ENERCALC Structural Engineering Library Version 6

For over 30 years engineers have relied on **ENERCALC**'s industry leading software solutions to perform structural design and analysis for low to mid rise buildings.

The **Structural Engineering Library**'s collection of dozens of modules is a proven solution to all the typical, repetitive and daily design tasks performed by engineers and architects.

As engineers ourselves we understand the full spectrum of the design process. By carefully combining building code provisions, proven analysis techniques, and standard materials into simple and elegant software, you can quickly design, analyze, or optimize all your daily design tasks.

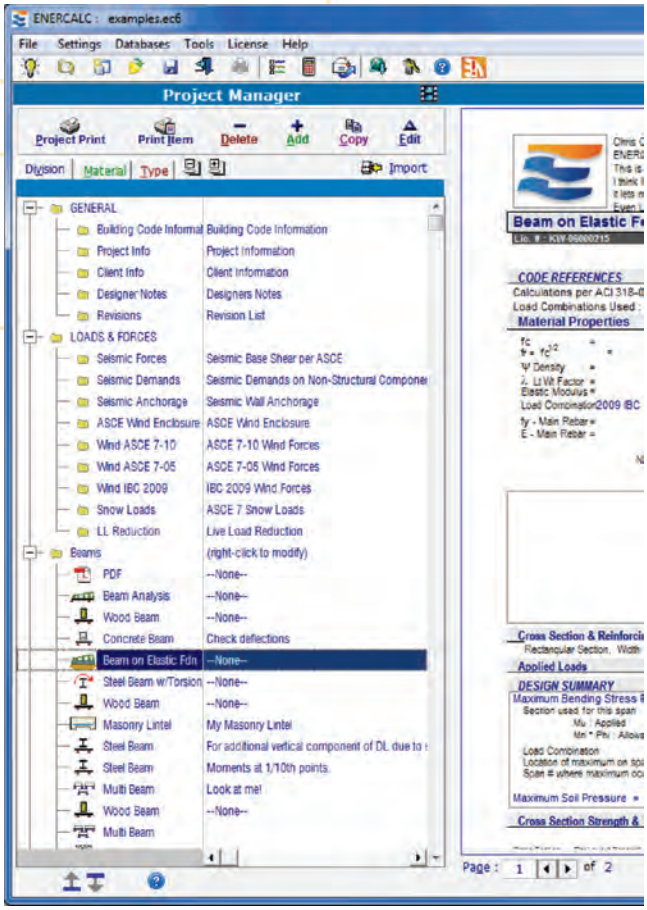
Now in its' sixth major revision and supporting all of the latest building and research codes, Version 6 of the **Structural Engineering Library** is more capable, more flexible and easier to use than ever before.

Combining a proven reputation, long company history, low price and widespread usage the **Structural Engineering Library** from **ENERCALC** is one (if not the) most widely used structural engineering software packages in the United States.

The Software

Although it goes by one name, the **Structural Engineering Library** is actually dozens of structural engineering design and analysis modules all in one system. It provides the practicing engineer with a large toolkit of capabilities to design the elements of structures.

The **Structural Engineering Library** is a versatile toolkit for the practicing engineer. Small projects of 5 stories or less dominate the structures built nationwide and this is where our software excels.



A Project Approach

The **Structural Engineering Library** has at its core the **Project Manager**, an ever evolving layout that allows you to build a calculation document.

Its design provides an environment to develop sets of project engineering calculations that contain non-ENERCALC items such as **EXCEL** spreadsheets, **WORD** documents, **PDF** files, **scanned** images, and general project information.

As you know all engineering project contract documents have two parts : drawings and calculations. Our role is assisting you in preparing your engineering calculations….. which ultimately include hand calculations, software calculations, your standard calculations in **PDF** format, your own Microsoft **Excel** spreadsheets, documents produced with Microsoft **Word** (either your own or product specification sheets), and perhaps even **scanned images** on sketches or site conditions.

The **ENERCALC Project Manager** wraps up all these separate documents into a single Project that can be managed and printed as your building department submittal.

