The Scanco Finite Element software consists of several additional software modules to enable Finite Element (FE) analyses. With this type of analyses it is possible to simulate mechanical tests in order to calculate bone mechanical properties and loading conditions.

**Includes**

- A solver for linear elastic microstructural finite element analyses
- A solver for non-linear continuum finite element analyses using fabric/density based properties\(^1\)
- An export tool to convert micro-CT images to input files for 3rd party FE-solvers
- Tools for pre- and post processing

**Finite element solvers**

**Features:**

- Integrated in the standard evaluation-tasks workflow: FE-analysis can be started with a few mouse clicks
- Integrated in Scanco-IPL for scriptable user-defined analysis
- Contains a built-in library of pre-defined tests (compression, tension, torsion, bending etc.)
- Micro-FE models can represent the actual bone microstructure for linear elastic analysis
- Continuum-FE models can represent the homogenized bone microstructure for elastic/plastic/damage analysis\(^1\)
- Results of FE-analyses are stored in a database for easy access and comparison

**Applications:**

- **Mechanical analysis of XtremeCT images**
  - Well validated and standardized approach to measure *in-vivo* mechanical properties of bone
  - Measured mechanical properties include:
    - Stiffness
    - Failure load
    - Load distribution (cortical/trabecular)
  - Enables measurement of changes in mechanical properties over time

- **Mechanical analysis of vivaCT and microCT images**
  - Simulation of any mechanical test
  - Complete characterization of elastic properties of bone samples
  - Determination of bone tissue-level loading conditions

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For further information regarding the equipment and software as well as contract imaging research options contact SCANCIO Medical AG via email at: info@scanco.ch or visit our website at: http://www.scanco.ch

\(^1\) available Q4 2015

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Example 1: Finite element analysis of bone in-vivo measured with the XtremeCT. A compression test is performed on the measured section of the radius.

Example 2: Von Mises stress distribution in a mid-section of the vertebrae (blue=low, red=high).

Example 3: Calculation of average elastic properties of a cube of trabecular bone
**SCANCO Finite Element Software**

### Export tool for FE-models

#### Features
- Supports MSC.MARCTM, ABAQUSTM and ANSYS™ format
- Voxel conversion and marching tetrahedrons algorithms
- Can generate 1st/2nd order hexahedron/tetrahedron models
- Can generate mixed hexahedron/tetrahedron models
  (bricks inside, tetrahedrons at the surface)
- Built-in library of pre-defined tests for easy generation of boundary conditions
- Can assign voxel density-dependent element material properties to micro-FE analysis
- Can assign homogenized density and fabric values to elements for continuum-FE analysis

#### Applications
- Prepare models for third-party FE-software

### Selection of recent publications using this software


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