

# MR. ESTIMATOR® SOFTWARE

## BEAM DIAGRAMS VERSION

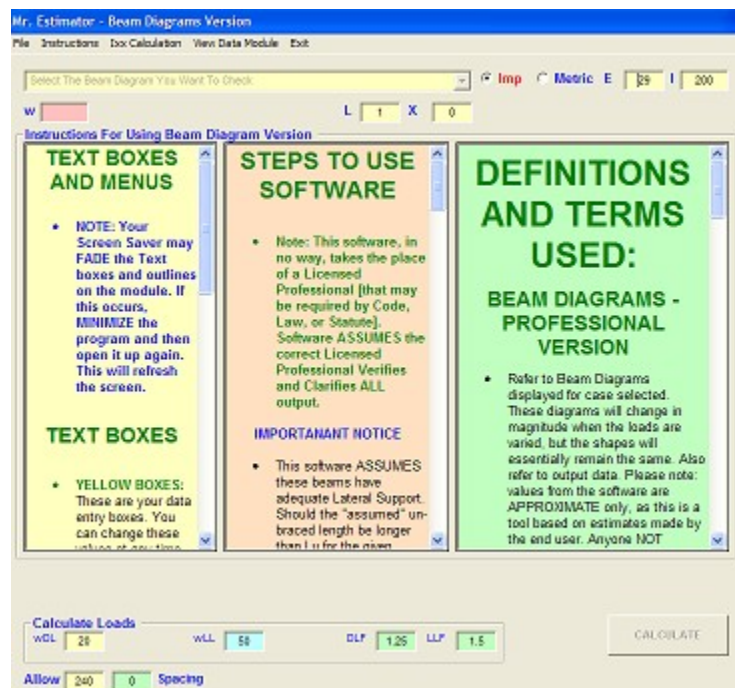
### SOLUTION FOR A TYPICAL BEAMS – ILLUSTRATED BELOW

#### Professional Version

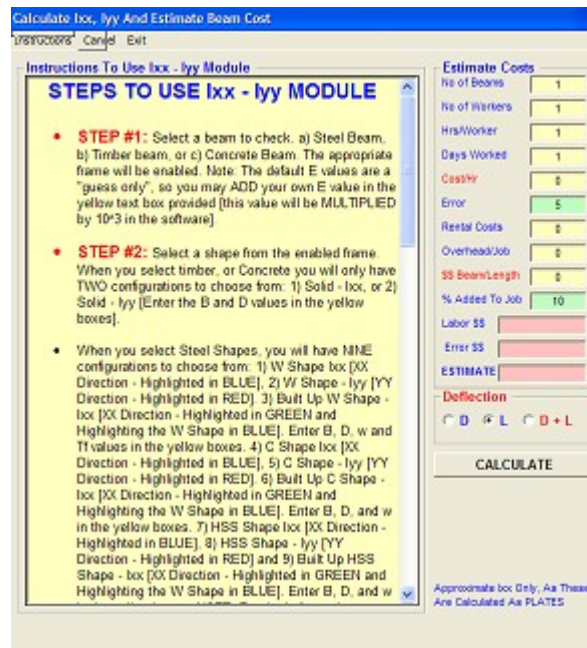
- **30 Different Beam Types:** **a) Simple Beams:** UDL, Triangular Load, Load Increasing Uniformly to One End, UDL Partially Distributed, UDL Partially Distributed at One End, Unequal UDL Partially Distributed at Each End, Concentrated Load at Center, Concentrated Load at Any Point, Two Equal Concentrated Loads Symmetrically Placed, Two Equal Concentrated Loads Unsymmetrically Placed, Two Unequal Concentrated Loads Unsymmetrically Placed. **b) Beam Fixed at One End:** Supported at Other – UDL, Supported at Other – Concentrated Load at Center, Supported at Other – Concentrated Load at Any Point, Free But Guided At Other With UDL, Free But Guided at Other – Concentrated Load at Guided End. **c) Beam Fixed at Both Ends:** UDL, Concentrated Load at Center, Concentrated Load at Any End. **d) Cantilever Beam:** Load Increasing Uniformly To Fixed End, UDL, Concentrated Load at Any Point, Concentrated Load at Free End. **d) Beam Overhang One Support:** UDL, UDL on Overhang, Concentrated Load at End of Overhang, UDL Between Supports, Concentrated Load at Any Point Between Supports, **e) Beam:** UDL and Variable End Moments, Concentrated Load at Center and Variable End Moments.
- Several Levels of Help Files built in for easy usage.
- Professional Version of software does calculations in Imperial Units and Metric Units.
- Illustrates the free Body Diagrams and Shear and Moment Diagram sketches along with the formulas for EACH of them.
- Calculates: Reactions, Shears, Moments and deflections based on DL and LL [factored, or un-factored]. Deflections are calculated based on a) Dead Load, b) Live Load, or c) Dead + Live Load.
- Compare your deflections with an Allowable deflection. This software does NOT design the steel member. In most cases, when a beam is properly laterally supported, the allowable deflection will govern. Designing any of these beams may require a Licensed Professional Engineer. Your codes, statutes, or laws will indicate if this is required in your area.

