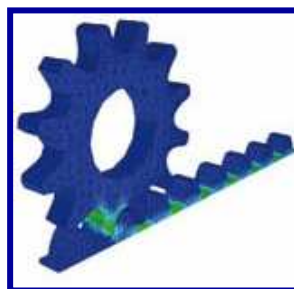
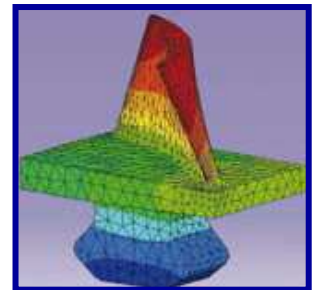
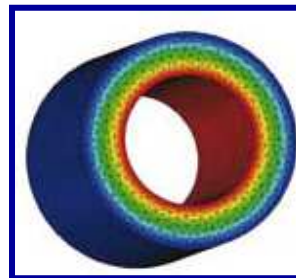
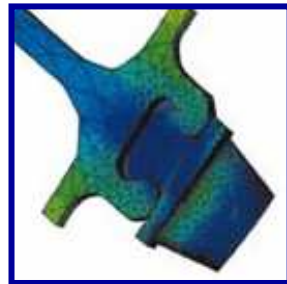


SAMCEF Express

Thermo-mechanical non-linear
analysis within CATIA V5



SAMTECH brings its specialized thermo-mechanical expertise within CATIA V5 environment.

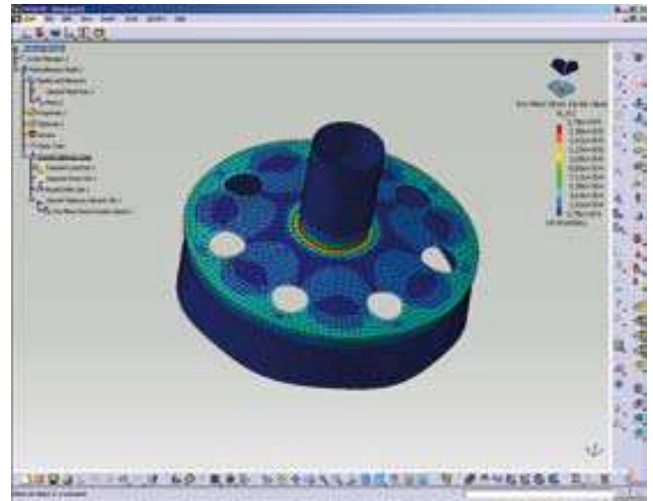
CAD integration of thermo-mechanical Finite Element Analysis using SAMCEF

Thanks to SAMCEF Express, CATIA V5 users benefit from SAMTECH recognized expertise in high quality Finite Element Analysis, respectively for preliminary design activities and for detailed verifications (stress analysis). Using these products embedded in CATIA V5, they can perform:

- Transparent mechanical simulations within an integrated CAD/CAE software for non-linear mechanical design;
- Transparent thermal simulations within an integrated CAD/CAE software for non-linear thermal design;

Whatever your industrial sector

With SAMCEF Express, SAMTECH targets respectively design and detailed verification of customer activities from the whole mechanical industry (aeronautics, space, defense, ship building, energy, car, trucks, railway, sport industries...), using CATIA V5 as CAD/CAE integrated platform and SAMCEF as Finite Element Analysis solver. The proposed wide range of analysis capabilities helps the designers and the analysts to eliminate the expensive iterations during the engineering process and to dramatically reduce the need of physical prototypes.



