*Front Page*

All Your Needs,

Under a Single Roof

• Fast multi-material building modelling using

 physical structural members

• State-of-the-art structural analysis methods

• Economical and reliable design

• Fully automated engineering drawings

 and fabrication detailing

• Complete quantities take-off for

 costing and comparison

• Leading BIM Integration for

 project coordination

ProtaStructure is an innovative BIM solution

for structural engineers to model, analyze and

design buildings quickly and accurately.

From one central model, easily compare different

schemes and automate your steel and concrete design,

significantly reducing project delivery time.

Produce high quality drawings and all design

documentation from ProtaStructure automatically using

ProtaDetails and ProtaSteel. Seamlessly coordinate

projects with intelligent BIM integration.

ProtaStructure saves time and increases business profitability.

***At First Glance***

Design to a range of leading international codes including specialist seismic requirements.

Seismic assessment methodologies for Performance Based Design or Retrofit of buildings using Linear Elastic, Nonlinear Push over or Time-History analyses.

Fully automated RC detailing into your drawing sheets. Manual drafting using smart rebars. Change management and dynamic quantity tables together with Fast engineering macros including retaining wall, stair, pool, pile analysis, design and detailing.

Fast project delivery with fully integrated Concrete, Steel and Composite Slab design from one central structural BIM model.

Easy, quick, and intuitive physical modeling and review with Multiple Model Views and Dynamic Input.

3D finite element analysis with state-of-the-art analytical model with extensive analysis options and shell element support for floors and shearwalls.

Advanced analysis techniques including Linear Elastic Analysis, Equivalent Static Earthquake Load, Response Spectrum Analysis, Time-History, Pushover, Concurrent cracked and uncracked analysis, Staged Construction, P-Delta, Temperature Difference, and Seismic Basement and Isolator considerations.

Flexible unit systematics that supports

SI, Imperial and MKS systems for modeling,

analysis, design and detailing of your buildings.

Automated steel connection design using IntelliConnect, full steelwork engineering drawings together with comprehensive part numbering and shop detailing for fabrication.

Industry leading BIM integration for starting, coordinating and sharing models

Interactive user experience with extensive in-product learning, contextual help, live updates and dedicated technical support from Professional Engineers.

***Why Prota Software?***

Since its establishment in 1985, Prota Software has been a leading provider of structural engineering software solutions to professionals worldwide. Our revolutionary software solutions have been widely adopted by businesses in more than 85 countries, transforming the way they work.

Designed by Engineers for Engineers

Prota Software is dedicated to engineering excellence and improving the world. The Prota Team is actively involved in technical research, presenting papers at conferences and publications worldwide, and contributing to the development of codes of practice, particularly in earthquake design. Prota Engineering, our consulting firm, has successfully completed projects in over 30 countries, focusing on large commercial and infrastructure projects such as airports and metro lines. We utilize BIM technology to efficiently complete both traditional and design-build projects, prioritizing optimal design and practical construction methods. **Prota**Structure is the result of our desire to share knowledge and is shaped by our internal expertise and the input of our numerous users worldwide.

Leading BIM Expertise

At Prota Software, open BIM collaboration and knowledge sharing are core principles that have been instrumental in successfully delivering some of the world’s most demanding infrastructure and transportation projects. The introduction of **Prota**BIM further solidifies Prota Software’s position as a leading provider of advanced BIM technology by incorporating bi-directional links with the latest versions of Revit, IFC, DXF, SAF, and other recognized BIM and Analysis formats. Through this enhanced capability, models can be seamlessly synchronized and design changes can be tracked, greatly enhancing project coordination and improving workflow efficiency.

Advanced Analysis Features

Prota Software offers a wide range of analytic approaches for building design. From basic static, dynamic, and finite element analysis to advanced techniques like nonlinear static pushover, time history, construction stage, and P-Delta analysis, Prota Software has the tools and expertise necessary to meet your design needs. Our proprietary analytic approaches are specifically tailored for building design and have been proven effective on a variety of projects. Whether you need to analyze the structural integrity of a small residential building or a large-scale commercial development, Prota Software has you covered.