- Check Steel, Timber, or Concrete Beams.
- Estimate the cost to place this beam, including Labor costs.[Professional Version only]
- Ixx and Iyy Module [on Professional Version Only], where you can select W Shapes, HSS Shapes, Channels, or Built Up Shapes to use as your beam.
- Conversions Module is provided with the Professional Version [13 Items to convert: Volume, Area, Force, Length, etc.].
- NOTE: This is **NOT** a spreadsheet and it does **NOT** require any 3<sup>rd</sup> party software to use it.

## MAIN MODULE WITH INSTRUCTIONS



## IXX - IYY MODULE WITH INSTRUCTIONS



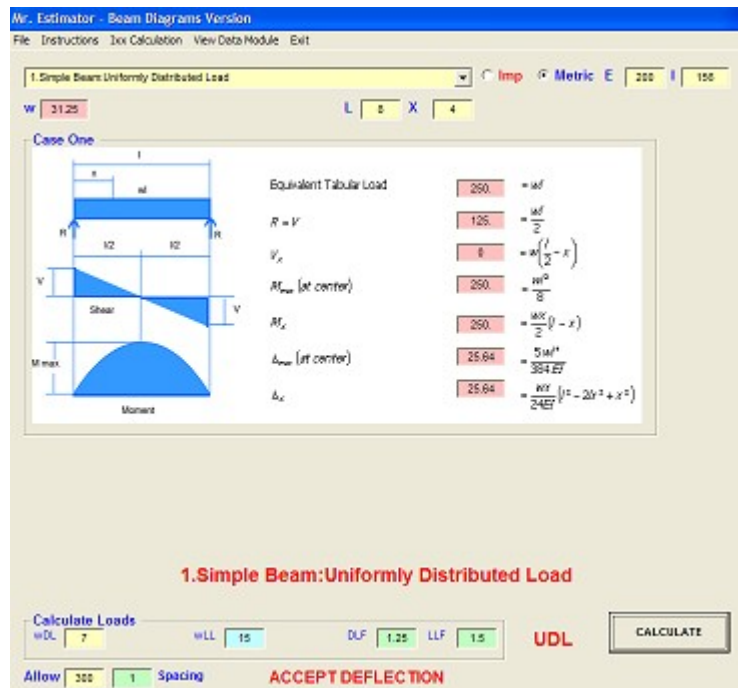
- Instructions are found on the modules. On the Ixx – Iyy Module you can also view instructions to complete your estimate. The software is easy to use, with a very short learning curve.

