
MADSIS

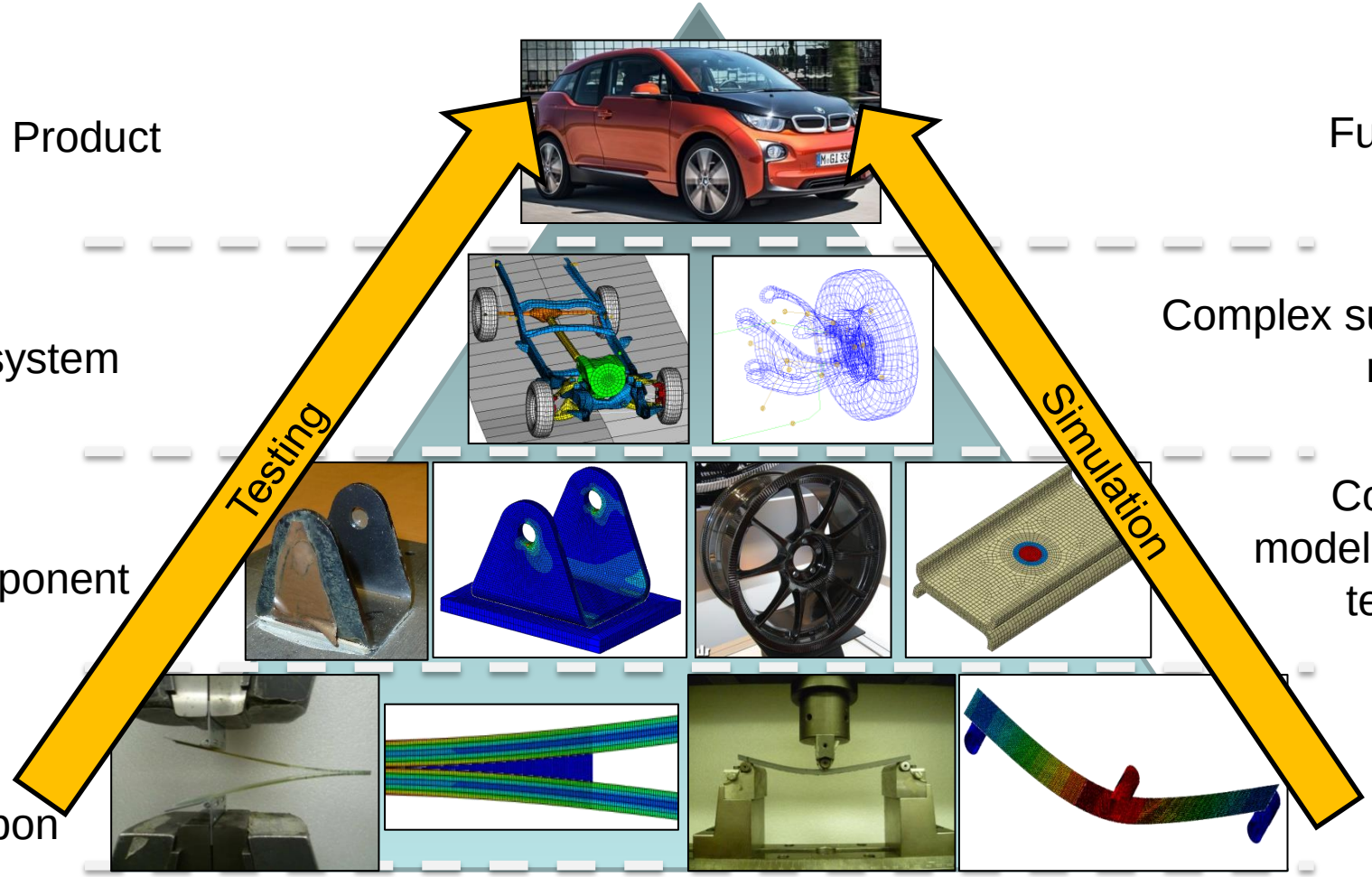
# P3Lab - Simulations

03/12/2014

# Outline

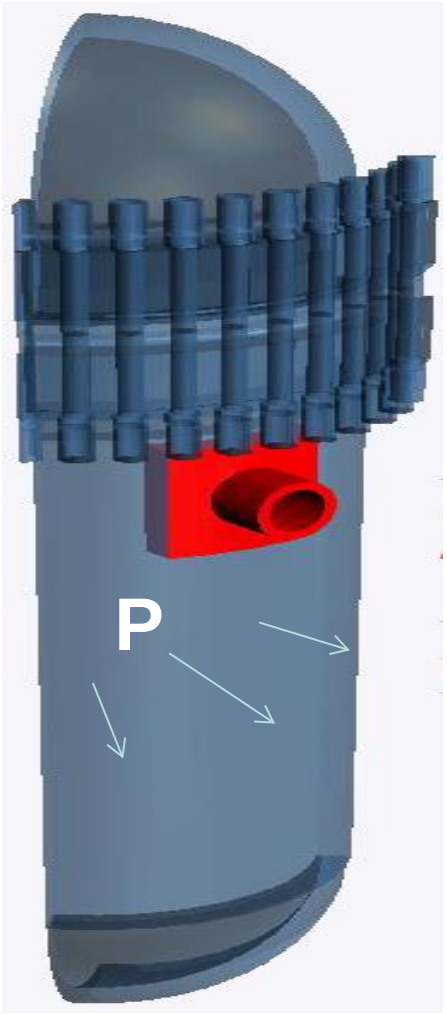
- Why / When use simulations?
- Conclusions
- What can MADSIS offer?
- MADSIM

