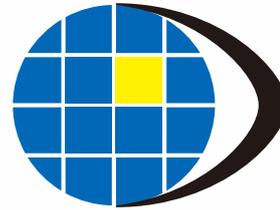


Annual Fee
\$2,399
(excluding taxes)

Free
for
60 Days



Femtet

Femtet - the ultimate tool for designers and researchers alike.
Our software simplifies your complex analysis tasks.



Murata Software



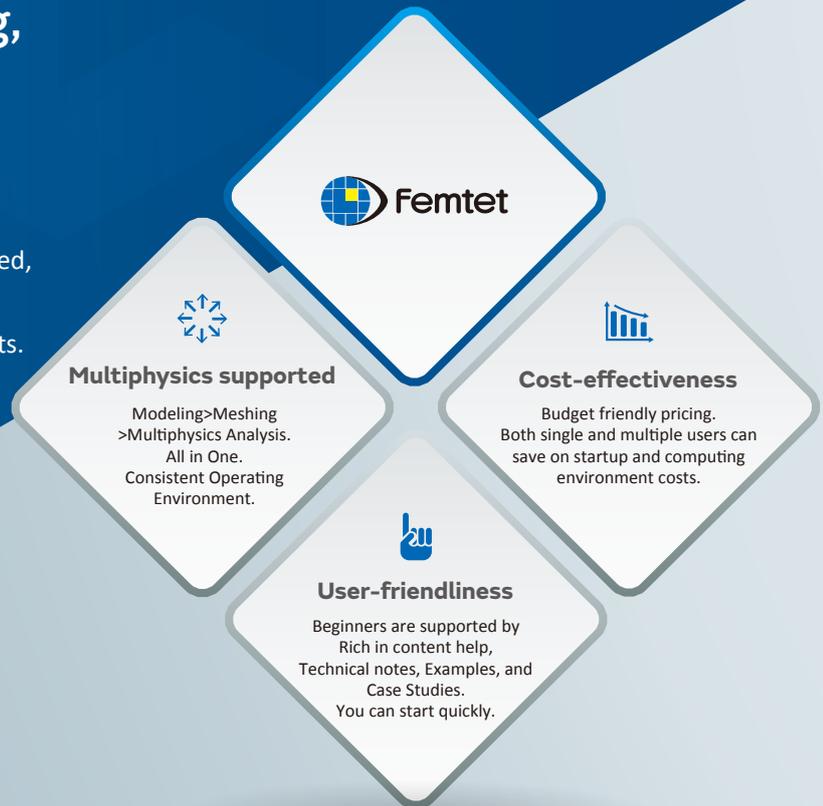
WEB



VIDEO

Femtet is Finite Element Method Software with intuitive tools. Effortless modeling, meshing, analysis, and viewing.

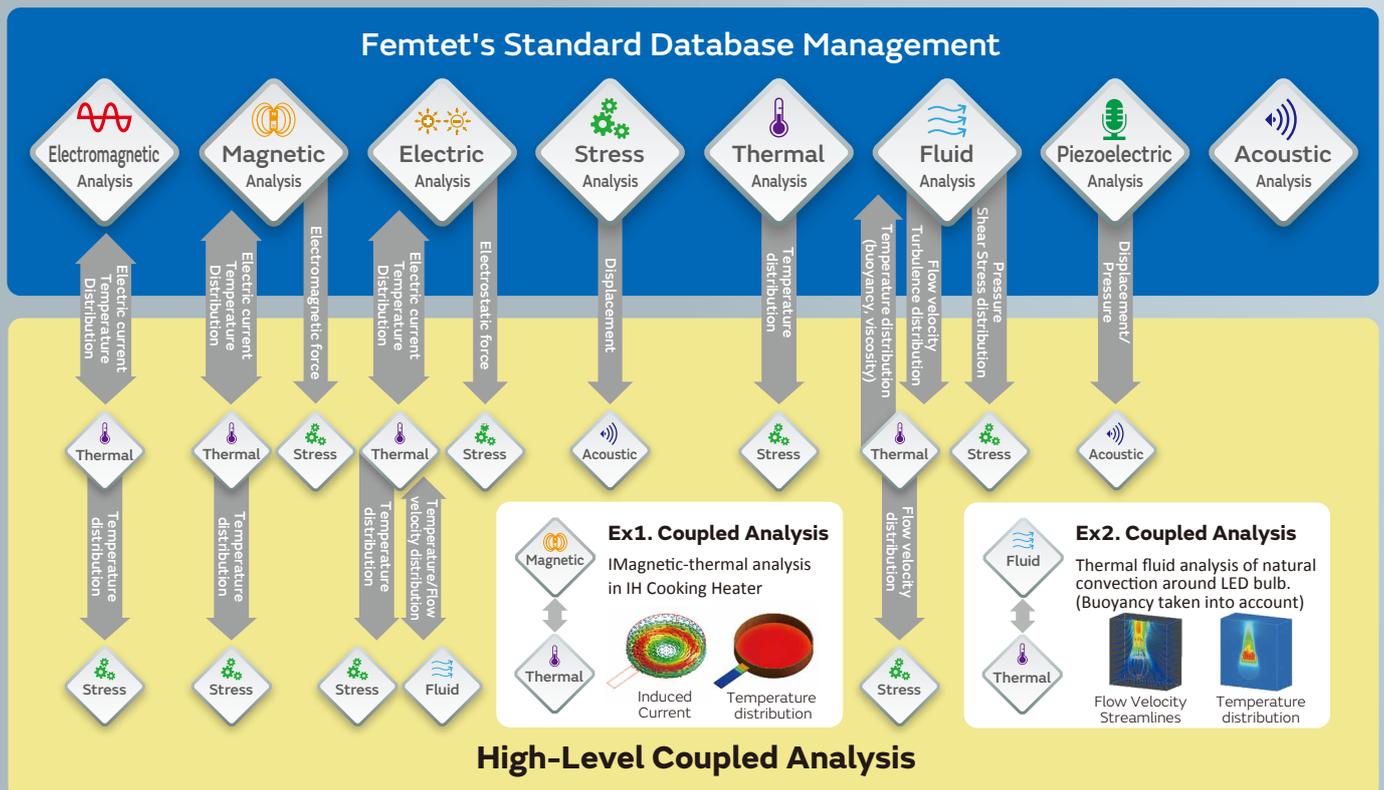
The result of decades of research and development by Murata Manufacturing Company. Femtet delivers on its core values: Multiphysics supported, user-friendliness, and cost-effectiveness. Femtet proposes designer-oriented analysis environments.