## BELOW ARE SAMPLE PROBLEMS FROM THREE DIFFERENT TEXTS TO ILLUSTRATE THE USE OF THE SOFTWARE.

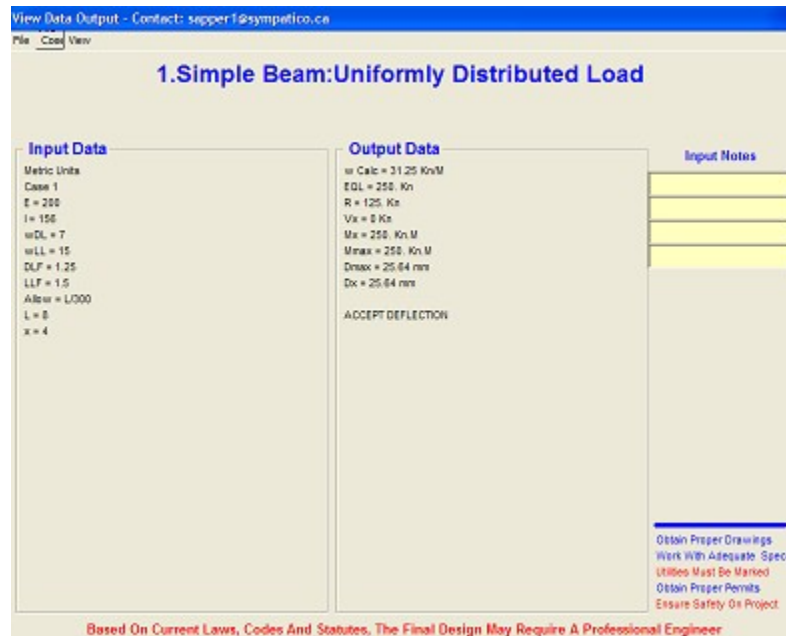
- The problems selected are based on a Simple Beam with a Uniform Distributed Load [UDL], as this is also available on the LITE Version. The Professional Version solves 30 different beams with 3 different loads [Steel, Timber, or Concrete beams]. The examples below focus on a) Steel beams using Canadian and US codes, and b) Timber beam.

## EXAMPLE ONE – FROM THE HANDBOOK OF STEEL CONSTRUCTION - 7<sup>th</sup> Edition 1997, pg 5 -75.

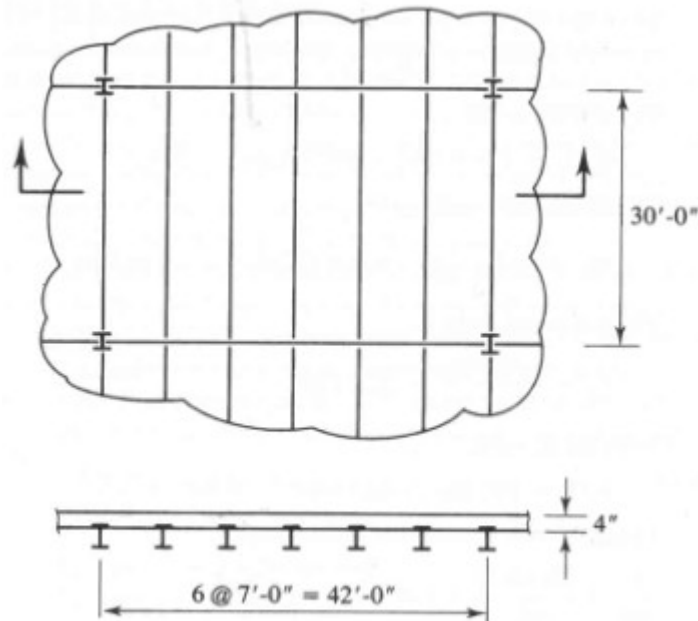
- **GENERAL PROBLEM DESCRIPTION:** Simply Supported Beam. Span = 8 Meters. Carrying a UDL [15 Kn/M specified Live Load and 7 Kn/M specified Dead Load – the Dead Load includes an assumed beam Dead Load = 7 Kn/M]. Live Load Deflection is limited to L/300. Beam is laterally supported.
- **STEP #1:** Input your data. In this case our Dead Load Factor = 1.25 and our Live Load Factor = 1.5 [Canadian Codes]. We enter wDL = 7 Kn/M and wLL = 15 Kn/M, Span = 8 Meters and the allowable = L/300.



