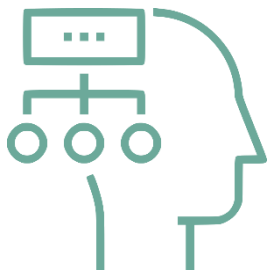


EXPLORE AND OPTIMIZE DESIGNS WITH HYPERWORKS DESIGN EXPLORER

Joyce Tang – Application Engineer – September 2021

Design Explorer

HyperWorks 2021



What's a DOE?



Design Explorer Demo



Q&A

Design Explorer



HyperWorks + HyperStudy

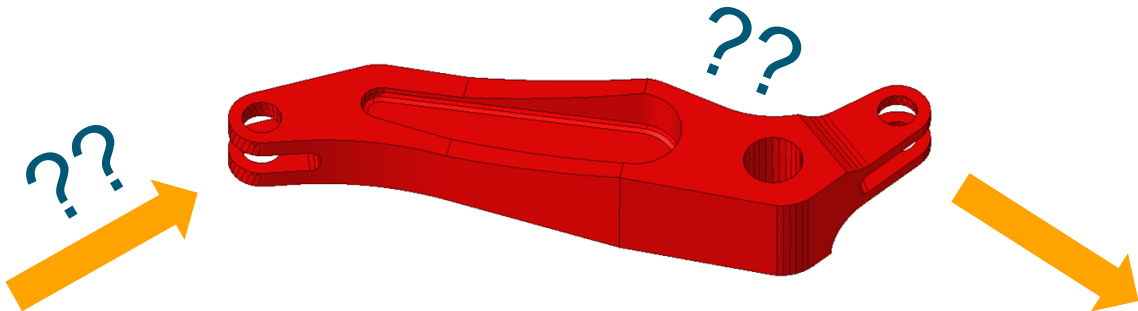


HAVE YOU EVER CONDUCTED A DOE BEFORE?

DO YOU KNOW WHAT DESIGN EXPLORATION IS?

Design of Experiments - DOE

Sensitivities of design variables and input parameters

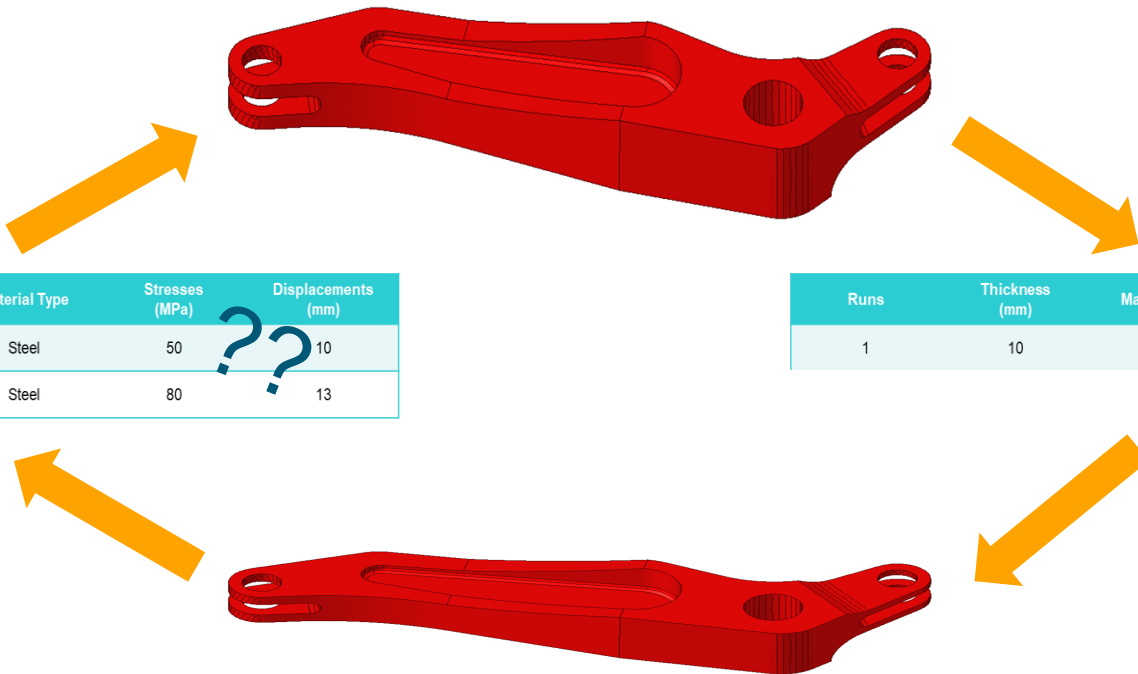


Runs	Thickness (mm)	Material Type	Stresses (MPa)	Displacements (mm)
1	10	Steel	50	10
2	5	Steel	80	13