# Design Process

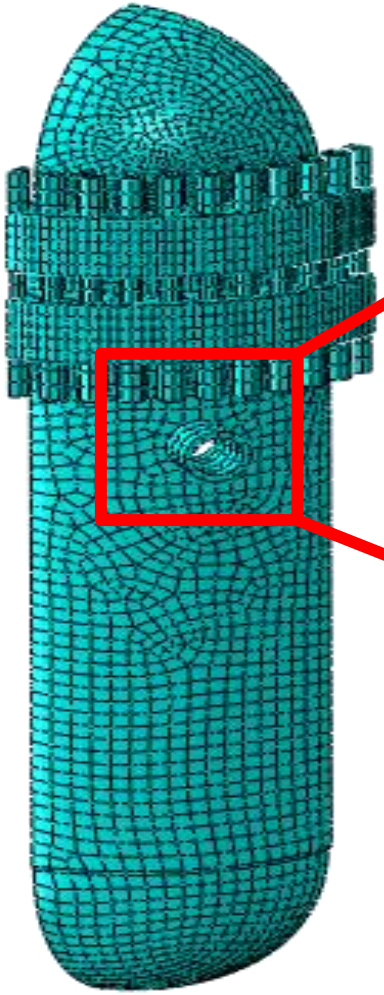


# Finite Elements

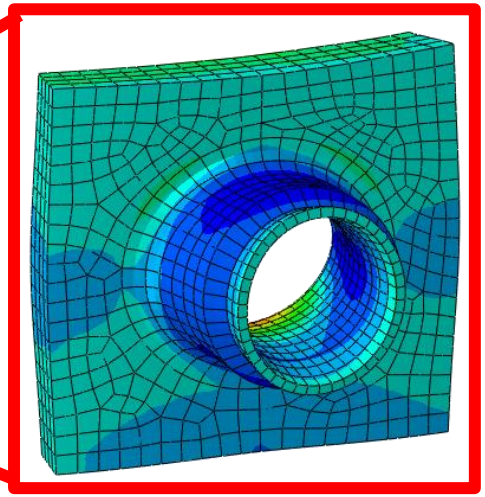
Study object




Mesh

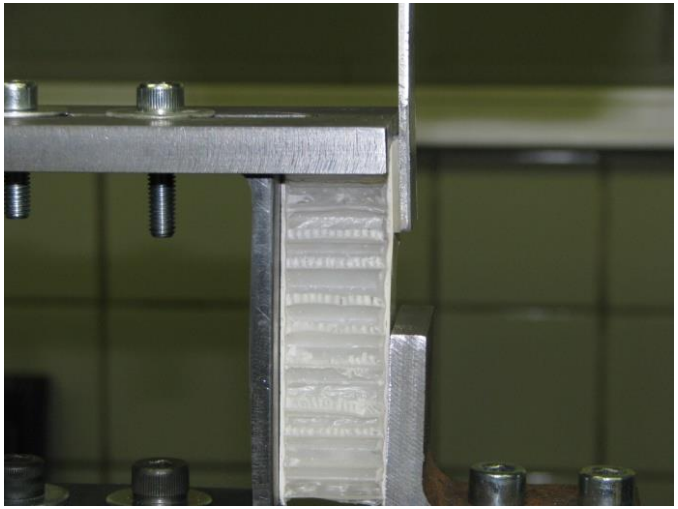


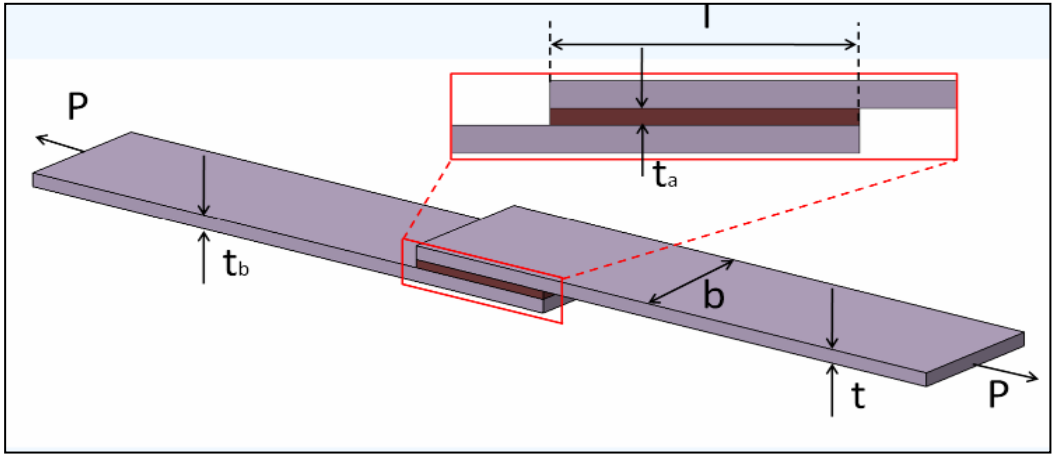
Results

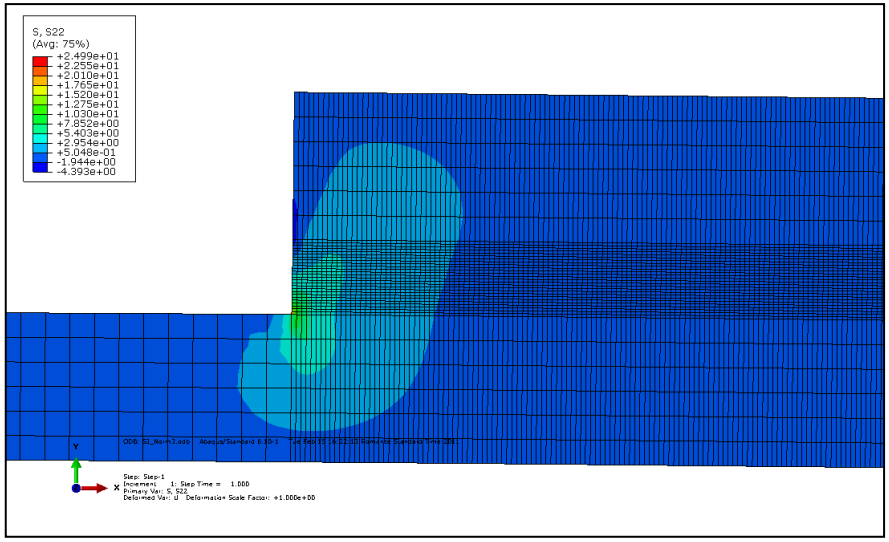


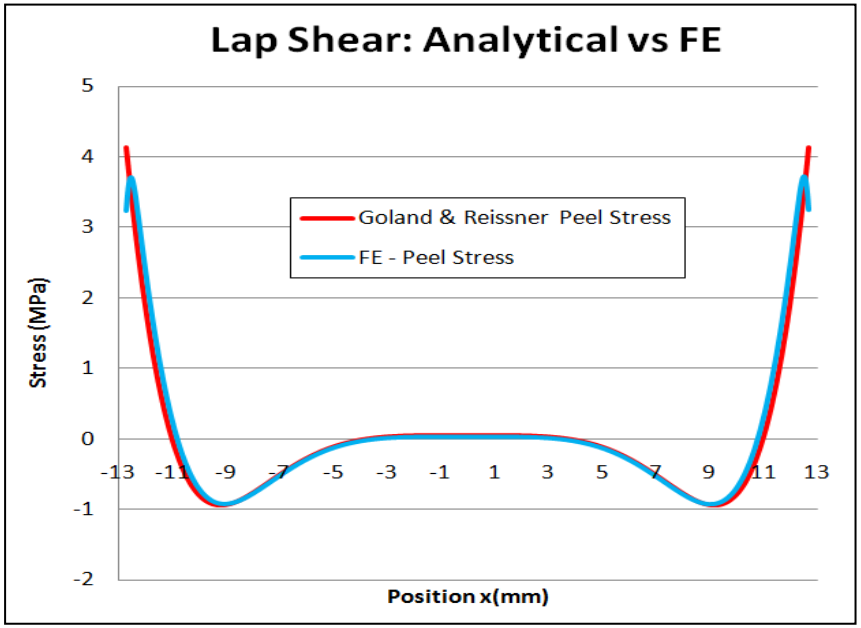
Allowed stress (or force)
Yes or No ?