8 solvers in a single Femtet package Coupled Analyses available

A variety of analysis fields: Electromagnetic wave, Magnetic field, and Electric field; Stress, Thermal, and Fluid; Piezoelectric; and Acoustic. Multiphysics analyses combining those solvers are available.

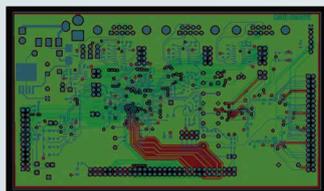
Femtet supports the database management system (DBMS) for materials, boundary conditions, body attributes, and modeling by default. Sharing databases among the developing group will improve the developing efficiency and speed.



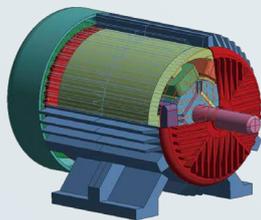
Intuitive comfortable operation

❖ Modeling (CAD feature)

Femtet provides CAD features that allow you to create your model or modify the imported CAD data with easy operation. Femtet also provides the healing function for detecting and correcting improper parts in 3D data. Femtet imports your CAD data in Parasolid (3D) , DXF (2D) or Gerber format by default. By adding optional packages, additional data formats can be imported.



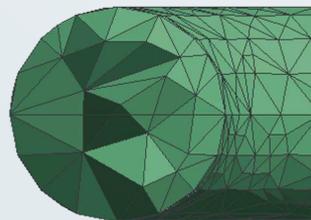
Gerber Import



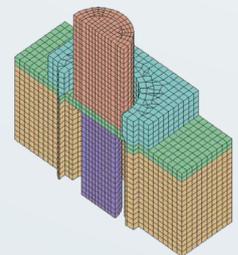
3D Modeling Ex. : Motor

❖ Meshing

Femtet automatically creates tetrahedral or hexahedral meshes with a simple button action. By setting mesh size locally, adaptive meshing, sweep meshing, or following the curved shape, high-quality meshes can be created. By setting bond boundaries, the coexistence of free meshes and sweep meshes is allowed without the restriction of node sharing.



Following to Curved Face

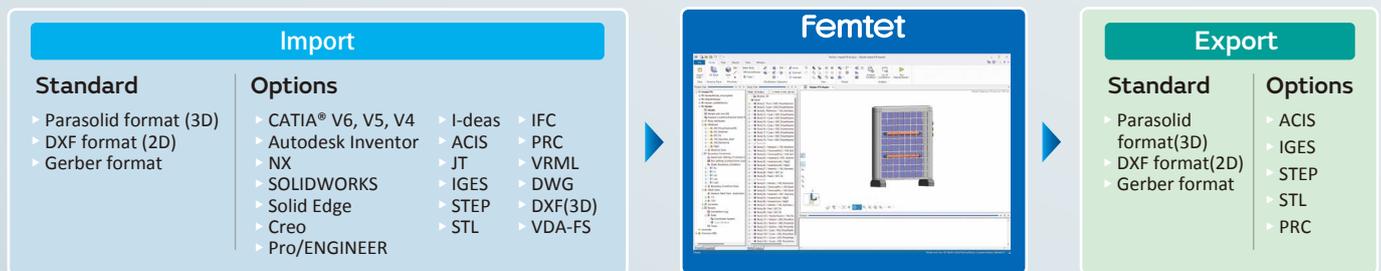


Hexahedral Meshes

❖ CAD Data Translator : Data format you can use

Femtet can import or export files in many data formats. You can directly use your saved CAD data in Femtet.