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Design of Experiments - DOE

Sensitivities of design variables and input parameters

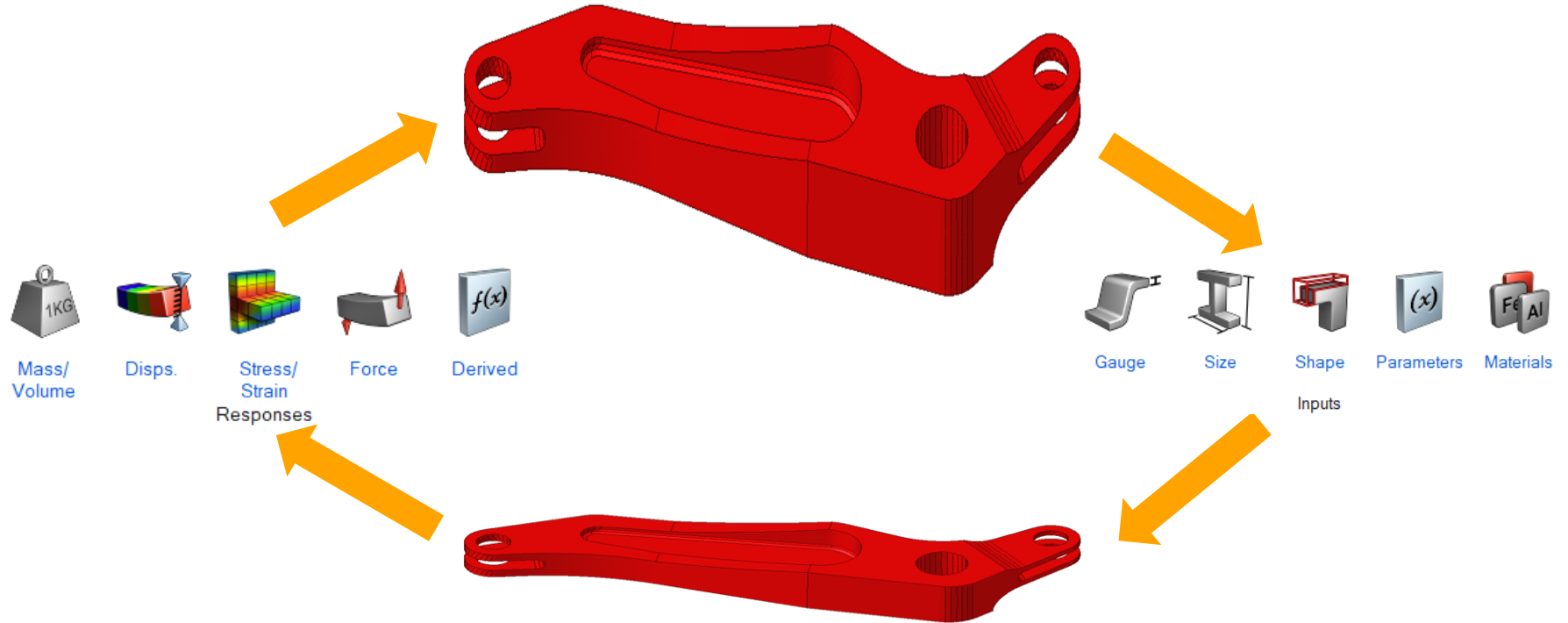


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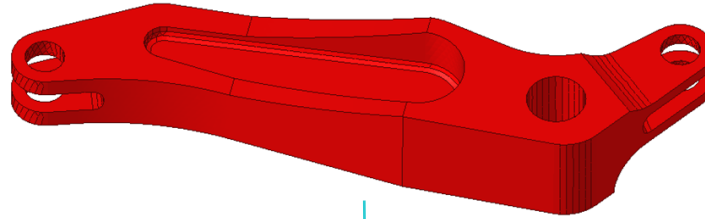
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Automatic Variation of Input Parameters

