

What Is Structural Optimisation?



Wish list for Product Topology Optimization

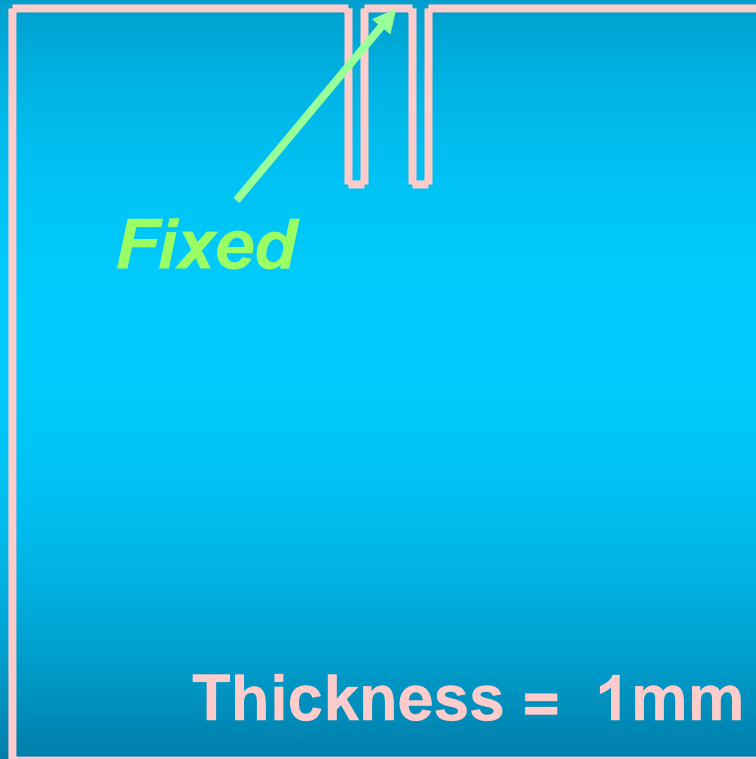
- Totally general and multiple load environments
- Totally general multiple support environments
- Totally general shape in 2D or 3D
- Multiple material environments
- Multiple physics
- Multiple modelling environments eg. static, dynamic and stability, separate or together
- Material and geometric non-linearity
- Multiple optimality conditions(Pareto)
- Manufacturable

STRUCTURAL OPTIMIZATION TECHNIQUES

- ✈ Parameter adjustment and search**
- ✈ Sensitivity and mathematical programming**
- ✈ Homogenization**
- ✈ Biological growth**
- ✈ GA's and GP**
- ✈ Evolutionary**
- ✈ Cellular Automata**
- ✈ Simulated annealing**

