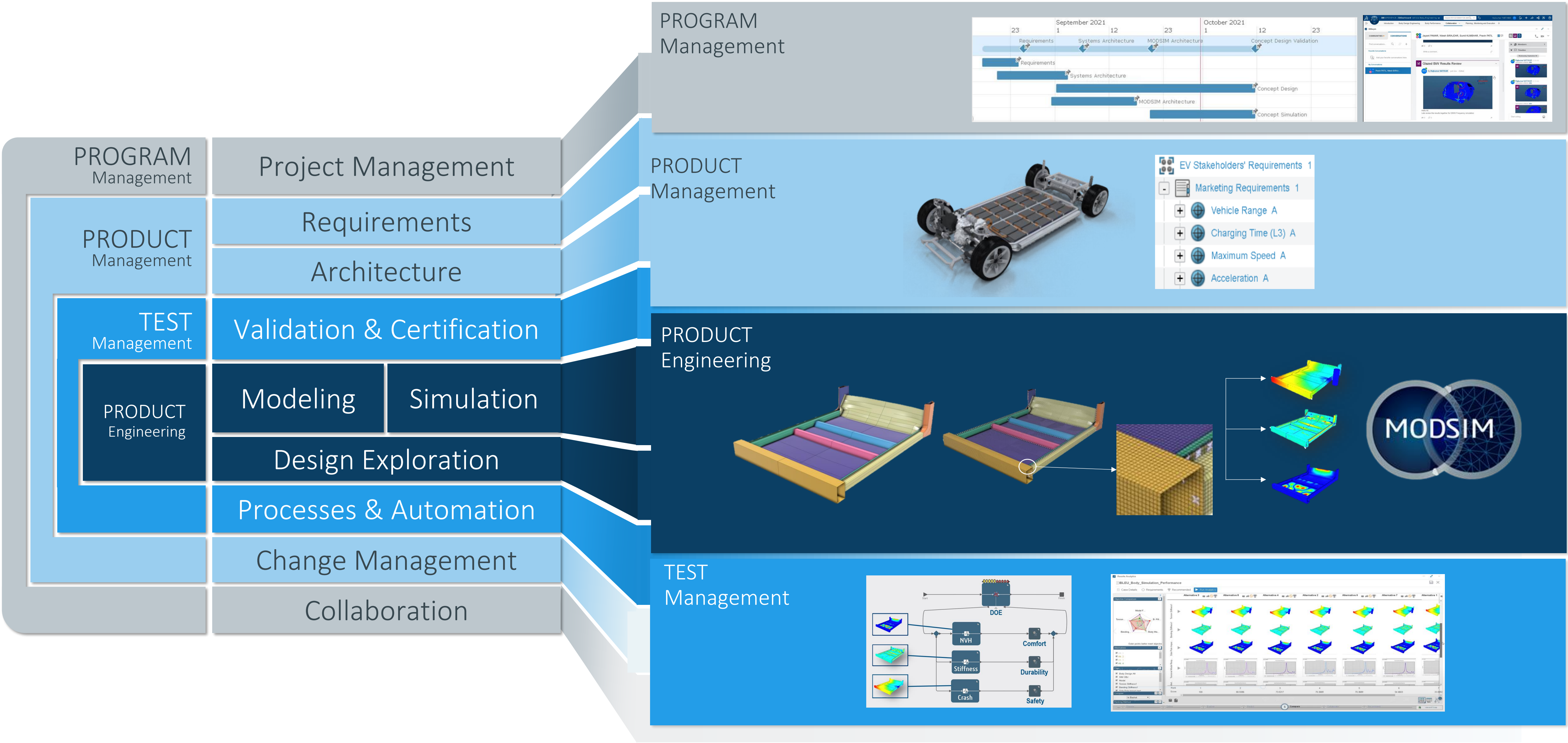


Leichtbaumethoden mit **3DEXPERIENCE**

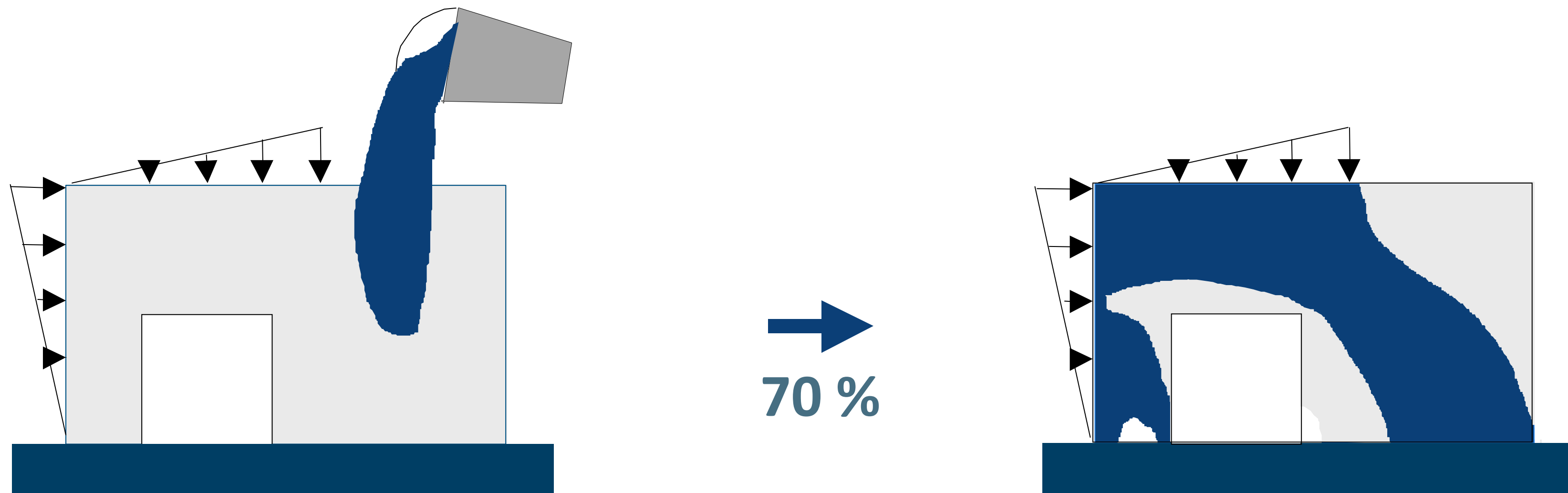
Kudentag
04.11.2025
11:40 Uhr

Unified modeling & simulation

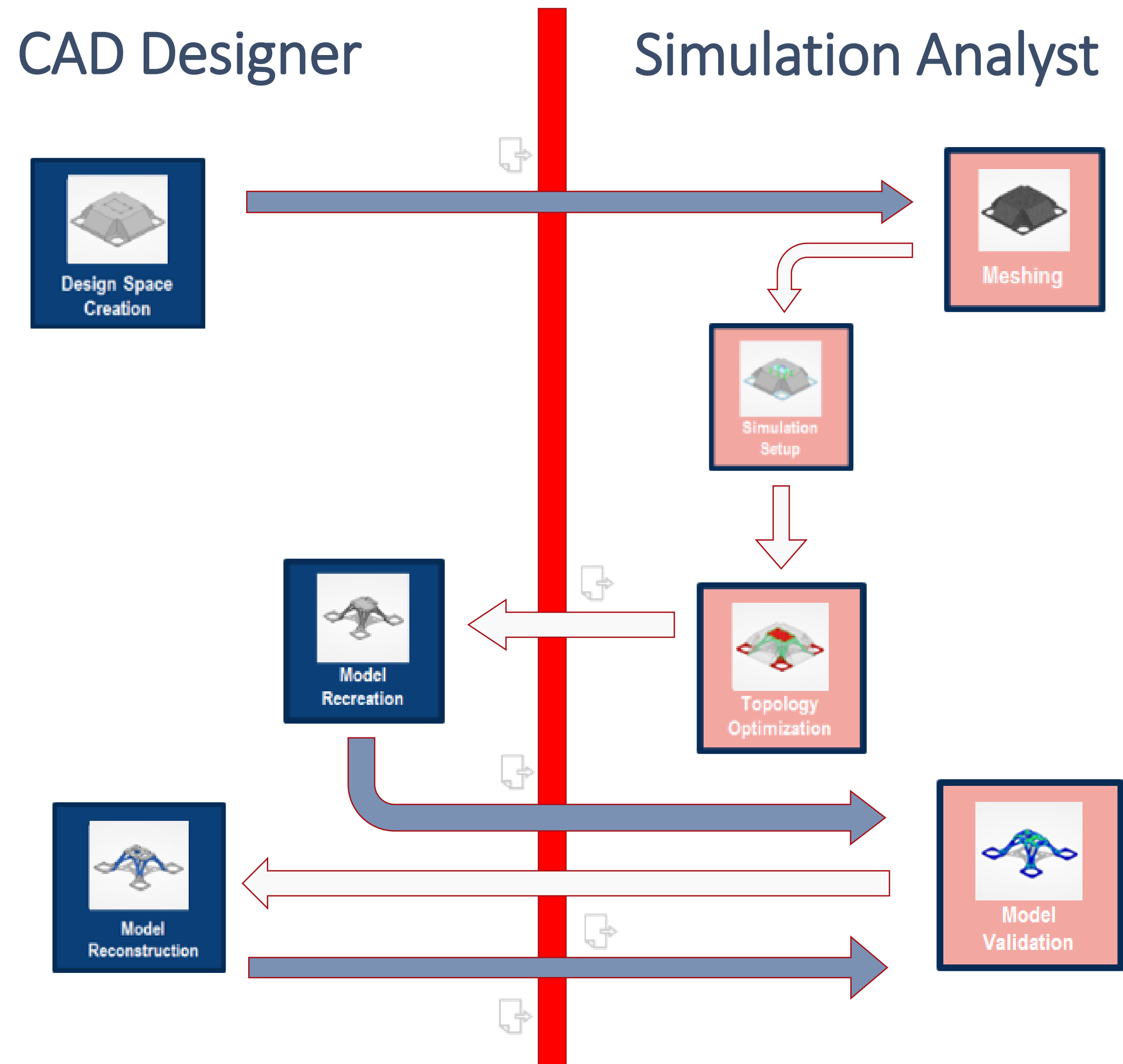


Topology Optimization

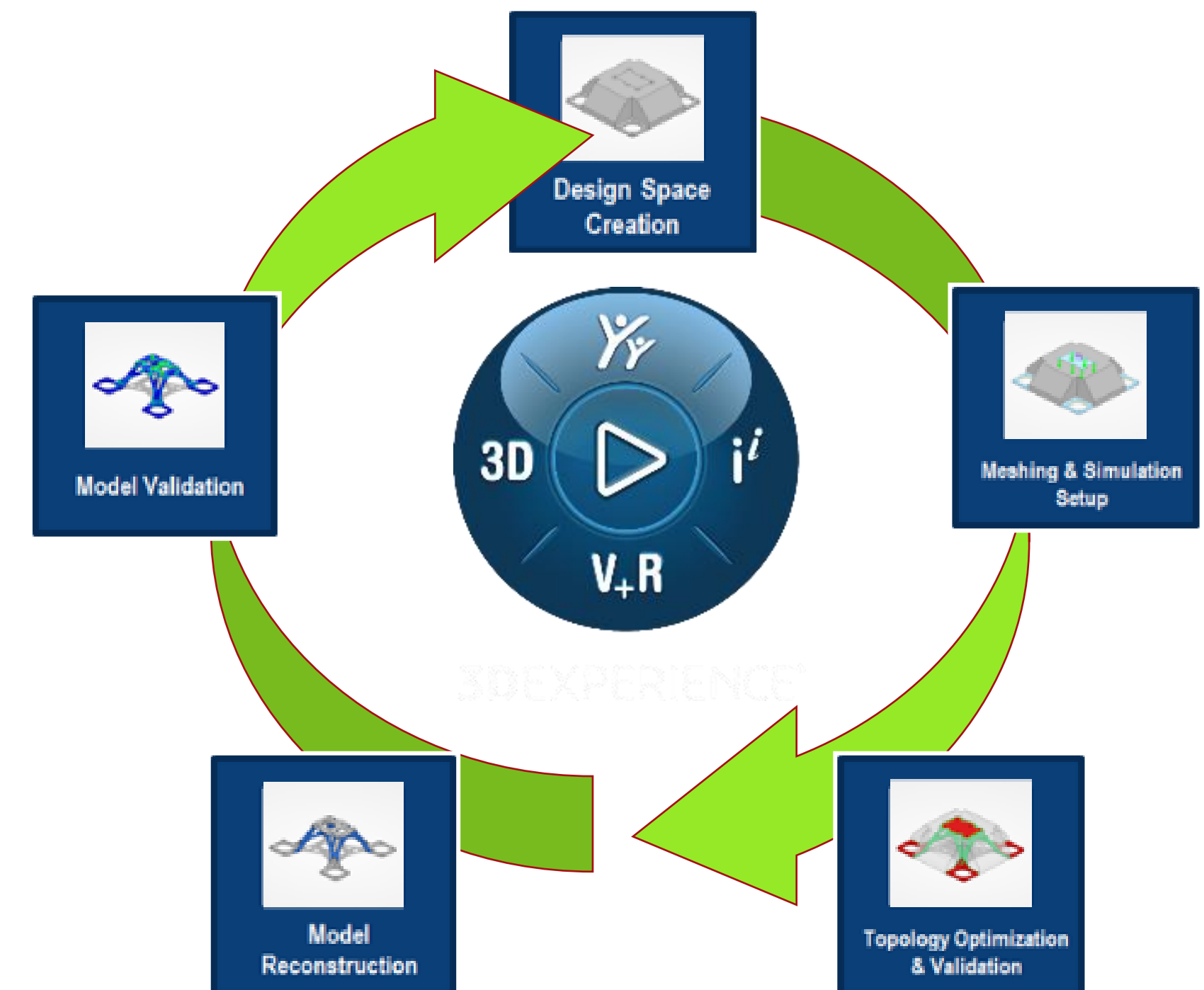
- Given a predefined design domain in the 2D/3D space with structural boundary conditions and load definitions.
- Distribute a given mass such that a global measure takes a minimum (or maximum) value.



A unified process in a single environment



Single User, Single Interface, Scalable Solution



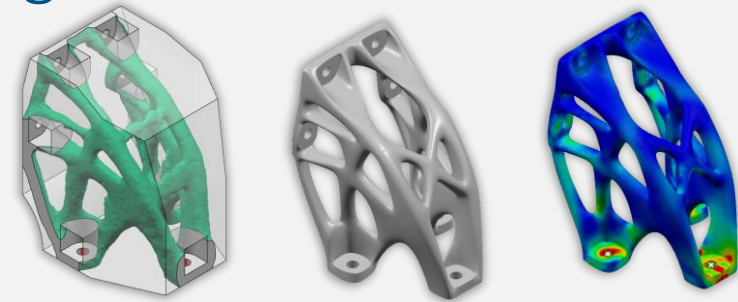
3DS GENERATIVE DESIGN ROLES

- 1. CAD reconstruction capabilities
- 2. CATIA geometry and Abaqus solver
- 3. High speed Cloud Computation



Function Driven Generative Designer
GDE

