Ausblicke auf neue Berechnungsoptionen in Freeware FEA- und Topologieoptimierungs-Programmen

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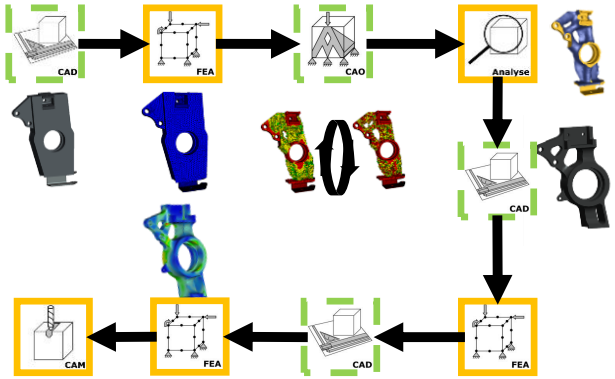
Ziele und Forschungsschwerpunkte

- Entwicklung fortschrittlicher Finite-Elemente-basierter Berechnungswerkzeuge speziell für Maschinenelemente

Validierung durch Versuch und Praxiseinsatz

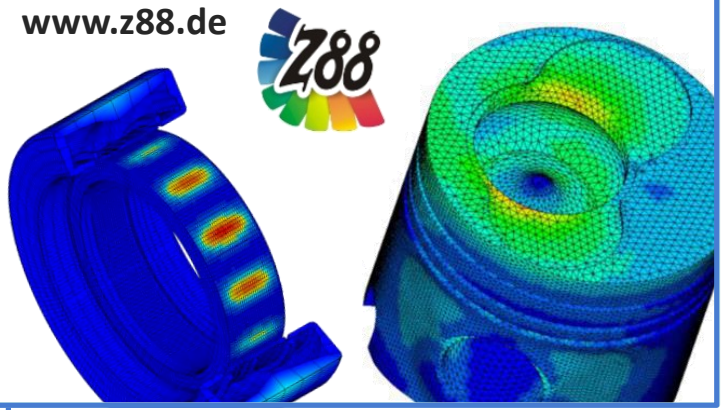
Simulation im Produktentwicklungsprozess



- Hilfestellungen zu gewinnbringenden Einsatzmöglichkeiten im Produktentwicklungsprozess

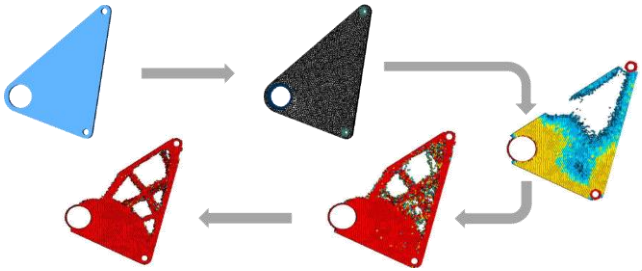
Entwicklung fortschrittlicher FEA-Algorithmen

www.z88.de

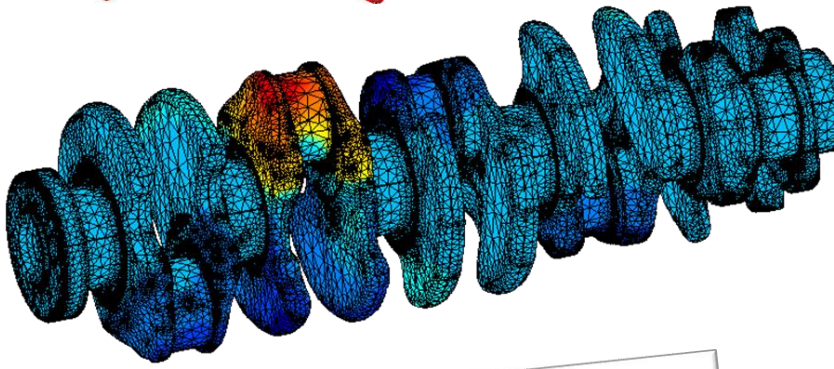


Agenda

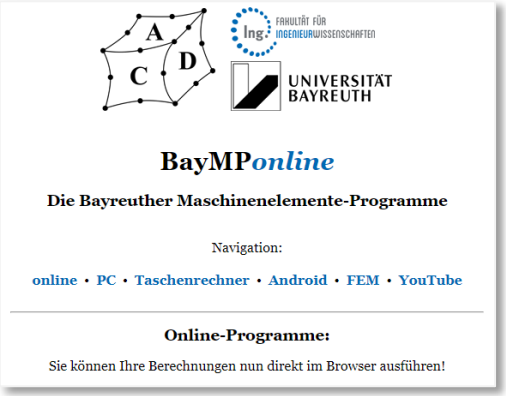
1. Z88Arion®V2

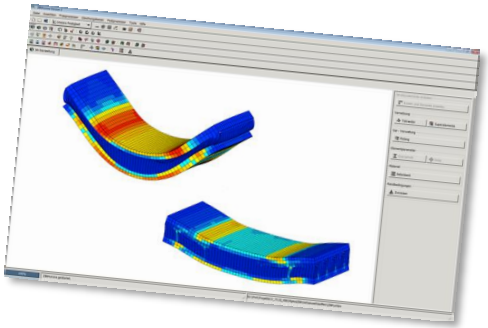


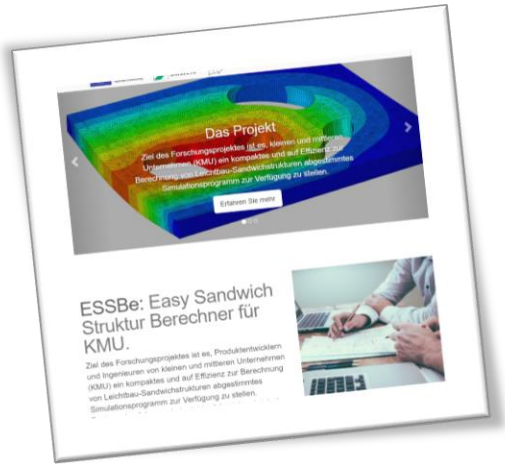
2. Z88Aurora®V4



3. Forschungsschwerpunkte







Was ist Z88Arion®?

