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Lightweight Design According to Nature

Computer-free Engineering Design Using Thinking Tools

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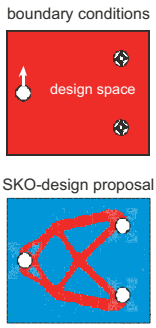
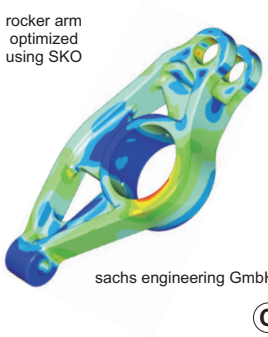
Computer-aided lightweight design using Soft Kill Option (SKO)

A) SKO (Soft Kill Option) is a computer application to optimize the weight of technical components, which is based on the demineralization of bones by osteoclasts.

B) In consideration of technical specifications, non - or minor - loaded areas of the technical component are removed.

C) For optimized technical components under the specified load, material usage and weight are minimized.



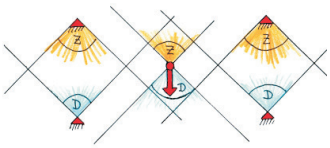


Simplified Design Tools

Shear Squares, Tension Triangles, and Force Cones

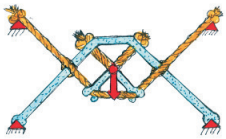
Method of Force Cones

Concept: Single loads orientate along axial 90° compression cones and 90° tension cones, respectively. Using the edges and intersection points of these cones, a lightweight design proposal can be generated.



applied load and force cones

design proposal using the Method of Force Cones



visualization of the principle

comparison with SKO computing

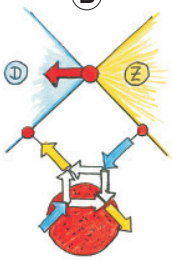
Torsion Anchor

At force cones and primary points (●), tensile and compressive forces intersect at right angles.

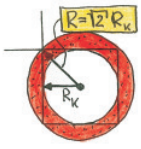
Each point along the circumference of the anchor circle is a primary point.

The constructive circle (radius R_K) enables simplified engineering of the torsion anchor using tangent lines. The loaded radius of the torsion anchor is R.

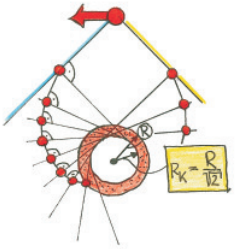
applied load



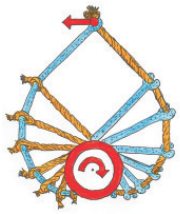
force cones



constructive circle

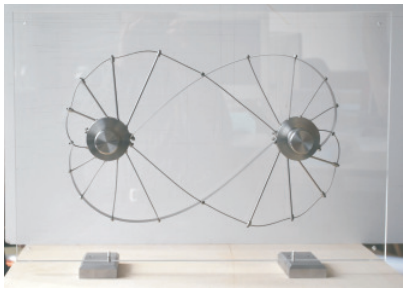


string of primary points

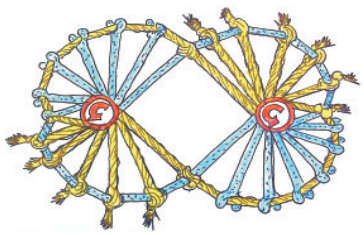


visualization of the principle

Demonstrator of Two Interacting Torsion Anchors



Visualization of the Principle



more information: www.mattheck.de