“Increase & parallelize weight reduction trade-off studies of generated design alternatives with high quality shapes respecting structural & thermal KPI targets”

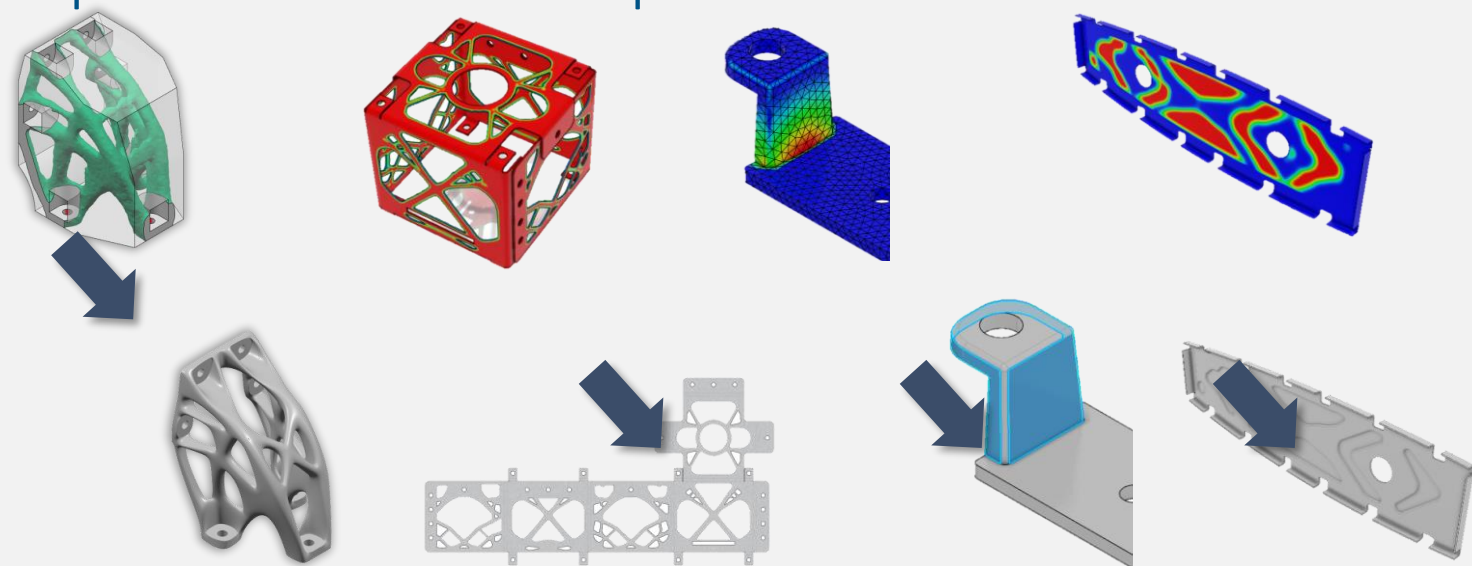


Designer



Structural Generative Designer
SGD

“Increase & parallelize weight reduction trade-off studies of generated design alternatives with high quality shapes respecting structural & thermal KPI targets leveraging Topology (Solid & Surface) , Shape, Bead & Parametric optimization techniques”

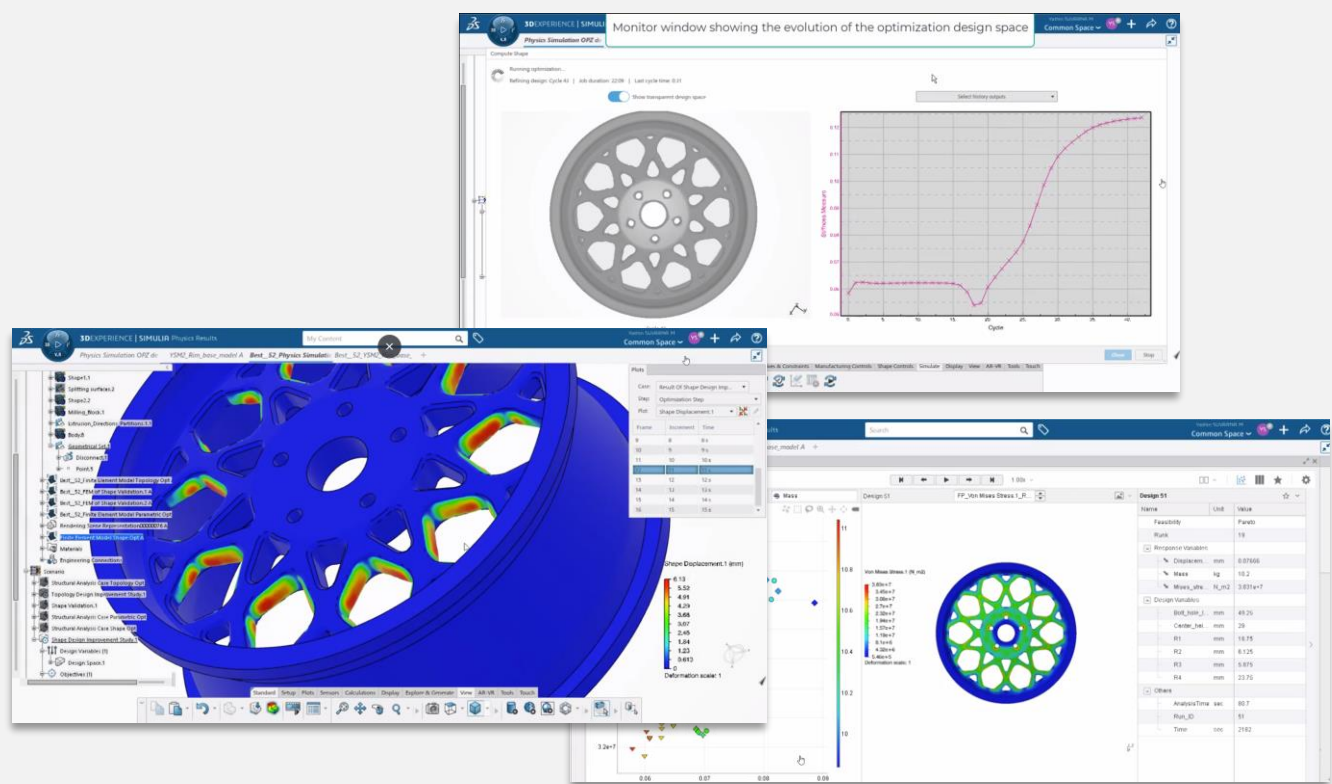


Design Engineer



Structural Generative Engineer
OPZ

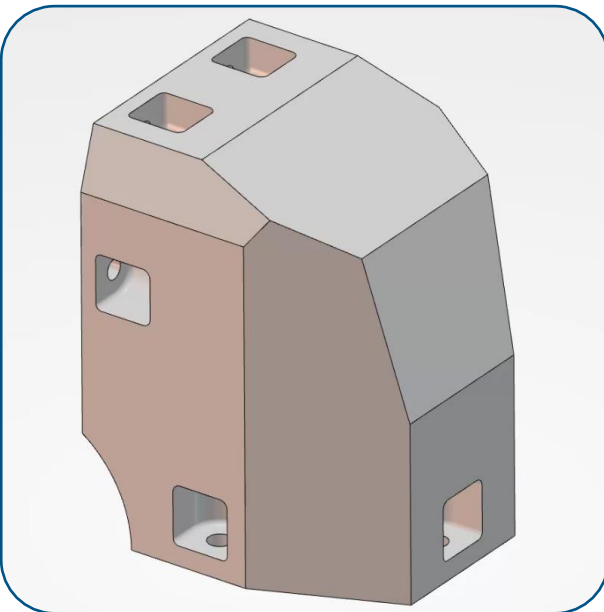
“Empower simulation engineers to improve designs through exploration of alternatives (parametric & non parametric) to conceive innovative lightweight structures that meet requirements for structural performance, manufacturing, and uncertainty throughout the lifecycle “



