

## Crane Girder Design to BS 5950-1:2000

CRANEgirder is an Excel Spreadsheet Template for the design of simply supported crane girders.

Its interactive features offer ease of use, fine design controls and time saving when sizing and improving details of crane girders and their supporting structure.

In general, the procedure is based on the Steelwork Design Guide to BS 5950-1:2000, Volume 2, Worked Examples, SCI Publication P326, The Steel Construction Institute, 2003

### Features:

- Steel Grades can be S275, S355 or S460.
- Impact factors can be 1.1, 1.25, 1.3, 1.4, 1.5 or 2, depending upon the crane usage & specifications.
- Crane Class can be Q1, Q2, Q3 or Q4. When the crane class is Q3 or Q4, the involved crabbing force is included in the design calculations.
- At supports, the flange restraint ratios for position and direction can be 0.7, 0.85, 1, 1.2, 1.5 or 2.
- The compound crane girder section can be comprised of up to two parts. The bottom section is always a UB. The top section can be a PFC, RSC, a rectangular plate or nothing.
- Two pull down menus offer selection of the bottom part from 72 UB sections and the top part from 52 PFC/RSC/Plate sections.
- A Yes/No option allows the user to include or exclude the UB top flange for resisting lateral loads and displacements. This allows the user to adopt the SCI approach<sup>2</sup> or follow a standard past practice<sup>5</sup>.
- At supports, the stiff-bearing-length and the beam-end to stiff-bearing-edge distance can be varied to optimise support extents.
- The wheels in end carriages of the crane bridge can have one or two flanges to transmit lateral loads.
- The template includes diagrams showing dimensions and details required for the crane design.
- To design the support structure, reaction values are shown together with diagrams for their direction and position.
- Calculation results are shown on the screen and included in the printed output. Users and checkers can verify them by hand calculations.
- On the spot background information display via comments, when the mouse is moved over cell results.
- Database facility within the CRANEgirder file keeps information for up to 100 crane girders in a project via its worksheet STORE. Using a reference number

in the range 1001 to 1100, the data for each girder can be retrieved, changed and re-saved later.

- The Database in worksheet STORE is visible to the user. Using spreadsheet features of Excel, new data can be generated and the existing one examined and or modified.
- The template has virtually no user interface. The printed Output matches the Screen Display. Knowing Excel use and the ability to verify results as a designer is sufficient for using CRANEGirder.
- Shaded cells in the spreadsheet signify User-Input and un-shaded cells the Results-output. This permits easy checking by users and checkers alike.
- At all stages of use, cells at upper left of the screen display summary of 7 adequacy checks. This makes the failing checks become obvious at a glance.
- To help select an economical girder section, 8 usage ratios based on actual to permitted values of deflection and strength are calculated. The maximum value representing economy of structural use is displayed in upper part of the output.