Michell frame with fixed ends





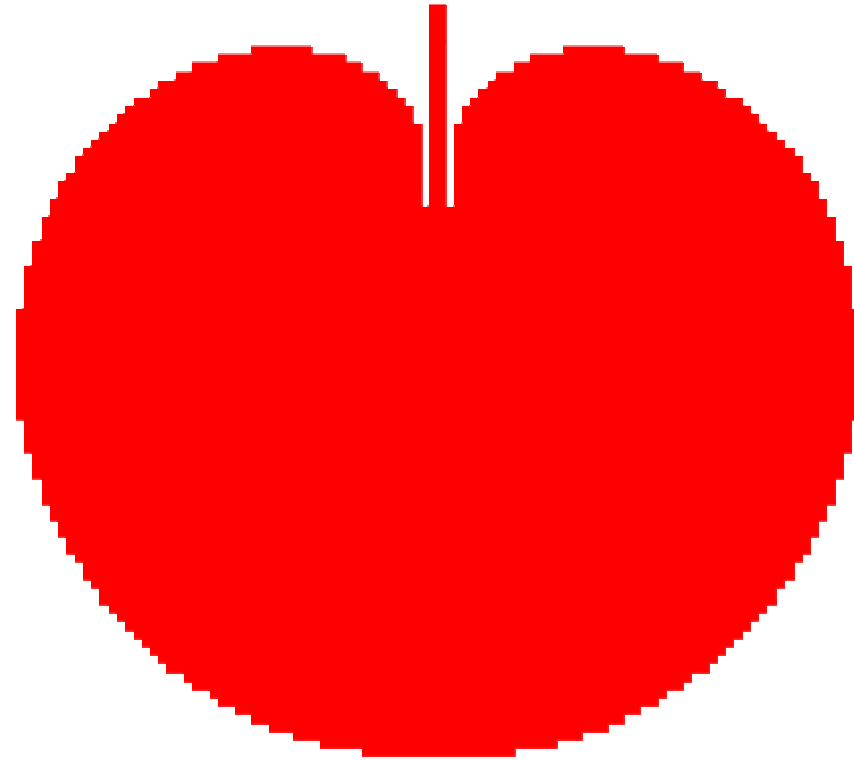
Fixed

Gravitation Load

Mesh = 100 X 100

Thickness = 1mm

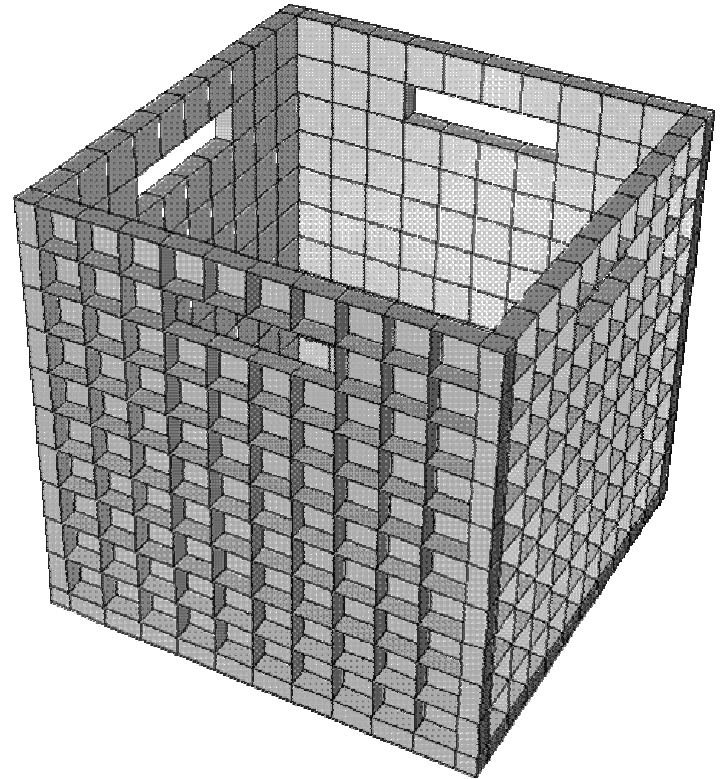
Design Domain



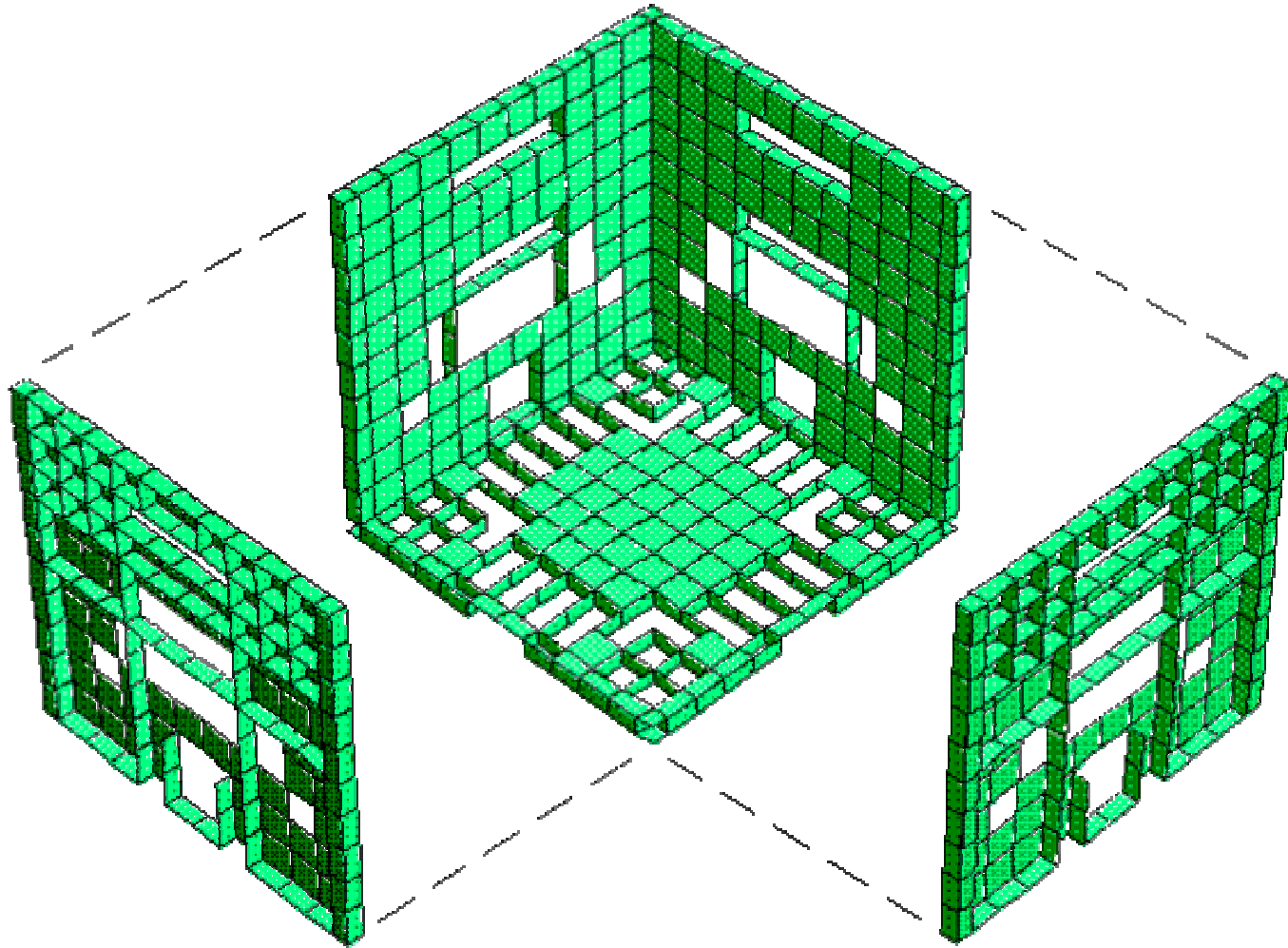
Optimum Topology Produced by ESO

Initial ESO Design

- Same material properties
- Orthogonal grid
- Full interior web

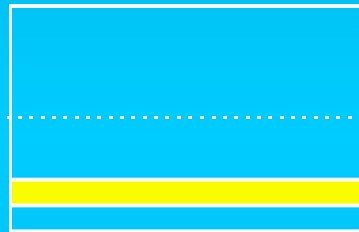