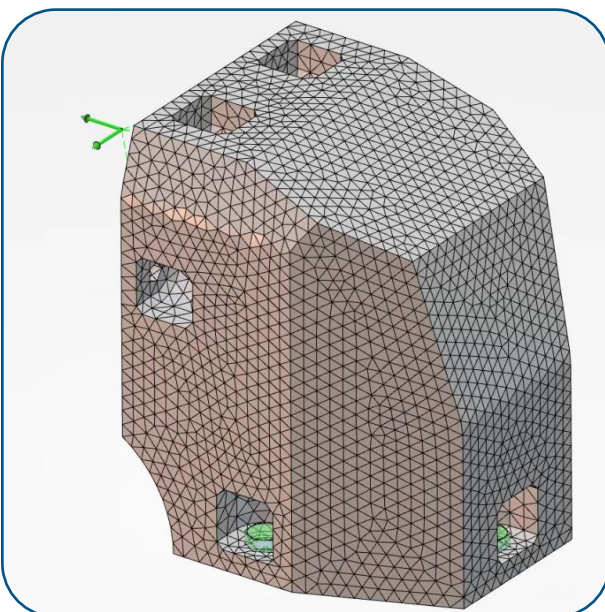
Simulation Engineer

Function Driven Generative Design (GDE)