Code-Based Design Expertise

Prota Software’s experience with delivering projects around the world coupled with close collaboration with users and industry experts means we understand structural design. At its core, **Prota**Structure provides a sophisticated and flexible structural design engine allowing you to optimize your entire building from the roof to the foundations. All the detailed code-based checks are performed and documented to your chosen code of practice. A growing range of international and seismic codes of practice are supported including US, European, Indian and British Standards. Together with numerous, country specific, localizations.

Friendly Professional Support That Engages

Prota Software is devoted to improving its clients’ experience with ProtaStructure Suite. Our primary objective is to provide our clients with knowledge and practical, user-friendly assistance. Our comprehensive Prota Help Center and in-product learning resources are intended to enrich your understanding. Our team of professional support engineers is enthusiastic about engaging with our clients, whether it be answering technical inquiries or providing hands-on training. Prota Software team is prepared to assist you with any needs you may have.

***Leading Structural BIM Collaboration***

Structural BIM at Its Core

ProtaStructure is natively designed with structural BIM in mind. We use intelligent physical objects to drive modeling, design, coordination and documentation.

Support for BIM Industry Standards

ProtaStructure supports both import and export of IFC, 2D/3D DXF and SAF files enabling professionals to share the models between ProtaStructure and other leading BIM platforms including Autodesk Revit, ArchiCAD, and AllPlan.

Bi-directional Integration with Autodesk Revit

Prota Software has developed bespoke integration with Autodesk Revit to facilitate direct, seamless model coordination, providing tools to roundtrip and synchronize changes as they occur. Explore revisions with color-coded visualization and interactive change logs. Take advantage of new family mapping functionality providing you with a tailored experience to suit your BIM work processes and standards.

Analysis Model Collaboration

We understand that engineering offices use a range of different analysis and design tools to get the job done. Many firms and checking authorities also require structural engineers to cross-check and validate analysis results against other accepted platforms. ProtaStructure allows you to easily achieve this with open intelligent model links to OpenSees, ETABS™, SAP2000™, LUSAS™, SAF integration and more.”

Output Reports and Drawings to Industry Standard Formats

Create and share customizable and highly visual calculation reports featuring Microsoft Office and PDF export abilities.

Detail drawings are fully compatible with industry standard DXF and DWG formats. All drawings in ProtaStructure follows best drafting practices and provide full layer, style and scaling flexibility.

Bespoke templates customized to suit your company drafting preferences can also be easily established and re-used for any project. Additional formats including 3D DXF, STL and image files are also available.

Create Models from 2D and 3D Information

Modelling processes can even start with our DXF import where we can convert and extrude drawings into Physical ProtaStructure models. Line and face elements like column, beam, walls and slabs in 2D key plans and 3D DXF files can be quickly converted to 3D ProtaStructure models. Architectural drawings can be overlaid against structural floors to aid coordination.

• Autodesk Revit is a registered trademark of Autodesk, Inc.

• Tekla Structures is a registered trademark of Trimble Solutions Corporation.

• GRAPHISOFT, ArchiCAD is a registered trademark of GRAPHISOFT SE. • SAP 2000 and ETABDS are registered trademarks of Computers and Structures, Inc.

***Seismic Analysis and Design Capabilities***

ProtaStructure provides engineers with comprehensive tools to design and detail buildings quickly and economically to meet rigorous earthquake standards including US and EC codes of practice.

Wide Coverage of Seismic Codes

**Prota**Structure supports a wide range of seismic codes including IBC, UBC, EC8, NSCP, SNI, Indian, Thai, Peruvian, Colombian and Turkish standards.

Seismic Parameters and Response Spectra

Elastic and design response spectra are calculated automatically using code-specified parameters. Site-specific spectra can also be introduced. Mass sources are automatically calculated including consideration of varied live load participation.

Equivalent Static Earthquake Loads

Static earthquake loads are automatically calculated and applied at story levels. Multiple diaphragms and accidental eccentricities are taken into consideration.

Diaphragm Modeling and Story Meshing

ProtaStructure has smart features for automatically detecting and defining intelligent rigid diaphragms. Multiple towers with discrete independent floors, discontinuous, stepping, sloping slabs and openings are all considered. Any floor can be selectively meshed and assigned as a flexible diaphragm.

Strong Column-Weak Beam Checks

Tedious Strong Column-Weak Beam checks are automated at every joint. Joint checks are summated bi-directionally at every floor to ensure building collapse mechanisms perform in meeting accepted code provisions.