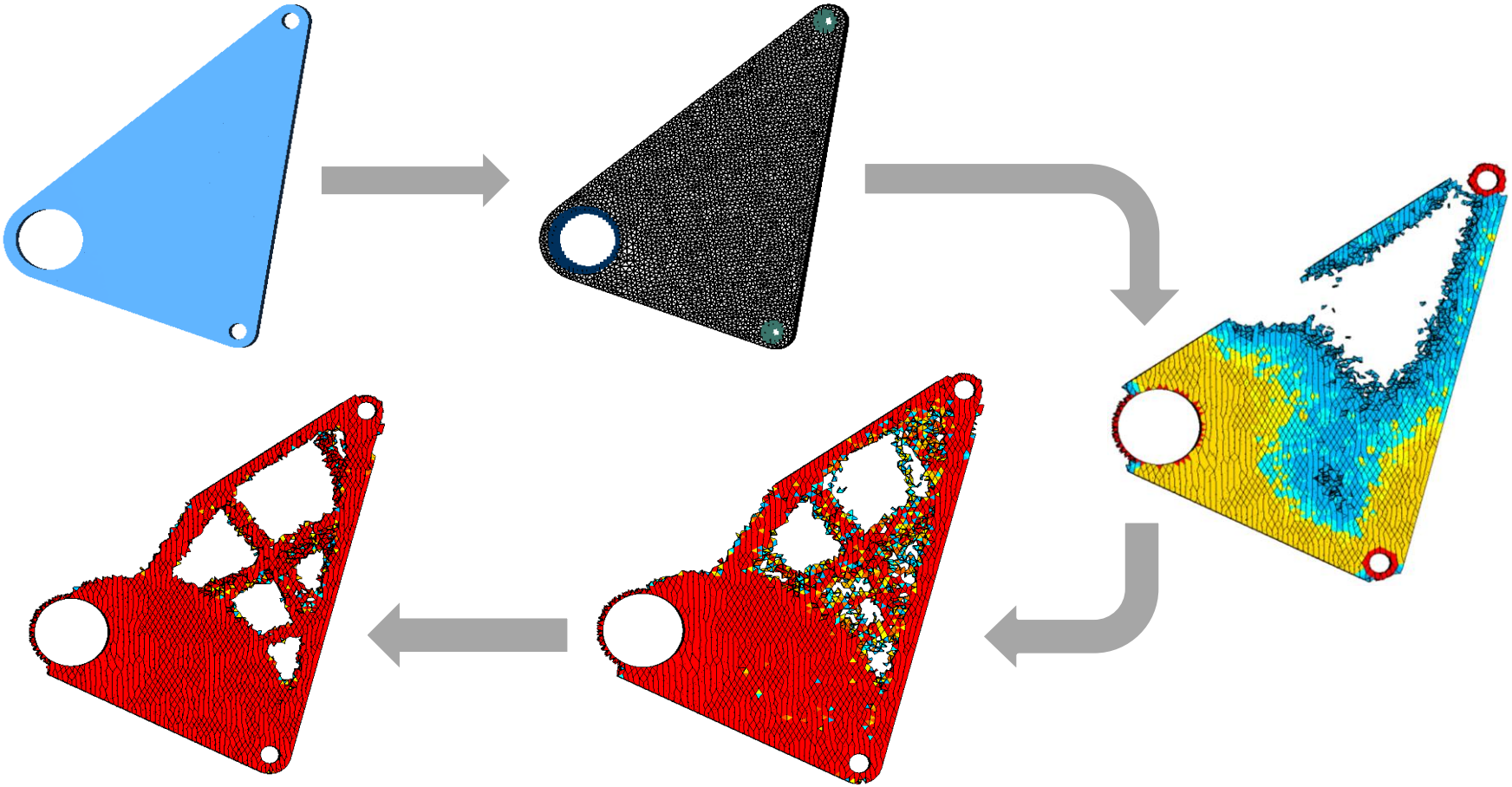
Topologieoptimierung

- Minimierung einer Zielfunktion durch Veränderung der Struktur

Zielfunktionen

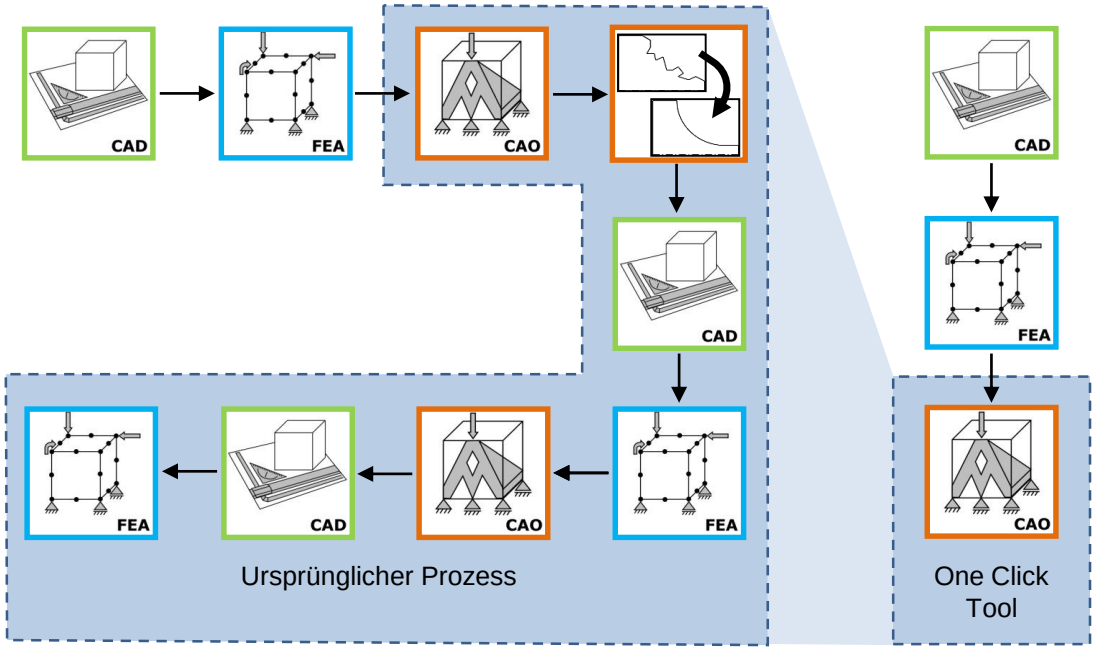
- Steifigkeit
- Festigkeit
- Durchbiegung
- Gewicht
- etc.

Was ist Z88Arion®?



Wer fördert Z88Arion®?

Z88Arion wird von der Europäischen Union über den Europäischen Fond für regionale Entwicklung (EFRE) gefördert.



OPTIONEN

Europäische Union
Europäischer Fonds für regionale Entwicklung

Was ist in Z88Arion®?

