox" expand **Design Exploration**. Next, drag **Response Surface Optimization** and drop it right underneath the **Parameter Set**. Your project schematic window, should look comparable to the one below. Note that all the systems are connected.



Next, double-click **Design of Experiments**. Again, we can see our input and output parameters but this time under the Design of Experiments step.

Outline of Schematic B2: Design of Experiments		
	A	B
1		Enabled
2	✓ Design of Experiments	
3	Input Parameters	
4	Plate (A1)	
5	P1 - DS_R	✓
6	Output Parameters	
7	Plate (A1)	
8	P2 - Surface Body Volume	
9	P3 - Equivalent (von-Mises) Stress Maximum	
10	Charts	
11	✓ Parameters Parallel	
12	✓ Design Points vs Parameter	

These parameters are the "Design Variables"

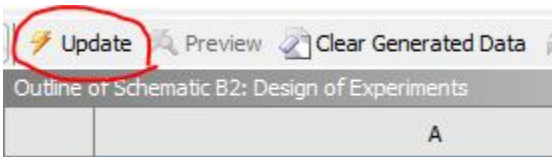
These parameters are used to set the "Objective Function" and "Constraints"

Highlight **P1-DS_R** and change the Lower Bound to 1 inch and the Upper Bound to 2.5 inches.

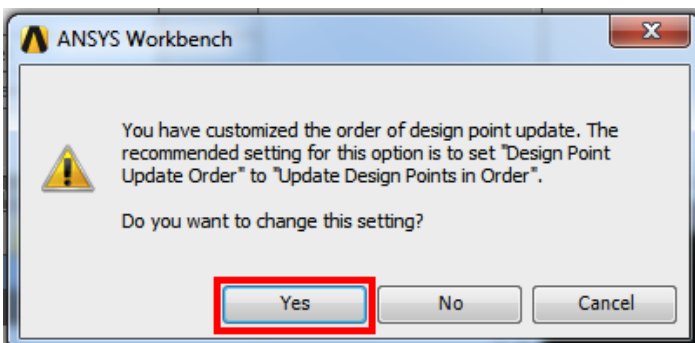
Properties of Schematic B2: Design of Experiments		
	A	B
1	Property	Value
2	General	
3	Units	
4	Type	Design Variable
5	Classification	Continuous
6	Values	
7	Value	1.4433
8	Lower Bound	1
9	Upper Bound	2.5
10	Use Manufacturable Values	☐

 Preview

Now, that the radius of the hole is properly constrained click on  Preview. ANSYS just picked what it thinks are the best sampling points according to an algorithm. Note that these sampling points are not necessarily linearly spaced. To get a numerical solution for each of these radii, click **Update**.



If you get the following error, click **Yes**.



Twiddle your thumbs a bit while ANSYS performs some time-consuming matrix inversions.

After the update has completed, click on **Return To Project**. You may want to save again at this point.

[Go to Step 5: Response Surface](#)

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