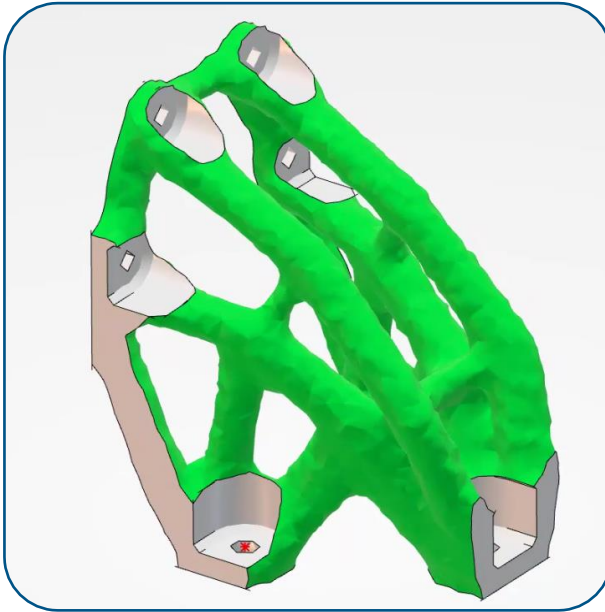
Unique
Capabilities



Design Space



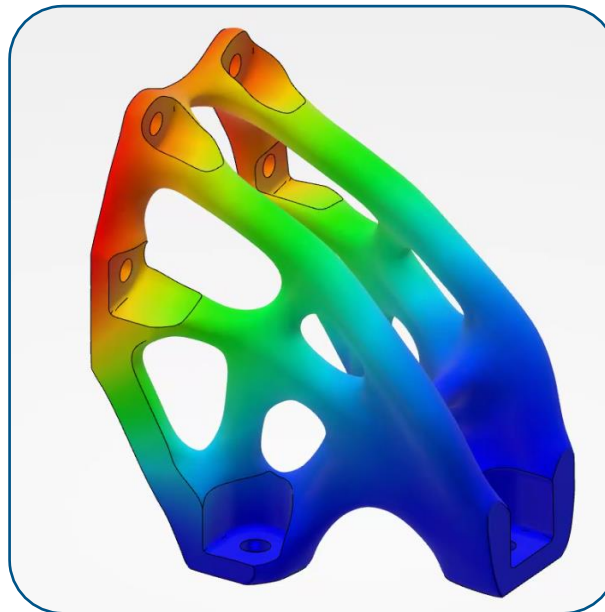
Problem Definition



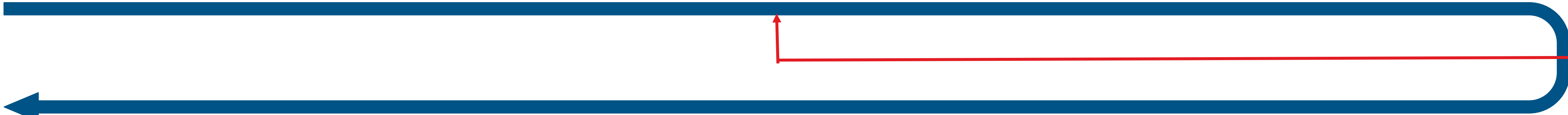
Topology Optimization



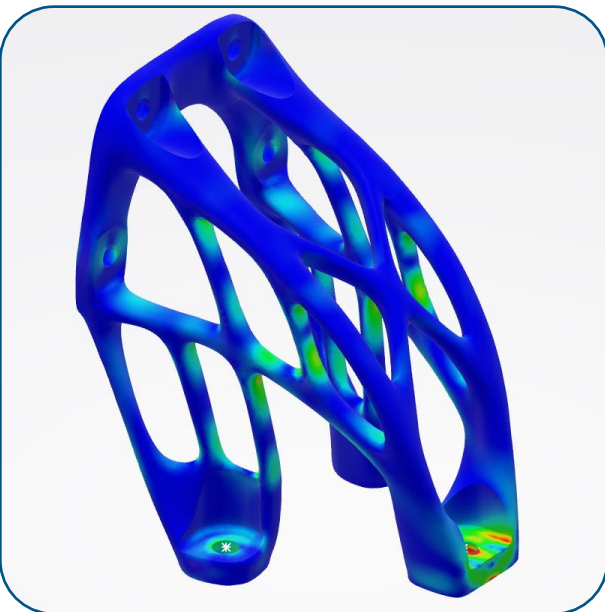
Solid Generation



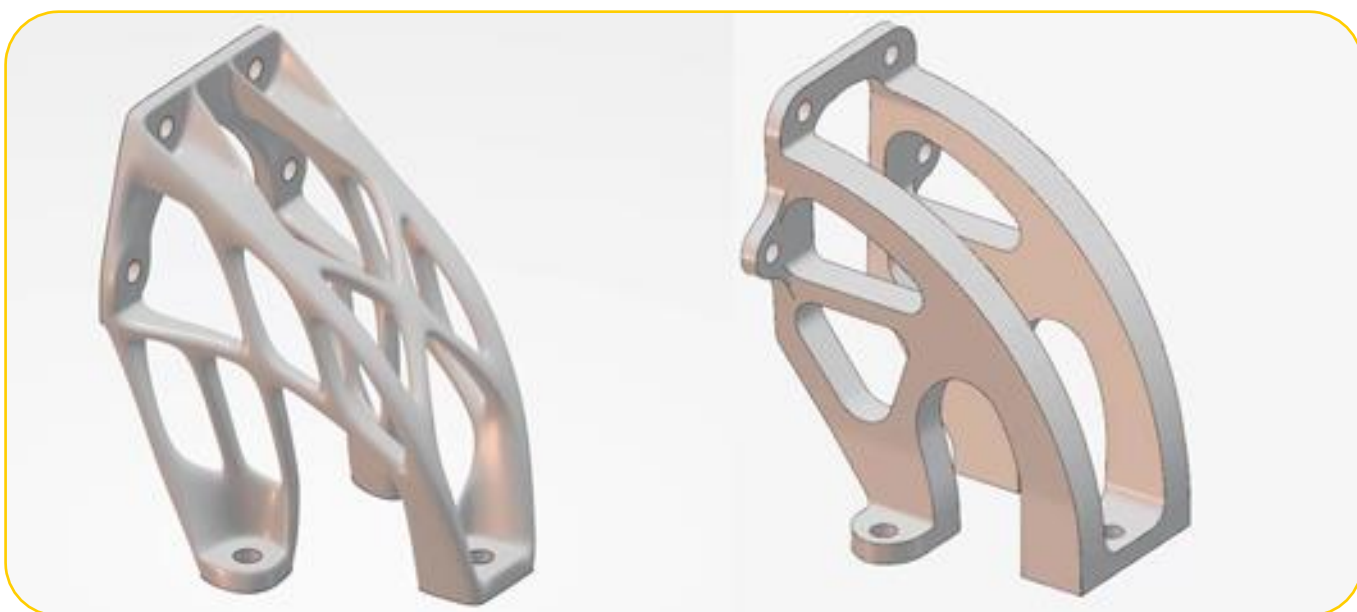
FEA Validation



Final
Validation



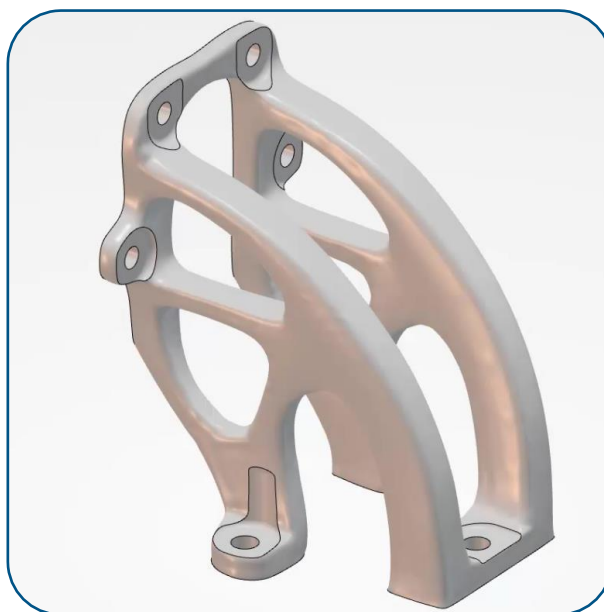
Detailed Design driven by
Manufacturing



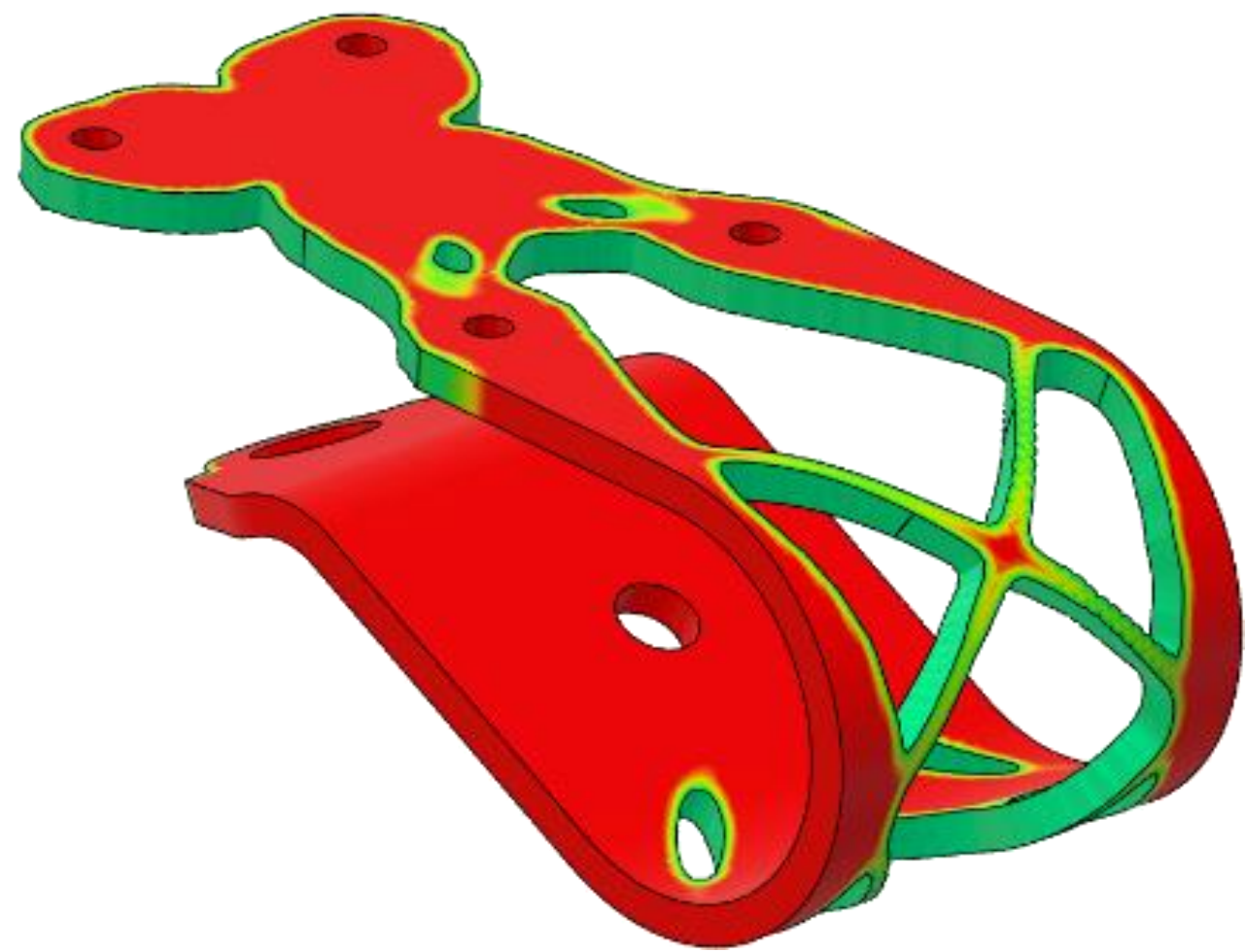
Trade-Off
Study

Sim_Satellite Bracket 1.1	Sim_Satellite Bracket 1.1	Sim_Satellite Bracket 1.1
AM	Milling	Free
15644V	3D5_15644V	3D5_15644V
tratic	Quadratic	Quadratic
	2mm	2mm
138	77.6951	99.4567
g	0.248kg	0.308kg
564kPa	482.564kPa	332.275kPa
mm	0.4mm	0.308mm
0.25N	ON	ON
04N1	2478.774N	4586.279N
	1195.058N	1583.02N

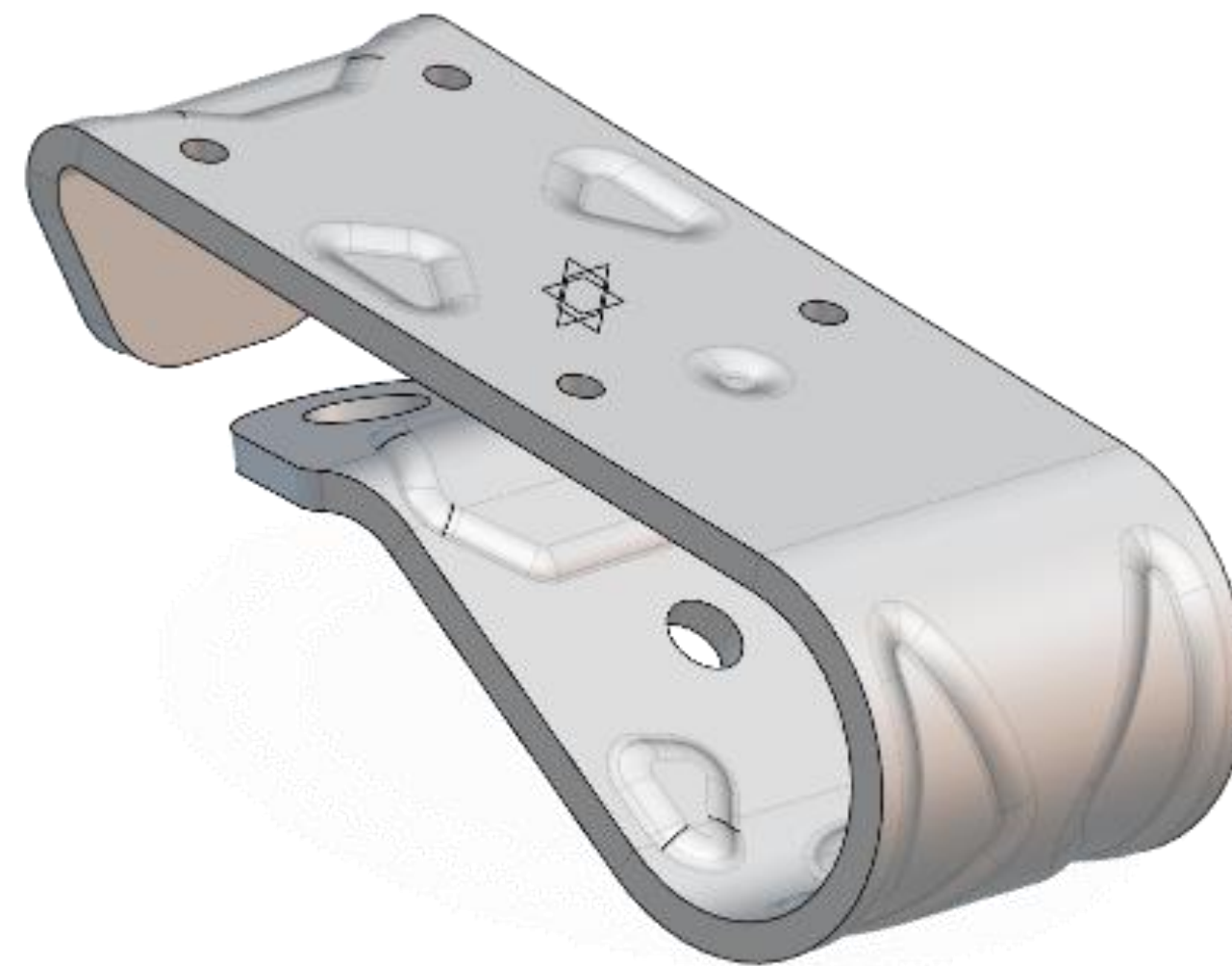
Variants
Generation



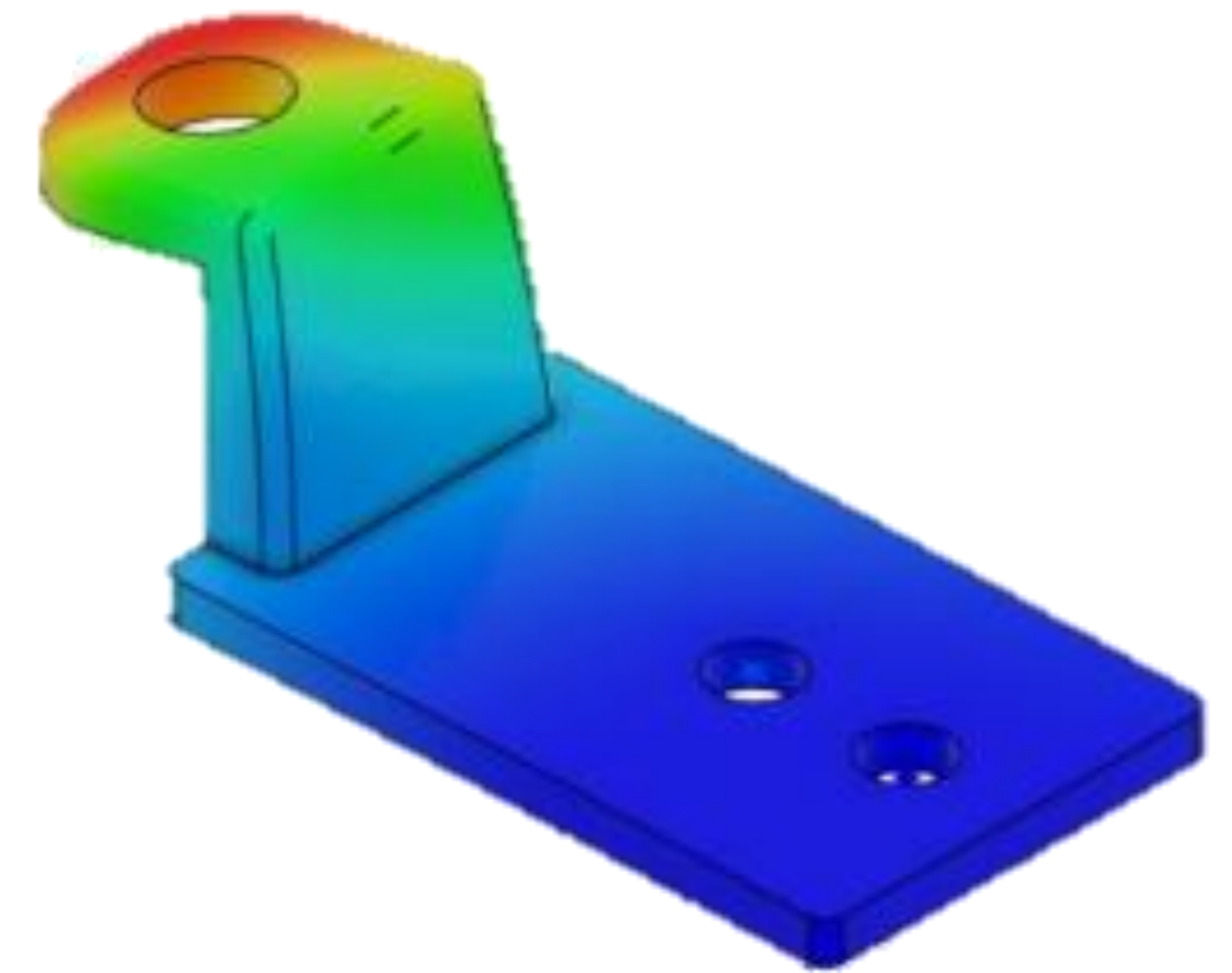
Structural Generative Design Capabilities