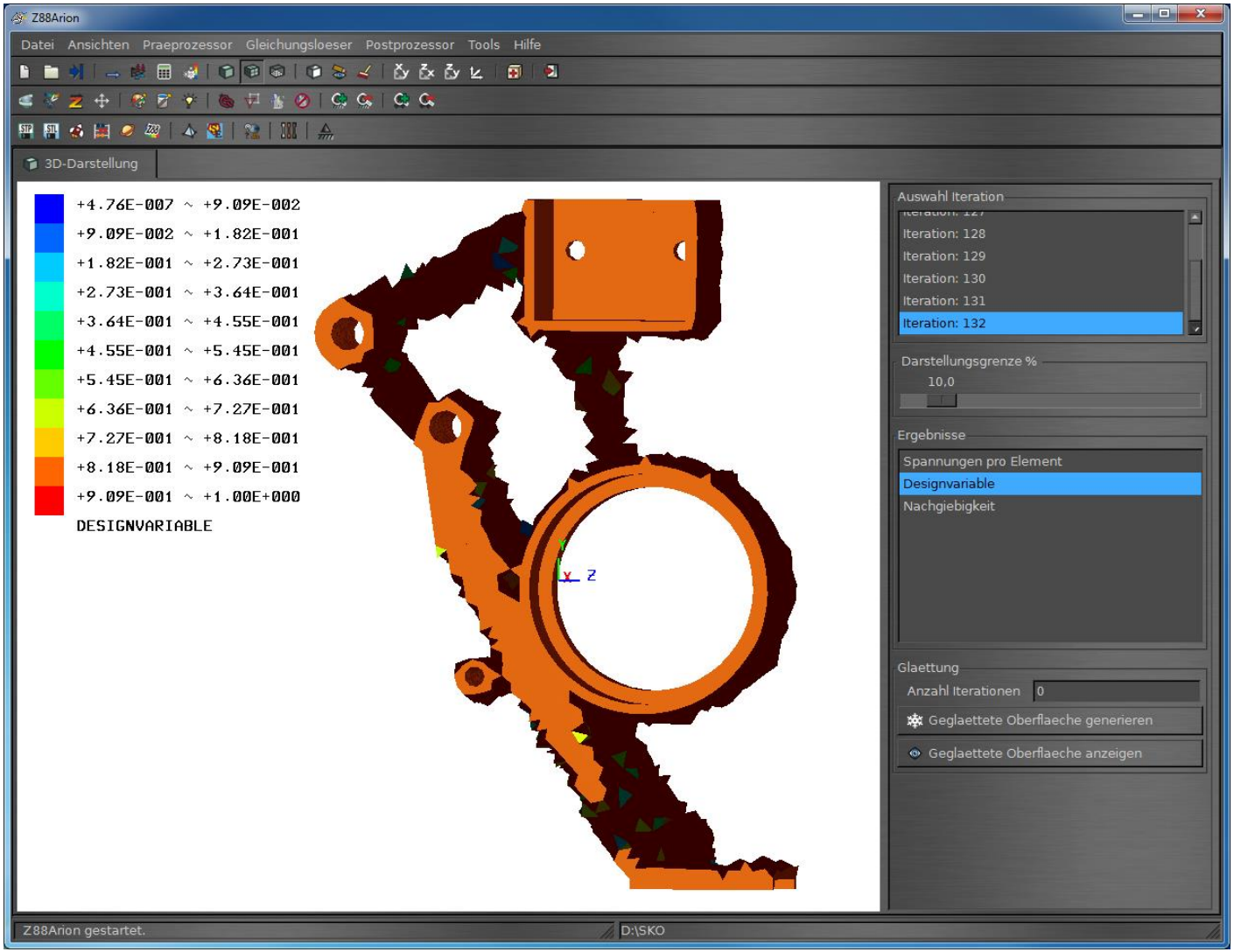
Optimierungsverfahren

- Optimalitätskriterien (OC)
- Topology Optimization for Stiffness and Stress (TOSS)
- Soft Kill Option (SKO)