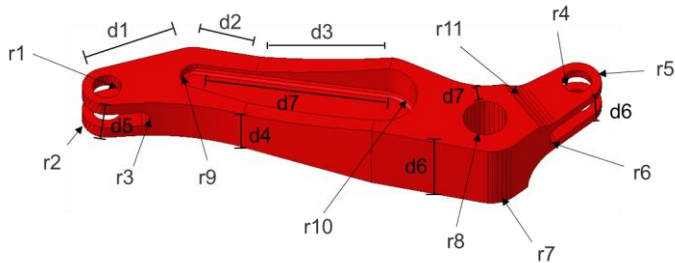
With respect to Output Responses



Input Parameters



Dimensions



Materials

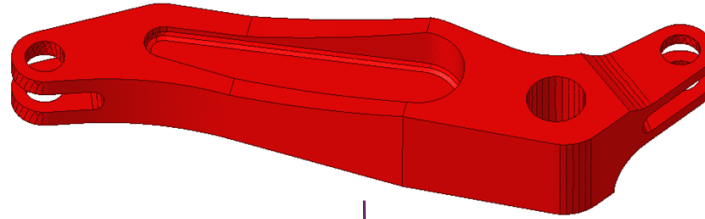


Many more!

Weld placement
Fastener type
Surface finish
Operating frequency
Mounting location
Adhesive strength
Operating temperature

Laminate layup
Couplers/bearings
Ply orientation
Mfg. process
...

Output Parameters



Structural Properties

- Mass
- Stress
- Natural Frequency

Manufacturing Capabilities

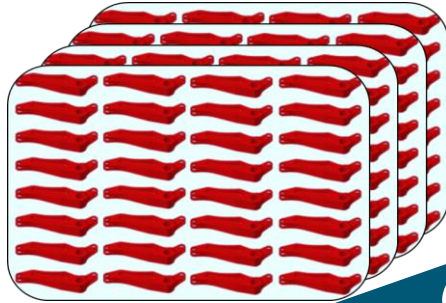
- Design Space/ Volume
- Processing Times
- Material Choice
- Cost

Many more!

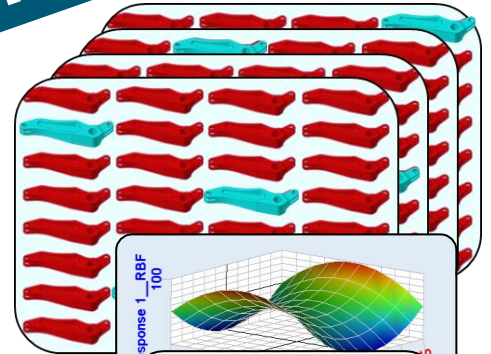
Design of Experiments - DOE

The Iterative Method

We call this the design space.

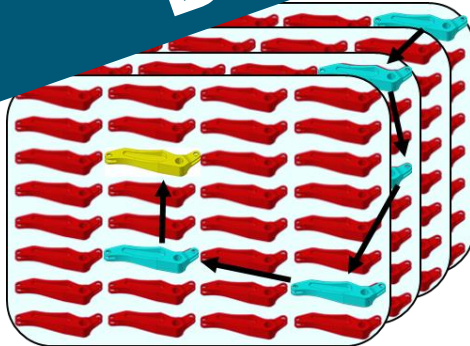


We need a way to narrow down the choices



Response 1_RBF	100
length_1.S	0.9867226
length_2.S	0.4282856
length_3.S	0.9200000
length_4.S	-0.5899474
length_5.S	-0.2803155
high.S	-0.0219165

We find the optimal design!