Joint Shear Checks

Overlooking joint shear can potentially cause catastrophic failure of buildings during earthquake events. ProtaStructure automatically detects Confined or Unconfined joints and checks against brittle failure.

**(Client Success)** *(btn.)*

Seismic Forces on Non-Structural Members

Forces acting on non-structural members and their connections to the building can be calculated to ASCE07, Eurocode 8, and TBDY2018. You just need to define the non-structural members and ProtaStructure will automatically calculate the story accelerations and forces depending on the analysis type.

Seismic Separation of Buildings

To avoid pounding damage in adjacent buildings, a spacing must be provided between them. With the Seismic Separation Design tool, you can either load the displacements of an existing second ProtaStructure model or you can enter the displacement values of the second model manually. Calculations can be done to ASCE07, Eurocode 8, and TBDY2018.

Retrofitting and Assessment with CFRPs

ProtaStructure is capable of retrofitting and assessment of beam and column members confined with Carbon Fiber Reinforced Polymers (CRFPs). The CFRP confinement has a positive effect on shear resistance and axial load capacity of members. These effects can be considered according to the TBDY2018 seismic code. CFRP definition can be assigned to the members using the “Retrofit Using FRP” command on the right-click menu or contextual ribbon tab of the member.

**(Projects Gallery)** *(btn.)*

***Seismic Analysis and Design Capabilities***

Response Spectrum Analysis

Mode superposition analysis can be used where static approach is not applicable. Modal results are combined with CQC. RSA base shear is automatically scaled to Equivalent Static results. Cumulative mass participation of modes is automatically calculated.

Two Stage Analysis for Upper and Lower Structure

An automated two stage analysis is performed in one-go for buildings with rigid basements. Different mass sources for upper and lower structure are automatically considered.

Vertical and Horizontal Irregularities

ProtaStructure has powerful features to assess building irregularities in accordance with earthquake code requirements. Floor Torsion, Diaphragm Discontinuity, Mass, Stiffness, Weak Storey and Non-parallel system irregularities are all checked, and any required penalties are applied.

Linear and NonLinear Seismic Isolators

Seismic isolators can be inserted anywhere on the structure for different seismic isolation scenarios. Both upper and lower structure design can be performed in **Prota**Structure target code spectra or ground motions. Nonlinear isolator properties can be considered in time-history analysis. Outputs like storey drifts, accelerations, internal forces, isolator displacements are reported as a part of the design.

Nonlinear Fiber Analysis of Sections

 Column, beam, and Wall sections can be modeled with
 fiber elements using distributed plasticity and analyzed with
 state-of-the-art numerical techniques to derive the Moment-
 Curvature relationships.

 Force-deformation relationships for integration points are
 obtained from detailed fiber section analysis.

Consider Cracked and Uncracked Sections in One Analysis Run

Cracked and uncracked section properties can be simultaneously used in the same analysis for different load cases. Code modification defaults can be automatically applied to section properties.

Nonlinear Static Pushover

 Single Mode Static Pushover analysis is performed using
 ProtaStructure - OpenSees integration. Parameters such
 as the number of steps and target displacements can be
 controlled by the user.

 After the analysis, the Capacity Curve is obtained. Users
 can specify the monitored node for which the curve will
 be generated. Results can be examined at any desired
 step. A detailed performance assessment report is
 generated afterwards.

**(Request a Quote)** *(btn.)*

***Seismic Analysis and Design Capabilities***

Ductile Member Design and Detailing

Columns, walls, and beams are designed to special ductility requirements. Automated confinement of beam and column critical sections, wall end zones (boundary elements), wall design envelope, capacity shear design and much more are automatically considered.

Diaphragm Integrity and Load Transfer Checks

Transfer of inertia loads between slabs and lateral load resisting members including shearwalls and collectors beams is automatically verified. For flexible diaphragms, in-plane shear, tension and compression stresses are checked to prevent diaphragm failure.

Wall Coupling Beams

Special attention is provided for coupling beams. Different cracked section properties can be defined. The wall-beams assembly is checked for coupled wall effectiveness.

ProtaStructure for Performance-Based Design and Building Assessment

Prota provides unique tools for engineers to carry out performance-based building assessment.