# 1. Material modelling





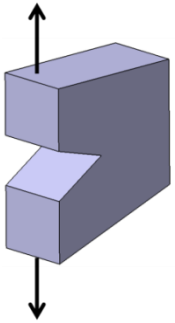



# 1. Material modelling

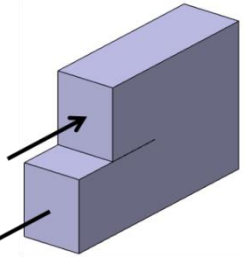
Mode I
Interlaminar tension

GIc



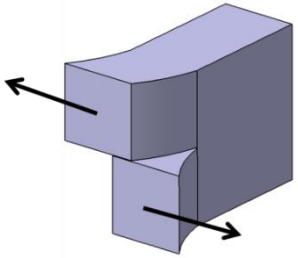
Mode II
Interlaminar sliding shear

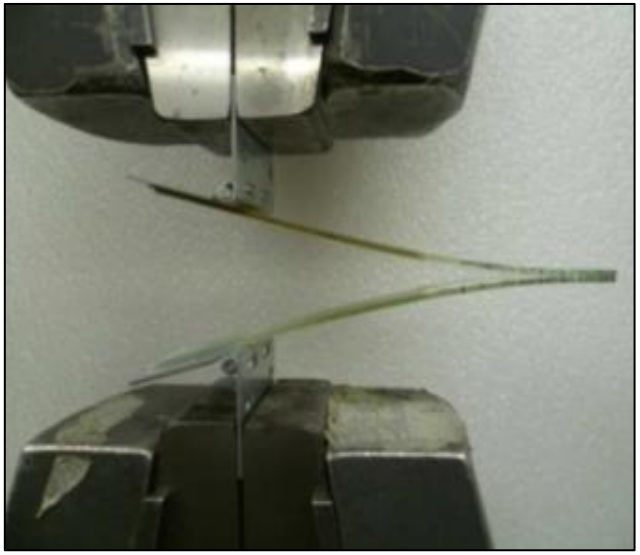
GIIc

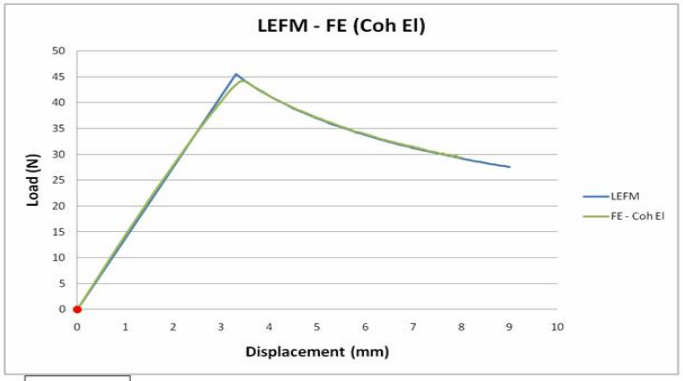


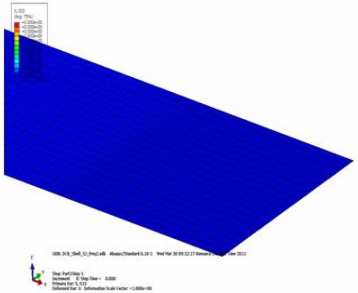
Mode III
Interlaminar tearing shear

GIIIc



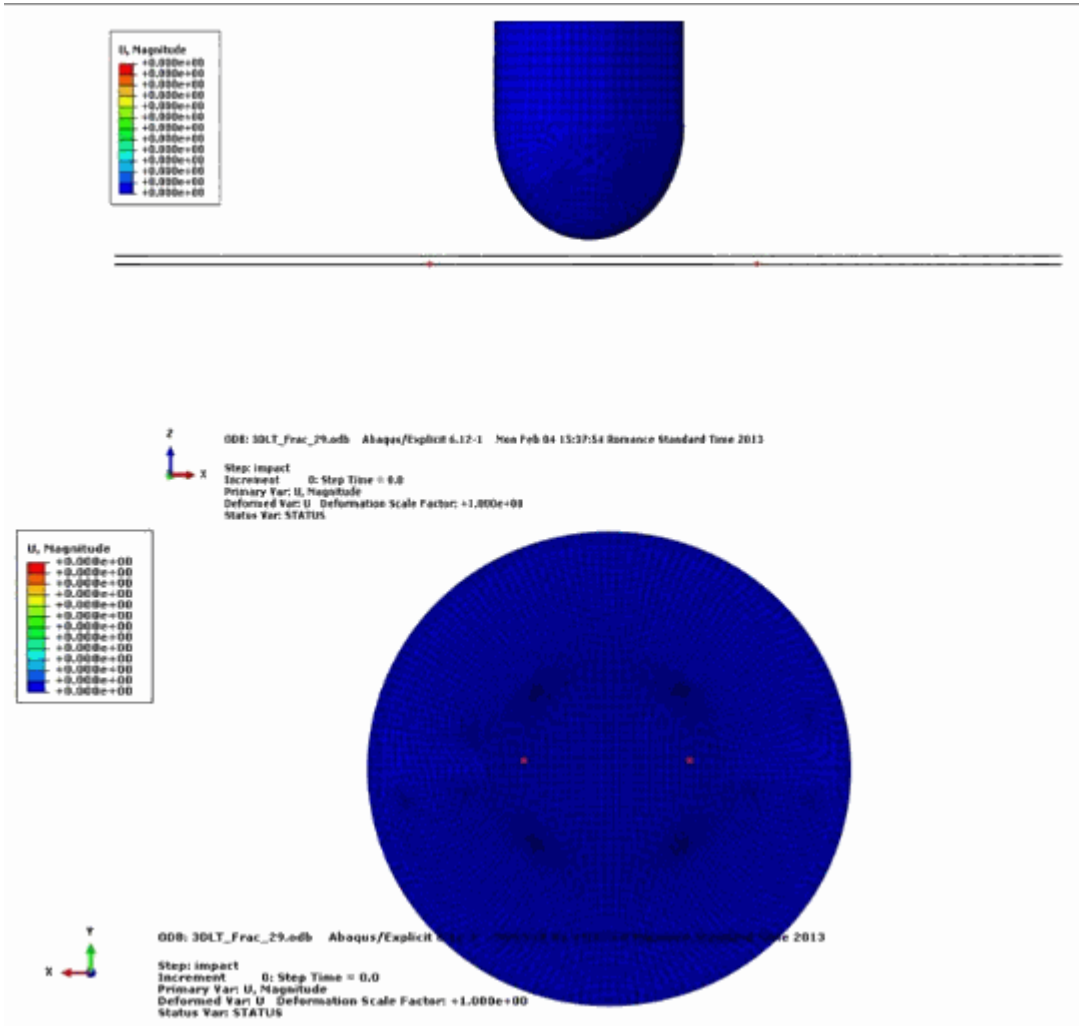


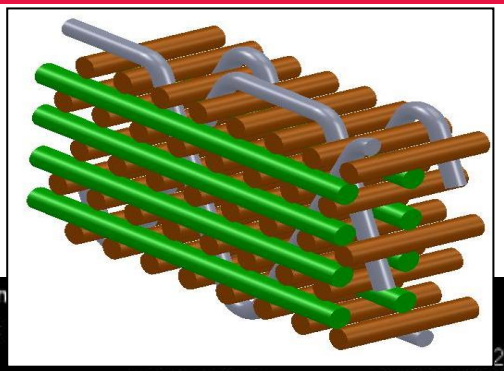


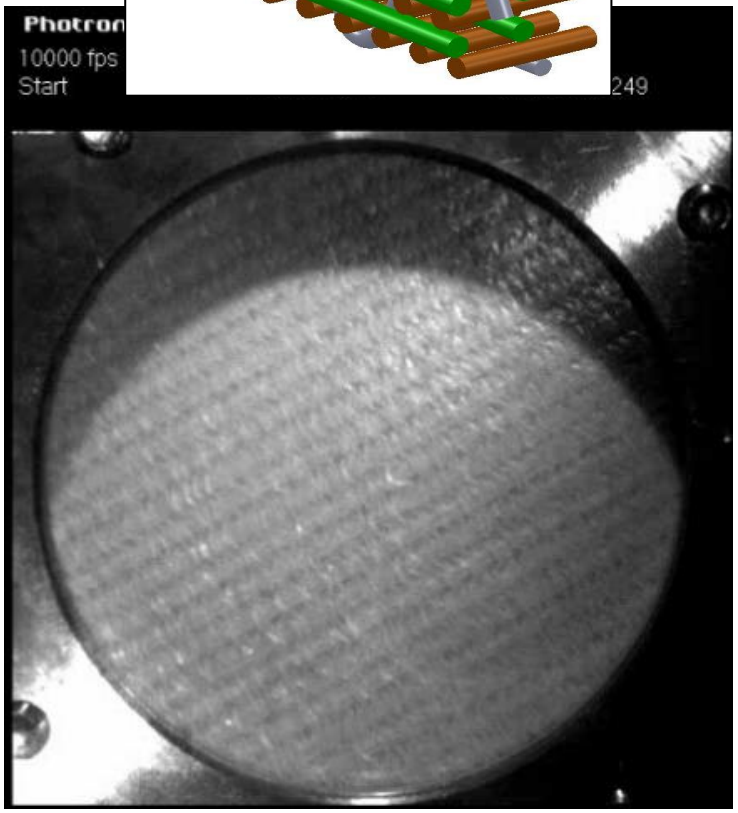



# 1. Material modelling

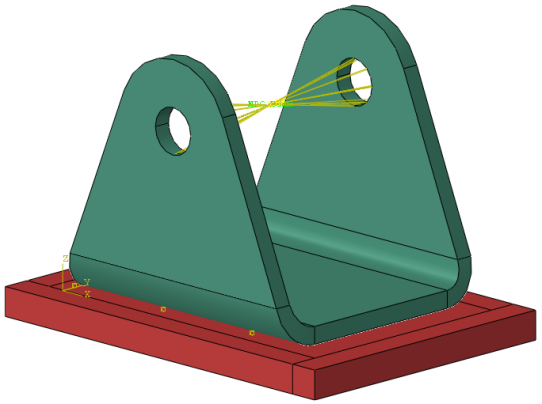
## ***Impact of 3D woven thermoplastic composite***