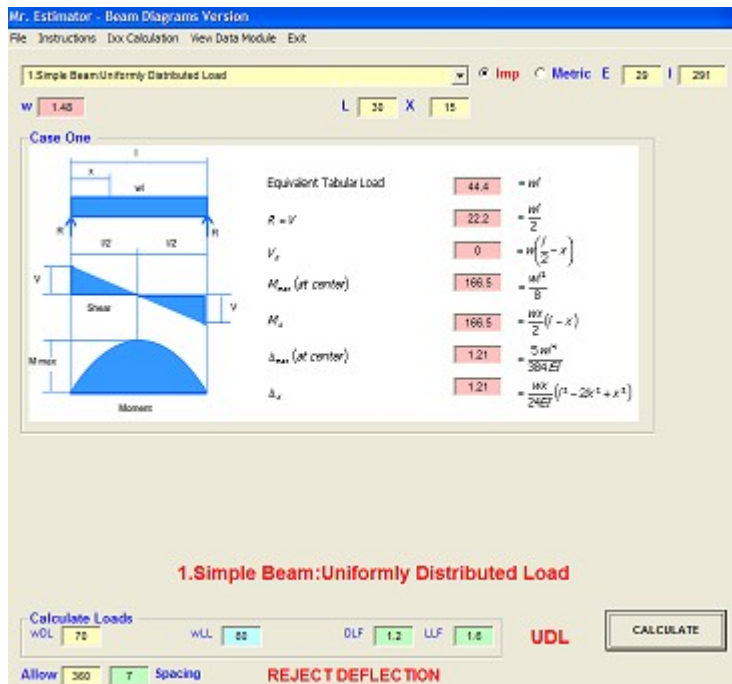
- The steel handbook shows a factored load of 31.3 Kn/M. In this case we set the spacing to 1 Meter. The software shows  $w = 31.25$  Kn/M. The problem illustrates that a W410 x 46 is acceptable and the software indicates to **ACCEPT** the deflection.
- **STEP #2:** View your Data by opening up the View Data Module. We did not use the Ixx – Iyy Module in this case, but I TURNED OFF the estimate on that module, so nothing would show for the estimate on the View Data Module.



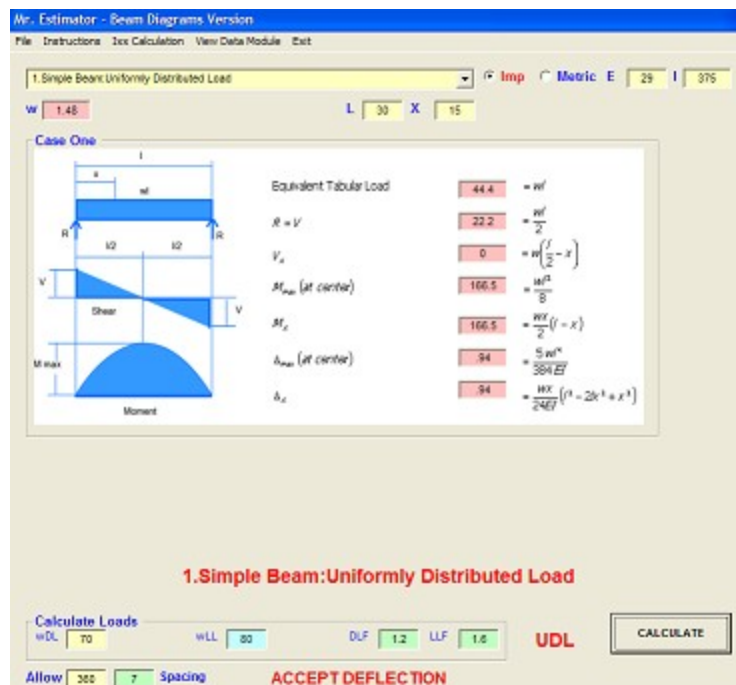
## EXAMPLE TWO – FROM LRFD STEEL DESIGN TEXT - 3<sup>rd</sup> Edition by William T. Segui. Problem 5.13 pg. 180