* CAD Data Translator is available in an optional package.



■ Modeling(CAD)/Meshing/Viewing

Solid Modeling	CAD features, Sketching, Boolean Operations, Cruising, Revolving, Lofting, Filletting/Chamfering, Shelling, Tapering, Offsetting, and More
Meshing	Elements (Triangle, Rectangle, Tetrahedron, Hexahedron), Auto meshing, Adaptive meshing (h method), Sweep meshing, and more.
Viewing	Mesh/Displacement/Contour/Vector/Cross Section diagrams, Graphs, CSV output file, Results in lattice, Multiple windows, Animation, and more

■ CAD Interface

Standard	Import	Parasolid format (.x_t, x_b), DXF format (.dxf), Gerber format
	Export	Parasolid format (.x_t, x_b), DXF format (.dxf), Gerber format
Options	Import	CATIA V6, CATIA V5, CATIA V4, Autodesk Inventor, NX, SOLIDWORKS, Solid Edge, Creo, Pro/ENGINEER, I-deas, ACIS/JT/IGES/STEP/STL/IFC/PRC/VRML/DWG/DXF(3D)/VDA-FS Formats
	Export	ACIS/IGES/STEP/STL/PRC formats

■ System Requirements

OS	Windows11, 10 (64bit)
Minimum System Specification	Minimum 1GB RAM, minimum 10GB HDD
Recommended Specification	Multi Core CPU, and Minimum 16 GB RAM

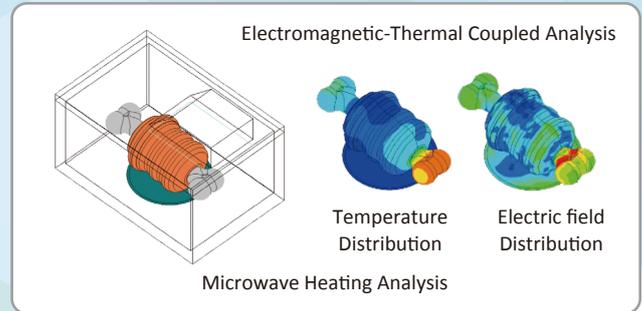
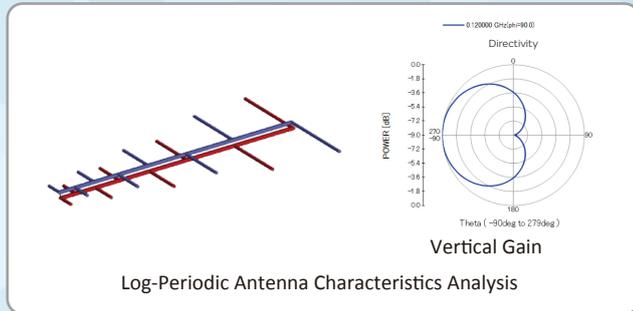
Wide range of applications covered by basic and optional

❖ Analysis Solvers



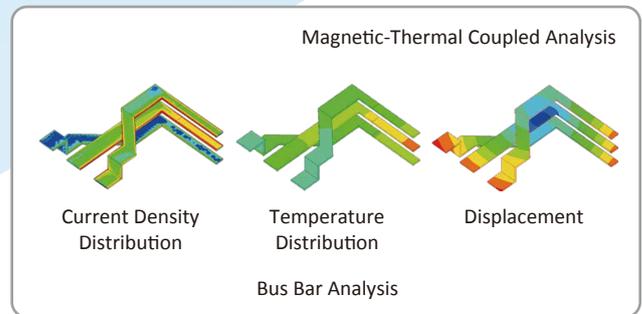
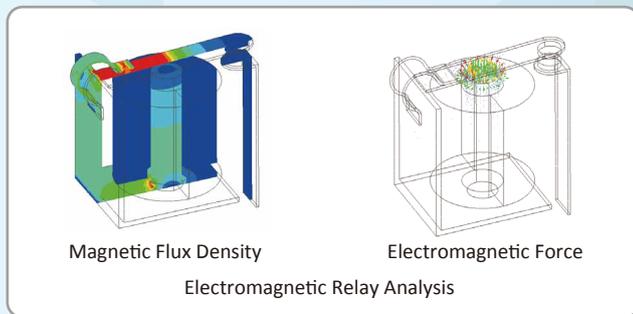
Electromagnetic Solver (Hertz)

Hertz can solve the propagation constant for waveguides, S-parameters, antenna directivity, radiation efficiency, noise, and other various electromagnetic problems.



