Engineer's studio® Ver.9

Three-Dimensional Plate Dynamic Nonlinear Analysis Software


FORUM8's award-winning Engineer's Studio is a powerful 3D Fine Element Analysis program helping structural engineers meet the international requirements in modern civil engineering. Efficient data input and intuitive handling facilitate modeling of simple and large structures.

A modular software system, Engineer's Studio® is widely used by Engineers working in some of the world's most earthquake-prone regions to define the geometry, materials and loads for complex structural systems using a variety of element types.

With an extensive range of plugin modules available, Engineer's Studio® enables structural engineers to simulate the response of large structures under extreme seismic events.


Main Features

- General 3D FEM analysis package.

- Static, dynamic loading (time history analysis), Eigen analysis.

- Maekawa model. World leading model for nonlinear reinforced concrete 2D analysis.

- Good range of element types including Mindlin plate (6 DOF), fibre element, moment curvature models, rigid elements, true catenary cable elements, nonlinear spring elements (used for elastomeric bearings, soil/structure interactions etc) and viscous damping elements.

- Extensive nonlinear material models for steel, concrete, RC concrete and FRP.

- High performance calculation speed.

- Robust 3D graphical user interface.

- Large deformation analysis (Corotational method).

- Used in new designs and strengthening evaluations.

- Excellent cost performance.
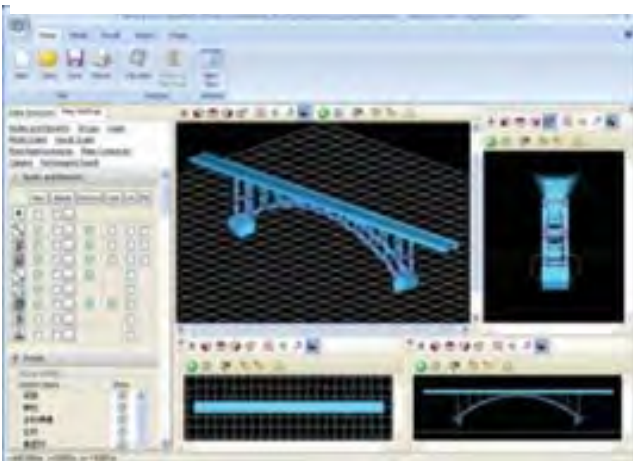
Software Overview

Engineer's Studio® covers the full range of analysis requirements from pre-processing through to post-processing. The program simulates the non-linear response of structures utilizing a variety of FEM element types and nonlinear material models.

The supported element types include 3D fiber beams , moment-curvature beam models, Reissner-Mindlin plates, 6 DOF springs and catenary cables among others. Static and dynamic analysis is supported incorporating material and geometrical non-linearity simultaneously. Plate elements have laminated material definitions. Each layer can have different thicknesses and material models defined. The Maekawa 2D non-linear RC model is applied to layers within a plate element thus giving it both in plane and out of plane nonlinear modelling abilities.
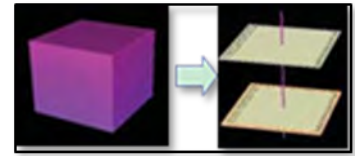
Fiber Elements
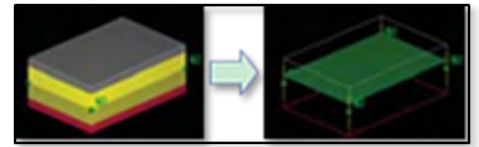
Laminated Plate Elements