This is an ever evolving system. Presently we give you the ability to include ENERCALC calculations, WORD documents, Excel spreadsheets, scanned images and Adobe Acrobat PDF files. As the product matures any number of other media formats can be added as we develop a module to attach the item to our Project Manager.

In addition to the these abilities the Project Manager has sections to let you keep track of the myriad data of a project….client, site, building department, revisions, designer notes and more.

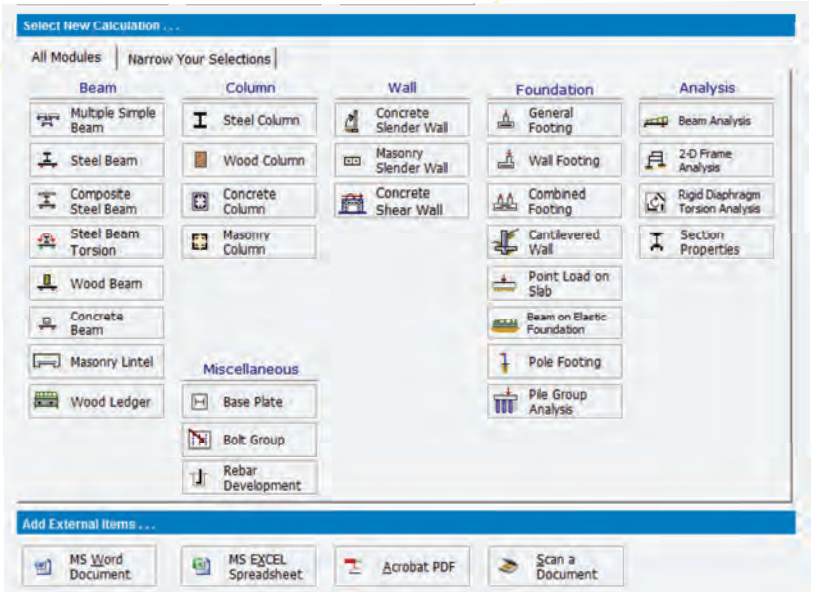
Simply scroll within the organized information of the project manager and click to access your document. Have a RISA frame analysis printout? Just print it to a PDF and add it to your mark it as "external". At print time the latest edition of that RISA printout will be included in the full set of calcs that are produced.

Calculation Modules

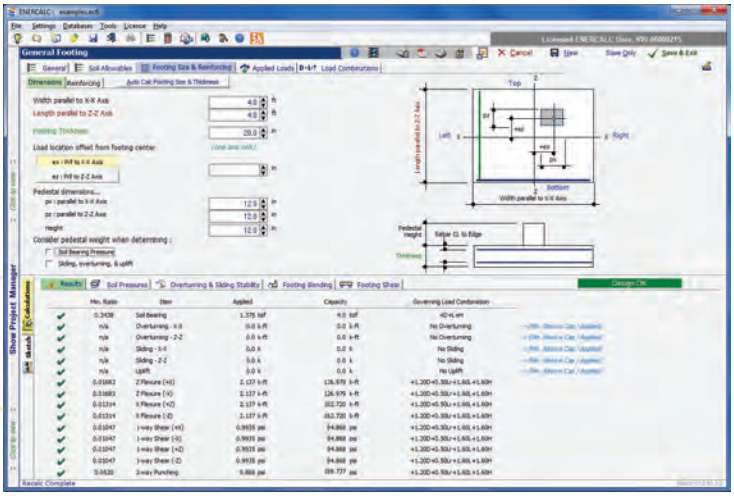
The core of **ENERCALC** is the calculation modules. Dating back to 1983 when our first software released as a set of spreadsheet templates, we design our modules to be "fill-in-the-blanks" style interactive programs. Just type in a value and instantly the resulting analysis or design is there to review. Our software is 100% in-house developed Windows software specifically for the engineering tasks it must perform. Here's a quick view of one of the calculation modules for footing design:

Completely rewritten in 2005-2008 and now conforming to ASCE 7-05 & 10, ACI 318-08 & 11, ACI 530-08 & 11, 2005 NDS, AISC 360-05, 2006 IBC and 2010 CBC.