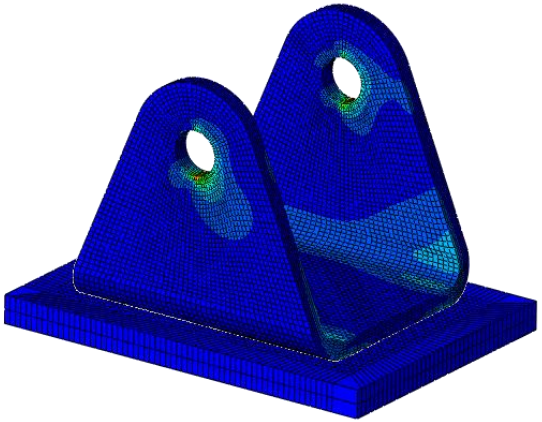


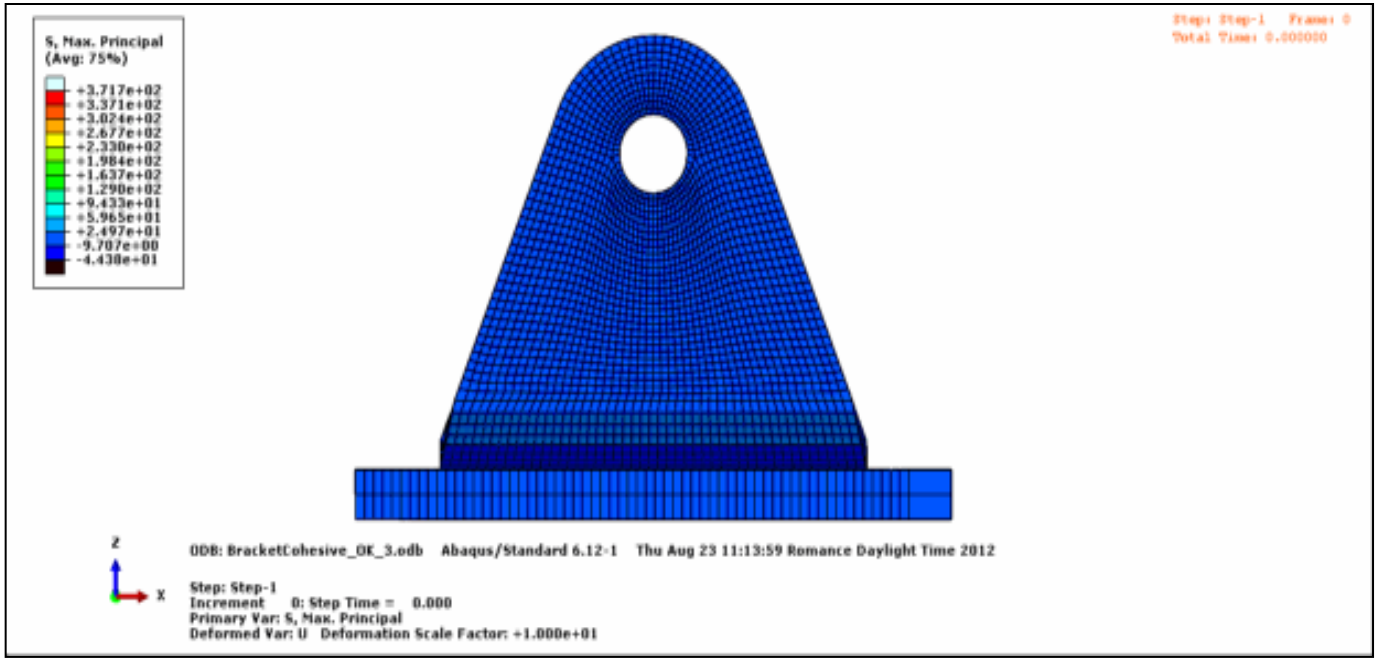





# 2. Joining techniques (e.g. adhesive)

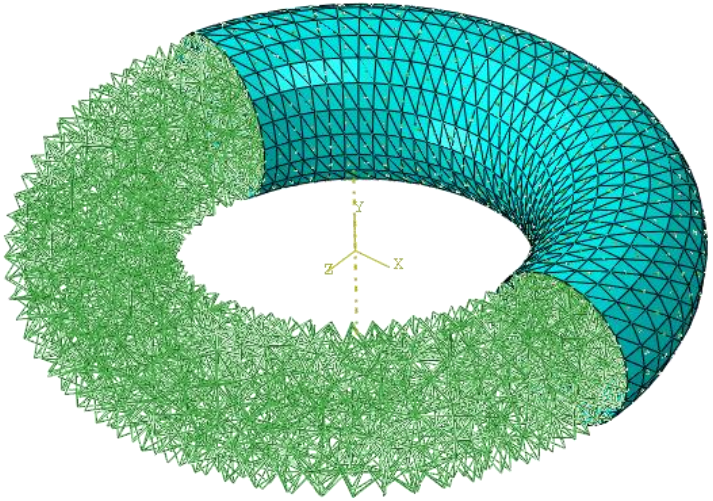


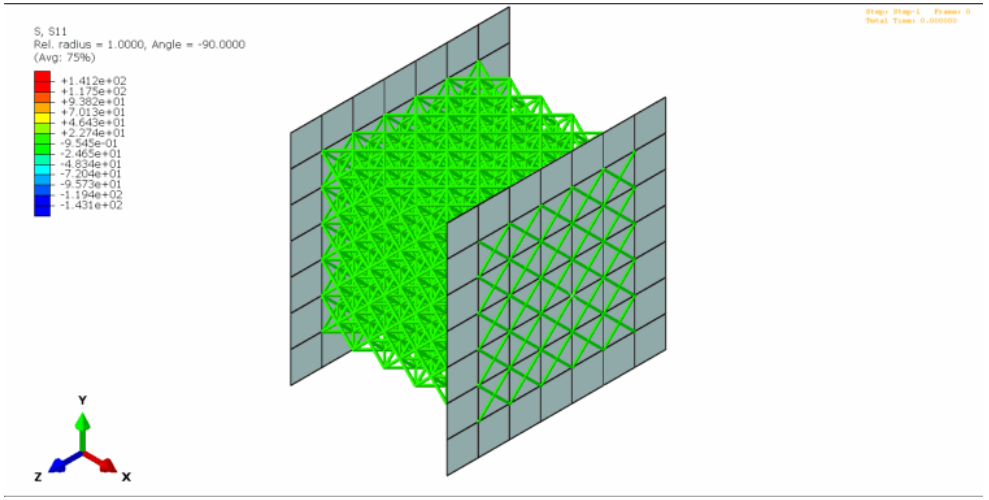