Key Features

Category	Contents
Analysis	Static & dynamic analysis (Time history Newmark method)/ Eigen analysis / moving load influence line analysis (beam model)
Nonlinear Analysis	Material nonlinearity / geometric non-linearity (large displacement via corotational method)
Applied Theories	Small scale displacement / large displacement / elastic foundation beam on distributed springs / Euler-Bernoulli beam theory / Timoshenko beam theory (considering shear deformation) / Reissner-Mindlin theory
Elements	Elastic beam element / rigid element / spring element / M-φ element / fiber element / p late element (laminated plate)/ cable element / damping element (viscous damper)
Boundary Conditions	Free, fixed or spring for each degree of freedom at nodes / distributed foundation spring for elastoplastic beam element (3 translational components)/ coupling spring (define at node)
Material Types	Concrete / reinforcement bar / prestressed steel (cables and rods) / steel plate / carbon fiber sheet / aramid fiber / elastic material / non-structural material (Weight only to assist mass modeling)
Loading	Nodes : 6 DOF applied loads or forced displacements. Frame elements: Concentrated / distributed / projected loads / internal forces / thermal loads Plate element: Surface distributed load. Cable element: Distributed load / Temperature load
Auto Created Load	Dead load / prestressed load / horizontal static seismic coefficient load
Static Load	Monotonic increasing / cyclic (constant, increasing) / reversible cyclic (constant, increasing)
Dynamic Load	Acceleration wave (three translation components). Multi point acceleration and/or forced displacement time history analysis Direct integration method by the Newmark-β method(β=1/4)
Damping	Stiffness proportional per element / Rayleigh damping / Rayleigh damping per element / initial stiffness, instantaneous stiffness proportional
Mass Matrix	Consistent mass matrix / lumped mass matrix

Non-Linear Properties

M-ϕ Properties

- Skeletal structure: Bilinear (symmetrical, non-symmetrical) / Trilinear (symmetrical, non-symmetrical) /Tetra linear (symmetrical, non-symmetrical)
- Internal hysteresis: Normal/Takeda/Elastic/Origin-oriented/Origin - Max oriented

Spring properties

- Skeletal structure: Bilinear (symmetrical, non-symmetrical) / Trilinear (symmetrical, non-symmetrical) /Tetra linear (symmetrical, non-symmetrical) Nagoya Expressway Public Corporation's rubber bearing /BMR damper
- Internal hysteresis: Normal/Takeda/Elastic/Origin-oriented/Origin - Max oriented /Positive & Negative direction / Positive direction only / Shock absorber / Clough / Slip type / Gap or Hook type

Hysteresis (stress strain curve for fiber element)

- Concrete：Secondary curve／Hoshikuma／COM3／JSCE／Mander
- Reinforcement, steel plate, prestressing steel
- Skeletal structure: Bilinear (symmetrical, non-symmetrical), Trilinear (symmetrical, non-symmetrical)
- Carbon fiber, aramid fiber: Skeletal structure: Linear (tensile side only)

Fiber element

- Original: Non-linear beam element that uses rigid link / distributed spring element at each end. It ignores the effect of shear deformation.
- Linear: 2 node isoparametric element that uses a linear curve for geometry function.
- Quadratic: 3 node isoparametric element that uses quadratic curve for geometry function.

Engineer's studio **Support Services**

Software Development Kit SDK

A tool for software developers to customize the Graphical User Interface of Engineer's Studio®. Developers can create an independent binary that can access the input functions of Engineer's Studio®. The plug-in binary allows developers to create and edit data within a model.

Engineer's Studio® and the plug-in are coupled via COM. Any language compliant to the custom COM interface can be used. C, C++, and Delphi (in particular) can be used.

The pl ugin SDK is a development kit for directly creating input data for Engineer's Studio® / API is COM（Component Object Model）/ As long as you have access to a development environment that supports COM (C, C++,VBA, Delphi, etc.), you can create models freely. / DLL is created within the development environment, and after registering it to the OS, it can be run on Engineer's Studio® / You can input data on the input window that you created in your development environment as well save your original file / Engineer's Studio® is required to calculate the models and display the results.

SDK Example Use Cases

Case 1 : A cylindrical structure. The top and bottom surface of the cylinder are open. It is modeled using 1 mesh element.

Case 2 : Same as case 1 except that the "Load on back -side" switch is turned on.

Case 3 : Same as case 1 and 2, including the "The direction of distribution". The only difference being the load type which is changed to "Projected".

