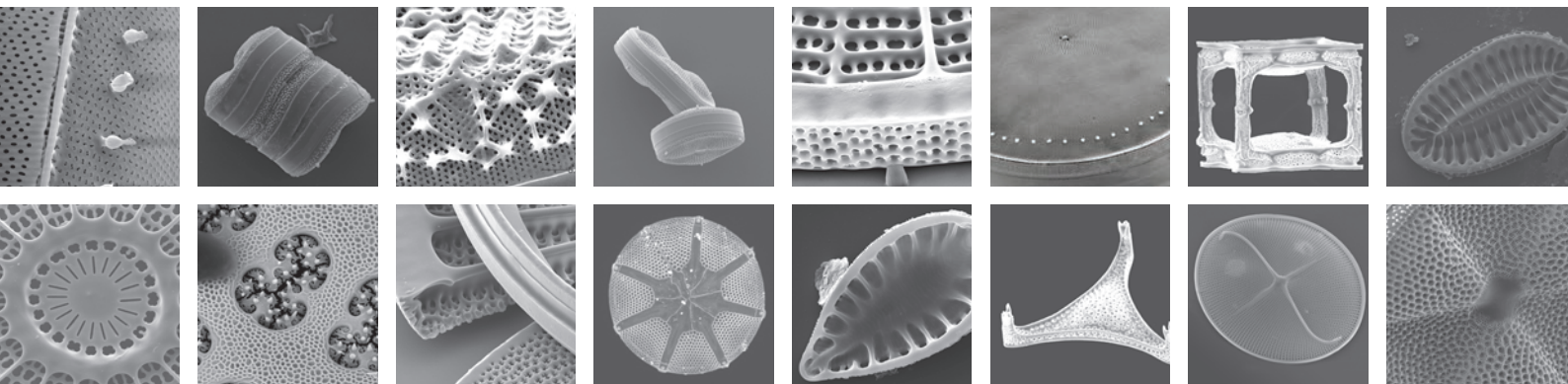


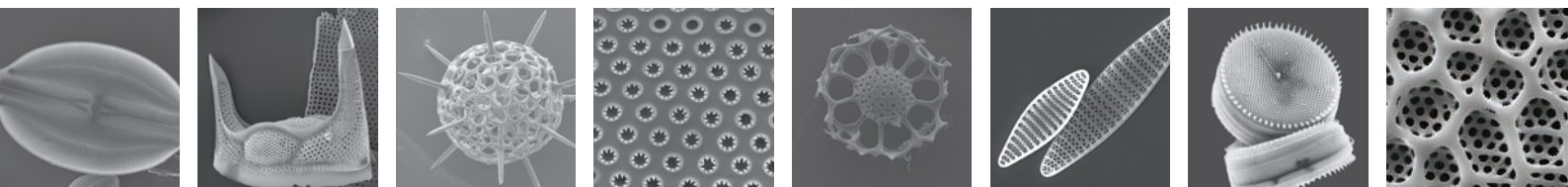


# ELiSE

Evolutionary Light Structure Engineering



## Bionic Lightweight Design



Usage of Pre-Optimised Biological Structures



The Evolutionary Light Structure Engineering procedure revolutionises structural lightweight constructions by using nature as its role model: In close collaboration with our clients we have achieved weight savings of more than 50%.

Fast Optimisation



Low Development Costs



Our range of services includes the whole value chain of the conception, development and optimisation of new lightweight solutions. Please do not hesitate to contact us. We are looking forward to optimising your lightweight product with the help of nature and bionics.

Solutions Based on Evolution



Unique Features through Bionic Design



Our optimisation approach is based on natural structures: During the course of evolution, microscopically small algae have developed very stable yet still very lightweight shell structures to remain in the necessary upper ocean layers for photosynthesis but at the same time to protect themselves against its natural predators. This arms race between the aggressive predators' teeth structure and the defensive structures of the diatoms leads to stable lightweight constructions, which we use as models for technically advanced lightweight constructions.



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## The Evolution of Lightweight Construction from the Idea to the Product

Today the efficient use of resources is economically inevitable and needs to be taken into account in all construction processes. In this context, bionics has established itself as a creative

Missing Ideas?  
Lightweight Construction Problems?  
Design Problems?

inspiration. Through the use of the award-winning ELiSE procedure, nature's lightweight competencies become useful for engineers. Since million of years evolution has developed solutions for various lightweight problems.

Biodiversity  
Load capacity > 800 t/m<sup>2</sup>

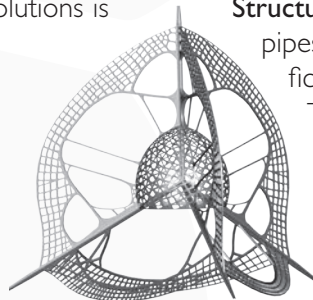
The ELiSE procedure was developed at the Alfred-Wegener-Institute for Polar and Marine Research. With more than 100,000 different species of natural models from the Hustedt-Collection of Diatom Studies and constantly new samples being collected from every part of the world by our research vessel "Polarstern", direct access is provided to the origins of our proposed solutions.

100,000 Archetypes  
Crash tests  
SEM/AFM/CLSM/MRT  
CAD/FEA/CFD  
Genetic Algorithms  
Topology Optimisation

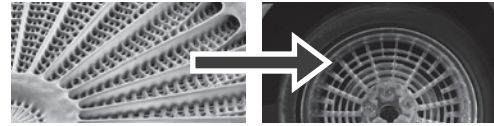
By using the infrastructure of a major research institution in combination with high-performance computers and modern analysis methods, an efficient transmission

Cost Savings  
Weight Reduction  
Stable Lightweight Design  
Additional Functions

between the natural models and the technical solutions is possible.

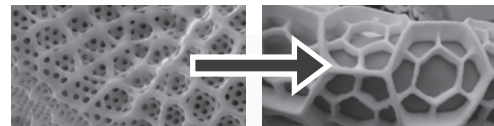


## Examples of Cross-Sectoral and Material Independent Structural Lightweight Constructions



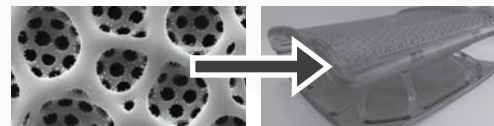
20%  
GEWICHTS-  
REDUKTION

**Car Rim** with excellent characteristics in transferring power between the wheel hub and the tyre. Through the use of a novel construction method of radial and concentric braces, which are supported by short, intermediate braces in the border areas, the rim offers a very homogenous stress distribution in all subareas. Crippling of the very thin radial spokes is prevented by the concentric structures.



50%  
GEWICHTS-  
REDUKTION

**Medical Support Bandage** based on a fractal honeycomb structure. This bionic construction allows for a very high mechanical stability while at the same time providing breathability and maximum wearing comfort.



40%  
GEWICHTS-  
REDUKTION

**Multifunction Headrest** without any foam material filling parts, which is suitable for the injection moulding procedure. The optional air permeability leads to an additional synergy effect of the bionic design.

**Tripod Offshore Foundation Structure** out of standard pipes, which is more efficient and cost-effective.

50%  
GEWICHTS-  
REDUKTION

The easy dimensioning is made possible through the deduction of construction principles of radiolarian skeletons.



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ELiSE



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