- Design & analysis in Steel, Concrete, Masonry & Wood
- Beams: Design single and multi span beams. Flexible support fixity and almost unlimited loading. Easy graphics beam builder, extensive lateral support options, automatic live load "skip loading", minor axis bending. Rolled steel sections with composite option, multi-span concrete beams with several cross sections,masonry lintels, concrete beam on elastic foundation, wood & steel beam "Quik List" for fast selection, highly detailed analysis results with concise summary, flexible diagraming.
- Columns : All rolled steel sections plus user created section database, multi-story capability with flexible brace point specification. Biaxial bending for steel, concrete & wood. Steel, Masonry & Concrete capacities calculated using interaction diagrams. Varying end fixities, slenderness specification for each axis, and flexible vertical and lateral load application. New concrete general shape biaxial cross section solvers.
- Foundations : Design of general footing with axial, moment & shear loads, specify capacity increases, rebar band requirements, column pedestals, highly detailed analysis including uplift & sliding.
- Walls : Concrete and masonry slender walls with one or two stories. Flexible vertical and lateral load application and highly detailed deflection calculations by modeling wall with FEM tools, temperature effects, base fixity option, reinforcing at center or each face, concrete wall "reveals" and more.



- Frames : 2-D Frames with completely flexible modeling options, “Frame Wizard” provides automatic frame creation, steel and wood databases (design coming soon), flexible load combinations, high limits, temperature loads, spring supports, etc. This is a simple program to handle most of your 2-D frame needs.
- Code based general Loads & Forces : Seismic base shear, Seismic demands on non-structural components, seismic wall anchorage, ASCE wind enclosure, ASCE 7 wind forces, ASCE 7 snow loads and live load reduction modules.
- Other general functions : Wood & Masonry Shear Walls, Steel base plate, General section properties, Torsional analysis of rigid diaphragms, point loads on a slab, bolting configurations, pile group loadings, cantilevered retaining walls, rebar development lengths.