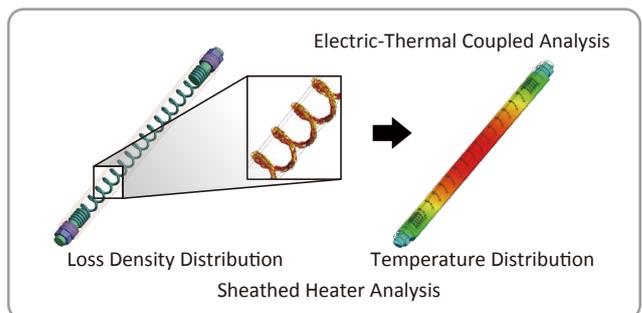
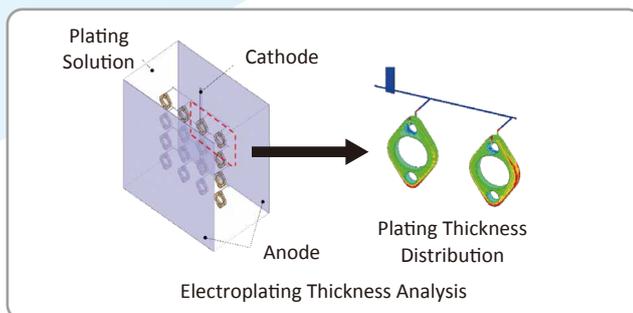
Magnetic Solver (Gauss)

Gauss solved the magnetic field distribution from coil or magnet. Harmonic analysis calculates an induced current in a conductor. Inductance and coupling coefficient are solved.



Electric Solver (Coulomb)

Coulomb solves the electric field of dielectric materials or conductors. The capacitance and resistance across electrodes are solved.



<p>Electromagnetic Solver (Hertz)</p>	Analysis Types	Harmonic Analysis, Resonant Analysis, Waveguide Analysis, Transient Analysis*
	Materials	Dielectric Material (Isotropic/Anisotropic/Temperature Dependent), Magnetic Material (Isotropic/Anisotropic), Conductor, Multilayer Conductor
	Boundary Conditions	Electric Wall, Magnetic Wall/, Ports (Power, Voltage, Current), Periodic/Open/Lumped-constant (LCR/S-parameters) boundaries
	Obtained Properties	Electric Field, Magnetic Field, S-parameters, Resonant Frequency, Propagation Constant, Directivity, Characteristic Impedance, Radiation Efficiency, SAR, Surrounding Electromagnetic Field, TDR
	Others	Fast Frequency Sweep, Thin Electrode Element, Surface Roughness, Differential Transmission Lines, Incident Wave, Parallel Discrete Sweep, Interpolation Sweep
<p>Magnetic Solver (Gauss)</p>	Analysis Types	Static Analysis, Harmonic Analysis, Transient Analysis*, External Circuit Coupled Analysis*, Rotating Machinery*, Translational Machinery*
	Materials	Magnetic Material (Isotropic/Anisotropic/Nonlinear), Magnet (Linear/Nonlinear), Conductor, Temperature Dependent
	Boundary Conditions	Magnetic Wall/, Electric Wall, Open/Surface Impedance boundaries
	Obtained Properties	Magnetic Field, Magnetic Flux Density, Induced Current, Inductance Matrix, Electromagnetic Force, Impedance, Torque, Superimposed DC Characteristics, Joule Loss, Hysteresis Loss
	Others	Current Specified (I/O Face, Current Value, Turns, Phase), Bulk Coil, Magnetization *, Linkage with Motor Analysis of MATLAB® and Simulink**
<p>Electric Solver (Coulomb)</p>	Analysis Types	Static Analysis, Harmonic Analysis, Plating Analysis, Hall Element Analysis
	Materials	Dielectric Material (Isotropic/Anisotropic), Conductor (Isotropic/Anisotropic), Temperature dependent
	Boundary Conditions	Voltage Specified, Floating Electrode, Open/Periodic/Current/Resistance Boundaries
	Obtained Properties	Electric Potential, Electric Field, Electric Flux Density, Current, Capacitance Matrix, Electrostatic Force, Loss Density
	Others	Space Charge

* Optional License Required



Stress Solver (Galileo)

Galileo solves the distribution and magnitude of stress and the deformation of objects subjected to load, pressure, and forced displacement. It supports the resonant analysis, harmonic analysis (frequency response analysis) as well.