Surface Optimization



Bead Optimization

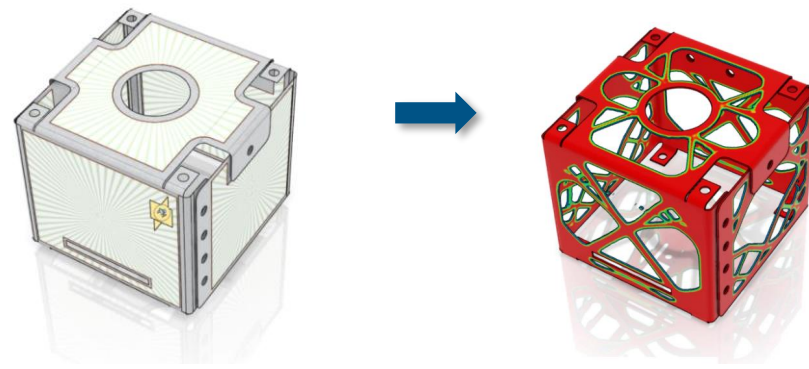


Shape Optimization

Surface Optimization

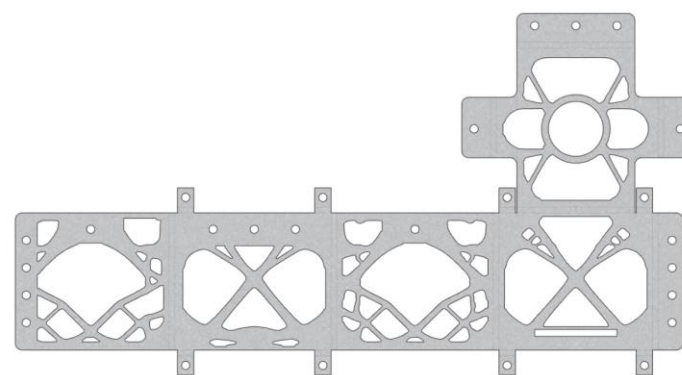
TOPOLOGY OPTIMIZATION

Modify the topology by removing material (creating cutouts)

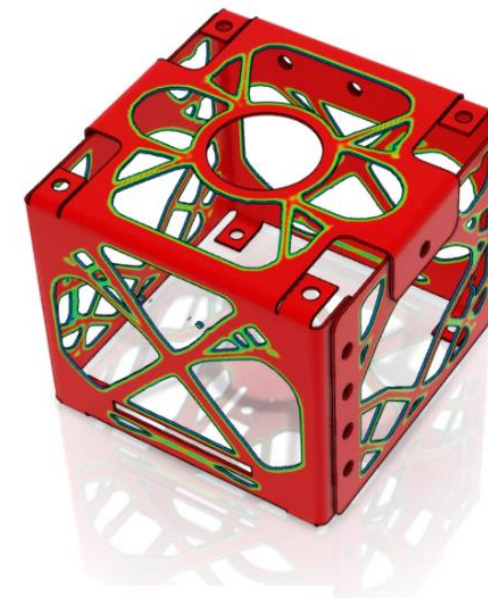


MANUFACTURING READY

Sheet metal reconstruction with Sheet Metal Cutouts



Surface Topology Optimization

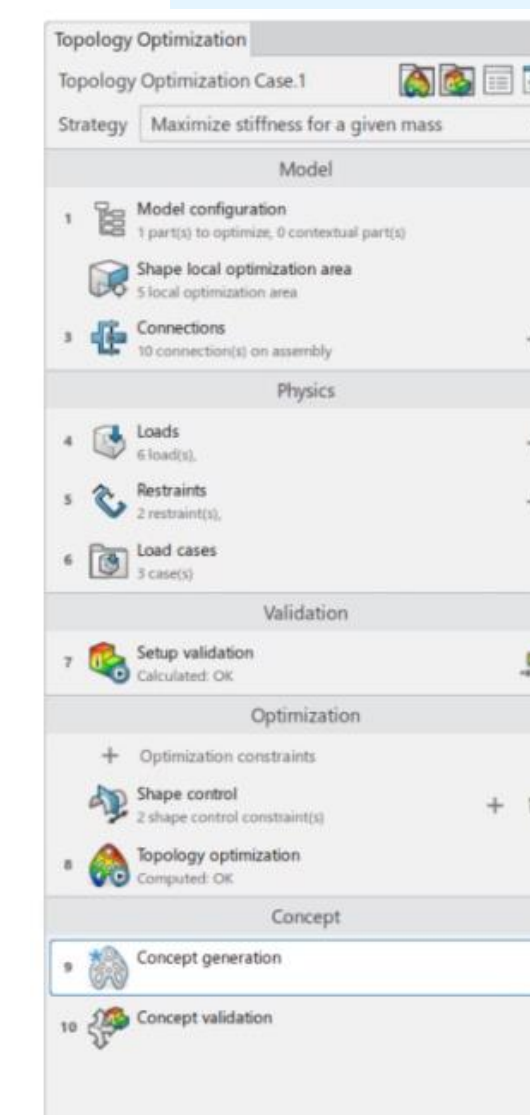


OPTIMIZATION STRATEGIES

Maximize Stiffness for a given mass or Minimize Mass while respecting constraints

GUIDED EXPERIENCE

Dedicated Assistant that guides Designers from Design space definition to result validations.



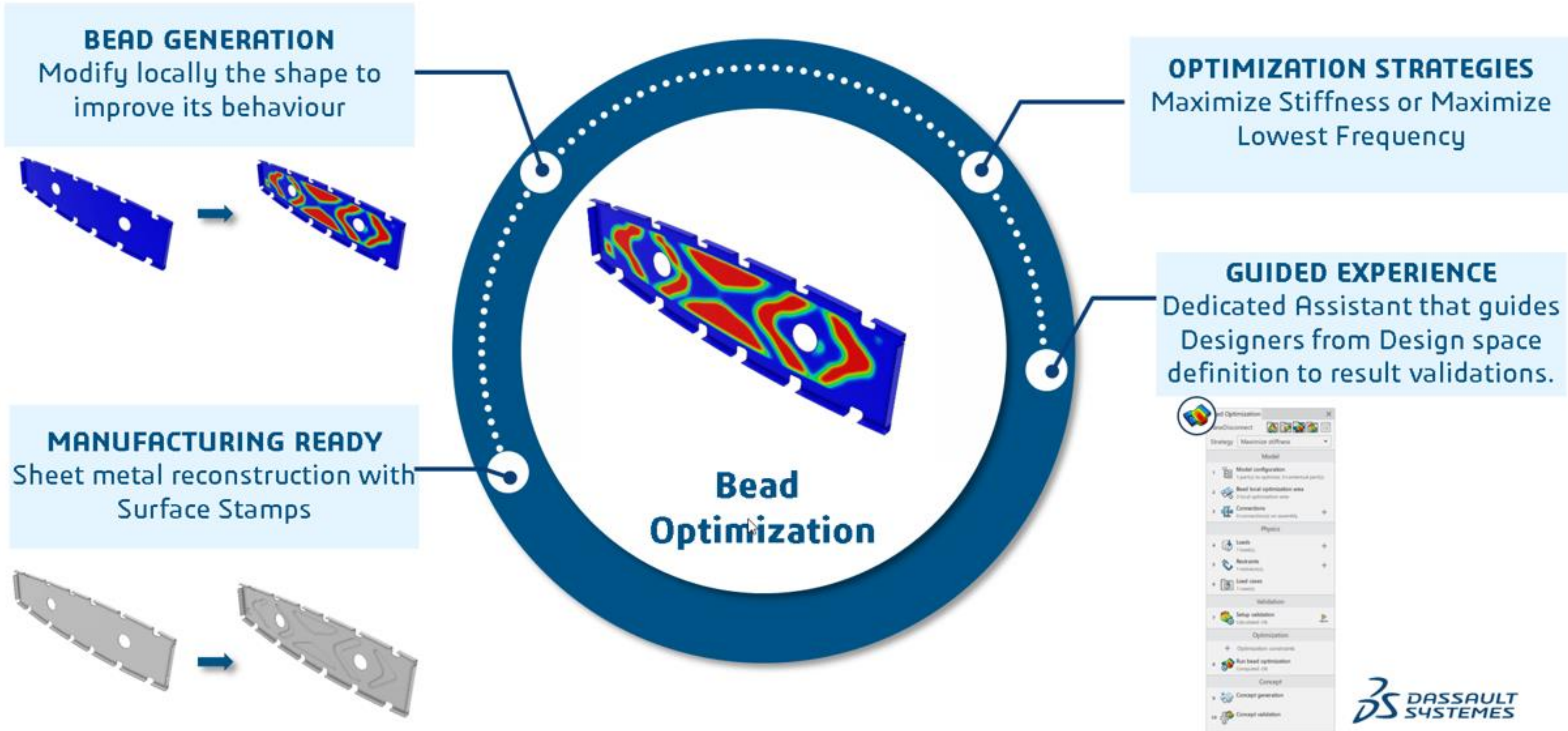
Surface Optimization



Generative Thin Part : Surface Topology Optimization

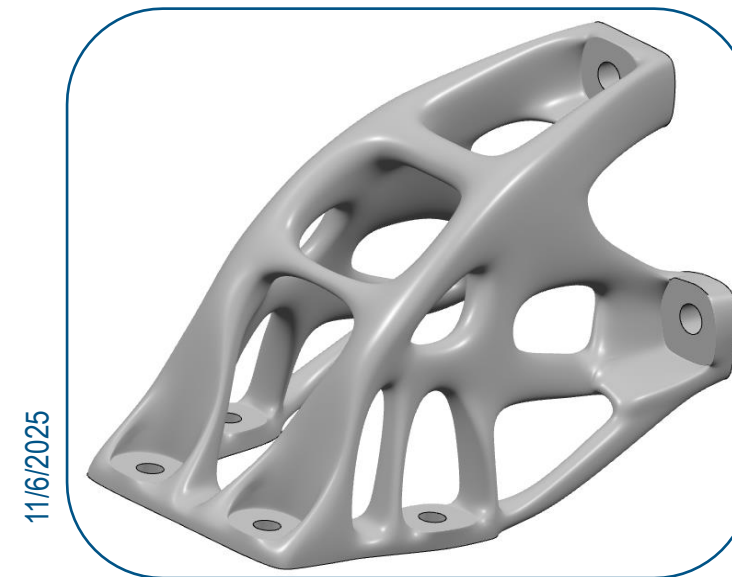


Bead Optimization

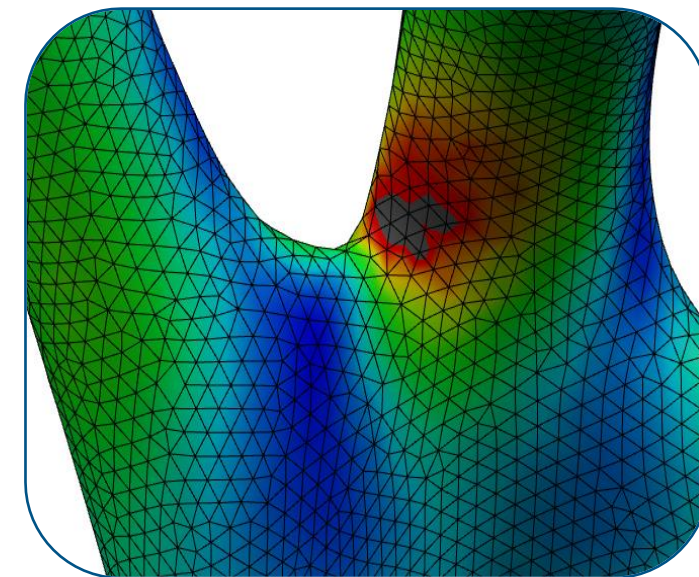


SHAPE OPTIMIZATION

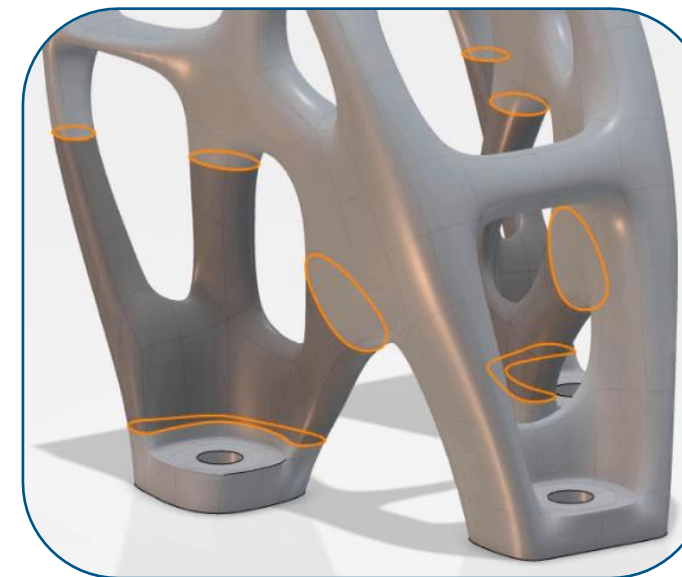
- Refine local region of the Parts to reduce peak of stress :



