DOE Purpose and Schemes

The purpose of a Design Of Experiments is to gather a representative set of data to compute a Response Surface, and then run an Optimization (for a Response Surface Optimization)

Basically, a set of Design Points will be calculated

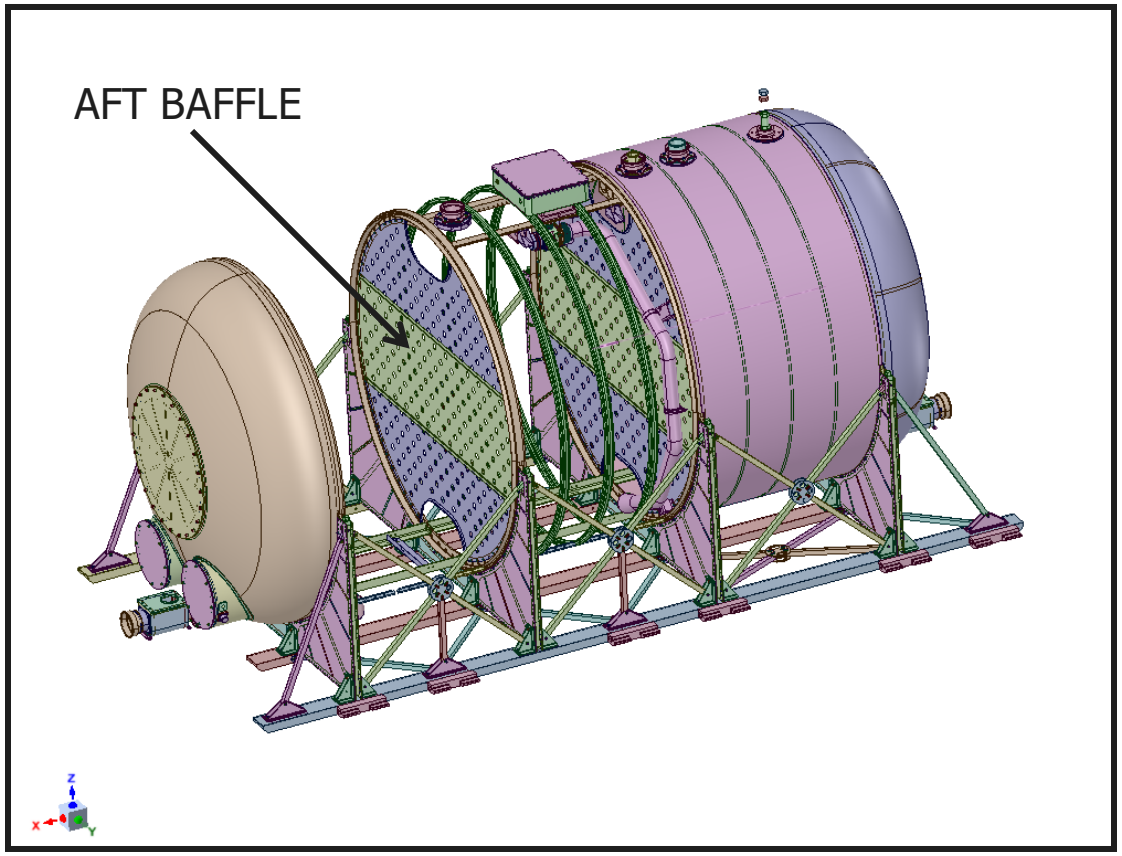
The Response Surface accuracy will greatly depend on the DOE scheme, and especially the number of Design Points that were calculated