Stress Distribution during insert Stress Distribution after insert
Press-fitting/Contact Analysis

Apply a load of 120 kgf to the central circular section (diameter 100 mm)

Unreinforced Structure Reinforced Structure
Automobile Hood (Bonnet) – Static Analysis



Thermal Solver (Watt)

Watt solves the temperature distribution and heat flux in a solid. It supports the steady-state and transient analyses and nonlinear materials as well. With Galileo coupled, it can solve the thermal stress resulting from the temperature distribution.

Temperature Distribution Visualization Tool for Heat Path
Thermal Resistance Analysis for Module Devices

Thermal-Stress Coupled Analysis

Distribution of displacement in thickness direction Maximum Principal Stress
Substrate Warping Analysis



Fluid Solver (Bernoulli)

Bernoulli solves the flow field of gas or liquid. It can visualize the distribution of flow velocity or pressure by vectors, contours, streamlines. It supports the transient and diffusion analyses as well.

Flow Velocity Pressure
Flow Analysis

Air Age Calculation (Diffusion Analysis) Uniform Coating
Non - Uniform Coating
Slot Die Coating Analysis (VOF Method)

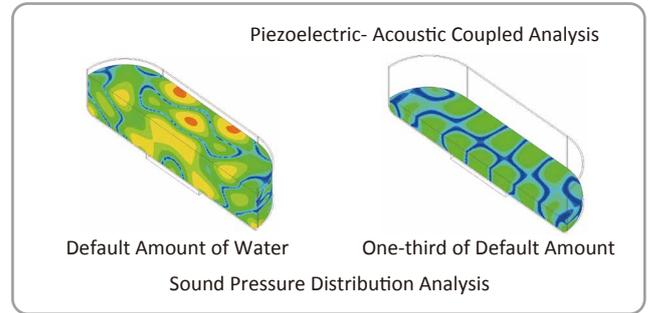
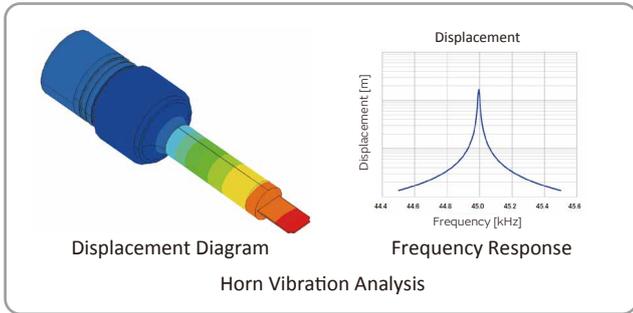
 Stress Analysis (Galileo)	Analysis Types	Static Analysis, Harmonic Analysis, Resonant Analysis, Transient Analysis*, Buckling Analysis (Linear), Large Deformation (Displacement/Strain*), Initial Stress Taken into Account
	Materials	Elastic (Isotropic/Anisotropic), Elasto-plastic*, Creep*, Viscoelastic*, Hyperelastic*, Linear Thermal Expansion Coefficient (Isotropic/Anisotropic), Temperature Dependent
	Boundary Conditions	Displacement/Lumped Load/Distributed Load/Pressure/Torque Load/Contact (Friction)/User-defined boundaries, Acceleration, Joint Load, Spring Connection, Remote Load, Rigid Face
	Obtained Properties	Displacement, Stress, Strain, Reactive Force, Contact Force, Strain Energy, J integral, Participation Factor, Effective Mass, Contacting Face Pressure, Contact Area
	Others	Acceleration, Centrifugal Force, Thermal Load (Possible To Be Coupled with Watt), Initial Strain, Birth/Death, Fatigue Life*, Rigid Body
 Thermal Solver (Watt)	Analysis Types	Steady-state Analysis, Transient Analysis, Simple Thermal-Fluid Analysis
	Materials	Isotropic/Anisotropic, Temperature Dependent
	Boundary Conditions	Temperature, Heat Flux, Heat Transfer (Coefficient Specified, Natural Convection, Forced Convection, Heat Sink), Heat Resistance, Radiation, User-defined Distribution
	Obtained Properties	Temperature, Heat Flux, Heat Density, Heat Flow, Heat Resistance.
	Others	Heat source
 Fluid Solver (Bernoulli)	Analysis Types	Steady-state Analysis, Transient Analysis, Thermal-Fluid Analysis (Forced /Natural Convection)*, Diffusion Analysis, Free Surface Analysis (VOF method)
	Materials	Density, Viscosity (Newtonian Fluid, Power - Law, Carreau Model), Molar Weight, Temperature Dependent *
	Boundary Conditions	Solid Wall (Static, Translational, Rotational), Slip Wall, Forced Inflow/Forced Outflow (Velocity, Flow, Pressure, Fan, Direction Specified, User User-defined Flow Velocity Distribution, Swirl), Natural Inflow/Natural Outflow, Inflow/Outflow Pair, Contact Angle
	Obtained Properties	Flow Velocity, Pressure (Static/Total), Turbulent Flow Energy K, Energy Dissipation Factor ϵ , Specific Dissipation Rate ω , Force on Wall Face, Volumetric Flow Rate, Pressure Loss, Operating Point of Fan, Heat Transfer Coefficient*
	Others	Laminar Flow, Turbulent Flow (Realizable K- ϵ , SST K ω), Internal Fluid Flow Specified, Porous Medium, Surface Tension