Nonlinear Time-History Analysis

* Nonlinear Time-History analysis can be performed using ProtaStructure - OpenSees integration.
* User selected multiple ground motions can be applied simultaneously in X and Y directions. Ground motion application direction is rotated by 90 degrees, and analyses are repeated.
* Ground motion records are automatically scaled by ProtaStructure to your design requirements using the simple scaling method between 0.2T and 1.5T.
* Analysis results from multiple ground motion sets are automatically post-processed. The average values of absolute maximum responses are extracted and used to prepare detailed performance assessment reports. Nonlinear Properties of Seismic Isolators can be considered in Time-History analysis.

***Design Codes***

Structural engineers around the world like to employ their own local approaches to both design and detailing. At Prota Software we understand this which is why we offer both a broad range of leading international codes as well as provide specific customization to suit your local requirements.

Reinforced Concrete Design Codes

Loading and Wind Codes

Steel Design Codes

Seismic Codes

Composite Beam / Slab Design Codes

Prestressed Beam Design Codes

Code Name/Abbreviation

Country

Only RC beam design is supported at the moment

United States

United Kingdom

Singapore

Hong Kong

Turkey

Peru

Indonesia

Philippines

Ireland

Poland

Malaysia

Thailand

Colombia

Romania

Europe

***Project References***

Total Area

sq. meters

Prefabricated Slabs

New Airport

Public Hospital

Seismically Isolated Building

Residences

High-Rise Concrete Building

Cast-In-Place Concrete Load-Bearing System

Research Hospital

Retrofit and Assessment with Seismic Isolators (Existing columns and walls are cut in place)

Yacht Maintenance Facilities

Steel Moment Resisting Frames

General Medical Laboratory

Reinforced Concrete Frames with Shearwalls

Chemical Facility

Reinforced Concrete Moment Resisting Frames

Women and Children Development Initiative Foundation Center

RC Structure with Steel Truss Roof System

Healthcare Campus

Cast-In-Place Concrete Frame Structure

College School Building

Data Center

Cardiology Hospital

State Hopsital

Maintenance Repair Overhaul Facilities

Composite Hangar with RC and Steel Members

RC Structure with Steel Roof System

Tower

High-Rise Residential Concrete Building

Steel Moment Resisting Frames

Municipal Stadium Roof

Steel Construction Roof System

Playground Roof

1,000 Tons Capacity RC + Steel Facility

RC & Steel Industrial Building

Sky Heights Residential Complex

Shopping Complex

Hotel Building

Office Complex

Office Tower

Multi-Purpose Building

Multi-Purpose Concrete Building

Industrial Structure

Braced Frames

Complex

Public Building

Steel Hangar Building

Braced Frames

***Modelling***

With its focus on structural BIM modelling, ProtaStructure allows physical RC, Steel and Composite structural members to be easily, quickly and intuitively defined in one model.

Instantly create models using smart DXF import to extrude gridlines, beams, columns, slabs and shearwalls directly from structural or architectural drawings or make use of physical BIM links with IFC’s, Revit or 3D DXFs to establish complete models with a click.

Use dynamic input to rapidly create Concrete beam, columns, slabs, foundations and shearwalls and custom shaped corewalls and columns. Define openings, drops and physical set out to exactly define your project.

Use real structural steel elements including truss, purlin, brace, girt, sag rods with flexible parametric macros. Specify your splice locations on steel columns, beams and trusses.

Insert steel dome members with the help of the highly parametric wizard.

Make use of the new general purpose frame member to model irregular arrangements with ease. Insert curved and arch frame members in any plane orientation in 3D. Use the Frame Group member to define multiple frames quickly on a region.

Insert primary and secondary composite frames and composite slabs to create composite slab systems.

Merge different model parts together allowing concurrent modelling for rapid project creation.

Fast generation of multiple storeys with similar storey feature.

Simultaneously work on different floor plans and 3D model

with multiple window system. Easy access to parts

of model with element Filters.

Define different materials and reinforcement

steel grades on floor and element basis

throughout the project.

Define conventional, waffle, precast and flat slabs with curved and irregular edges and drop head panels.

Create Raft, Piled-Raft, Pad Base, Pile Cap and Combined foundations together with Strip Footings and Foundation Beams for complete foundation design. Set foundations up at any level.

