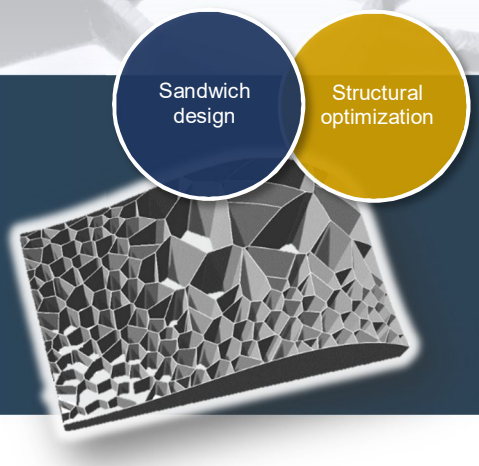
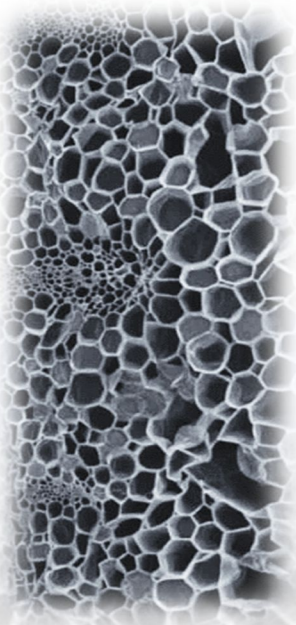
CellCore

Optimized and manufacturing-aware biomimetic design of technical components





Inspired by nature we implement a highly efficient design principle of many biological load-bearing structures *to engineering applications:*

the sandwich design with **functionally-optimized cellular cores**.

CellCore has developed a new and innovative approach based on numerical component optimization. With the use of in-house software tools as well as commercial solutions in the field of computer-assisted engineering (CAE) we offer the design of manufacturing-aware CAD-models of complex and for the specific application **optimized cellular cores in high-perfomance sandwich constructions**.

For the manufacture of our designed structures we address different methods suitable **for large scale productions**, e. g. pressure die-casting, injection moulding or milling, as well as for highly flexible manufacturing using, for instance, **additive manufacturing methods** (e.g. SLM, SLS, STL, FFF/FDM). This allows the usage in a wide range of application fields ranging from lightweight engineering, energy absorption, vibration damping and sound absorption to thermal or multifunctional use cases. Different industries could benefit from the unique and valuable properties of cellular materials to **enhance safety and comfort** as well as to **save resources, costs and energy**.

Contact

CellCore
Hardenbergstr. 38
10623 Berlin

René Giese (CEO)
+49 176 7075 4304
rene.giese@cellcore3d.com

Dr.-Ing. Paul Schüler (R&D)
+49 176 9820 9050
paul.schueler@cellcore3d.com

www.cellcore3d.com

Bundesministerium für Wirtschaft und Technologie
ESF Europäischer Sozialfonds für Deutschland
Technische Universität Berlin
eXIST Existenzgründungen aus der Wissenschaft

CellCore Biomimetic Engineering

Our workflow in component optimization

Input

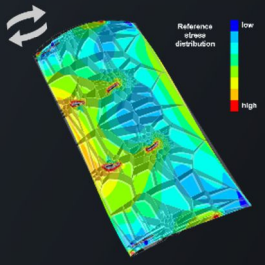
- Geometry
- Operation conditions
- Loads (CFD, Forces)
- Constraints and requirements

in close coordination with the client

Conception

- Analysis and recommendation of suitable manufacturing methods and materials
- *s.o.s.* material testing and characterization

Design



- FEA-based **mesostructural topology optimization**
- Integration of functional features

Output

- Optimized component design (CAD, STL)
- Physical prototypes or small batch production

Our services overview

…a holistic approach for the specific application

Design (CAD-based)

CAD-based and manufacturing-aware component optimization using a new and innovative biomimetic approach.

Material testing & qualification

Comprehensive service for material and component investigations in accordance to DIN EN ISO and ASTM standards with focus on 3D printing materials (powder- and filament-based).

Manufacture of prototypes and small batches

Manufacture of physical prototypes with different additive manufacturing systems to visualize the design concepts as well small batch production

</> Software tools

In the medium to long term, we will develop a platform-independent software, which allows for an easy-to-use application of our biomimetic optimization approach in a fully integrated workflow.

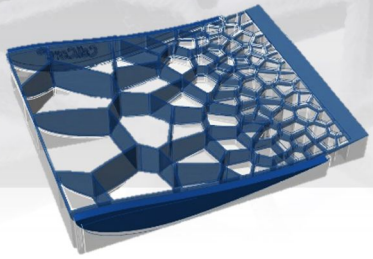
Bundesministerium für Wirtschaft und Technologie
ESF Europäischer Sozialfonds für Deutschland
Technische Universität Berlin
eXIST Existenzgründungen aus der Wissenschaft

CellCore Biomimetic Engineering

Innovative optimization approach based on stochastic structures

Our designs make use of **stochastic cell structures**

with a constant wall thickness, graded cell sizes and convex wall curvatures, which are calculated by FEA-based optimization algorithms and specific material laws.



This new approach

- allows for the simple handling construction and production of highly efficient lightweight components with **weight savings of up to 30 %**
- is applicable to **complex** (outer) **component geometries**
- provides an **optimized load path and homogeneous stress distribution** in the component by specifically engineering the distribution of load-bearing material
- allows for the additional implementation of functional features (**multifunctional lightweight design**)

Competing optimizing technologies

Conventional topology optimization (0/1-Integer-problem, SIMP-Approach, BESO etc.)

Volume filling with geodetic lattice structures (unit cells)

Altair HyperWorks

AUTODESK WITHIN

TOSCA STRUCTURE

PLM Software SIEMENS NX

materialise innovators you can count on

FRUSTUM

Our optimization approach offers **several advantages** over competing, convential technologies:

- **manufacturing-aware** design
  (no manual reworking post design optimization required)
- adresses not only pure monolithic parts, but also more complex **composite constructions** with an optimized shear resistant cellular core and high-strength top layers (CFRP, Kevlar etc.)
- allows taking advantage of a **wider range of manufacturing methods** such as machining production, e. g. milling, primary forming methods, e. g. die-casting (metals) or injection moulding (plastics), or additive manufacturing techiniques, e.g. SLM, SLS, STL, FFF/FDM

➡ no limitations to costly powder-based additive manufacturing methods, but also usable for **medium-sized and mass production**

Bundesministerium für Wirtschaft und Technologie
ESF Europäischer Sozialfonds für Deutschland
Technische Universität Berlin
eXIST Existenzgründungen aus der Wissenschaft

CellCore Biomimetic Engineering

CellCore

Biomimetic Engineering

www.cellcore3d.com