* Optional License Required



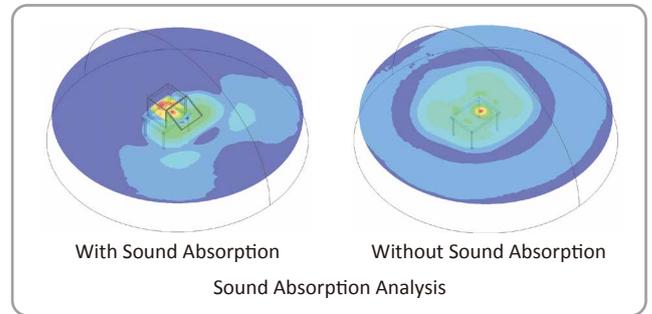
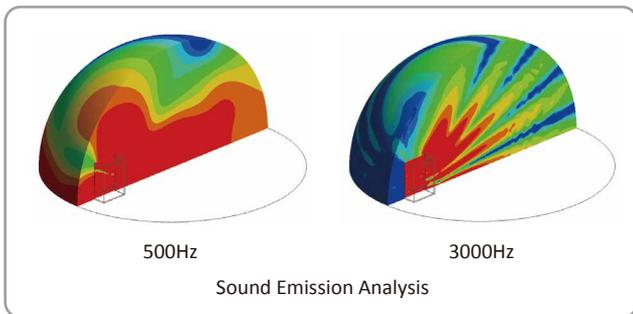
Piezoelectric Solver (Rayleigh)

Rayleigh analyzes piezoelectric devices, which use a piezoelectric crystal such as quartz as well as a piezoelectric ceramic, such as sensors, buzzers, and actuators. The vibration distribution and impedance characteristics are solved.



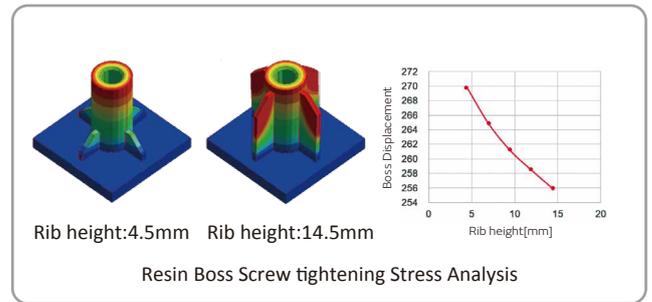
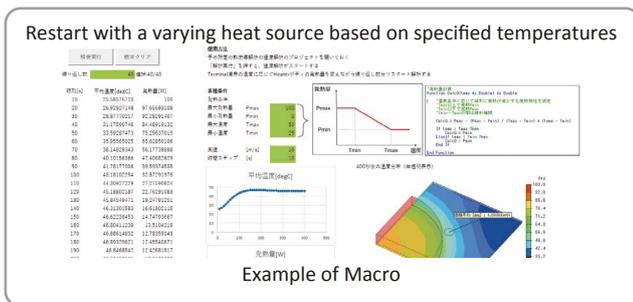
Acoustic Solver (Mach)

Mach analyzes reflection, resonance, directivity, and other sound characteristics. With Rayleigh coupled, it can analyze the sound waves emitted from the piezoelectric discs.



Macro, Parametric Functions

Macro allows you to control Femtet operations freely with VBA or Python. By setting and calculating automatically with multi-levelled design parameters, Femtet can achieve parametric analysis. It also supports batch analysis, allowing multiple projects to be calculated automatically in sequence.