Build custom trusses using the truss editor and save them in the library for later use. Define multiple horizontal and vertical braces and use flexible purlin layout generators.

Create Arc and multi-segment axes/beams, sloping members and structures with non-orthogonal plans.

Anchor fixed column and beam positions to corners and edges. When section sizes change, anchored positions are retained.

Model sloping slabs, beams, columns and sloping and tapered shearwalls easily using planes or multi gridlines.

Assign flexible user-defined supports including springs under columns and shearwalls.

***Loading***

Prota Software’s unique loading processes are highly automated and accurate, saving you time and driving efficient design.

Automatically decompose loads from plate, ribbed and waffle slabs, using Yield Lines and/or Finite Elements Methods. Apply point, line and patch loads to slabs.

Check model loads, finishes, elements sizes and properties using color coded visual interrogation.

Assign point, function, distributed, area loads and concentrated moments to members in any direction with the new interactive loading editor.

Visualize and inspect the loads on the physical model in 3D.

Easily apply roof live loads, snow and rain loads to slab members.

Import point loads from Excel files and assign to multiple columns easily for multiple load cases.

Create user-defined gravity and imposed load cases and assign loads to them. This will help you categorize and review the gravity loads on your structure and apply different combination factors where necessary.

**(Getting Started)** *(btn.)*

Apply point, distributed and functions loads to truss members and truss joints. Concentrated moments can be applied as well.

Automatic calculation of code-based seismic loads using Equivalent Static and Response Spectrum Analysis methods.

Automatic Wind Load Calculation to EN 1991-4 (2005), BS6399-2 (1997), ASCE07 (2010), MS 1533 (2002), S875 (2015), NSCP (2015), NSR-10 (Colombia), Thailand and Peru codes.

Automatic Snow Load Calculation to EN1991-1-3 and TS498

Calculate static and dynamic soil thrust on basement or cantilever walls by entering water table and soil profile.

***Analysis***

Structural analysis is performed by specifically developed 64-bit 3D finite element solver and

state-of-the-art analytical model.

Rapid analysis using multi-cores and pre-processing technology.

Analysis of slab systems independently or integrated with the structure by using finite elements.

Automatic rigid links, rigid zones and asymmetrical end-releases on frame members.

Analysis of shearwalls and custom shaped corewalls with or without openings using shell elements, mid-pier and single-pier models.

Manage multiple analyses at the same time using the “Analysis Manager”.

Review the analysis results in a single integrated post-processor with a unified and performant animation, contouring, diagramming and rendering engine.

P-Delta analysis and definition of equal/gradient temperature differences. Special Seismic Analysis considerations.

Soil-Structure Interaction Analysis for all types of foundations in a single run.

Sophisticated Post Analysis checks for reviewing code compliance including deflections.

Real-time visualization of stress contours, deformations, force and moment diagrams using the full-featured Analysis Post-Processor.

Visualize the slab strip diagrams and station nodes on 3D analytical model.

***Design***

Design is the very essence of what we do as Structural Engineers. Providing elegant, practical solutions to design is at the heart of ProtaStructure

Interactive and batch concrete beam and column design including reinforcement optimizations, design grouping and user-defined rebar patterns.

Biaxial design and reinforcement optimization of columns and shearwalls with any section. Generation of interaction diagrams and capacity reports for easy design tracking.

Design of shearwalls and slabs using conventional or mesh reinforcement.

Selection of the most efficient steel profile based on active codes.

Automatic design of steel connections using IntelliConnect and ability to reuse at all similar joints.

Integrated meshing and analysis of slab and foundation systems with the building model.

Design of composite slabs with segmented or uniform shear studs considering construction and final
stages.

Advanced documentation tools including ordered report sets, integration of external reports, table of contents, smart notification system (summary of warning, error and information messages).

Detailed design reports with step-by-step calculations, formulas and code references.

Automatically create reinforcement layouts for columns and corewalls with “I, H, L, T, U, E, +” or arbitrary
complex sections.

Automatically create end zones (boundary elements) for rectangular and core walls. Specify end zone or web reinforcement easily.

Code-based automatic containment tools to specify link and tie-bar layouts compatible with column sections of any shape and size.

