



## SIMULATION DRIVEN DESIGN and NUMERICAL TESTING

### FEATURED SERVICES

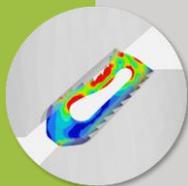
Contemporary medical device design challenges include decreasing time to market while meeting the ever-higher levels of product verification and certification.



Using our mechanical design expertise along with our powerful mechanical and biomechanical simulation tools, we can get your product faster to commercialization by getting more insight in the numerical world. All this before even manufacturing a prototype or conducting physical tests.



Our approach will make you achieve your performance, efficiency and costs goals for your device design or certification phase.



#### Simulation driven design

- Mechanical design: project definition to manufacturing preparation
- Feasibility studies: eliminate the bad ideas early
- Topology and material optimization
- Medical, sport and industrial products

#### In silico testing

- Proprietary biomechanical models
- Human/Product interaction simulations
- Testing in realistic operating conditions

#### Virtual standardized testing

- Simulations for certification
- Replace physical testing to save time and costs
- Specialization: Orthopedic implants
- Also used for general mechanical testing standards

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### Project assessment

- Literature review
- Technical and functional specifications definition

### Ideation stage

- Concept generation
- Feasibility analysis
- Eliminate bad ideas using simulation

### Design and optimization

- 3D Modeling
- Topology optimization
- Material optimization
- Design for additive manufacturing

### In silico testing (replicated operating conditions)

- Biomechanical testing
- Dynamic simulations (drop tests, impacts, mechanisms, rupture)
- Fluid/structure interactions

### Manufacturing preparation and optimization

- 2D drawings
- Manufacturing optimization using simulations (injection molding, extrusion, forging, stamping, and more)

### Certification

- Numerical tests in standard conditions
- V&V40 reports for FDA and CE submission of numerical tests
- Reduce or even eliminate the need for physical tests
- Avoid costly prototypes and physical tests



### Case studies: Orthopedic implants certification

ASTM 2077  
Test Methods  
For  
Intervertebral  
Body Fusion  
Devices

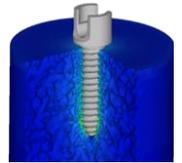
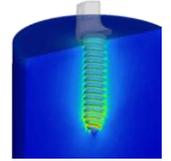


Numerical tests replaced physical tests for CE marking

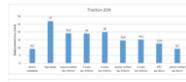


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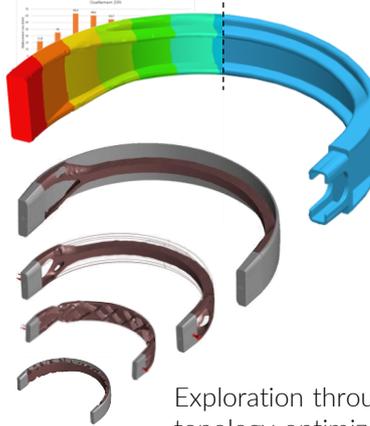
### Case study: Product design



Final validated design



Technical requirements achieved with first prototype

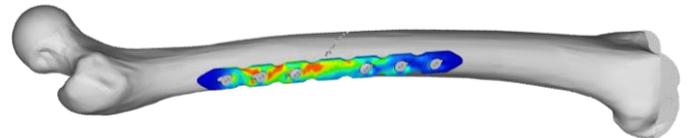
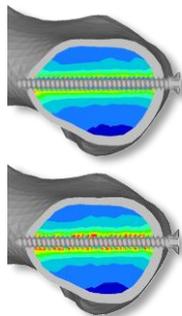


Exploration through topology optimization



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### Case study: Femoral plate and screws



Bone-Implant interaction



Validated Biomechanical model



In situ product biomechanical analysis



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