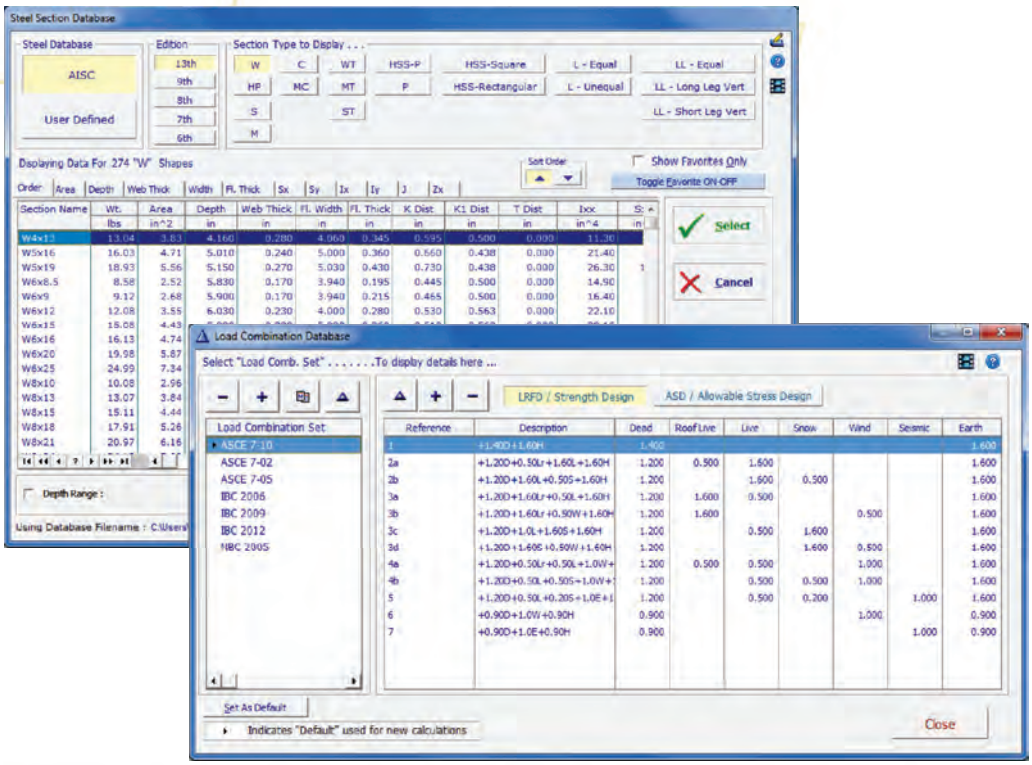


The calculation modules are an ever expanding set of structural calculations that provide design for the elements of a building. And as requests are received from our users we develop additional modules…..and make use of the proven steel, concrete, timber, finite element analysis, and other engineering “solvers” we have developed.

Databases & Load Combinations

Essential to any project are the standard construction products that the engineer will employ to develop the final structure. **ENERCALC** provides databases of all typical rolled steel sections, sawn wood sections, material grades for steel and wood and small databases for concrete block and rebar. In addition the user can create their own steel & wood section databases.

We also have load combination sets available from IBC, ASCE and IBC codes. You can set the building code and load combination set for your project and each calculation module will run thorough calculations for all combinations - for both strength and service levels as required.