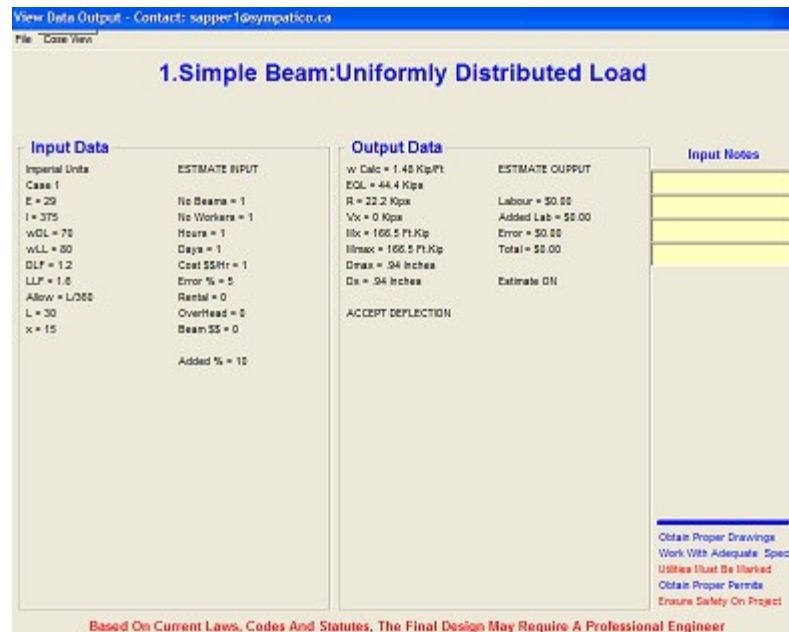
- **GENERAL PROBLEM DESCRIPTION:** 4 inch thick reinforced concrete floor slab is supported by the beams illustrated above [wslab = 50 psf , therefore = 350 lbs/ft @ 7 ft spacing]. Floor beams are supported by girders. In addition to the weight of the structure, loads consist of a uniform live load of 80 psf and movable partitions @ 20 psf. The max live load deflection must not exceed  $l/360$ . Problem shows  $w_D = 0.49$  Kips/Ft, and  $w_L = 0.56$  Kips/ Ft. Note: Dead Load factor = 1.2 and Live Load factor = 1.6. [pg.181].
- **STEP #1:** Input your data. In this case our Dead Load Factor = 1.2 and our Live Load Factor = 1.6 [US Codes]. We enter  $w_{DL} = 70$  pounds/Ft<sup>2</sup> and  $w_{LL} = 80$  pounds/Ft<sup>2</sup>. We enter our spacing as 7 Ft. For the first part of the problem we shall use  $I_{xx}$  for a W14 x 30 @ 291 in<sup>4</sup>. Our allowable in this problem is entered as 360 [which means  $L/360$ ]. Note: We did not have to use the  $I_{xx} - I_{yy}$  module here, as  $I_{xx}$  was known. When  $I_{xx}$  is entered, the software calculates the results, or you can press the **CALCULATE** button.



- Notice this W14 x 30 Beam **FAILS**, as it does in the text example.  $W_u = 1.484$  Kips/Ft in the text and in the software.  $M_u = 167$  Ft-Kips in the problem and the software shows 166.5 Ft-kips. The deflection is 1.21 inches in the problem and the software. This is GREATER than  $L/360 = 1$  inch, therefore NG.
- Now, we can check the W16 x 31 stated in the problem. See solution in next frame. Notice the deflection is **ACCEPTED**. Ixx used here was 375 in<sup>4</sup> and the deflection was found to be 0.94 inches < 1 inch.