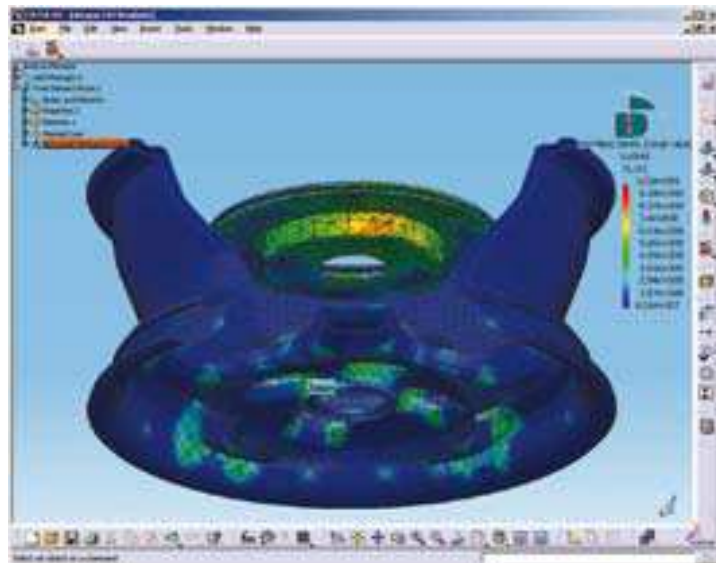
Modeling Environment

SAMCEF Express is embedded in CATIA V5 for CAD based FE modeling, non-linear thermo-mechanical analyses and post-processing of FEA results.

Users benefit from advanced visualization tools of CATIA V5, allowing very efficient and straightforward pre- and post-processing of the above-mentioned analyses.

Advanced FEA/CAE capabilities

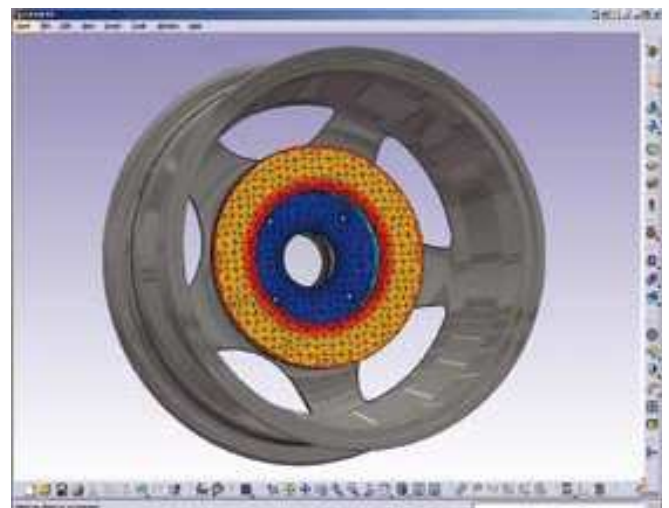
- Non-linear thermo-mechanical Finite Element Analysis;
- Non-linear structures and flexible-flexible contact;
- Large deformations;
- Transient analysis.
- Stationary and transient thermal analysis;
- Convection and fluid temperature;
- Thermal flux;
- Interface conditions;
- Mutual radiation.



Brake Disk in Thermomechanics

Customer Benefits:

- Perform product engineering optimization in a single environment
- Increase productivity thanks to full associativity between CAD and CAE models
- Easy transparent use of advanced non-linear of mechanical and thermal FEA
- Virtual testing: avoid expensive re-design and reduce costs of prototyping
- Increase quality and reduce time to market



Temperature Field with the rim

Boundary conditions

- Periodic condition
- Restraints

Different restraints can be imposed to fix all the degrees of freedom on a geometry selection (clamps), to fix some degrees of freedom along the normal of a surface (surface slider), to fix any combination of degrees of freedom (advanced restraint) or to generate statically determinate supports on a part (Isostatic restraint). Ball joints, pivots and sliding pivots can also be used.

- Enforced displacement

Translational and rotational displacements can be prescribed by the user.

- Contact conditions

Contact condition between parts can be deformable-deformable rigid joint, stick joint, tightening joint... The complete set of CATIA analyses connection can be used.

- Temperature field

The temperature field can be imposed by the user or computed via a thermal analysis.