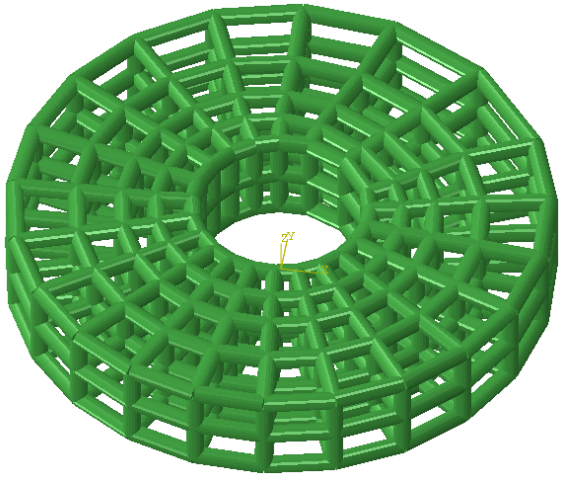


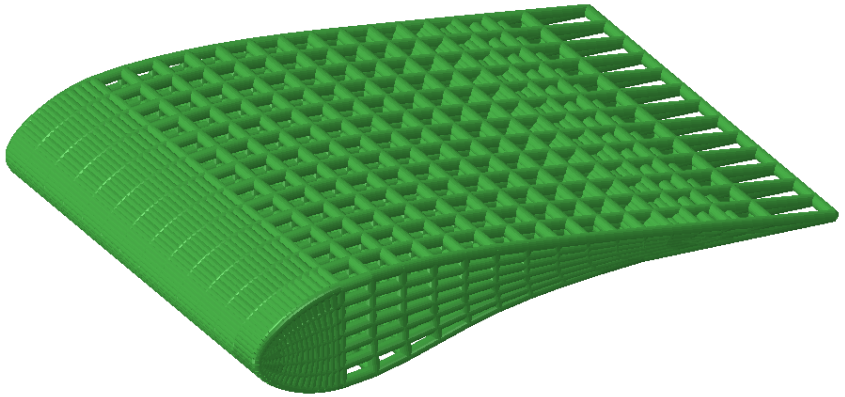
# 2. Component

***Additive manufacturing: 3D printed Lattice structures***

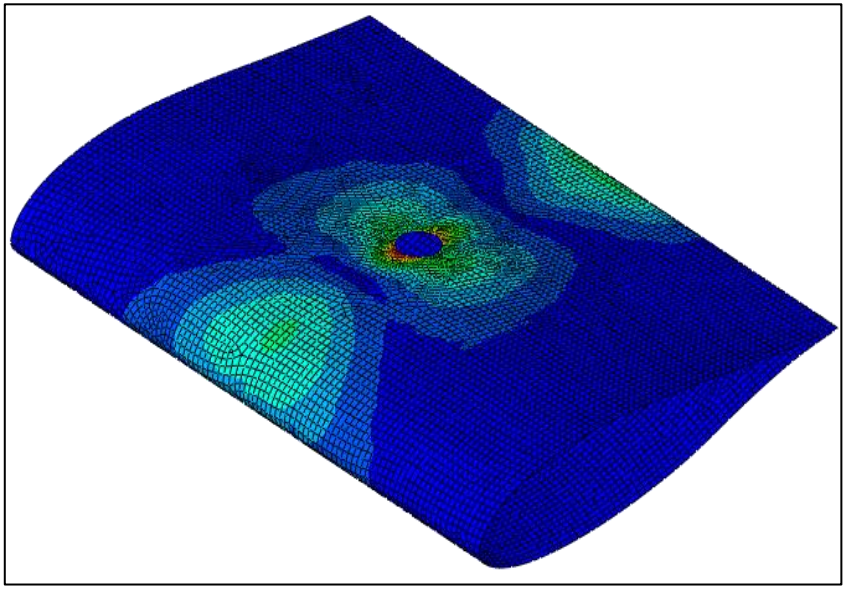


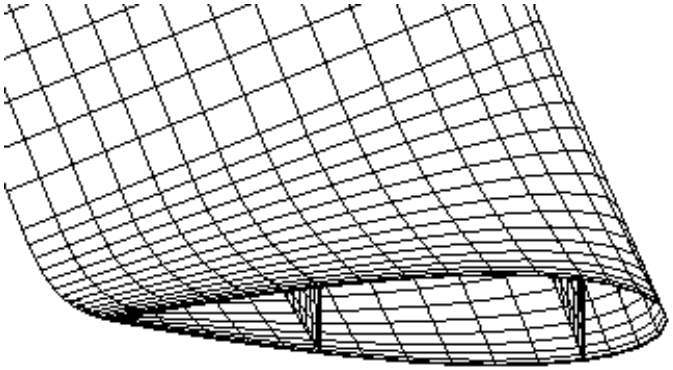