	Analysis Types	Static Analysis, Harmonic Analysis, Resonant Analysis, Transient Analysis*, Initial Stress Taken into Account
	Materials	Piezoelectric Material, Dielectric Material (Isotropic/Anisotropic), Perfect Conductor (Isotropic/Anisotropic), Viscoelasticity
	Boundary Conditions	Electric Wall (Electric Potential Specified/Floating Electrode), Magnetic Wall, Displacement, Lumped Load, Distributed Load, Acceleration, Pressure, Torque Load, Remote Load, Simple Contact Acoustic Impedance, Open Boundary, Periodic Boundary, User-defined Distribution Boundary
	Obtained Properties	Displacement, Stress, Strain, Electric field, Electric Flux Density, Impedance, Electric Charge, Electric Potential, Current, Resonant Frequency, Contact Force, Contact Face Pressure, Contact Area
	Others	Fast Frequency Sweep, Acceleration, Thermal Load, External Resistance, Centrifugal Force, Coriolis Force
	Analysis Types	Harmonic Analysis, Transient Analysis
	Materials	Density, Sound Velocity, Frequency Dependent, Damping Medium
	Boundary Conditions	Displacement, Pressure, Speed, Sound Pressure Level, Acceleration, Rigid Wall, Open Boundary, Acoustic Impedance
	Obtained Properties	Sound Pressure, Sound Pressure Level, Particle Speed, Acoustic Intensity, A-weighted Sound Pressure Level, Directivity, Radiation Impedance, Loss Density, Loss
	Macro	VBA, Python, Visual Basic, C++, Language Description, Automatic Macro Generation (VBA/Python)
	Design Efficient Tools	Parametric Analysis, Batch Simulation, User Database Management, Nastran-format Mesh Import/Export, Healing, Model Generation from Mesh Data

* Optional License Required

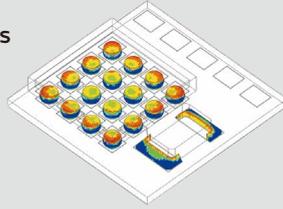
❖ Optional Solvers

Advanced Mechanical : Nonlinear Material (Elasto-plasticity, Creep, Viscoelasticity, Hyperelasticity) , Transient Analysis

Advanced Material can analyze elasto-plasticity of solder material, viscoelasticity of resin material, and hyperelasticity of rubber material.

■ Elasto-plastic Creep Analysis

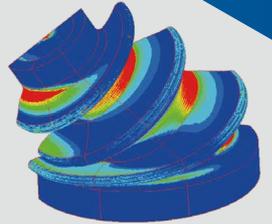
Solder's fatigue life can be calculated from the variation in accumulated equivalent inelastic strain under the heat cycle.



Solder's Fatigue Life Analysis

■ Hyperelastic Material Analysis

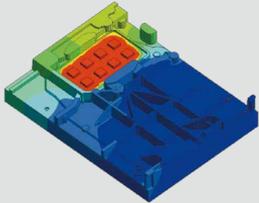
Large deformation of hyperelastic material, such as Neo-Hookean and Mooney-Rivlin, can be calculated. Curve fitting function is supported to identify the coefficient for each model from the multiple material test results.



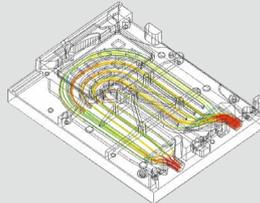
Driveshaft-Boot's Large Deformation Analysis

Thermal-Fluid : Thermal-Fluid coupled analysis

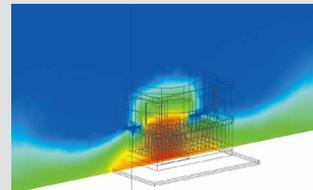
Thermal-Fluid can take into account heat transfer caused by advection (the phenomena of thermal energy carried by flow) and promoted by turbulent flow, and buoyancy caused by temperature distribution.



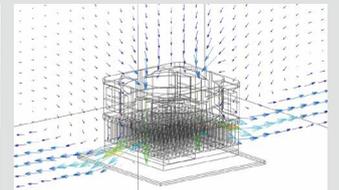
Temperature distribution
Cooling Heated Components with Water Cooled Heat Sink



Flow Velocity Streamlines



Temperature distribution

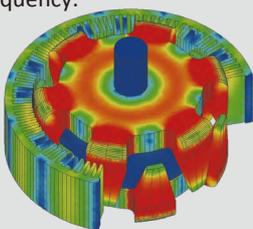


Flow Velocity Vectors

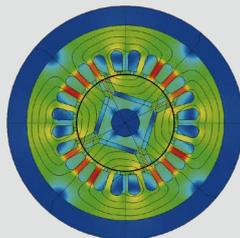
Cooling with CPU Cooler

Advanced Magnetic : Transient Analysis

Advanced Magnetic can calculate the time variation in magnetic field and magnetic flux density over time. Motors and generators can be analyzed, and those further including non-linear materials can be analyzed with respect to frequency.

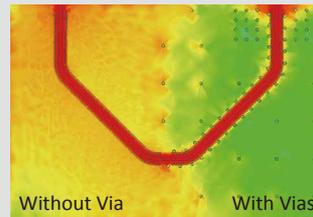


Motor Characteristics Analysis

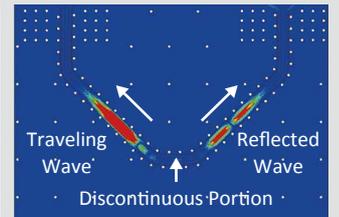


Advanced Electromagnetic : Transient Analysis

Advanced Electromagnetic can calculate the electromagnetic field in time domain. It can simulate ESD test or TDR.