Weiteres

- Zwei-Schritt Glättung
- STL Export
- Direkte Schnittstelle zu Z88Aurora

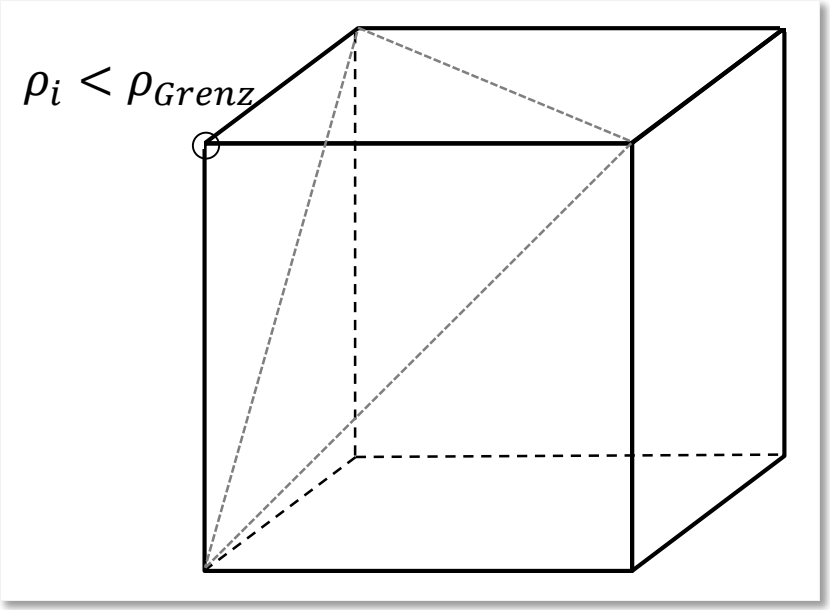
SKO mit Z88Arion®



Glättung in Z88Arion®

Das Verfahren besteht aus **zwei** Schritten

1. Schritt

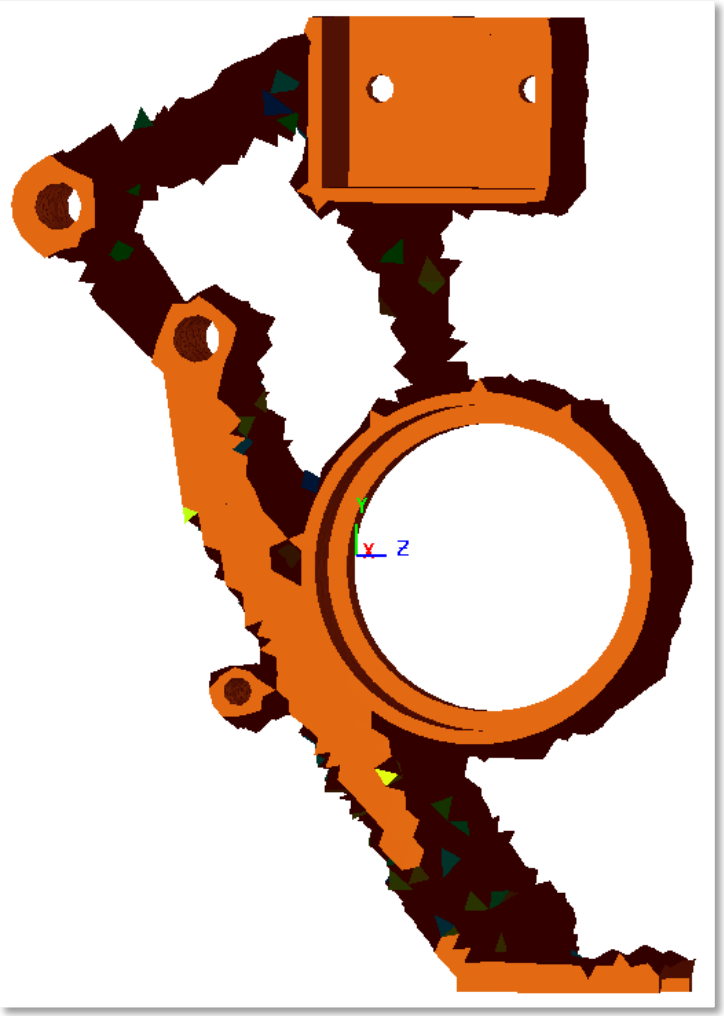


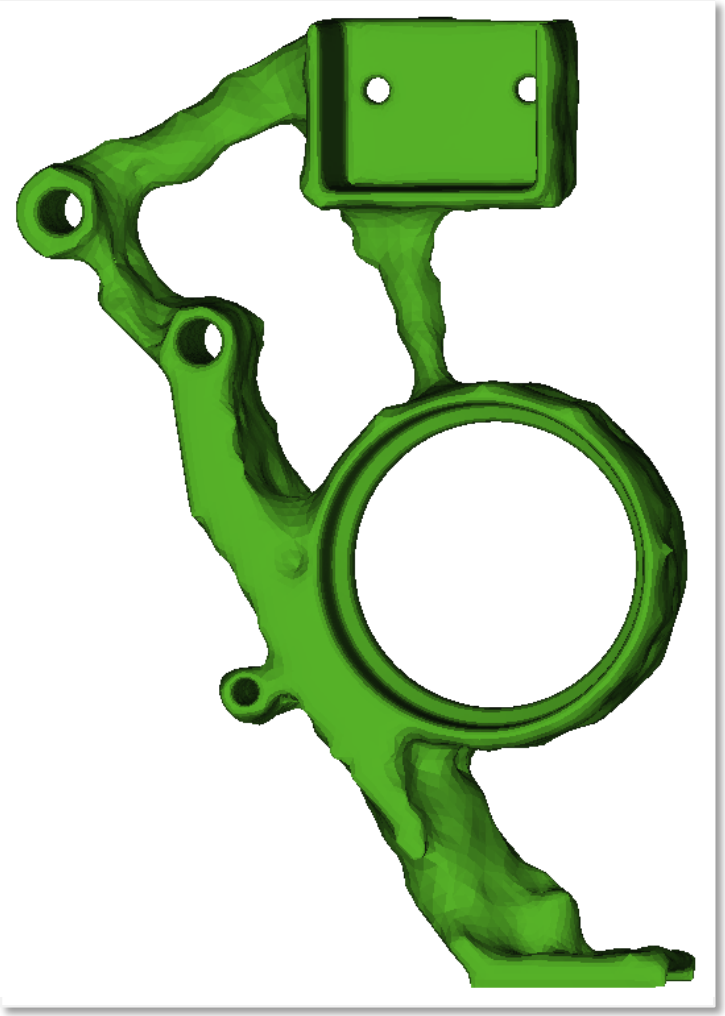
2. Schritt

$$(I - \lambda dtL)X^{n+1} = X^n$$

$$L(x_i) = \frac{1}{|N_1(i)|} \sum_{j \in N_1(i)} x_j - x_i$$

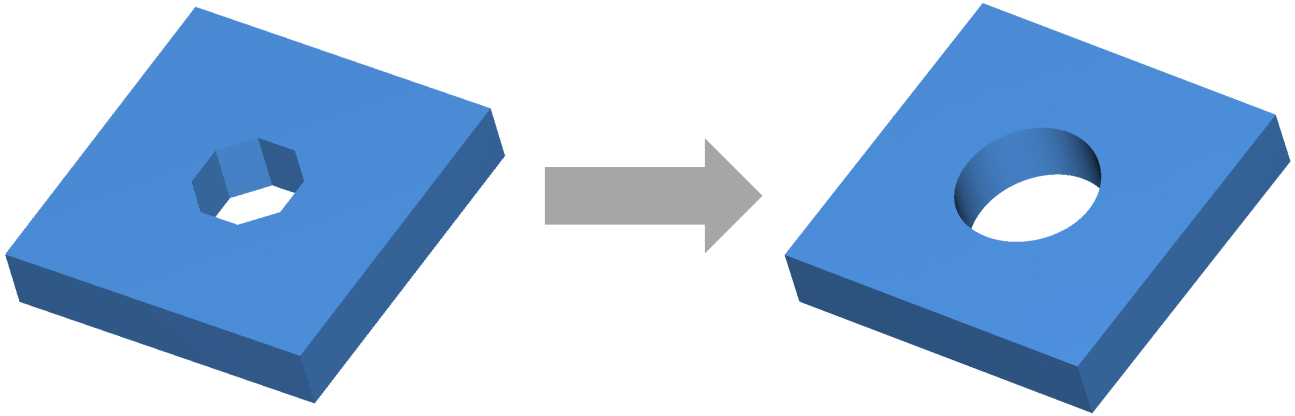
Glättung in Z88Arion®

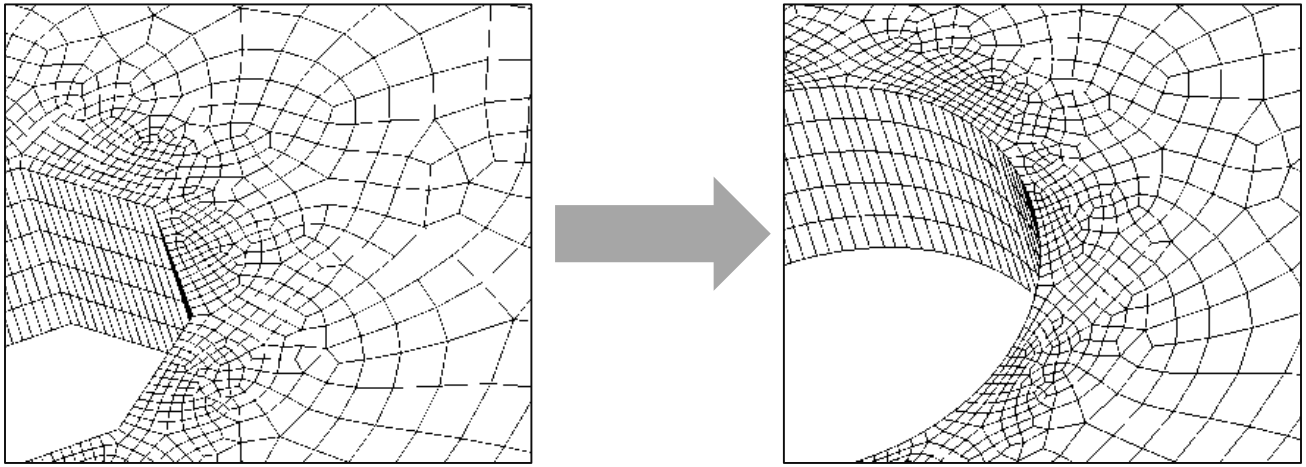




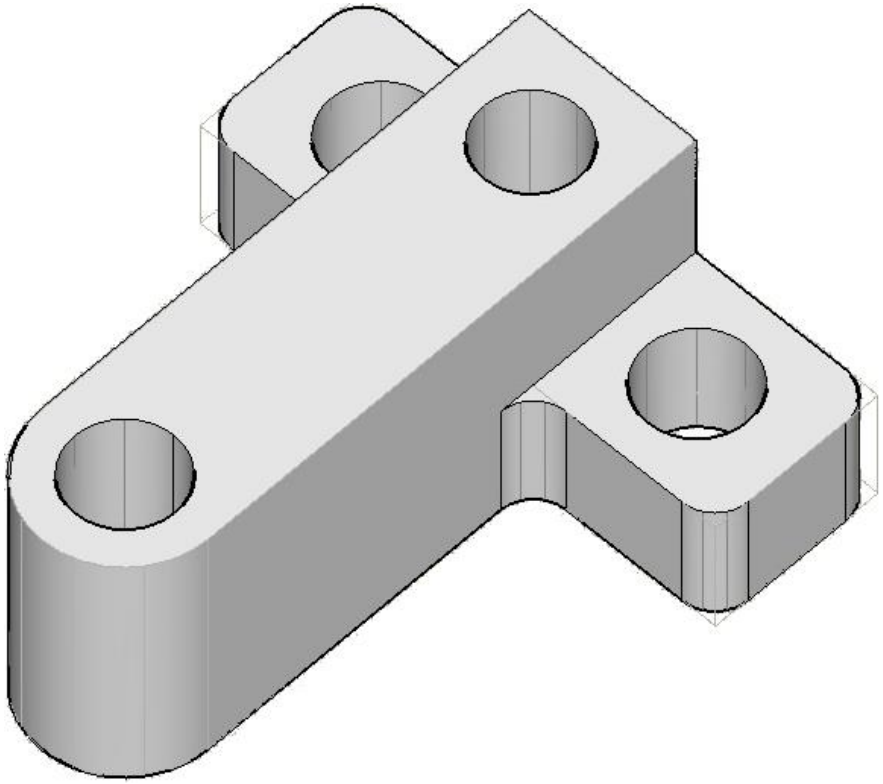
Was bringt Z88Arion® in Zukunft?
Gestaltoptimierung