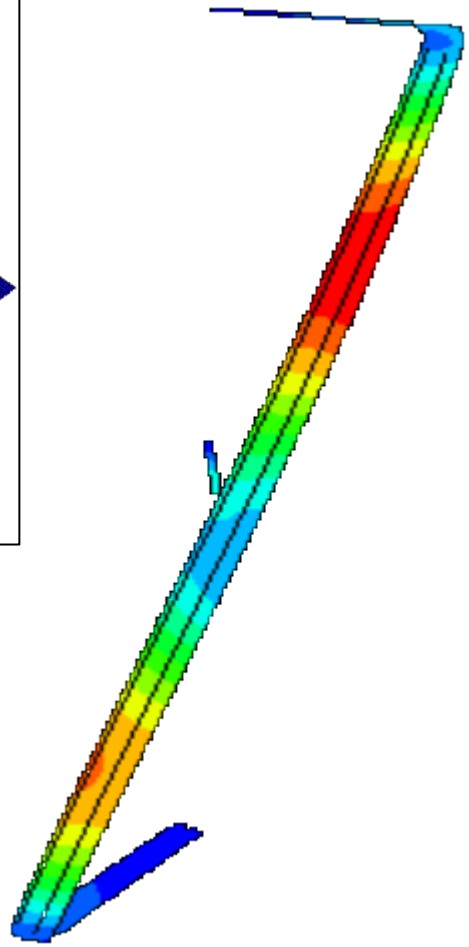





# 3. Subsystem





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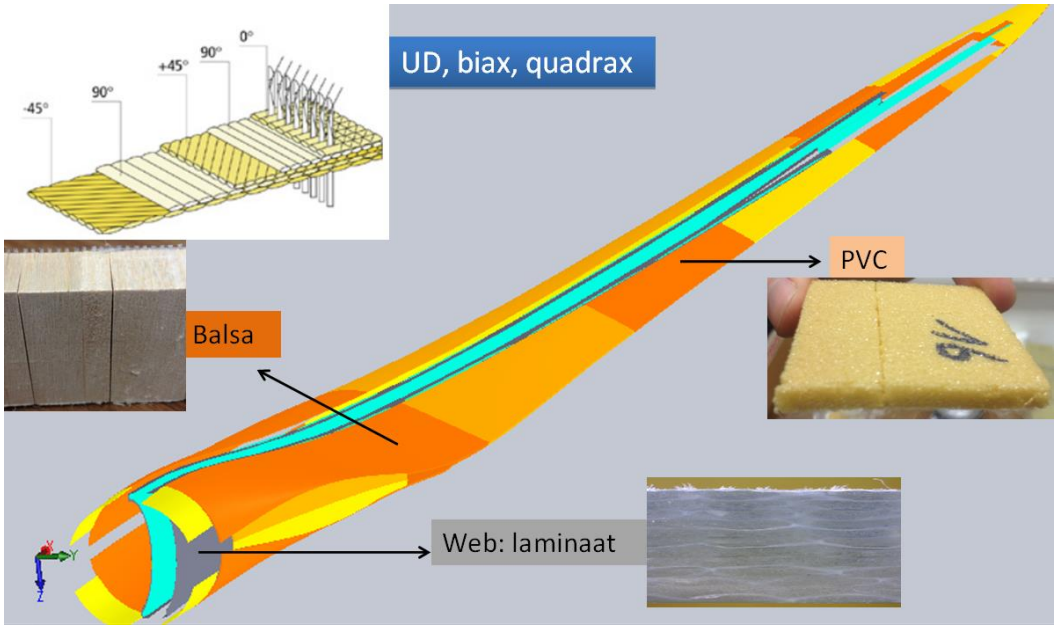
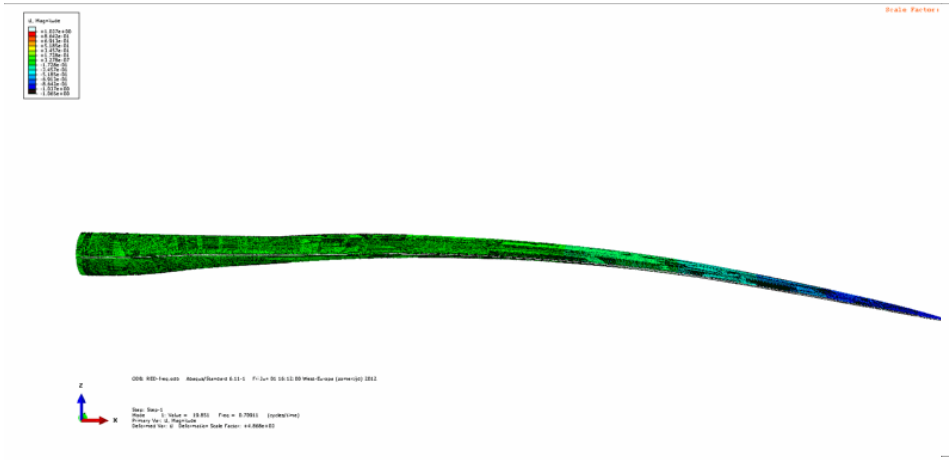
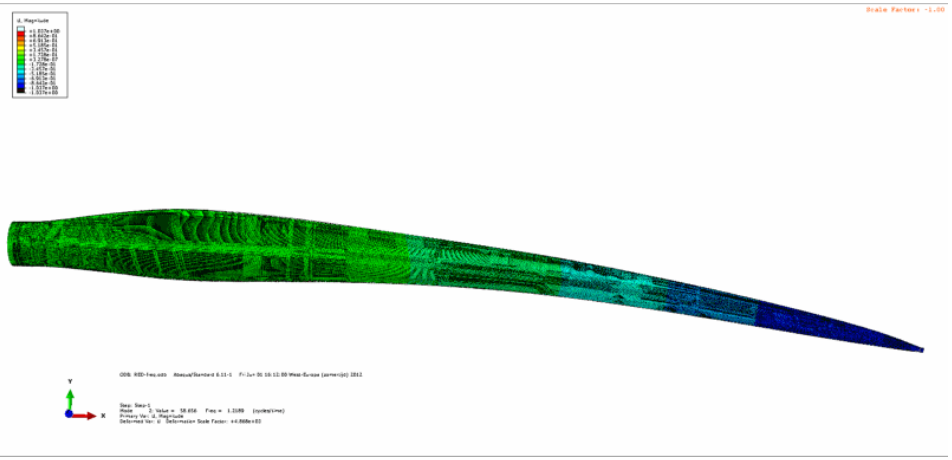




