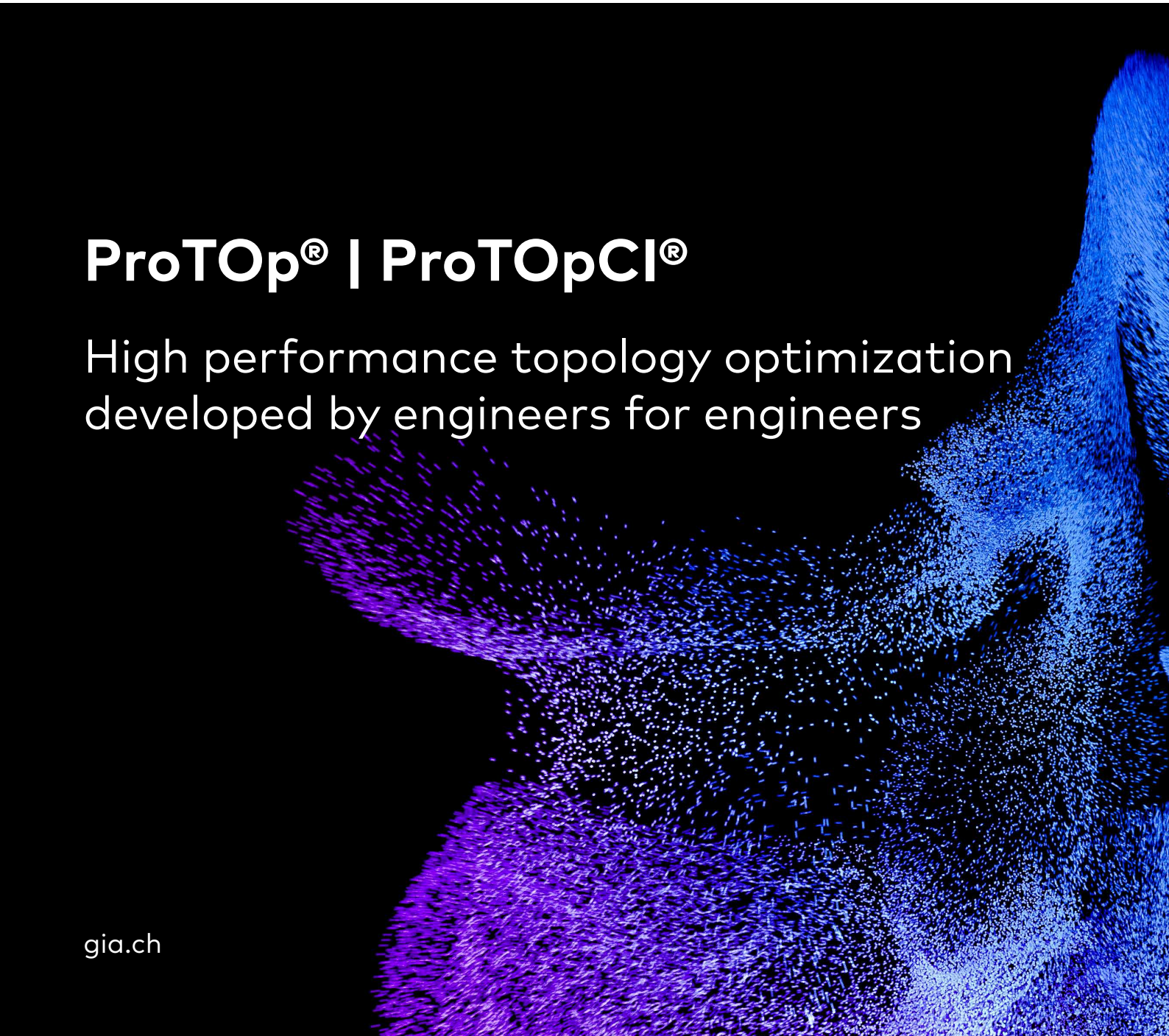
ProTOp® | ProTOpCI®

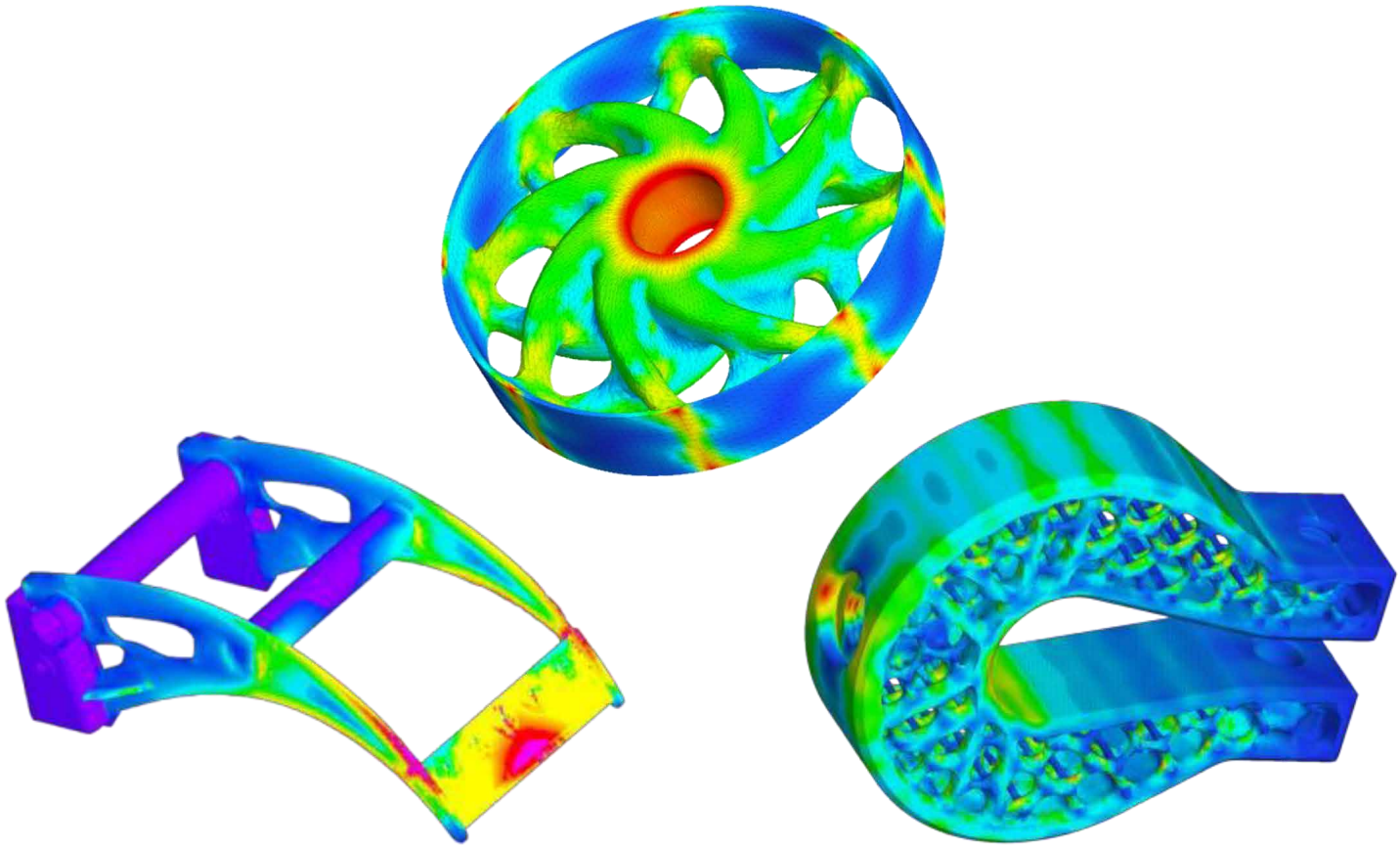
High performance topology optimization
developed by engineers for engineers



gia.ch

ProTOp® | ProTOpCI® is a standalone topology optimization software

It takes as input FNF and INP files, generated by PTC® Creo® and Simulia Abaqus®, SolidWorks® Simulation.