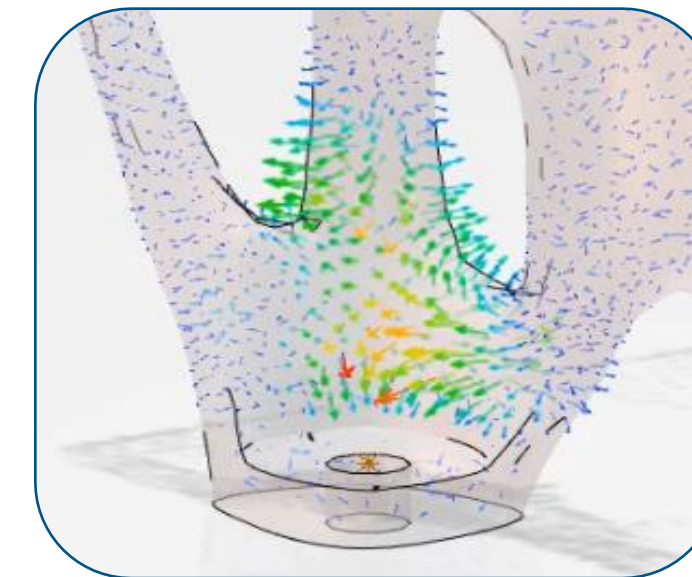
Detailed Design



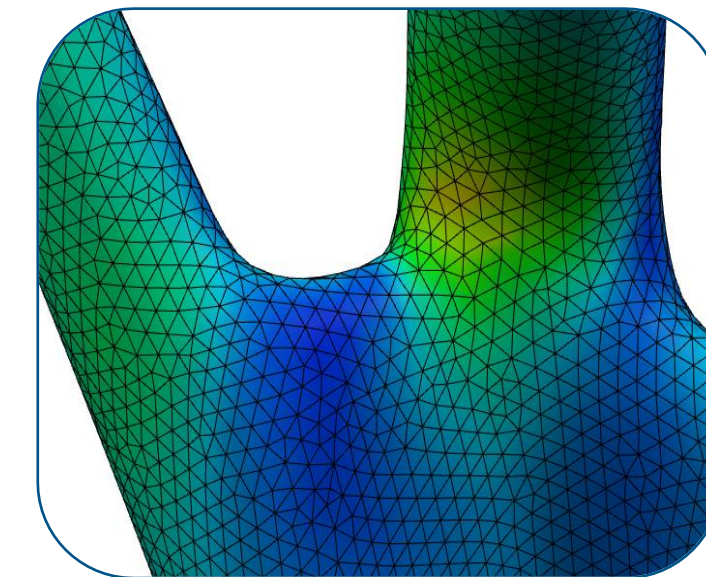
Local Peak of Stress



Regions Definition



Shape Optimization

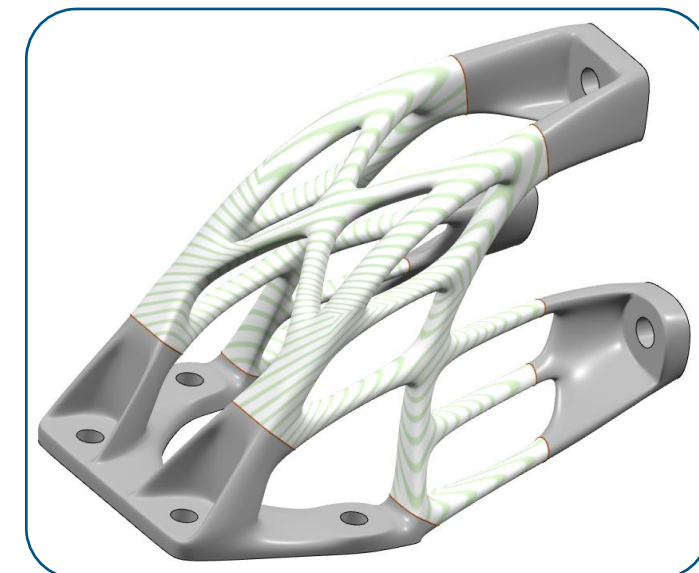


Validation

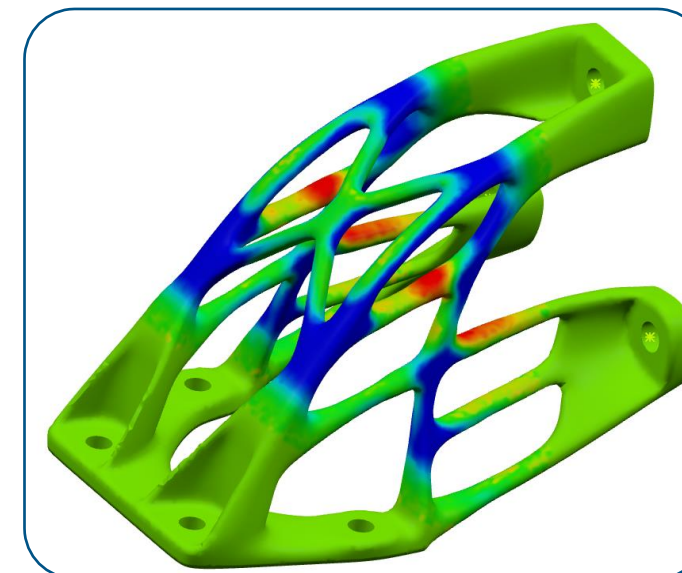
- Or refine the whole Part by automating the Design/Validation loops:



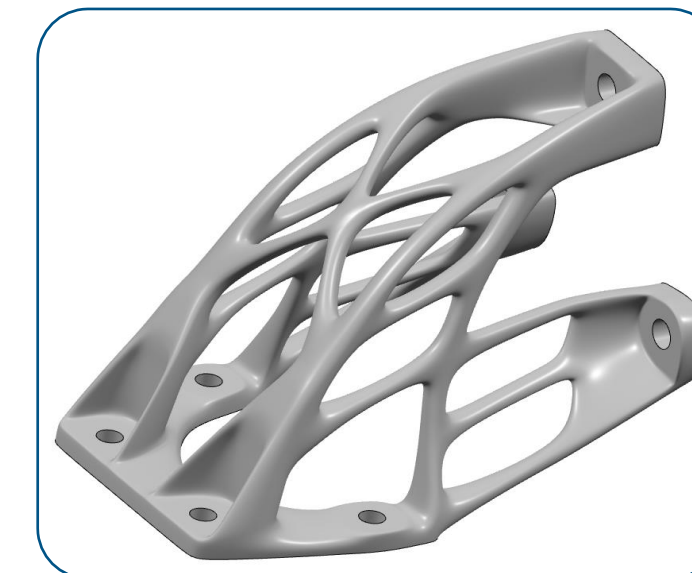
Detailed Design



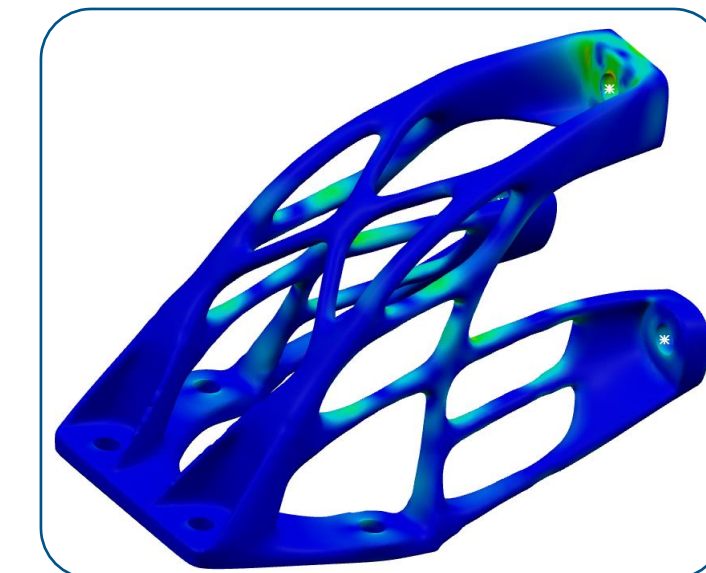
Regions Definition



Shape Optimization



Update Design



Validation

Structural Generative Engineer (OPZ)

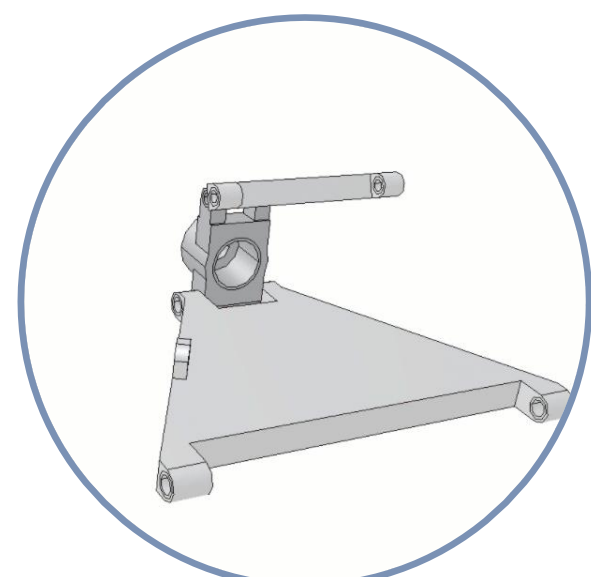
- Design Improvement Study Example



DESIGN IMPROVEMENT STUDY

Identify designs that **satisfy requirements and improve performance** while trading off across multiple objectives