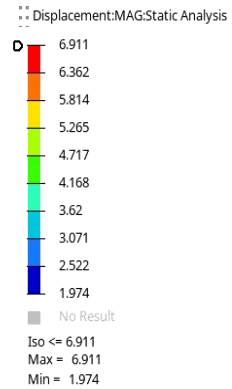
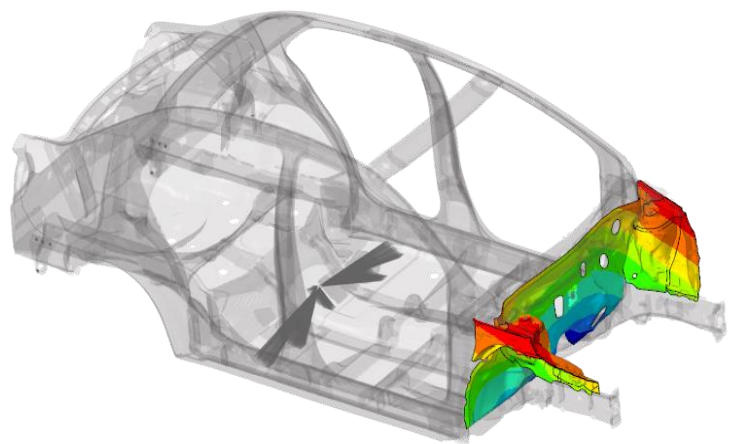
Find trade-offs and understand the sensitivity of the parameters

Design Explorer tool



Run Result Visualization

Evaluation Index	196_firewall1...	176_shockho...	79_frameupper...	167_housings...	Mass_2	Displacem...	Condition	Best Iteration
1	0.746700	1.750000	1.231000	1.660000	0.240082	3.455328	Acceptable	None
2	0.792715	1.916600	1.322586	1.820748	0.240640	3.438630	None	None
3	0.680605	1.612520	1.314314	1.495585	0.239488	3.472330	None	None
4	0.815902	1.599640	1.331647	1.797370	0.240674	3.454656	None	None
5	0.760230	1.781696	1.231000	1.692516	0.240214	3.451716	None	None
6	0.703752	1.924953	1.215428	1.666774	0.239844	3.452160	Acceptable	None
7	0.705052	1.924998	1.227046	1.634259	0.239833	3.451947	None	None
8	0.688860	1.924993	1.221651	1.753473	0.239816	3.453392	Acceptable	Optimal
9	0.702430	1.925000	1.233273	1.666774	0.239844	3.452160	None	None
10	0.715367	1.924993	1.279157					
Load Results					Displacement			
					Element Stresses (2D & 3D)			



Design Explorer Tool

Design Sensitivity Studies

Fully comprehend your designs



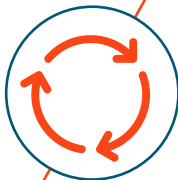
Does both DOE and Optimization

"Mini HyperStudy"



End to End Workflow

All-in-one GUI



Easy to Use

Immediate Insight



SOFTWARE DEMONSTRATION

Design Explorer Workflow

1

2

3

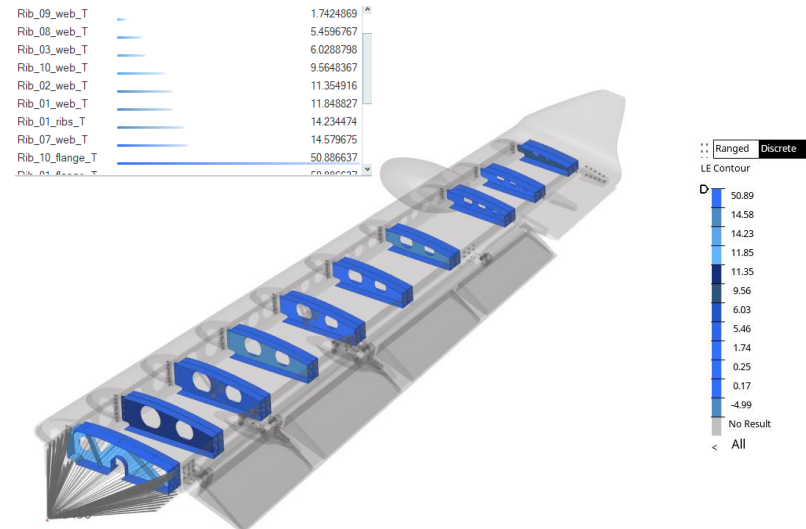
The Design Explorer

How well do you understand your designs?

- Quick and Easy Set Up
- Can be solved with using OptiStruct or Radioss
- Applicable for morphing, panel thicknesses, materials, geometry shape and size parameters
- Multi-disciplinary but not multi-model (yet!)
- Conducts both DOE and Optimisations – all files retained in directories



Design Variable Sensitivities displayed on the model





THANK YOU

altair.com



#ONLYFORWARD