Case 4 : Same as case 1, 2, and 3, including the "The direction of distribution". The only difference being the load type which is changed to use the elements coordinate system.
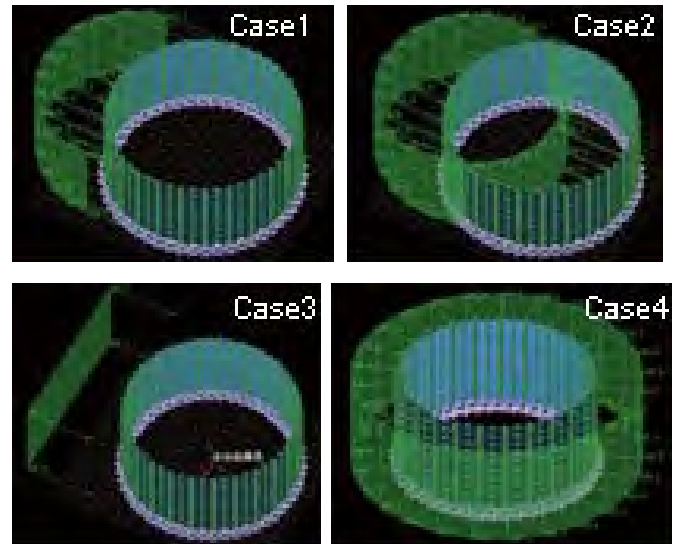
Engineer's Studio® Analysis and Geo Technical Analysis -International Support Service.

The international version of the " Engineer's Studio® Analysis Support Service" and" Geo Technical Analysis Support Service" (available in English, Chinese, and Korean) is for users outside Japan that are using Engineer's Studio® and users in Japan that are taking orders for the work to be conducted outside Japan. Since the service commenced in 2004, it has been provided to more than 500 world-wide users. FORUM8 provides a high-quality service by using the advanced analysis method such as the Dynamic Nonlinear analysis and Geo Technical Dynamic FEM Analysis on various types of civil works and architectural structures. The products targeted for this service are Engineer's Studio®, and Geo Technical Analysis series (GeoFEAS3D, UWLC, LEM3D, VG-Flow have been localized in English and other languages for the worldwide market.

Analysis Support Service via Multiframe and Engineer's Studio®

The support service uses Multiframe, UC-win/FRAME(3D), and Engineer's Studio®. FORUM8 first requires a structural image and load conditions, which are required to create an acceptable quotation before commencing work. The technical team works closely with the client throughout the project to model the structure and perform the analysis. The results are summarized to illustrate cross sectional strength, etc. Input data and options are documented for use by the client. Technical staff will be available to answer any questions regarding the data that may arise post-delivery.

Engineer's Studio® Price List

Engineer's Studio® Module	Price (USD)
ES-Advanced License	$11,000
ES-eigenvalue analysis option	$200
ES-dynamic analysis option	$200
ES-M-φ element option	$700
ES-non-linear spring element option	$700
ES-fiber element option	$200
ES-geometric nonlinear option	$200
ES-plane element option Ver.5	$1,180
ES-Maekawa concrete constitutive law option	$6,500
Engineer's Studio ES-Cable element option	$4,400

About FORUM8

FORUM8 is the leading Japanese producer of state-of-the-art 3D Simulation software.

Its premier product, VR-Design Studio (formerly known as UC-win/Road), is at the forefront of Interactive 3D VR simulation and modelling technology.

Established in 1987, this award-winning company has offices and partners on every continent and is a member of the ITE and an associate of the TRB visualization group.

VR-Design Studio is the ideal solution for all urban and transport planning/design projects, as well as driving simulation, interactive visualisation of rail, road and pedestrian-based events, and in the development of emergency planning/training scenarios including seismic impact analysis.

Enquires from Europe, the Middle East, Africa, North & South America should be directed to the Western Regional office team

Contact: Dr. Brendan Hafferty on +44 203 753 5391 or

email: brendan@forum8.com