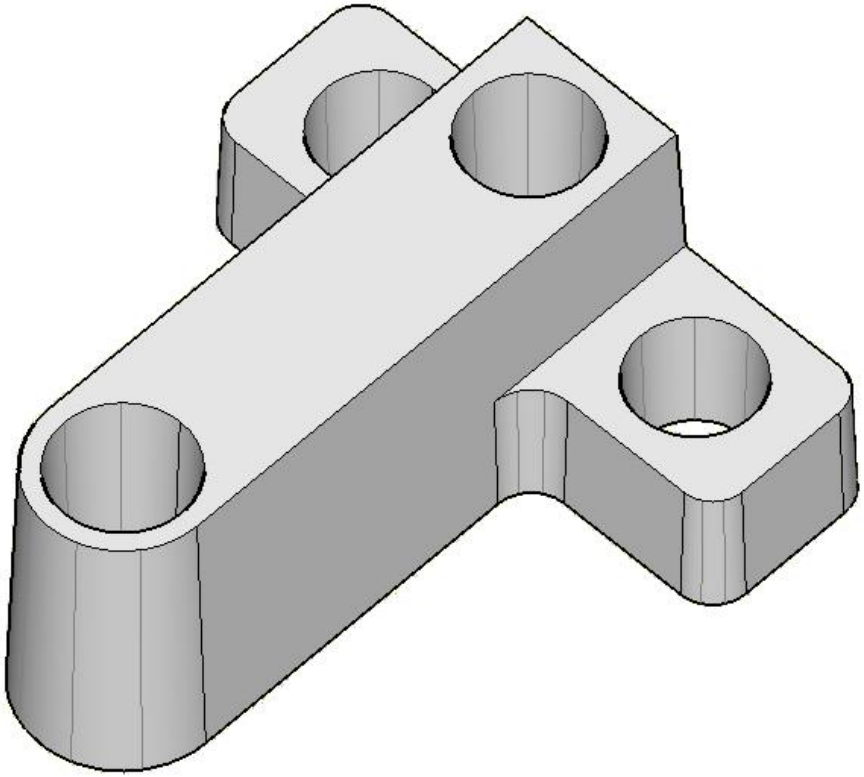
Methode: Computer Aided Optimization (CAO)





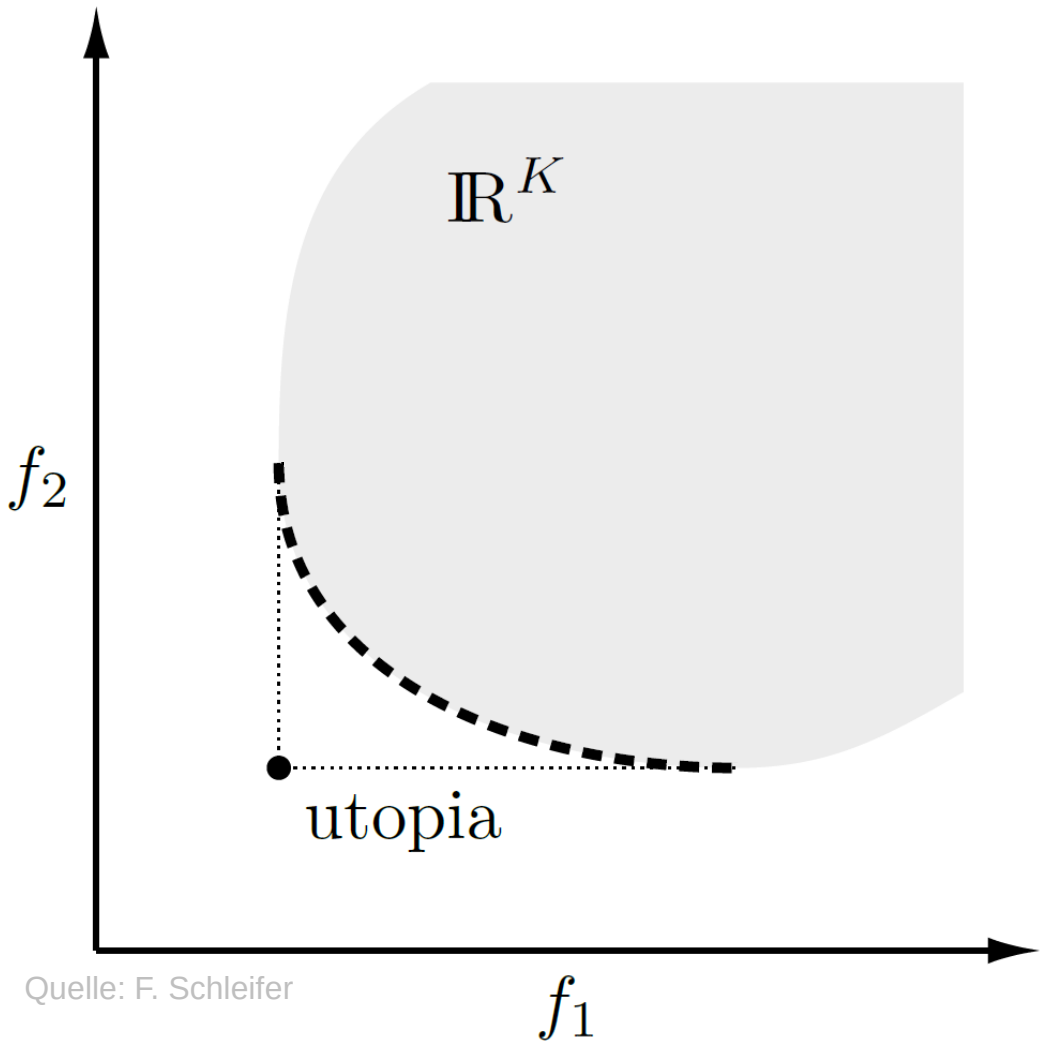
Was bringt Z88Arion® in Zukunft?
Fertigungsrandbedingungen