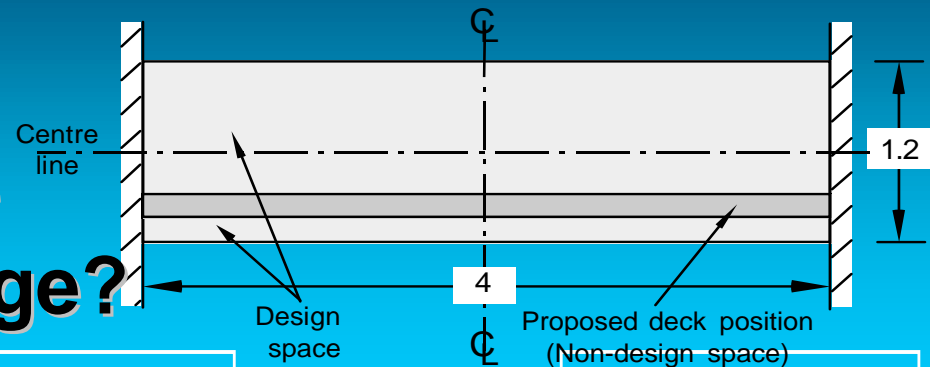


Optimal Design by ESO



APPLICATION 7

Where should the deck be on a bridge?



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Deck Position	1	2	3	4	5	6
Performance index ($\times 10^4$)	1.026	1.084	1.131	1.179	1.196	1.275
Volume reduction (%)	59.00	58.15	56.10	53.33	53.07	56.23
Steady state number	60	69	157	58	57	62