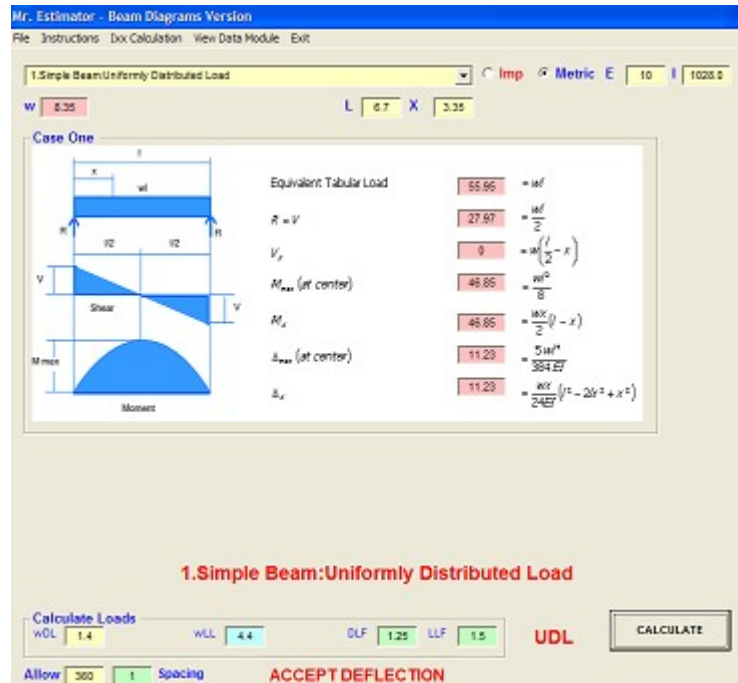
- Both versions of the software will show the same results.
- **STEP #2:** View your Data by opening up the View Data Module. Since we did not do an estimate, you will see these values are \$0.00. These values are here because the default setting on the lxx – lyy Module is Estimate = On. Notice above in first problem this was turned OFF and not showing.



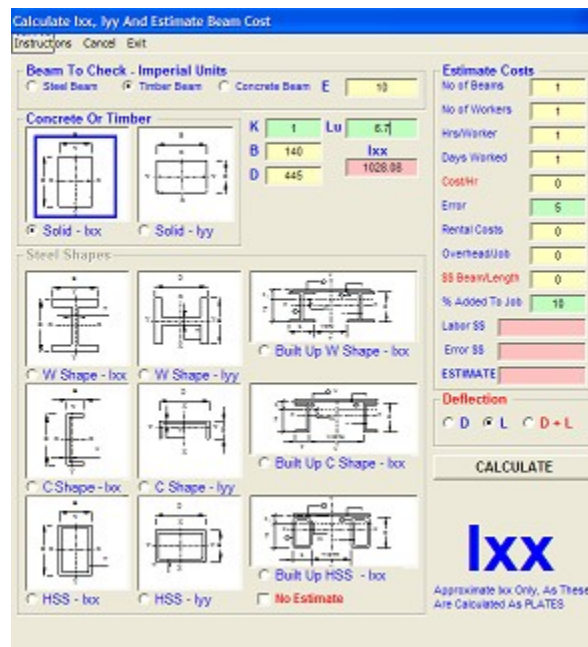
- Notice that this software is versatile to solve problems in Imperial Units with changes to the Dead Load and Live Load Factor. The software assumes the beams are laterally supported. In most cases the allowable deflection will govern the design. The allowable can be adjusted to compensate for other cases. You may require a Licensed Professional Engineer if you are actually designing any of these beams, based on the current steel codes in your area. Your local codes, statutes, or laws will dictate if a Licensed Professional Engineer is required.