Quelle: www.formz.com

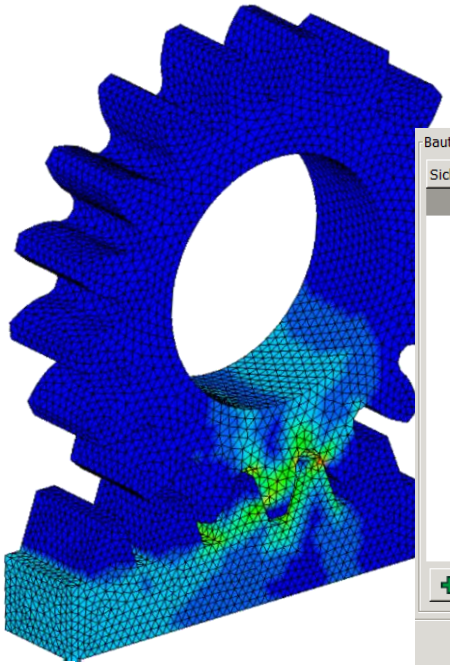
Was bringt Z88Arion® in Zukunft?
Mehrzieloptimierung

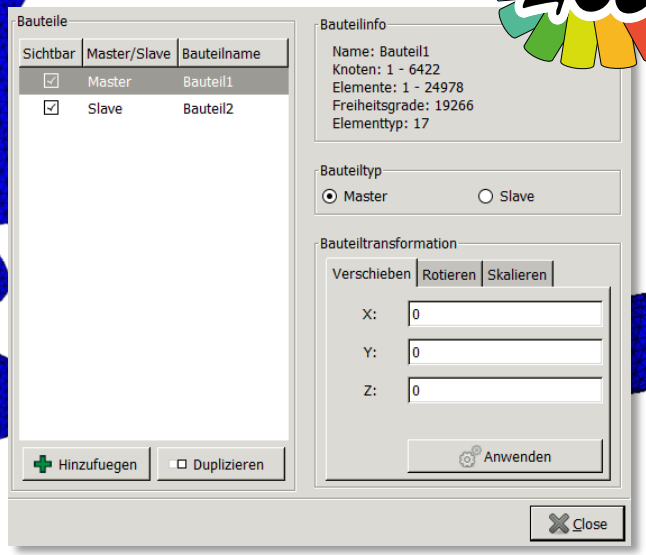


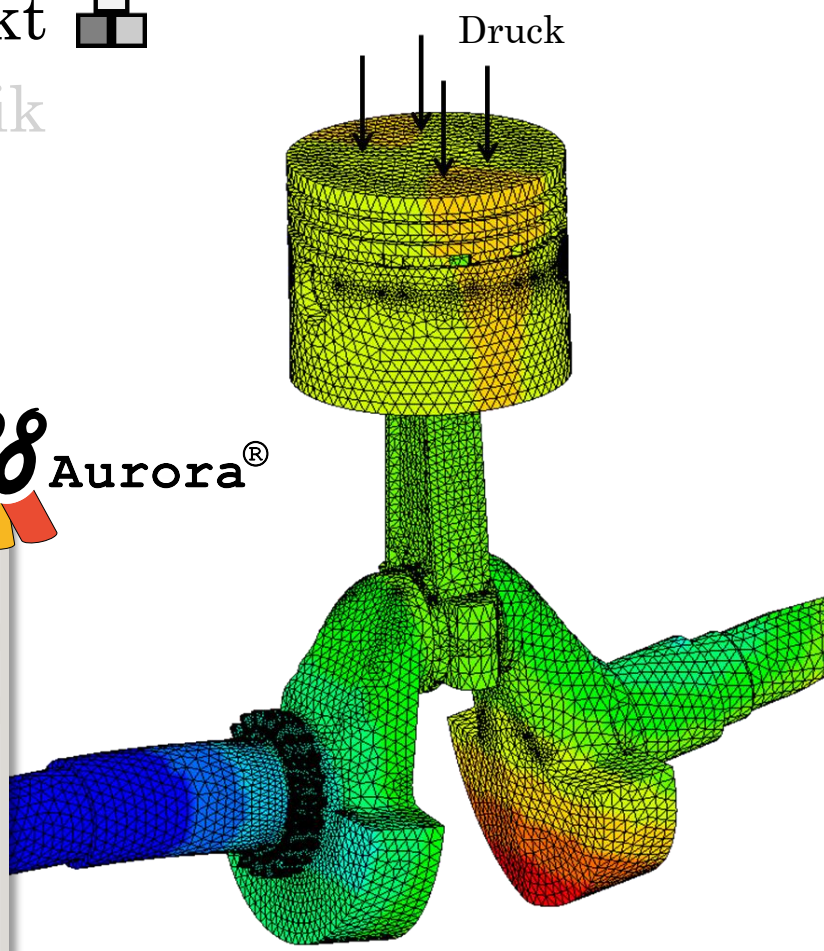
Quelle: F. Schleifer

Aktueller Leistungsumfang

- Lineare Elastizität mit Kontakt
- Nichtlineare Strukturmechanik
- Eigenschwingungen
- Stationäre Thermomechanik



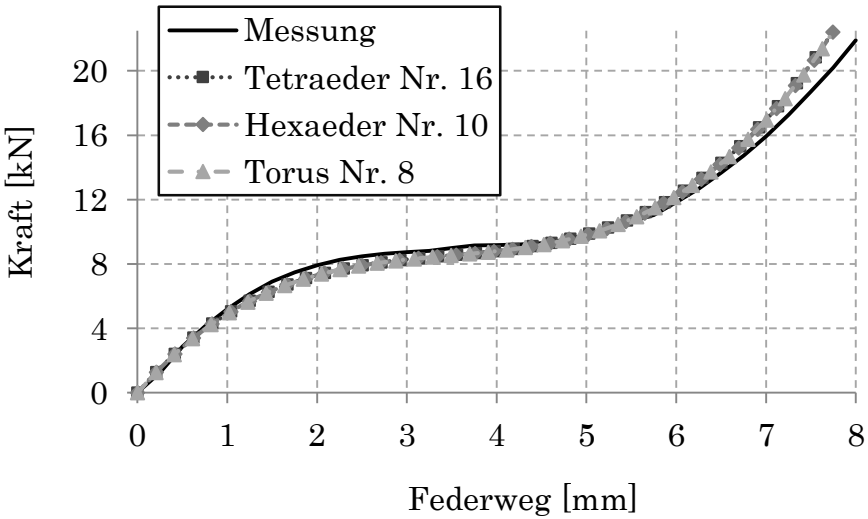




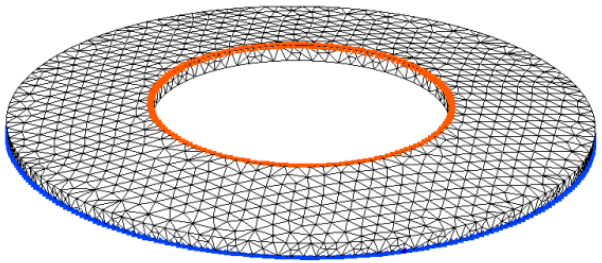
Z88Aurora®
Aktueller Leistungsumfang

- Lineare Elastizität mit Kontakt
- Nichtlineare Strukturmechanik
- Eigenschwingungen
- Stationäre Thermomechanik

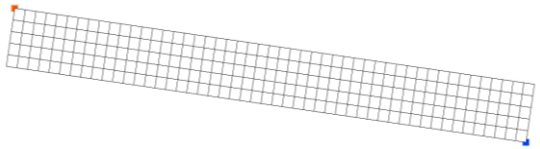
Kennlinien der verschiedenen Elementtypen