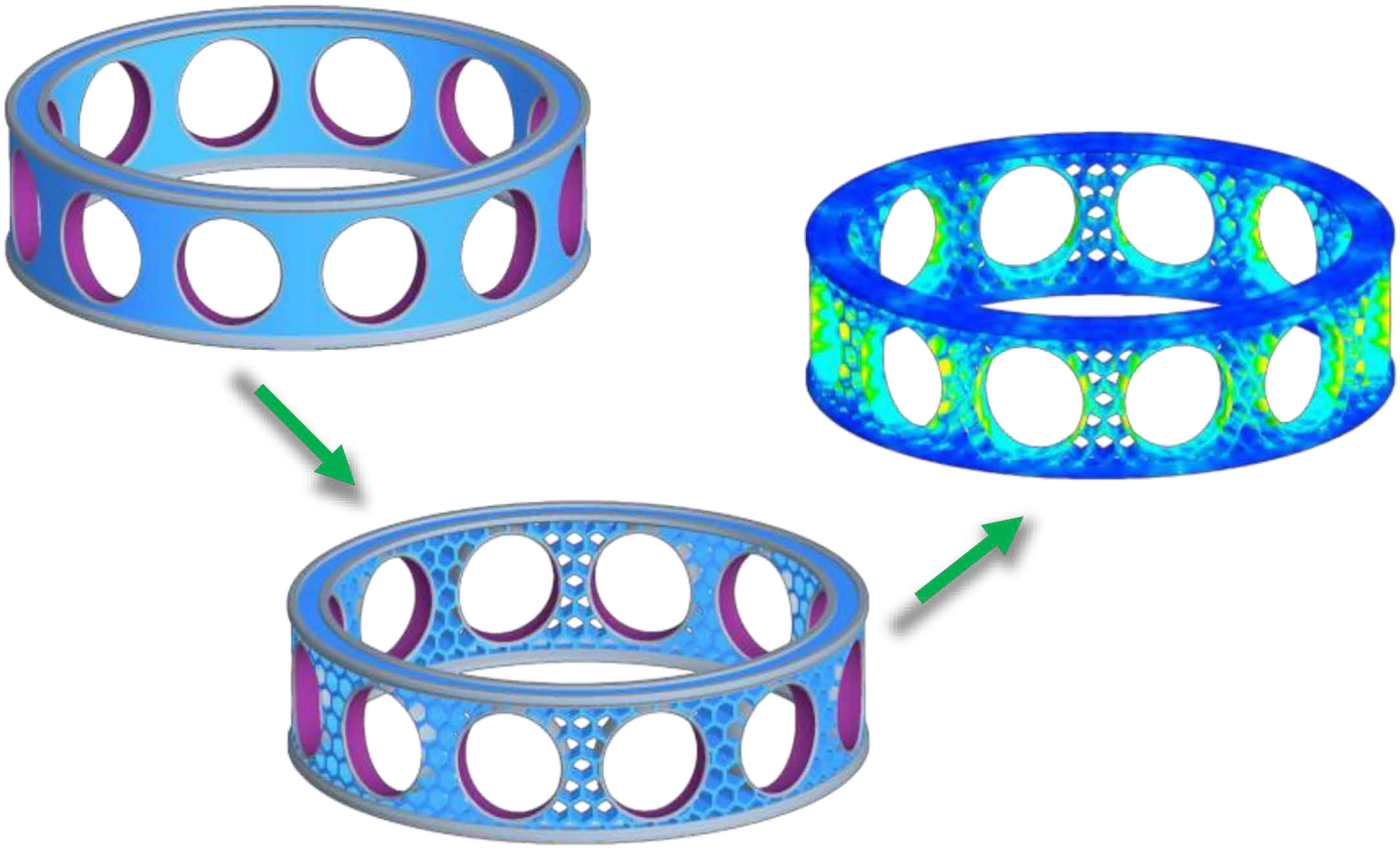
Explore ProTOp® | ProTOpCI® Capabilities

- Easily find minimum-strain energy designs that exhibit minimal stresses, while efficiently removing stress concentrations
- Prolong the life span and increase the resistance to crack fatigue of your structural parts
- Reduce the weight and material cost of your products
- Efficiently solve multi-million-element models, involving contacts and plasticity if required
- Deliver high-quality optimized designs
- Smooth and improve the design obtained, and export it to popular CAD and 3D printing formats
- Easily create innovative shell or/and lattice designs
- Generate and adjust your desired lattice configuration on the fly
- Immediately optimize your lattice structure to remove stress concentrations

Lattice structures in ProTOp® | ProTOpCI®

ProTOp® | ProTOpCI® contains powerful configuration tools. It reconfigures any solid region into a lattice, shell or mixed structure. ProTOp® | ProTOpCI® tools perform this for you numerically – no CAD work is required.