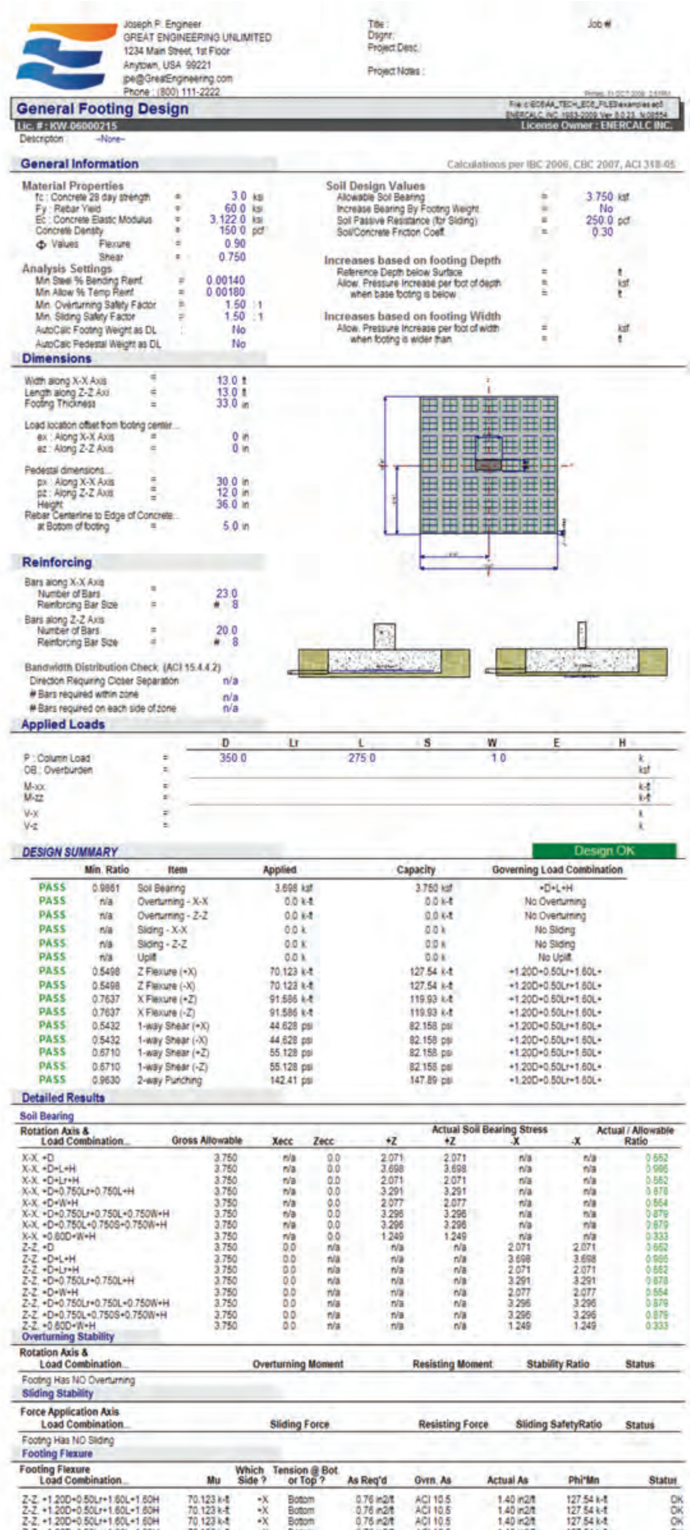
ENERCALC

Reporting

ENERCALC software provides well designed calculation reports for all of its modules. Using the full capabilities of modern printers we combine highly readable font styles with well laid out calculation reports and integrated graphics.

The goal of our reports is to provide the reviewing engineer and governmental plan check reviewer with a well laid out, concise and thorough report that details the structural design. New technology has given us the gift of low cost color on printouts which benefit us all with contrasting colors to call attention to warnings or overstress conditions.

All printouts conform to 8.5" x 11" or 14" typical United States paper sizes, and the user is also free to add company logos and customizing title block layouts.



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Title :
Dsgnr:
Project Desc.:

Project Notes :

Job #

General Footing Design

Lic. # : KW-06000215 — License Owner : ENERCALC INC.

Description : -None-

General Information — Calculations per IBC 2006, CBC 2007, ACI 318-05

Material Properties

f'c : Concrete 28 day strength	=	3.0	ksi
Fy : Rebar Yield	=	60.0	ksi
Ec : Concrete Elastic Modulus	=	3,122.0	ksi
Concrete Density	=	150.0	pcf
Φ Values Flexure	=	0.90	
Shear	=	0.750	

Analysis Settings

Min Steel % Bending Reinf.	=	0.00140	
Min Allow % Temp Reinf.	=	0.00180	
Min. Overturning Safety Factor	=	1.50	: 1
Min. Sliding Safety Factor	=	1.50	: 1
AutoCalc Footing Weight as DL	:	No	
AutoCalc Pedestal Weight as DL		No	

Soil Design Values

Allowable Soil Bearing	=	3.750	ksf
Increase Bearing By Footing Weight	=	No	
Soil Passive Resistance (for Sliding)	=	250.0	pcf
Soil/Concrete Friction Coeff.	=	0.30	

Increases based on footing Depth

Reference Depth below Surface	=	ft
Allow. Pressure Increase per foot of depth	=	ksf
when base footing is below	=	ft

Increases based on footing Width

Allow. Pressure Increase per foot of width	=	ksf
when footing is wider than	=	ft

Dimensions

Width along X-X Axis	=	13.0	ft
Length along Z-Z Axis	=	13.0	ft
Footing Thickness	=	33.0	in
Load location offset from footing center...			
ex : Along X-X Axis	=	0	in
ez : Along Z-Z Axis	=	0	in
Pedestal dimensions...			
px : Along X-X Axis	=	30.0	in
pz : Along Z-Z Axis	=	12.0	in
Height	=	36.0	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	5.0	in

Reinforcing

Bars along X-X Axis		
Number of Bars	=	23.0
Reinforcing Bar Size	=	# 8
Bars along Z-Z Axis		
Number of Bars	=	20.0
Reinforcing Bar Size	=	# 8

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation	n/a
# Bars required within zone	n/a
# Bars required on each side of zone	n/a

Applied Loads

		D	Lr	L	S	W	E	H	
P : Column Load	=	350.0		275.0		1.0			k
OB : Overburden	=								ksf
M-xx	=								k-ft
M-zz	=								k-ft
V-x	=								k
V-z	=								k