Tetraederelemente

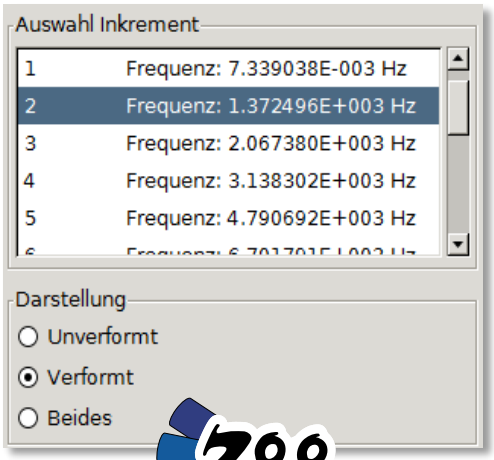


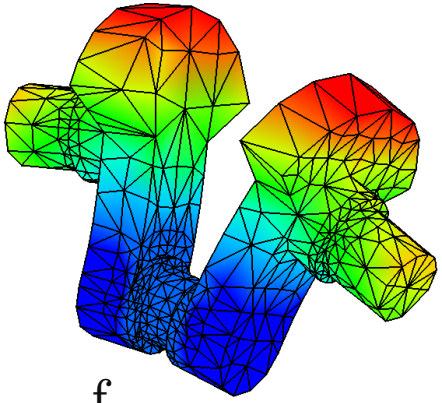
Toruselemente



Aktueller Leistungsumfang

- Lineare Elastizität mit Kontakt
- Nichtlineare Strukturmechanik
- **Eigenschwingungen**
- Stationäre Thermomechanik





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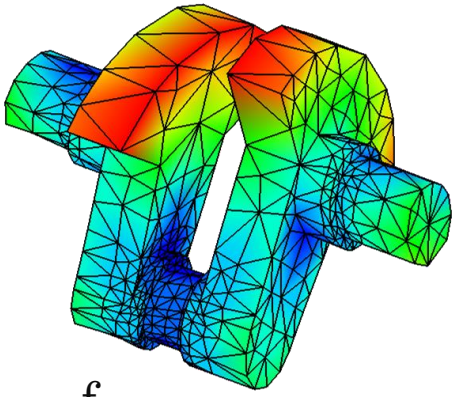

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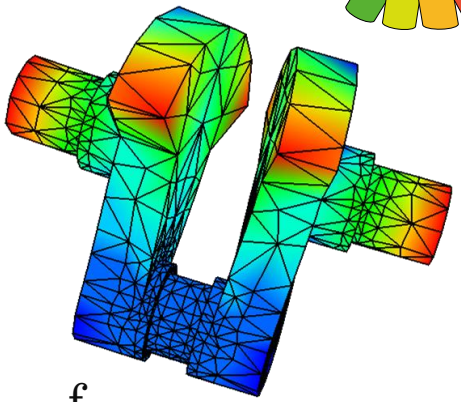
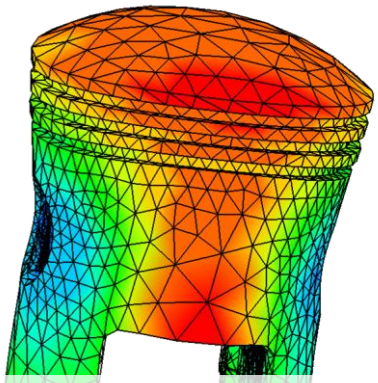


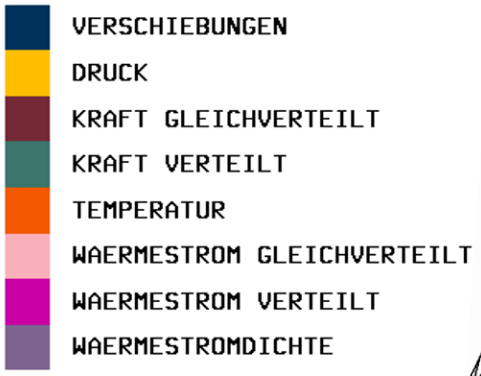
f_3

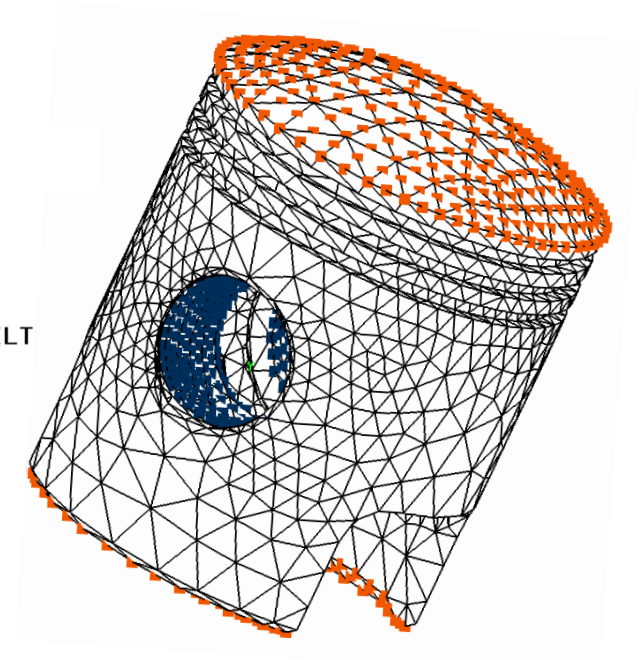
Z88Aurora®
Aktueller Leistungsumfang

- Lineare Elastizität mit Kontakt
- Nichtlineare Strukturmechanik
- Eigenschwingungen
- Stationäre Thermomechanik