- Imposed temperatures

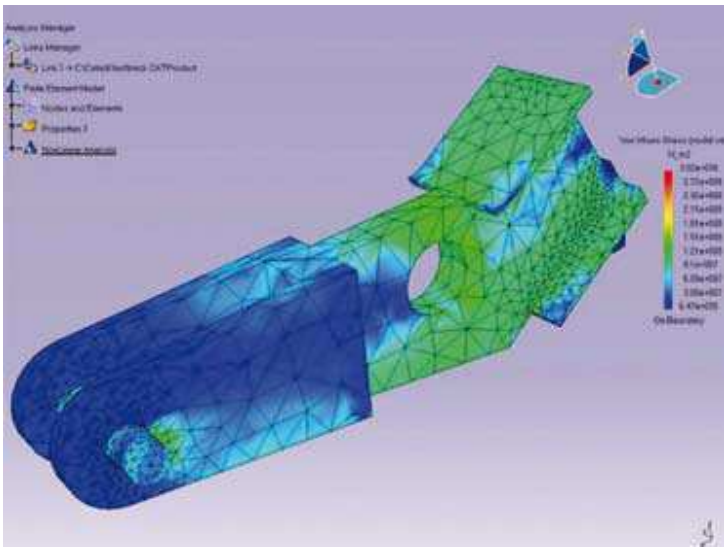
Initial and prescribed temperature field can be defined on geometry.

- Interface conditions

Interface conditions between parts: dissipation, conduction.

- Temperature bounds

Temperatures will only take value from a given range.



Thermal loads

- Imposed point flux

The simplest thermal load is a point flux that can be defined on a selection of points.

- Imposed distributed flux

It is possible to apply a distributed flux over a surface.

- Convection coefficient and fluid temperature

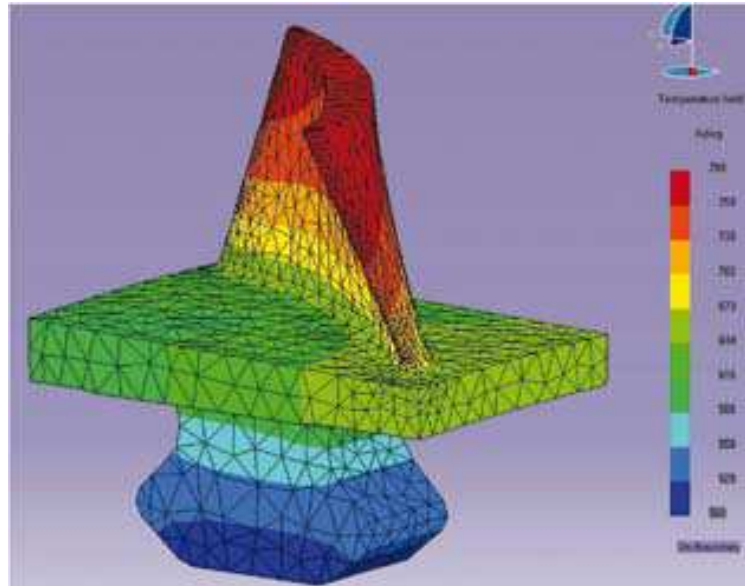
Convection coefficient and fluid-fluid temperature can be defined on each faces of volumic parts.

- Mutual Radiation

View factors and mutual radiation between bodies.

- Time dependency

Thermal loads and restraints can be time dependent.



Conduction heat transfer

TEA Thermal provides you with comprehensive and very powerful software for thermal steady state analyses. For the conduction analysis with SAMCEF Express, 3D, 2D, 1D linear and quadratic elements are available. Axisymmetrical hypotheses are available in 2D and 1D. The conduction is isotropic or orthotropic. The thermal properties can be time or temperature dependent.

Mechanical loads

- Distributed Force or Moment

The definition of a distributed force system equivalent to a pure force at a point or of a local moment is allowed.

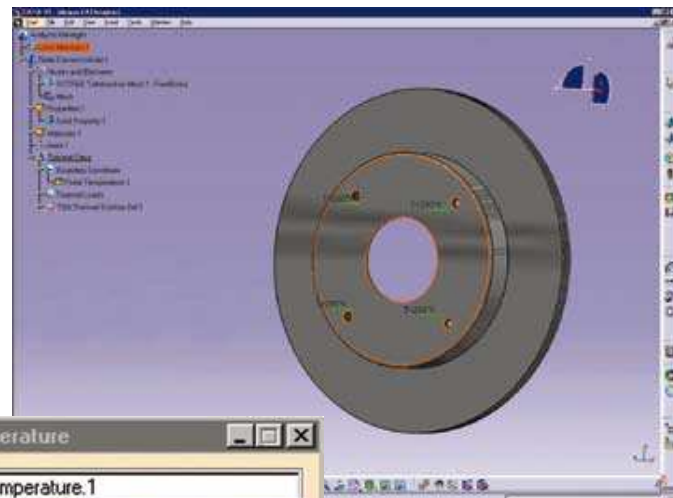
- Force Density

It is possible to generate a line force field of given uniform intensity on a part edge (Line Force Density), a surface traction field on a part face (Surface Force Density) or a volume body force field on a part (Body Force).