## EXAMPLE THREE – FROM LIMIT STATES DESIGN OF WOOD STRUCTURES by: F.J. Keenan, Example 8.3.2 pg.174

- **GENERAL PROBLEM DESCRIPTION:** Choose the lightest sawn lumber roof beam adequate for the following conditions: Specified Dead Load  $w_D = 1.4 \text{ Kn/M}$ , Specified Live Load  $w_L = 4.4 \text{ Kn/M}$  [both UDL],  $L = 6.7 \text{ M}$ , Beam held in line by purlins, non – load sharing, Hem – Fir Species group [ $E = 10,000 \text{ N/mm}^2$ ], No treatments, No. 1 grade, dry service condition.
- **STEP #1:** Input your data. As indicated in the problem description. The interface for the Professional and LITE Version will appear as illustrated below:



- STEP #2:** Open the  $I_{xx} - I_{yy}$  module and select Timber Beam, then pick a Solid  $I_{xx}$  Shape. Enter the trial joist as  $B = 140 \text{ mm}$  and  $D = 445 \text{ mm}$  [5.5 inches x 17.5 inches]. We are not filling in the estimation data in this case. Enter  $E = 10,000 \text{ N/mm}^2$ . Press the **CALCULATE** button.  $I_{xx}$  is calculated as approx  $1028 \times 10^6 \text{ mm}^4$  [checking pg 51, Table 3.1.4, this value is correct]. This value is placed on the main module. This module allows to select various other shapes as well.



- STEP #3:** Cancel this module and go back to the main module. If all data is entered OK, press the **CALCULATION** button. See the diagram in Step #1.

- Note: The problem in Step #1 the w value calculated is 8.35 Kn/M [as in the problem]. The spacing used for this beam is 1 M. Pg 184 illustrates the deflection at 11.2 mm [as calculated by the software]. Hence, this 140 x 445 Hem – Fir roof beam is **ADEQUATE** and **ACCEPTED** by the software.
- This software is excellent for small to medium contractors doing renovations on steel, timber, or concrete beams. The software allows for several shapes to be selected with ease. The solution is very quick.

## WHAT ARE SOME BENEFITS OF THIS SOFTWARE?

### 30 Reasons Why This Product Will “Add Value” to your projects.

- Easy to use. Simple interface.
- Very short learning curve. Don't have to train staff to use this product.
- Easy Instructions and definitions given.
- Very Low Cost per project. Make ALL your money back with one use.
- No Spreadsheets and No 3<sup>rd</sup> Party software required.
- Consider Labour, Retail and Overhead costs to place beam(s).
- Reasonably accurate. See sample problems above.
- Calculates Reactions, Shear(s), Moments and Deflection(s).
- Uses both Metric and Imperial Units.
- Free body diagram, Shear and Moment diagrams.
- Formulas for each beam are indicated on the beam being checked.
- Ixx – Iyy Module to Calculate Moment of Inertia for Various Shapes.
- Conversions calculator comes with the Professional Version.
- Excellent for Small Projects – House projects and Larger projects.
- Excellent for small to medium contractors who want a FAST quote,
- 30 Different Beam Types.
- 3 Different Load Types: UDL, Point Load [and Double loads], Or Triangular Load.
- Quotes for beam can be given over the phone in minutes.
- Compare deflections will Allowable entered [see examples above].
- No databases to be updated and maintained.
- No extra training is required. Use immediately to “automate” your design process.
- Simple View Data display and printout.
- Improve your “Bottom Line” immediately with one use.
- Professional Version can be “customized” for your business, or projects.
- Deflections calculated for Dead, Live, or Dead + Live Loads.
- Very **LOW** price compared to software using spreadsheets.
- Allows for project flexibility.
- Load Factors can be used for any area used. Canadian & US illustrated above.
- Calculation ERROR is eliminated.
- Professional Version is “Personalized” for you.

If you have any questions, please do not hesitate to ask. We will be pleased to answer all of your questions and concerns.

**OUR PROFESSIONAL VERSIONS OF THE SOFTWARE ARE  
CUSTOMIZABLE.**

We can add your own projects to the software to “automate” your design process.

**High Security Software – Copy Protected  
30 – Day Limited E – Mail Support**