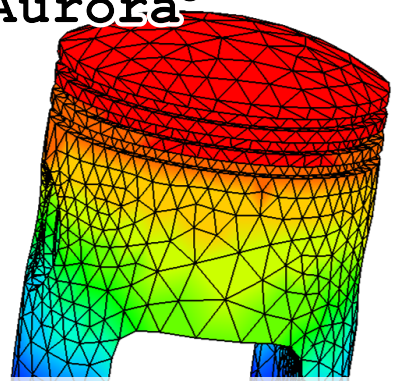


Gesamtverformung





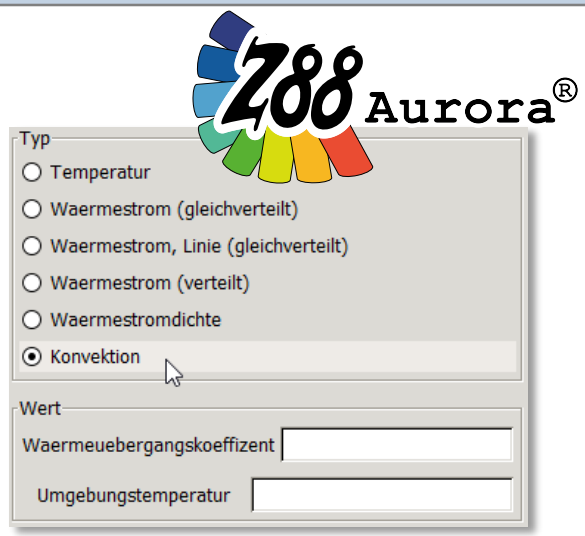
Z88 Aurora®

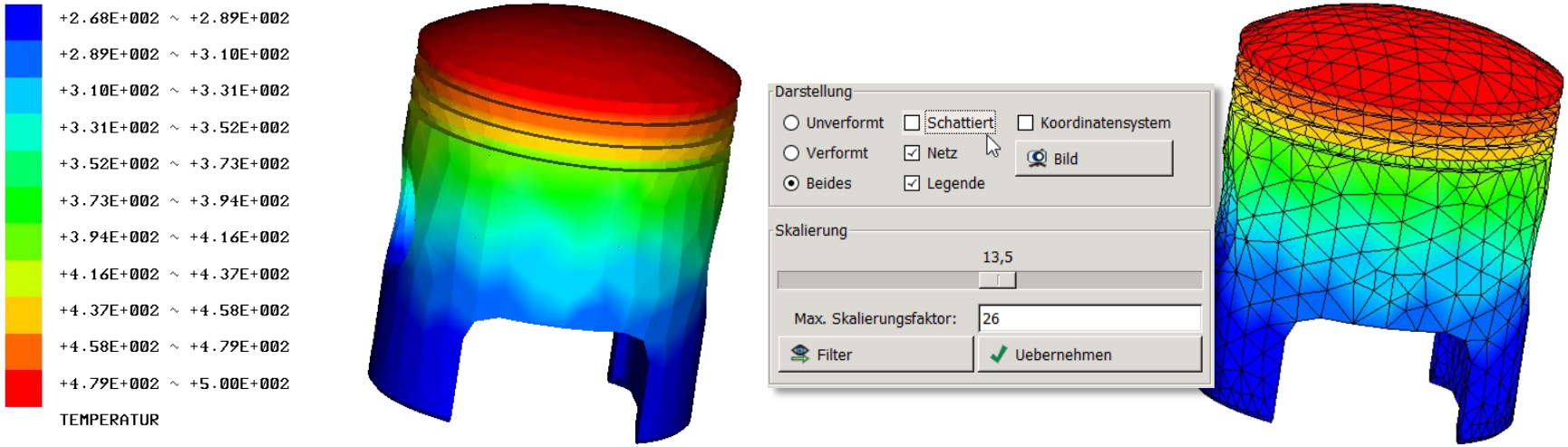


Temperaturverteilung

Z88Aurora®
Ausblick für V5

- Lineare Elastizität mit Kontakt
- Nichtlineare Strukturmechanik
- Eigenschwingungen
- Stationäre Thermomechanik
  + konvektiver Wärmeübergang
- Erweiterung der Visualisierung im Postprozessor





ESSBe

Easy Sandwich Struktur Berechner für KMU

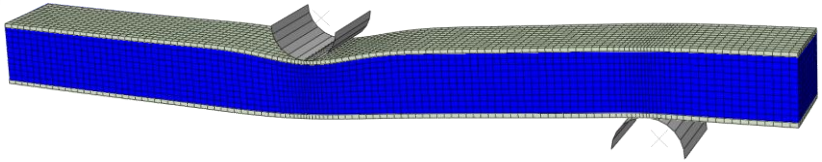
LAMILUX

MÜHLMEIER composite

FRANKIA

hydewa®

AL-KO



www.essbe.lscad.de

Europäische Union
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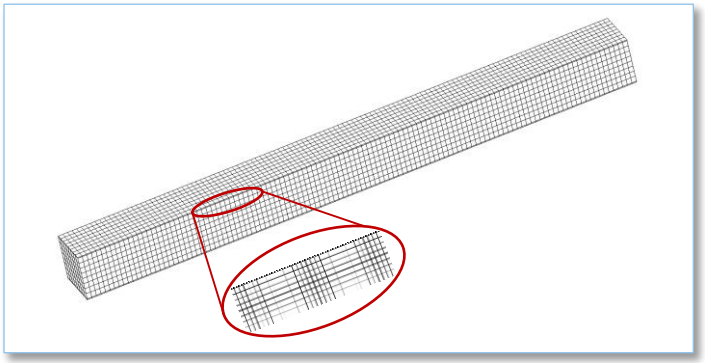
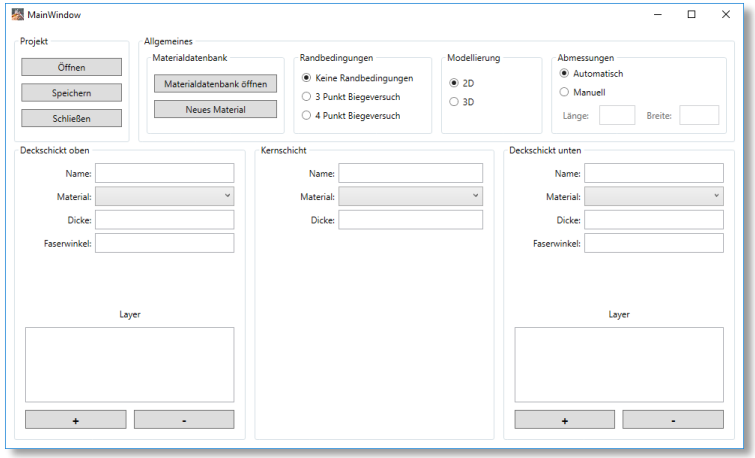
ESSBe

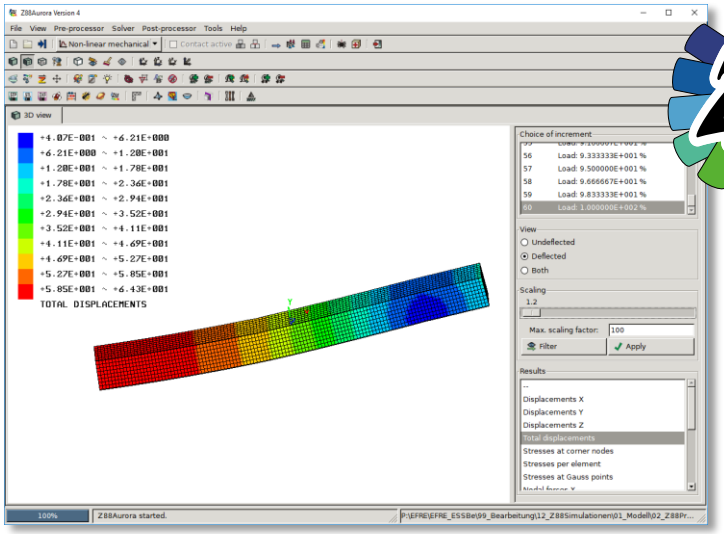
Easy Sandwich Struktur Berechner für KMU

Struktur Generator



Sandwich Modeler





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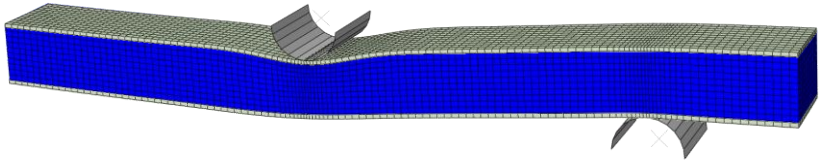

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Vielen Dank für Ihre Aufmerksamkeit.

Z88 Arion®

Z88 Aurora®