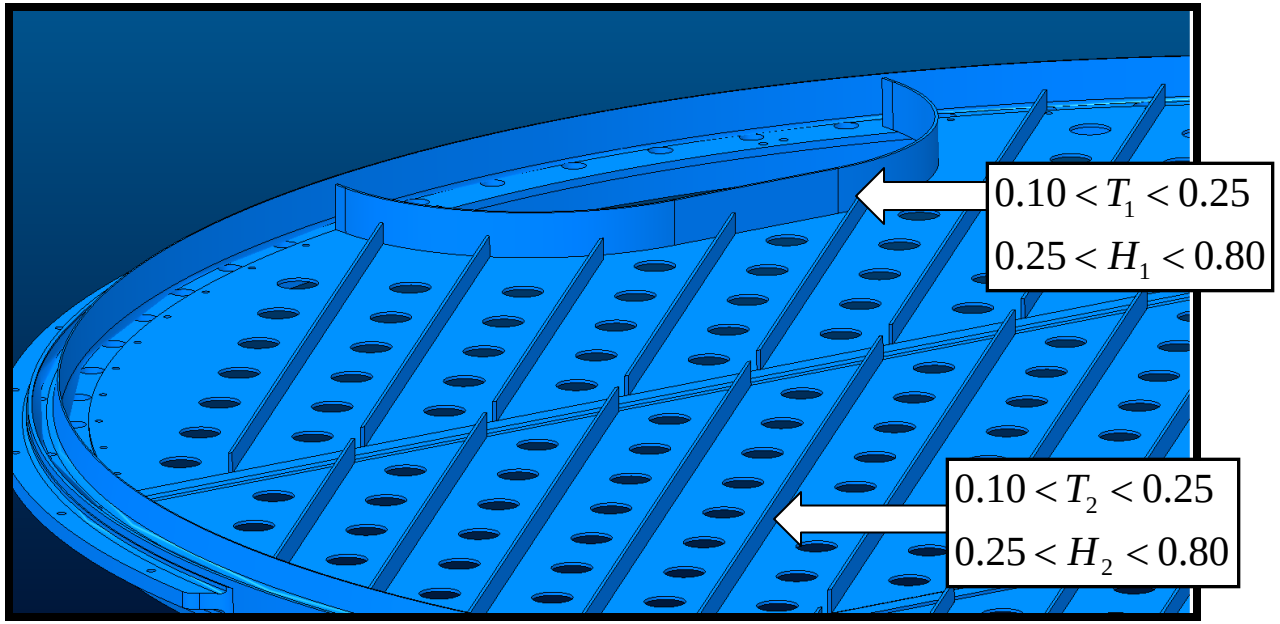
DesignXplorer proposes several DOE schemes. Design Points are automatically chosen to explore the parametric space efficiently:

- **Central Composite Design (CCD) [default]**
- **Box Behnken Design**
- **Optimal Space Filling Design**
- **Custom + Sampling**
- **Sparse Grid Initialization**
- **Latin Hypercube Sampling Design**

ANSYS

TYPICAL DESIGN OPTIMIZATION





Parameters are assigned for geometrical features, boundary conditions, or material properties

Transient Dynamic Loading is used to generate results for a series of different parameters using Design of Experiments

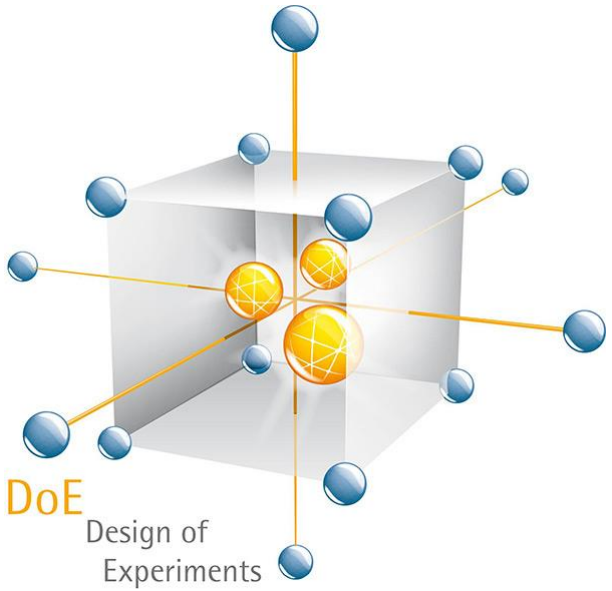
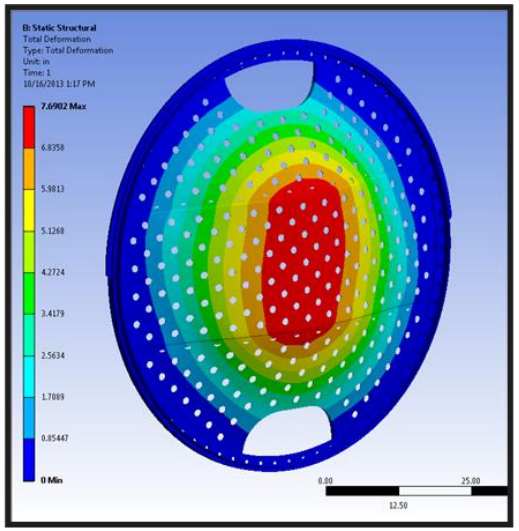


Table of Schematic B2: Design of Experiments

	A	B	C	D	E	F	G
1	Name	P1 - ds_cutout	P3 - Bea... Load X Com... (N)	P2 - Solid Mass (kg)	P4 - Equ... Stress Max... (MPa)	P5 - Total Defo... Maxi... (mm)	P6 - Equiv... Stress 2 Maxi... (MPa)
2	1	5	4000	0.17858	109.44	0.013564	36.88
3	2	4.5	4000	0.18289	109.76	0.013287	35.44
4	3	5.5	4000	0.17414	109.03	0.013876	38.315
5	4	5	3600	0.17858	98.492	0.012208	33.192
6	5	5	4400	0.17858	120.38	0.014921	40.568
7	6	4.5	3600	0.18289	98.78	0.011959	31.896
8	7	5.5	3600	0.17414	98.125	0.012489	34.483
9	8	4.5	4400	0.18289	120.73	0.014616	38.984
10	9	5.5	4400	0.17414	119.93	0.015264	42.146