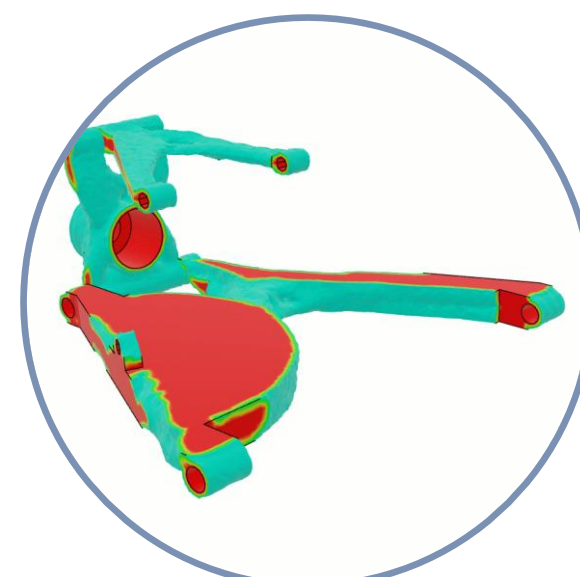
Architecture Layout



PARAMETRIC

Vary parameters to improve static and kinematic architecture

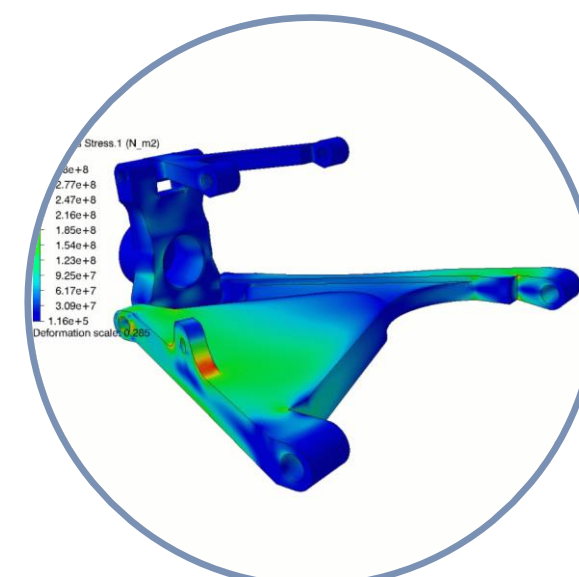
Component & Sub- system Ideation



TOPOLOGY

Efficient material distribution

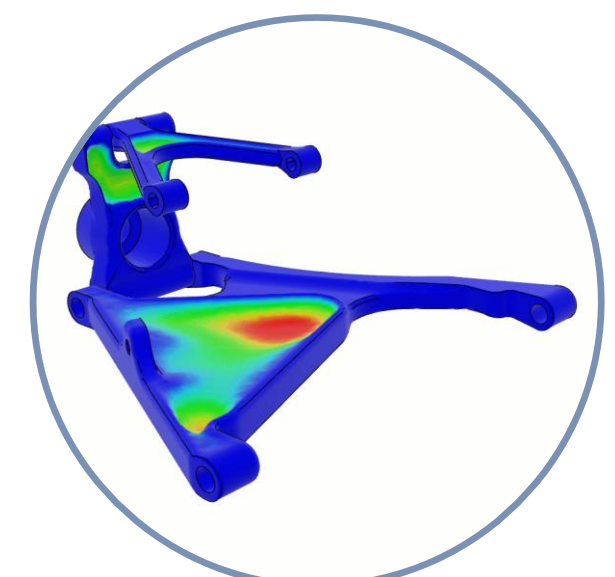
Performance- driven Product Design



PARAMETRIC

Vary parameters to generate alternative designs

Component & Sub- system Refinement



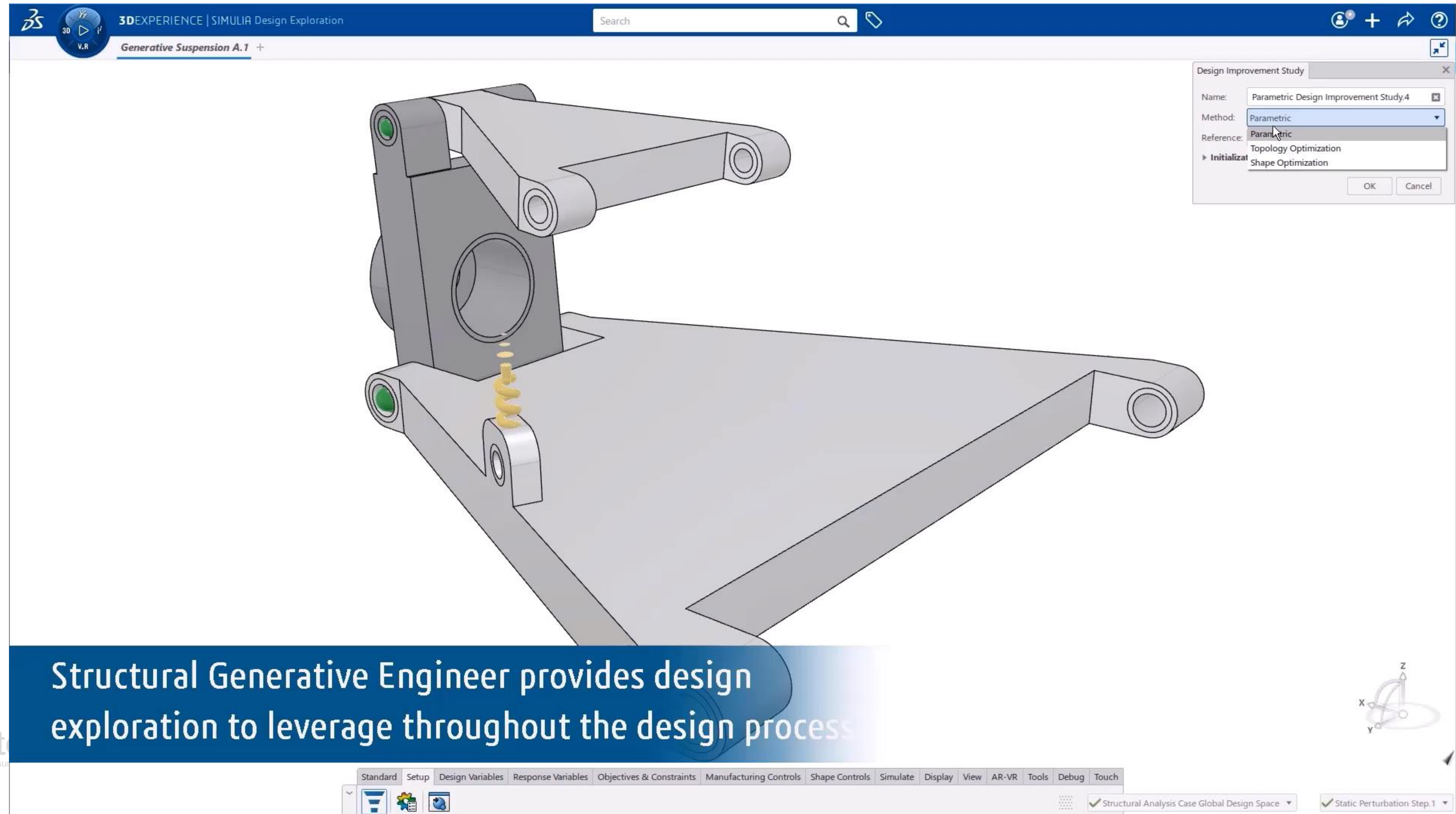
SHAPE

Refine the material distribution



Design Exploration

- Design Improvement Study Example using Structural Generative Engineer

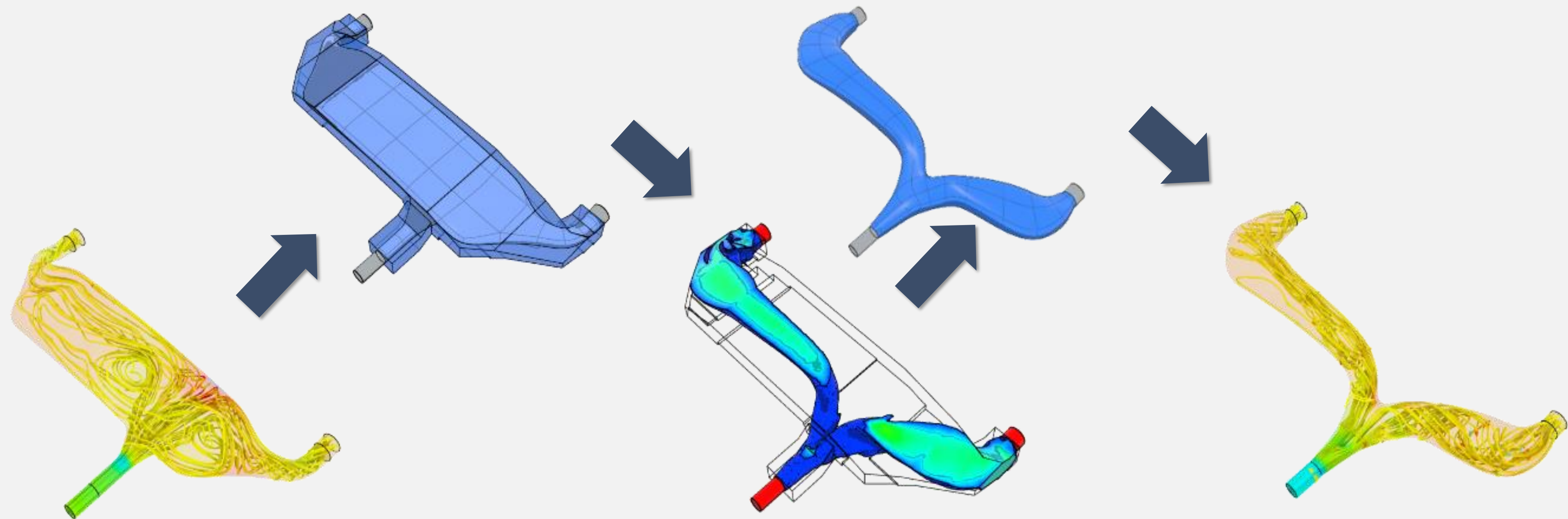


Flow Driven Generative Design (GDF)



Flow Driven Generative Designer GDF

“Improve the efficiency of internal fluid systems by generating shapes that respect performance KPI targets, via a streamlined & intuitive workflow experience ”