# 4. Final product

Design vs Manufacturing

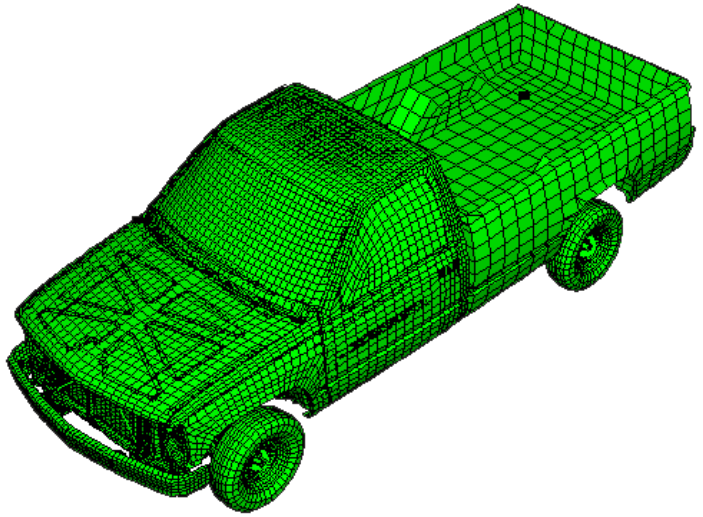
- Reduce scraps
- Cost

Optimization of Components

- Shape
- Mass

Damage tolerance

- In service or in production
- What is the influence of defects on the component?



Simulia - Abaqus

# Conclusions

***Advantages of simulations:***

Accelerates the design process and thus the time to market

A different load ≠ new prototype or test

Reduces the number of tests needed

Reduces the number of prototypes

Makes analyses of complex shapes possible

➔ **Reduces the cost**

***Disadvantages:***

The need of skilled engineers

Cost of licenses (CAD/FE/…)

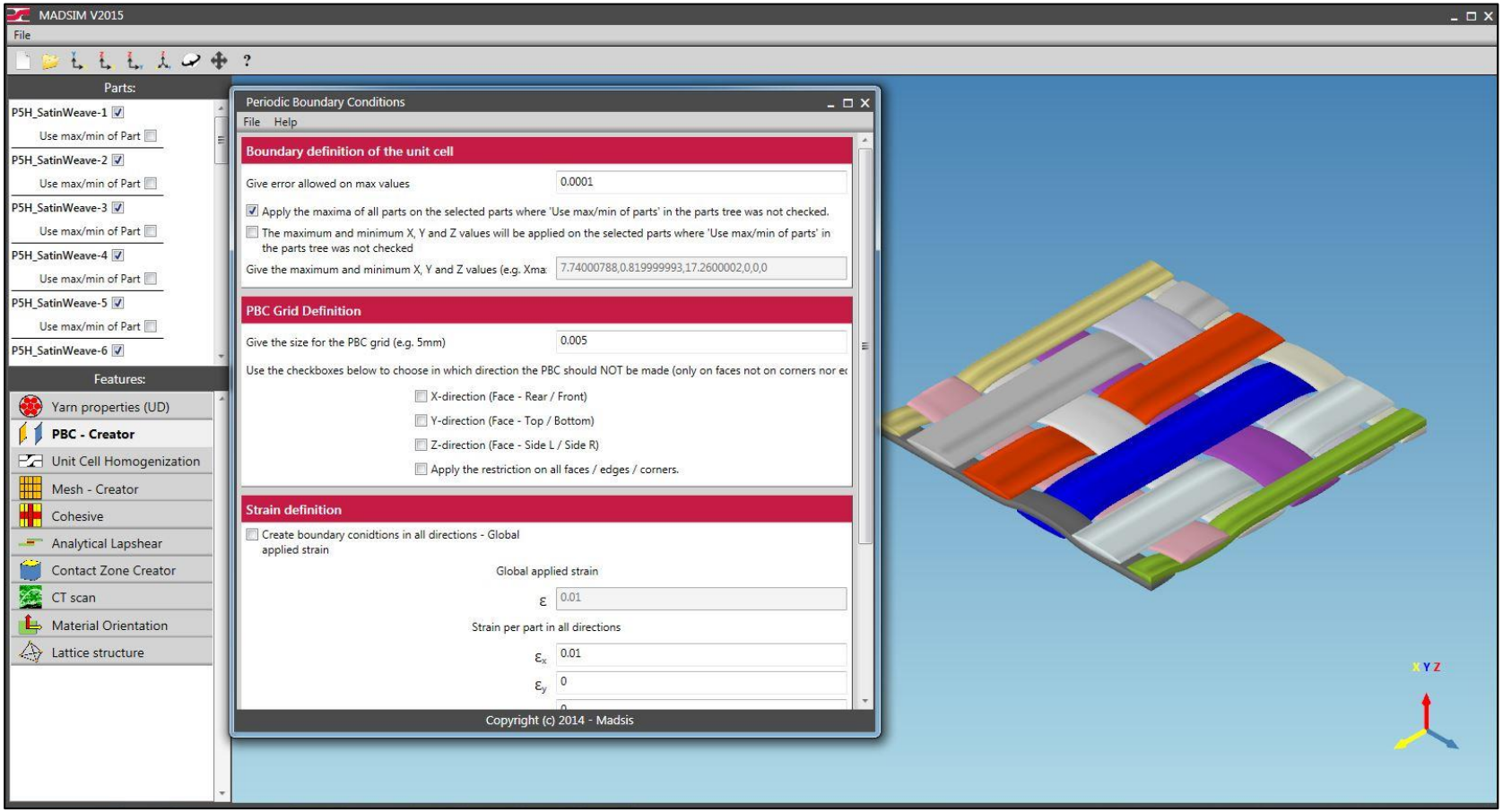
**MA**terials – **D**esign – **SI**mulations – **S**oftware

MADSIS offers high-quality, efficient and cost-effective consulting services that will accelerate the design process, reduce its cost and shorten your time-to-market.