DESIGN SUMMARY — Design OK

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.9861	Soil Bearing	3.698 ksf	3.750 ksf	+D+L+H
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.5498	Z Flexure (+X)	70.123 k-ft	127.54 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.5498	Z Flexure (-X)	70.123 k-ft	127.54 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.7637	X Flexure (+Z)	91.586 k-ft	119.93 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.7637	X Flexure (-Z)	91.586 k-ft	119.93 k-ft	+1.20D+0.50Lr+1.60L+
PASS	0.5432	1-way Shear (+X)	44.628 psi	82.158 psi	+1.20D+0.50Lr+1.60L+
PASS	0.5432	1-way Shear (-X)	44.628 psi	82.158 psi	+1.20D+0.50Lr+1.60L+
PASS	0.6710	1-way Shear (+Z)	55.128 psi	82.158 psi	+1.20D+0.50Lr+1.60L+
PASS	0.6710	1-way Shear (-Z)	55.128 psi	82.158 psi	+1.20D+0.50Lr+1.60L+
PASS	0.9630	2-way Punching	142.41 psi	147.89 psi	+1.20D+0.50Lr+1.60L+

Detailed Results

Soil Bearing

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Zecc	Actual Soil Bearing Stress +Z	+Z	-X	-X	Actual / Allowable Ratio
X-X, +D	3.750	n/a	0.0	2.071	2.071	n/a	n/a	0.552
X-X, +D+L+H	3.750	n/a	0.0	3.698	3.698	n/a	n/a	0.986
X-X, +D+Lr+H	3.750	n/a	0.0	2.071	2.071	n/a	n/a	0.552
X-X, +D+0.750Lr+0.750L+H	3.750	n/a	0.0	3.291	3.291	n/a	n/a	0.878
X-X, +D+W+H	3.750	n/a	0.0	2.077	2.077	n/a	n/a	0.554
X-X, +D+0.750Lr+0.750L+0.750W+H	3.750	n/a	0.0	3.296	3.296	n/a	n/a	0.879
X-X, +D+0.750L+0.750S+0.750W+H	3.750	n/a	0.0	3.296	3.296	n/a	n/a	0.879
X-X, +0.60D+W+H	3.750	n/a	0.0	1.249	1.249	n/a	n/a	0.333
Z-Z, +D	3.750	0.0	n/a	n/a	n/a	2.071	2.071	0.552
Z-Z, +D+L+H	3.750	0.0	n/a	n/a	n/a	3.698	3.698	0.986
Z-Z, +D+Lr+H	3.750	0.0	n/a	n/a	n/a	2.071	2.071	0.552
Z-Z, +D+0.750Lr+0.750L+H	3.750	0.0	n/a	n/a	n/a	3.291	3.291	0.878
Z-Z, +D+W+H	3.750	0.0	n/a	n/a	n/a	2.077	2.077	0.554
Z-Z, +D+0.750Lr+0.750L+0.750W+H	3.750	0.0	n/a	n/a	n/a	3.296	3.296	0.879
Z-Z, +D+0.750L+0.750S+0.750W+H	3.750	0.0	n/a	n/a	n/a	3.296	3.296	0.879
Z-Z, +0.60D+W+H	3.750	0.0	n/a	n/a	n/a	1.249	1.249	0.333

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Footing Flexure Load Combination...	Mu	Which Side ?	Tension @ Bot. or Top ?	As Req'd	Gvrn. As	Actual As	Phi*Mn	Status
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	70.123 k-ft	+X	Bottom	0.76 in2/ft	ACI 10.5	1.40 in2/ft	127.54 k-ft	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	70.123 k-ft	+X	Bottom	0.76 in2/ft	ACI 10.5	1.40 in2/ft	127.54 k-ft	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	70.123 k-ft	+X	Bottom	0.76 in2/ft	ACI 10.5	1.40 in2/ft	127.54 k-ft	OK
Z-Z, +1.20D+0.50Lr+1.60L+1.60H	70.123 k-ft	+X	Bottom	0.76 in2/ft	ACI 10.5	1.40 in2/ft	127.54 k-ft	OK

Technical Assistance

ENERCALC now offers several avenues of technical assistance to our user base. Technical assistance (along with other items like purchase discounts) is only available while the users Maintenance and Support Plan (**MSP**) is in effect.