Parameters

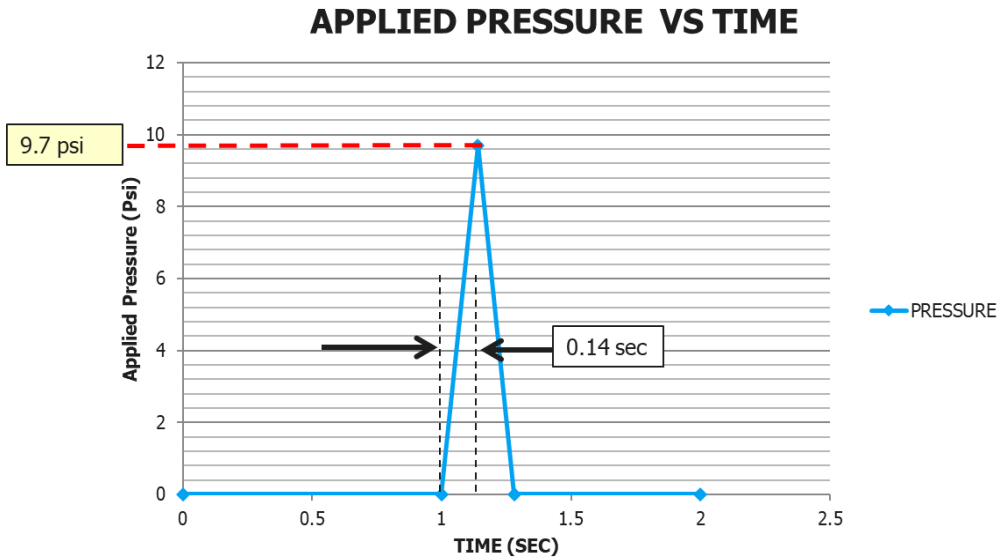
$T_1 = 0.25$

$H_1 = 0.75$

$T_2 = 0.25$

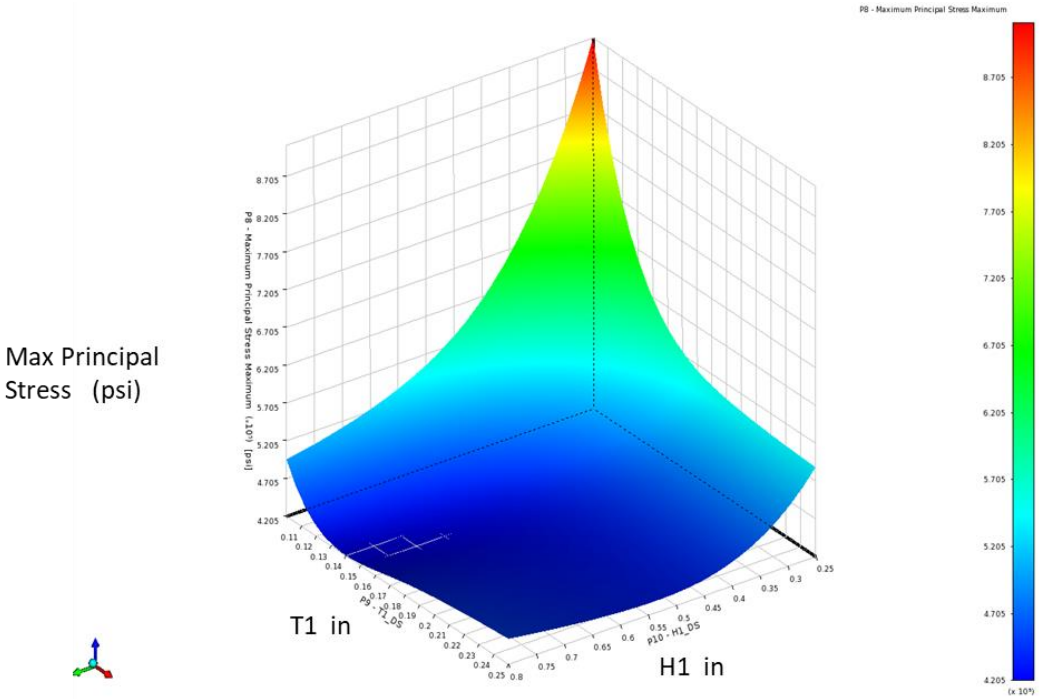
$H_2 = 0.75$

Max Static deflection = 7.6 in



Results can be summarized to determine their interaction and sensitivity

Response Surfaces between variables for the objective



Local sensitivity between variables