- Pressure field

Documentation

For direct access to information, the Users Guide and Help manual are available on the CD-Rom (PDF file)



Technical Characteristics:

SAMCEF Express offers non-linear thermo-mechanical analyses directly accessible from CATIA V5 environment.

General capabilities

- Solution based on CATIA V5 GPS (Generative Part Structural Analysis)
- Control of mesh refinement

Prerequisite CATIA V5

- GPS
- Optional:
 - GAS (Analysis Connections)
 - EST (Advanced pre&post processing)

Formulation

- Finite Elements

Transparent Non-Linear Analysis

- Minimum data definition for static analysis
- Automatic choice of solver strategy
- Very robust contact algorithms
- Automatic storage of intermediate configurations
- Steady state heat transfer
- Transient analysis

Element Library

- 3D: volume, membrane, Mindlin shell, membrane shell, beam, pipe, rod
- Axisymmetrical: volume, Mindlin shell, membrane
- 0D: nodal capacity

- Plane Strain: volume, Mindlin shell, membrane

- Plane Stress: membrane, rod
- Linear or quadratic

Material laws

- Elastic, orthotropic and elastoplastic material laws
- Time and temperature dependent
- Isotropic and orthotropic conductivity (temperature dependant)
- Composite property from composite design workbench

Restraints

- All native GPS restraints (clamps, surface slider, ball joint, pivot, sliding pivot, advanced restraints)
- Clamps
- Advanced restraints
- Surface Slider

Mechanical loads and boundary conditions

- Time dependent
- Periodic conditions
- Enforced displacement (translation/rotation)
- Distributed force or moment
- Lineic force density

- Surfacic force density
- Body force
- Pressure field
- Distributing mass and inertia
- Temperature field

Thermal boundary conditions

- Imposed temperature
- Imposed flux
- Convection coefficient and fluid temperature
- Interface conditions
- Time dependent
- Temperature bound
- Initial temperature field
- Mutual radiation

Contact conditions

- Flexible-flexible contact defined between geometrical faces
- Tightening joint
- Welded joint
- Stick joint
- All native GPS analysis connection
- Pressure fitting

Available results

- Successive configurations
- Von Mises stresses
- Plastic strains
- Contact pressure
- Temperature field
- Flux field

About SAMTECH

SAMTECH is a European specialist in Computer Aided Engineering (CAE) software for Finite Element Analysis (FEA) and Multi-Disciplinary Optimization (MDO).

Founded in 1986 from the Aerospace Laboratory of University of Liege, SAMTECH develops and markets the general-purpose Finite Element Analysis code SAMCEF, the Multi-Disciplinary Optimization platform BOSS quattro, the Open CAE Design Framework CÆSAM and the multi-physics solver OOFELIE. SAMTECH Group is present in Belgium, France, Germany, Italy, Spain, UK and China for technical support, sales and engineering services.

The company relies also on a network of technically advanced distributors in other markets all over the world. SAMTECH is a DASSAULT Systemes partner for the development of its products embedded in or connected to CATIAV5. SAMTECH is a partner of CEA and JRC for the development and the commercialization of the explicit code EUROPLEXUS (impact, explosion and fluid-structure interactions).

SAMTECH is also NAFEMS member and is certified to ISO9001:2000 quality standards. The software technology of SAMTECH has an unsurpassed reputation for its quality and reliability. It has been adopted by many major companies across all engineering disciplines as an integral part of their design process.



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SAMTECH, integrating CAE towards Professional Solutions

Need some information about SAMCEF Express?

Need some information about non-linear thermo-mechanical analyses?

Need some information about SAMTECH expertise ?



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