The **ENERCALC MSP** is included with your purchase for 12 months and renewable thereafter. Access to technical support, the ability to receive continual product updates and the ability to enjoy discounts on new products are only available to users active **MSP**.

Direct assistance using email and fax: You can contact ENERCALC technical support personnel directly via email or fax. The software contains built-in features to gather your information and prepare a report to send directly to us. We offer menu items within the software to let you easily construct email and fax messages.

Telephone Assistance: Telephone assistance is available however to allow staff to concentrate deeply on issues without interruptions the phones are not continuously monitored......email is the primary method of personal assistance. However, voice mail messages are always returned with 24 hours.

GoToMeeting Sessions: We use the Citrix product GoToMeeting to assist users with questions that are too difficult to properly describe via email or telephone. This single secure session enables us to see your computer screen to observe the behavior and, with your permission, use mouse and keyboard to inspect and fix the issue.

ENERCALC S.E.L. Version 6 - Executive Summary

Version 6 of the Structural Engineering Library is now available. This version is the largest ground-up rewrite we have ever performed.

The SEL provides you with dozens of structural calculation modules and allows you to build a set of calculations that include Excel spreadsheets, WORD documents, Scanned images and PDF files.

- Completely rewritten in 2005-2008 and now conforming to ASCE 7-05, 08 & 11, ACI 318-08 & 11, ACI 530-08 & 11, 2005 NDS, AISC 360-05, 2006 IBC and 2010 CBC.
- Design in Steel, Concrete, Masonry & Wood
- Beams: Design single and multi span beams. Flexible support fixity and almost unlimited loading. Easy graphics beam builder, extensive lateral support options, automatic live load "skip loading", minor axis bending. Rolled steel sections with composite option, multi-span concrete beams with several cross sections,concrete beam on elastic foundation, wood & steel beam "Quik List" for fast selection, highly detailed analysis results with concise summary, flexible diagraming.
- Columns : All rolled steel sections plus user created section database, multi-story capability with flexible brace point specification. Biaxial bending for steel, concrete & wood. Steel, Masonry & Concrete capacities calculated using interaction diagrams. Varying end fixities, slenderness specification for each axis, and flexible vertical and lateral load application. New concrete general shape biaxial cross section solvers.
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- Frames : 2-D Frames with completely flexible modeling options, "Frame Wizard" provides automatic frame creation, steel and wood databases (design coming soon), flexible load combinations, high limits, temperature loads, spring supports, etc. This is a simple program to handle most of your 2-D frame needs.
- Code based general Loads & Forces : Seismic base shear, Seismic demands on non-structural components, seismic wall anchorage, ASCE wind enclosure, ASCE 7 wind forces, ASCE 7 snow loads and live load reduction modules.
- Other general functions : Wood & Masonry Shear Walls, Steel base plate, General section properties, Torsional analysis of rigid diaphragms, point loads on a slab, bolting configurations, pile group loadings, cantilevered retaining walls, rebar development lengths.
- Project calculation manager enables to create "project files" which include ENERCALC calculations, Excel spreadsheets, Word documents, PDF files and Scanned images. It also provides single-set calculation printing, import of standard calculation templates, and full Division/Module organization.
- Includes steel a section, wood section, timber material, steel grade, and seismic acceleration databases.
- Project Load Combination manager integrated with all calculation modules.
- Extensive sketches, stress diagrams and column interaction diagrams.
- Automatic member selection for steel and timber. Automatic design iteration for concrete.
- "What If" spreadsheet instant recalculation design (which has been an ENERCALC design since 1983!)
- Well designed and highly readable printed calculation reports that incorporate your own title block and logo.
- Flexible Internet based activation for portability to any computer plus network licensing.
- Automatic web updating system always keeps your software current as an MSP subscriber.