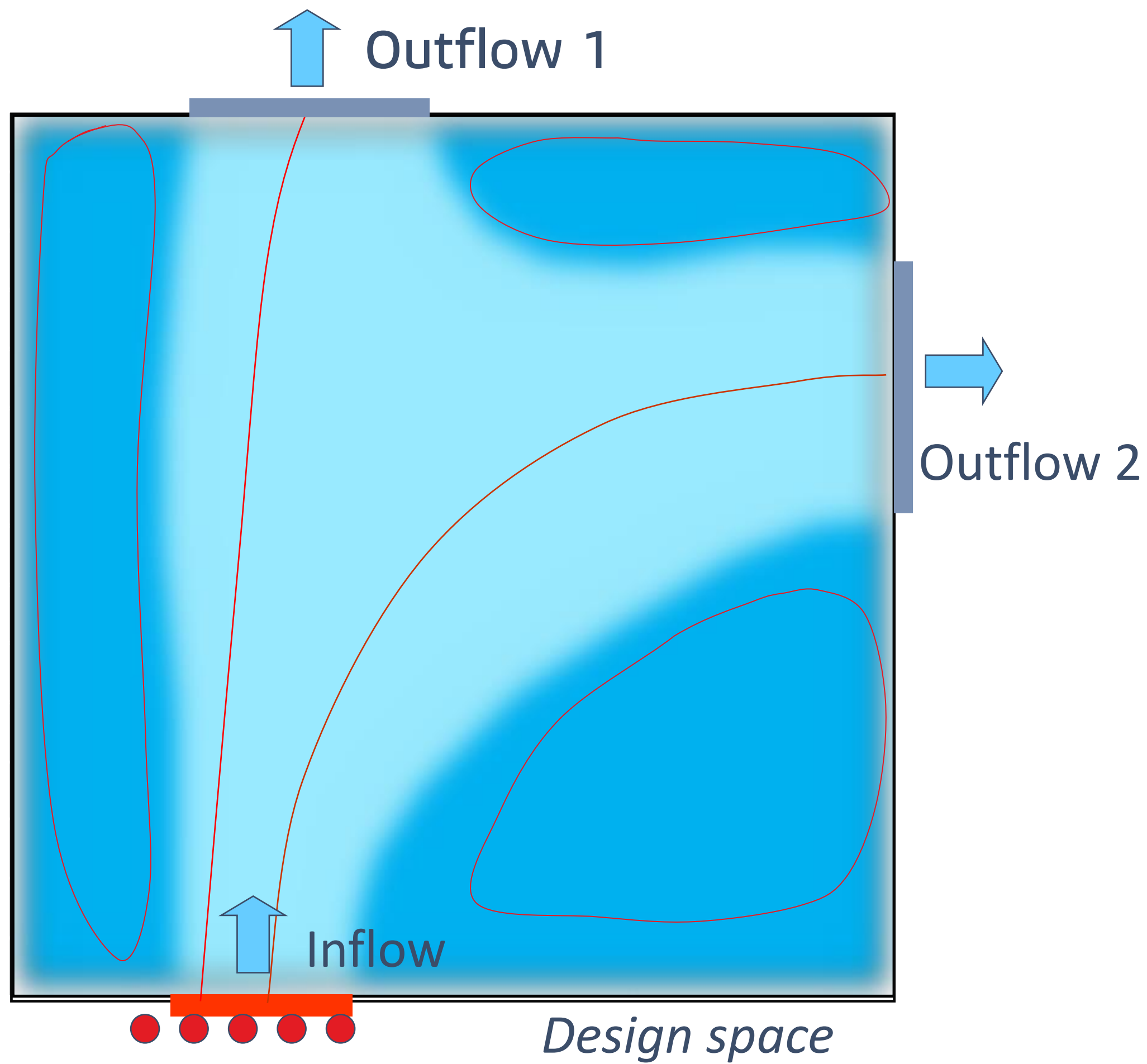


Design Engineer

Simulation Engineer

Generative Design For Fluid Flow

Unique Flow Optimization Capabilities



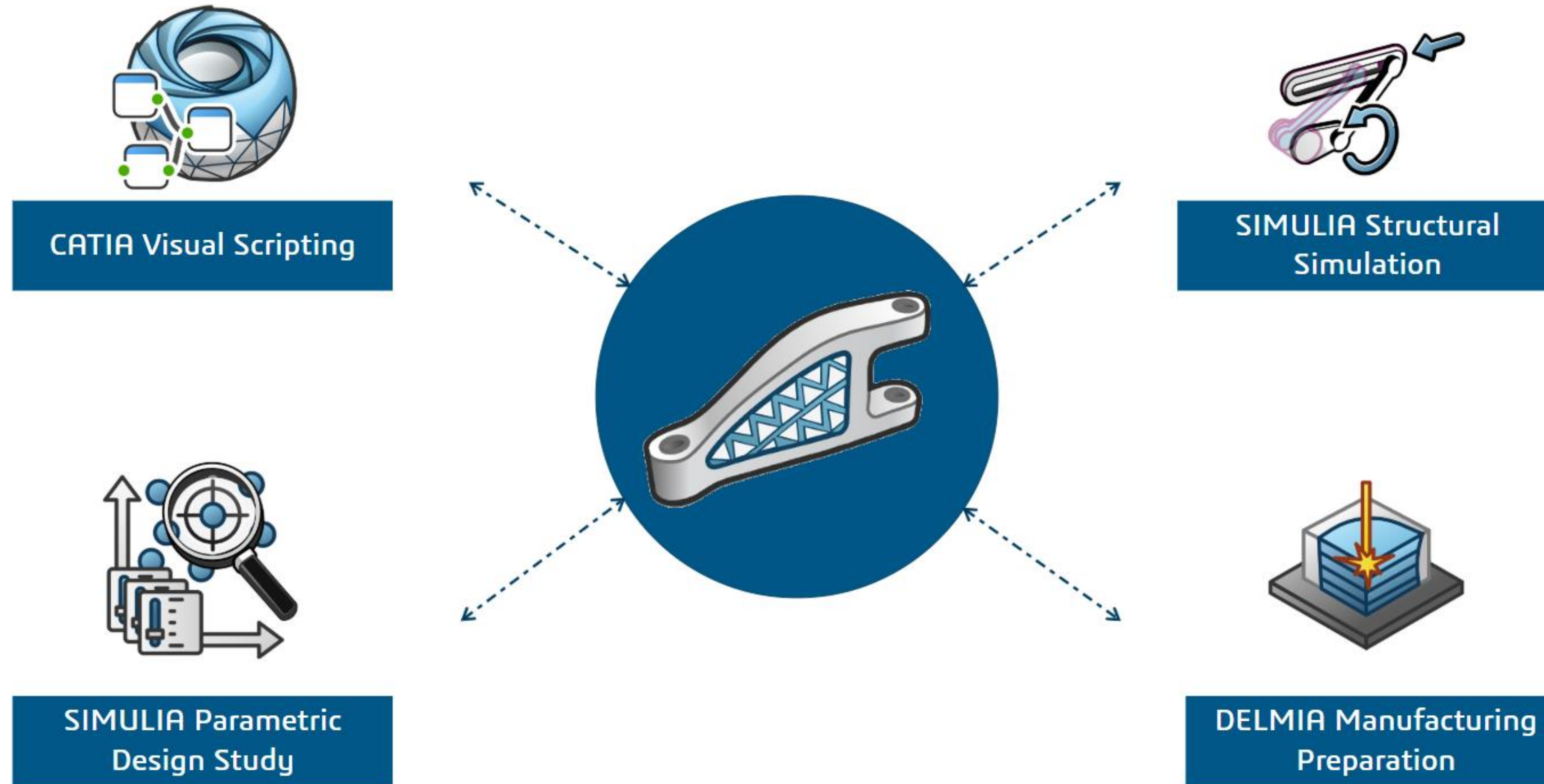
- ▶ Define the design space (e.g. CAD)
- ▶ Meshing
- ▶ Define boundary conditions
- ▶ Run the optimization

Flow driven generative design

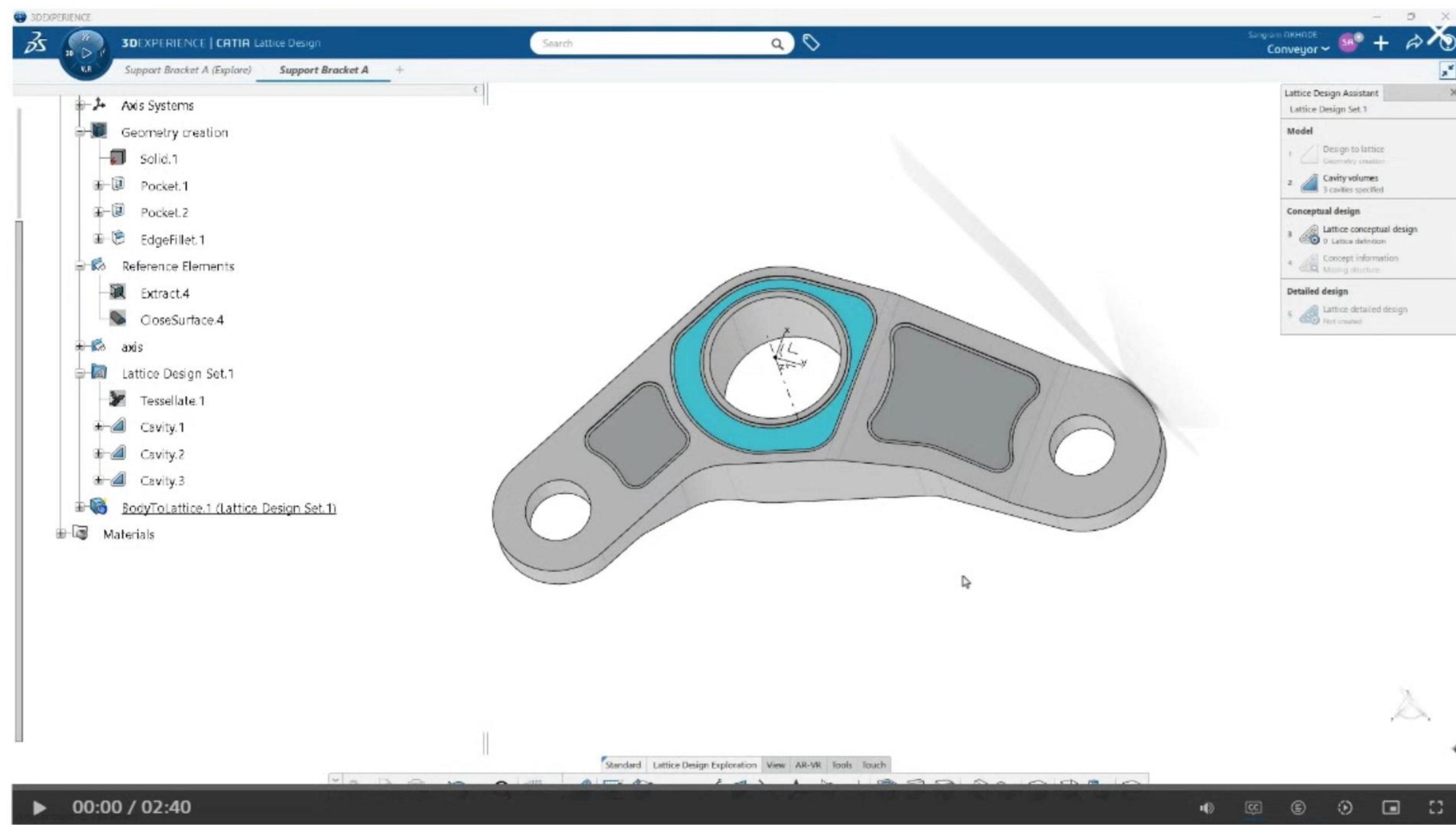
- From Traditional Design to Performance Driven Design



Lattice Designer Role



Lattice Design and parametric Optimization



Summary

- Introducing Design exploration allows engineers to create multiple variants tailored to specific uses.
- Multiple Stage Optimization ensures lightweight yet robust components.
- MODSIM capabilities make creation, execution and validation of concept easily and fast.
- Reduced time for Concept development and reduces the mistakes in design Phase.
- Cloud simulation with 192 cores per Tokens/Credits.



Danke für Ihre Aufmerksamkeit

Bei Fragen bin ich gerne persönlich
für Sie da!



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Pre-sales and Simulation Consultant

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