Via Hole's Effect (ESD Analysis)



TDR Analysis

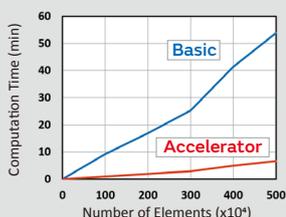
Accelerator :

Parallel Computation with Multi Core

Accelerator provides parallel processing to shorten the time to compute and display.

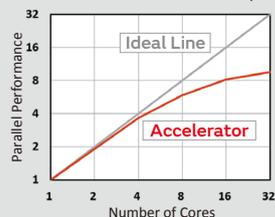
■ Number of Elements vs Calculation Time

(CPU: 38 cores)



■ Number of Cores vs Parallel Performance

(Ratio of multi-core calculation time to one core calculation time)



Workstation (Intel® Xeon® W 3375 2.5GHz, RAM 512 GB, Windows®10 pro 64bit) is used. Benchmark using the 2nd order element model in the Magnetostatic Analysis.

: Domain Decomposition Method

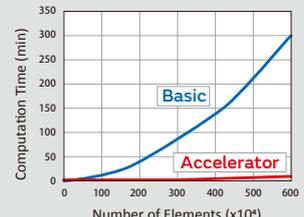
Domain decomposition method with high efficiency of parallel computing in the stress analysis is supported.

For the model with more than several hundred thousand meshes, the calculation time can be largely shortened.

* Contact/Spring Connection/Joint Load/Shell Elements are not supported.

■ Number of Elements vs Calculation Time

(CPU: 38 cores)



Femtet provides flexible options for your needs

❖ Packages

You can start by Femtet Basic. Additional option will enhance the performance. All packages are provided both in Japanese and English.

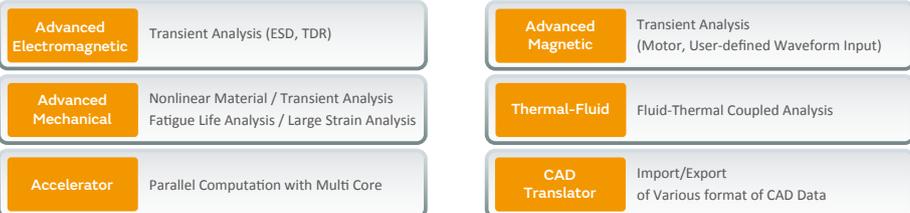
Femtet Basic



CAD
 Parasolid(.x_t, .x_b), DXF(.dxf), Gerber

CAD features (Modeling) , 8 solvers (Electromagnetic, Magnetic, Electric, Stress, Thermal, Fluid, Piezoelectric, Acoustic), and those couplings are available.

Options



By adding Advanced Electromagnetic, Advanced Magnetic, Advanced Mechanical, Thermal-Fluid, and Accelerator, Femtet's features can be expanded.

Femtet Academic

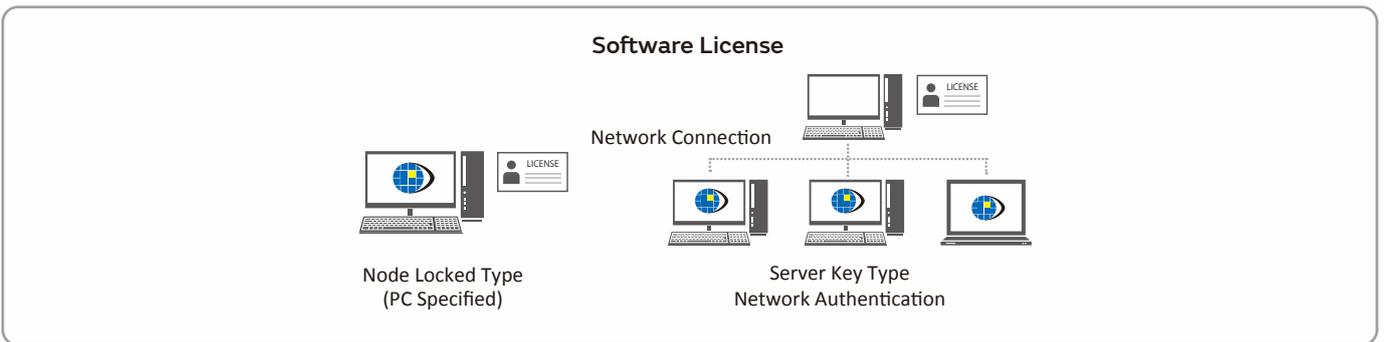




By paying \$499 per year, all functions of Femtet without CAD translator are available. (College, Specialized Vocational High School, and High School are subject to Femtet Academic)

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 Software License Key is available for a remote desktop.



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