Design economically and accurately by including column sections in FE mesh and considering openings, drops and loads on slabs in FE analysis.

Design economical flat slabs and raft foundations by automated base reinforcement and slab patch panels
for additional support bars.

Design of flat, ribbed, waffle slab systems using analytical and finite elements methods and automatic punching checks.

Design pad bases, pile caps, strip foundations, rafts, piled rafts, combined foundations and using analytical and finite element methods.

Combine different models to cater for shared foundation systems.

Use different vertical and horizontal subgrade coefficients and varied thicknesses for within raft foundations.

Finite Element analysis of foundations at different elevations, stepped foundations.

**Prota**Details ***RC Detailing and Component Design***

Engineers have longed for the ability to automatically create all RC detailing from the design, intuitively laid out into drawing sheets, and complemented with full drafting and editing capability.

Automatically produce details from your ProtaStructure design models into your drawing sheets, only with one click.

Carry out all your drafting using standard CAD drawing commands without the need for other CAD software. Features include extensive command-line support and customization, DWG/DXF support, dimensions, layers, style, intelligent undo/redo and much more…

Generate dynamic quantity tables with full bar bending schedules, which are updated instantly when changes occur.

Customize drawings with your own title blocks with auto referencing including all project and sheet information.

Use ProtaDetails’ growing library of intelligent macros to design and detail other components in your projects including;

Automated analysis, design and detailing of cantilever retaining walls.

Design of RC Stairs, Pile Caps, Corbels, Steel Scaffold Systems, Swimming Pools and more including all details, quantities and calculation reports.

Design your piles using detailed soil profiles for pile working load assessment, iterative non-linear lateral pile analysis and pile section design.

Produce engineering details for other components including Culverts, Retrofit Walls, Foundation Pits, Pad Bases, Walls, Continuous RC Beams and more.

Make use of smart rebar library, intelligent detailing items and tools to perform semi-automatic structural drafting for the cases where a full automation is not possible.

Automatically or manually truncate beam elevations to fit any sheet layout.

Convert your old reinforcement drawings to smart rebars and instantly provide steel quantity take off.

Insert details with different drawing scales side-by-side on the same sheet. Smart scaling system automatically manages all relevant texts, object sizes and dimensions.

Automatically update design detail changes from ProtaStructure as they occur.

**Prota**Steel ***Steel Connections and Detailing***

Nowadays clients want practical, complete steel details and automated connection design to drive on-time project delivery and cost control.

ProtaSteel is the all-in-one steel detailing solution for engineers, fabricators and drafting professionals.

Communicate ProtaStructure models seemlessly to ProtaSteel including all physical elements and analytical results

Use our unique IntelliConnect to rapidly automate connection design with a focus on constructability.

Easily model and detail any steel connection using Fully-featured Parametric Connection Libraries.

See the step-by-step connection design calculations with detailed code clause referencing.

Insert ancillary steel including sag rods, purlins, girts, braces, stairs, chequer plate, railings, secondary beams and eaves beam to complete your model.

Automatically detect all clashes between parts.

Increased productivity with unique connection macros including truss apex, truss-column, steel beam to concrete, and embedded steel connections.

Automatically compile comprehensive design reports and track connection design status with model color coding.

64 bit architecture and user-friendly interface with ribbon toolbar, macro galleries, smart wizards and filters.

Create macro presets for any connection or modeling macro using your favorite settings and company standards.

Seamlessly update any changes in ProtaStructure models to ProtaSteel

Fully-flexible Automatic Part and Assembly Numbering that intelligently manages part-marks on subsequent revisions of the model.

Automatically prepare all General Arrangement Drawings, Truss Details, Connection Details, Assembly, Part and Shop Drawings with SI and Imperial Units support.

Full cutting lists provide insight into efficient procurement and cost control. Intelligent data communication with IFC’s, NC’s, and Tekla Structures.

Easily create your own user-defined connections using general purpose tools like plate, bolt, weld, section, cut, chamfer and fillet and use these connections at similar joints.

***Internationality***

Headquarters

Branch Offices

Resellers

Become a Prota Software Partner

Expand your business with Prota’s Software Solutions

Please contact us at

***Back Page***

Structural BIM Design Technology for a Connected World

© ProtaStructure Suite is a product of Prota Software. All Rights Reserved.