Consultancy | Software | Training

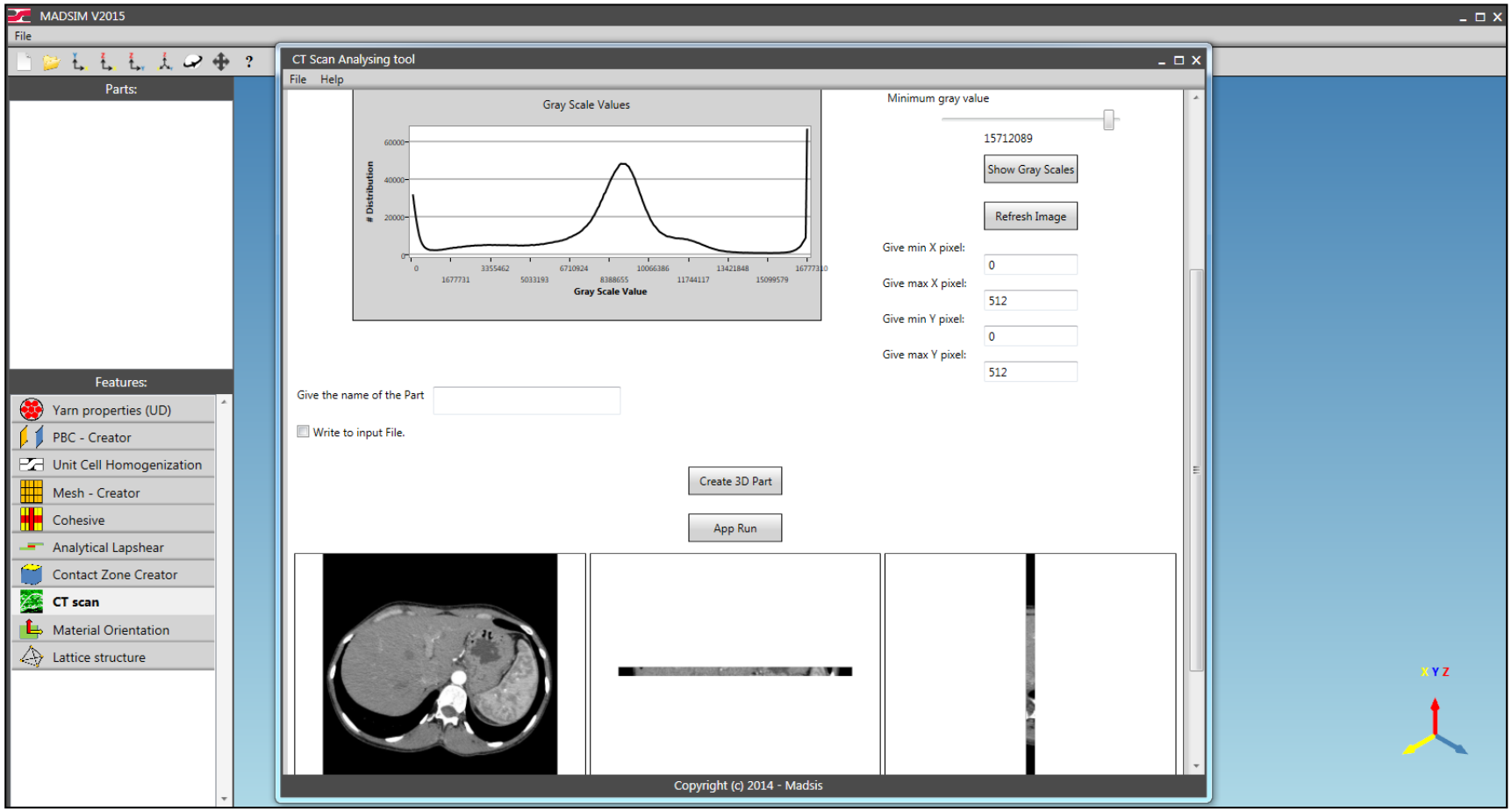
- Entire design from CAD to Drawing
- Finite Element Analysis (static, dynamic) and analytical analysis
- All materials: metals, polymers, composite materials
- Adhesive bonding simulations
- Failure and damage tolerance analyses
- Optimizations (shape, topological…)
- Techniques and Instrumentation
- Customized software development (scripting and stand alone software)
    - Pre / Post processing
- Project management

## *Meso-scale modelling of composites ➔ Elastic properties*

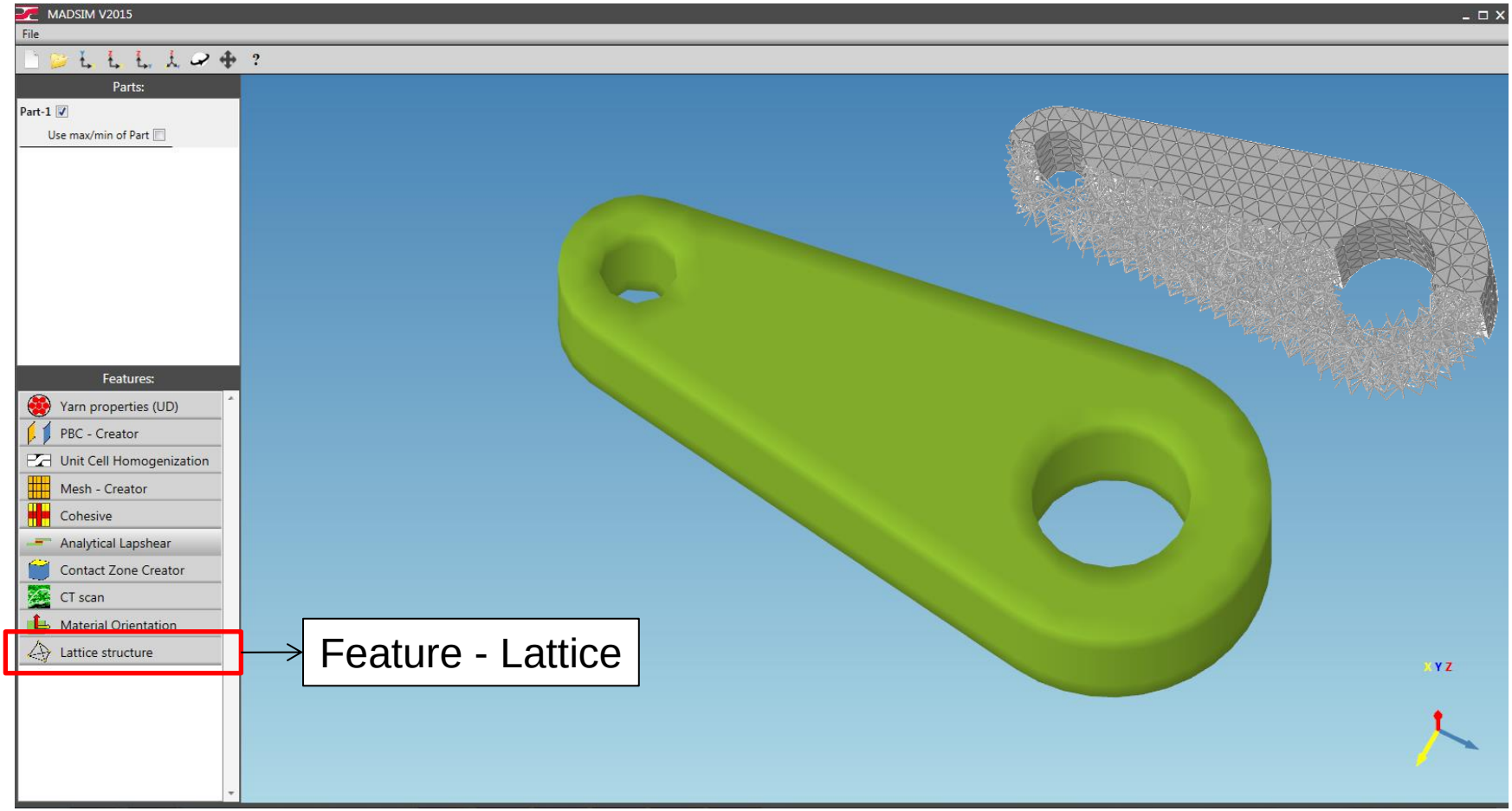



MADSIM = efficient pre-processor

# *CT Scan analysis*



## *3D printed Lattice structures*



# Thank you for your attention

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