Concise Beam

Concise Beam Version 4
Concise Beam

Precast/Prestressed Beam Design

A state-of-the-art, easy-to-use Windows based program for the analysis and design check of precast concrete beams, prestressed or not, to American, Canadian, Australian, and New Zealand design standards.
Main Window

Concise Beam
Beam Layouts

- Simply supported precast beams
- Cantilever at either end
- Composite topping/slab with optional haunch
- Shored construction optional
- Hollow-core fill
- Automatic generation of openings
Beam Cross-Sections

- Model any user defined cross-section
- Select from a library of standard sections
- Use the section editor to create your own section, or modify a standard section
- Vary the section prismatically over the length of the beam
Section Editor

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Reinforcement Options

- Reinforced, partial or fully-prestressed, precast beams
- Mix of rebar, wire, and strand
- Deflected and debonded strands
- Fully developed or hooked rebar and strand ends available
- Epoxy coated reinforcing bar available
Section, Material and Loading Libraries

- Libraries of standard beam cross-sections
- Libraries of standard materials
  - reinforcing steel sizes and material
  - prestressing strand sizes and material
- Libraries of Moving Loads
- Create your own libraries
Edit Concrete Section Library - CPCL4 rev.1.precast.lib

Folder
Name: Double Tee

Section
Name: DT 3000x 700
A: 341824 mm^2
I: 15649000448 mm^4
yb: 492 mm
V/S: 40 mm
bw: 293 mm

Section Type: Double Tee

* These values will be generated by the Section Editor and can be overwritten. The shear width bw is only an approximation and needs to be checked to ensure that it is appropriate.

Height of Loading: 700 mm
Top of Web: 650 mm

Box Beam
- Double Tee
- Flat Slab
- Hollow Core
- I-Girder
- Inverted Tee
- L-Shaped
- Rectangle
- Single Tee

DT 3000x 700
- DT 2400x 300
- DT 2400x 500
- DT 2400x 700
- DT 2400x 900
- DT 3000x 300
- DT 3000x 500
- DT 3000x 700
- DT 3000x 900
- DT 3660x 350
- DT 3660x 600 PT
- DT 3660x 550
- DT 3660x 600 FT
- DT 3660x 750
- DT 3660x 800 PT

Import or Export Sections
Convert Library to US Units (ft & ip)
Save Current Library File
Save As New Library File
Cancel
Applied Loads

- Automatic beam and topping self-weight
- Static Point loads, moments or torques
- Uniform, or linearly varying, distributed loads or torques
- Moving Loads including Highway Live Loads
Flexible Load Groups

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Static Applied Loads

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Moving Loads

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Design Codes

- American standard ACI 318-99 through ACI 318-14
- Canadian standard CSA A23.3-94 through CSA A23.3-14, CSA S6-06S-10 and CSA S6-14
- Australian standard AS 3600-2001 and 2009
- New Zealand standard NZS 3101:2006
- Customize select code parameters
Customized Code Parameters

Concise Beam
Units of Measure

- Work in metric or U.S. Customary (Imperial) units
- Switch back and forth at any time
- Select specific unit of measure (m, cm, mm, in, ft, etc.)
- Save your selection for future use
Flexible Units of Measure

Concise Beam
Advanced Engineering Capability

- Uses detailed methods whenever appropriate
- Provides select alternative methods
- Cracked section analysis
- Strain compatibility analysis including slippage of reinforcement
- Lateral stability check during lifting and transport
- Shear check of hollow-core with filled cores
Loss and Design Parameters

Concise Beam
Analysis and Design Features

- Serviceability and Ultimate State Analyses
- Automatic design code checks
- Shear and torsion steel design
- Interface shear design for deck/topping
- Follows recognized methods as used in the PCI Design Handbook, CPCI Metric Design Manual, and the NPCAA Precast Concrete Handbook
Ease of Use

• Standard Microsoft Windows desktop interface
• Easy-to-read on-screen user's manual and context-sensitive help
• Design tutorial and examples
• Full technical support
• Regular program upgrades
Text Output

- Summary text report of input and output
- Detailed text reports of analysis and design check results for:
  - Flexure, shear, and torsion analysis
  - Prestress loss and force
  - Concrete stresses and cracking estimate
  - Deflection and camber estimates
  - Flexural, shear, and torsion design checks
  - Stirrup, interface tie and hollow-core fill design checks
**Summary Report**

*Design Code Used: CSA S6-14*

**NON-DEFAULT OPTION SETTINGS**
- **OFF** **G2:** Use PCI Standard Design Practice, TR-7-05 (ACI codes only)
- **ON** **L1:** Vary User Defined Losses Along Beam
- **ON** **S4:** Use the Ultimate Section Capacity for Horizontal Shear (Moment Region Check)
- **OFF** **D3:** Have Concise Beam calculate the long-term deflection multipliers for prestressed beams