- Prepare the CAD model of your solid part, in your favorite modeler
- Apply BCs as usual, to define and complete your FEA model
- There's no need to carry out CAD modeling of a shell or lattice structure
- Import your FEA model into ProTOp® | ProTOpCI® and select the desired lattice pattern
- Adjust your lattice configuration as desired
- Create any number of additional (different) lattice configurations, if required
- Quickly check your design by running ProTOp® | ProTOpCI® initializiation FEA
- Simply proceed with optimization cycles to improve the design and remove stress concentrations
- Use ProTOp® | ProTOpCI® export tools to smooth and export your design

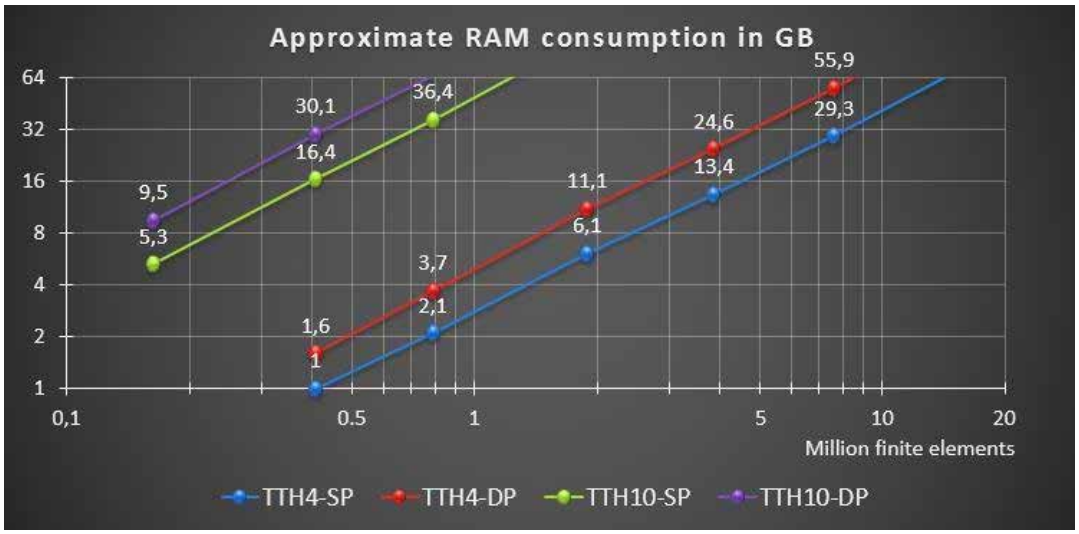


ProTOp® or ProTOpCI®?

ProTOp® | ProTOpCI® share the same numerical procedures, making them identical in the computational sense. The only differences are related to their import capabilities and interfacing features, as indicated in the following table:

	ProTOp®	ProTOpCI®
FEA model import from	• PTC Creo® FNF file • Simulia Abaqus® INP file • SolidWorks® Simulation INP file	• PTC Creo® FNF file
Integration plug-in for	• PTC Creo®	• PTC Creo®

- Specialized custom-coded finite elements
- Hybrid custom-coded evolutionary/level-set optimizer
- High-performance sparse SLE solver
- Only highly parallelized HPC code
- Semi-active element technology
- Smart Start – from functionality
- Interactive load case management
- Special semi-contact elements for efficient contact and fastening modeling
- Special semi-plastic elements for better designs
- Unique shell and/or lattice generation and optimization tools
- Numerical shell or lattice generation from solid models – no additional CAD work necessary
- Full 3D (solid finite element) lattices – immediately ready for optimization with ProTOp® | ProTOpCI®



In practical topolgy optimization, FE models quickly become quite large, because of the need to use rather small elements. Finite element analysis of such models requires a large amount of memory (RAM) to solve the problem in a reasonable time. ProTOp® | ProTOpCI® are very efficient in terms of CPU Time and RAM consumption, but in spite of that, limited RAM may quickly prevent computing the results efficiently. To get a feeling for approximate RAM requirements, the figure below despicts the situation for a simple test structure, meshed by tetrahedrons (full material design; no void regions).

CAESS d.o.o.
Tržaška cesta 65
2000 Maribor, Slovenia

E-Mail: info@caess.eu
Web: www.caess.eu

Reseller Europe

Urs Simmler
CAD Simulation Specialist

GIA Informatik AG
Peyermattstrasse 3
4665 Oftringen

Phone: +41 62 789 73 08
Mobile: +41 76 574 90 16
Email: urs.simmler@gia.ch