### Concrete Material Properties

<table>
<thead>
<tr>
<th></th>
<th>Precast Beam</th>
<th>Cast-in-Place Four</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete Density</td>
<td>$W_C = 2400 \text{ kg/m}^3$</td>
<td>$W_C = 2400 \text{ kg/m}^3$</td>
</tr>
<tr>
<td>Compressive Strength</td>
<td>$f'c = 50.0 \text{ MPa}$</td>
<td>$f'c = 35.0 \text{ MPa}$</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>$E_c = 29966 \text{ MPa}$</td>
<td>$E_c = 26273 \text{ MPa}$</td>
</tr>
<tr>
<td>Strength at Transfer</td>
<td>$f'c = 50.0 \text{ MPa}$</td>
<td>$f'c = 35.0 \text{ MPa}$</td>
</tr>
<tr>
<td>Modulus of Elasticity</td>
<td>$E_c = 29966 \text{ MPa}$</td>
<td>$E_c = 26273 \text{ MPa}$</td>
</tr>
<tr>
<td>Cement Content</td>
<td>410 $\text{ kg/m}^3$</td>
<td></td>
</tr>
<tr>
<td>Air Content</td>
<td>5.00 %</td>
<td></td>
</tr>
<tr>
<td>Slump</td>
<td>50.0 mm</td>
<td></td>
</tr>
<tr>
<td>Aggregate Mx1</td>
<td>0.40 (Fine to total aggregate ratio)</td>
<td></td>
</tr>
<tr>
<td>Aggregate Size</td>
<td>20.0 mm</td>
<td></td>
</tr>
<tr>
<td>Basic Shrinkage Strain</td>
<td>780.000E-6</td>
<td></td>
</tr>
<tr>
<td>Curing Method</td>
<td>Moist</td>
<td></td>
</tr>
<tr>
<td>Relative Humidity in Service</td>
<td>70 %</td>
<td></td>
</tr>
<tr>
<td>Ambient Temperature in Service</td>
<td>20 deg C</td>
<td></td>
</tr>
</tbody>
</table>

### Construction Schedule
- Age at Transfer = 0.75 days
- Age at Erection = 49 days
- Age at Cast-In-Place Pour = 50 days
- Age Construction is Complete = 143 days

### Precast Beam Layout

<table>
<thead>
<tr>
<th>No</th>
<th>From</th>
<th>To</th>
<th>Length</th>
<th>Folder Name</th>
<th>Section Identification</th>
<th>Section Name</th>
<th>Section Type</th>
<th>Z (mm)</th>
<th>Y (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.000</td>
<td>30.600</td>
<td>30.600</td>
<td>I-Girder</td>
<td>CPCI 1600</td>
<td>Flanged Beam</td>
<td></td>
<td>0.000</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Span Length at Transfer = 30.600 m, Centre of Supports, Left @ 0.000 m, Right @ 30.600 m
Span Length in Service = 30.000 m, Centre of Supports, Left @ 0.300 m, Right @ 30.300 m
Graph Output

- Graphs of analysis and design check results for:
  - Flexure, shear, and torsion analysis
  - Prestress forces
  - Concrete stresses
  - Deflection and camber estimates
  - Flexural and shear design checks
  - Stirrup, hollow-core fill and interface tie design checks
Graphs
Computer Requirements

- Simply, any computer capable of running Microsoft Windows XP or later, including Windows 10
- Supports any Windows installed printer or PDF printer
- Internet access and e-mail address for program distribution, updates, announcements, and technical support
How to Obtain Concise Beam

- Visit Black Mint Software's web site at www.BlackMint.com to download a free 30 day, fully-functional, evaluation copy of the program
- Current pricing, ordering, and payment options are available on the web site
- Black Mint Software can also be reached through the web site to answer any of your questions
Visit Us at www.BlackMint.com

Contact Us at ConciseBeam@BlackMint.com

Concise Beam

Concise Beam is an easy to use program for the design of precast concrete beams. Concise Beam will perform a load analysis and design checks in accordance with the latest edition of ACI 318, CSA A23.3 & 86, AS3600, or NZ3101.1. Key code parameters can be customized to simulate other design codes. The beam can be conventionally reinforced, partially or fully prestressed. It can model any cross-sectional shape and will allow the cross-section to vary prismatically (step-wise) over the length of the beam. A graphical editor allows the user to describe any cross-section, including voids.

Concise Beam currently works in two-dimensions using beam theory.

News

June 9, 2016 - Concise Beam version 4.60 beta 3 released for beta testing
Concise Beam version 4.60 beta 3 is now available for user beta testing on the Download page. Please give it a try and give us your feedback.

April 12, 2016 - Concise Beam version 4.60 released for beta testing
Concise Beam version 4.60 is now available for user beta testing on the Download page. Please give it a try and give us your feedback.

February 13, 2016 - Concise Beam version 4.50 is now available for download
Your commercial license must be current up to the end of February 2016 at the earliest to be able to use this release. Users evaluating this new release will be able to use this version for the remainder of their 30 day evaluation period. If your license has expired please contact us about how to bring your license up to date in order to use the latest release and to receive technical support. You do not need to install any previous versions of Concise Beam before installing this latest release.

Version 4.50 is an interim release which includes the following changes:

- Corrected calculation of U/V where M = 0 for prestressed beams under ACI 318.
- Corrected the label of the Principal Stress option and how it is saved to file.
- Adjusted the reading of version 2 files by re-setting the deflection multipliers to default.