

MasterSeries 2022

What's New?

General

1. Steel Section Databases updated to latest blue book sections
2. Added 'Check availability' field on RHS/SHS section as per the blue book, with an option to exclude these sections.
3. European sections now separated into its own database, leaving an exclusive UK steel sections database
4. Ability to more easily switch between the MasterSeries 'Out of the Box' databases for UK, Europe, South Africa, USA and China.
5. Network sharing of the database file, with singular access for database editing.
6. File locking protection, with information on PC name that the file is open on when trying to open the file.
7. You can now specify the 'Approved By' field in print design calculations. This was previously a manual signing process.
8. Email current data file to help@masterseries.com added to all File menus
9. Migrated database technology to SQLite for all databases, resulting in easier installation/deployment, faster database access and ability share read only databases access in some instances.
10. In the steel section drop lists in all areas of the software where steel sections are applied, the last section size used in each type is used as the default when the section type is changed. This is saved to the computer registry and therefore persists between MasterSeries sessions.
11. Built-in trouble-shooter for MS Word that attempts to silently resolve common exporting issues.
12. Automatically repairs files that have incorrect or inconsistent Windows line endings.

MasterFrame

13. Member Property Editor – read only properties now given for total length, principal axis lengths, principal plane angles.
14. Steel sections database file used and it's setting are now optionally saved with the MasterFrame data file. As you then open the data file, if the current steel section database does not match the saved one, MasterFrame will automatically switch to the correct database saved with the file. The database settings will be saved with the file, such as 'Hide Old Sections', 'Hide Check Availability' sections will also be used.
15. Option to save the entire Steel Section database with the file. This may be convenient when you are working with a custom steel section database and moving the file to another PC or sharing the file with another user who does not have your custom database.
16. You can now fully specify the concrete or timber section properties when adding a new member.

17. Member filtering – if you check a child node and the parent node is not checked, it will be automatically checked. For example, if you check 'Vertical member' and the parent node 'Orientation' is not checked, then it will be automatically checked.
18. Option to quickly switch between member split and merge functions.
19. New perp to line offset snapping feature. Useful in CAD layer snapping.
20. Intermediate member snap point at Y levels of frame.
21. Warning message added – when turning on composite design MasterFrame the self-weight load group changes from D1 to A1. A warning message asks the user to check their load cases for any required changes is given.
22. In the tabular output of member forces, members can be optional grouped per physical member in the correct order.
23. Beam eccentricities (horizontal offsetting of beams relative to columns for design purposes) interface improved to increase clarity on sign convention of offsetting. The horizontal offset of the beam is also drawn in 3D.
24. Improvement in graphical results labelling of curved members. Previously all sub members were labelled, whereas now only the ends and max points are labelled.
25. In graphical output member labelling of moment and deflection, the position on the max internal value is now at the location of the value and not always at the centre of the member as previous.
26. In graphical output member labelling of deflection, the position of the maximum deflection can be optionally given.
27. Member section labelling of flitch timber members now gives full timber and steel plate details.
28. You can now change the order of Frame Views
29. The auto generation of Horizontal Notional load interface has sometimes caused confusion and has been improved to clarify it will generate multiple load case with HNL, and is related to the current load case
30. The 'Auto Load Case Generation' wizard now allows you to specify the % of the horizontal notional loads, where previously this was always 0.5%.
31. 'Auto Load Case Generation' wizard, in the preview of generated load case, you can now scroll horizontally so see long load case title names.
32. The show key for sections, when the width is too large is will split over two lines.
33. Drawing of area loading style line, patch and point loads, it always draws all the parts associated with current load, even those outside the current view. The new 'Draw in View Only' option ensures only the parts within the current view are drawn.
34. Area loading input of local loaded surface Dead Live Loads interface has been improved to separate out the different load groups into individual inputs (rather than one input of six comma delimited values).
35. Drag and drop to reorder items in lists such as Line/Patch/Point loads, Cad Layers, Slab Design and Slab Deflection.
36. In the tabular export of member forces to excel, an option to include section sizes has been added.
37. Beta angle editing area - align beta angle of member relative to another member. For example, if you had a horizontal member between two sloping rafters and you wanted the beta angle of the horizontal member to be rotated to that it is aligned with the slope of the rafter, you can hold ctrl or alt and pick the rafter member to align major or minor axis of beam with the rafter slope. A similar function has existed for some time for columns, whereby using ctrl or alt and clicking on connected beams would align the beta angle of the column with the beam.

38. Accidental ultimate design load case in Eurocode where there was no load factor great than 1.0 was being taken as service load case.
39. New option in 'Global Analysis' options to override non-linear number of iterations and convergence factor
40. New option in 'Global Analysis' options to 'Capture non-linear iteration snap shots. Following a non-linear analysis, from the Results menu you can select 'Non-linear iteration viewer' to view the deformed state of the model at each non-linear iteration per load increment & load case, along with convergence factor and max out of balance convergence degree of freedom. This is very useful for diagnosing non-linear analysis issues and non-convergence.
41. 'Combined Load Cases' is based on the principles of load case superposition for previously analysed load cases. It should not be used where non-linearity is of importance. That is, the non-linear result of two actions is not the same as the non-linear result of the two separate actions added together. The analysis procedure now checks for the non-linear condition in combined load cases and provides an appropriate warning at the commencement of static analysis.
42. Analysis Launch Window – You could previously suspend load cases from here but only one case at a time. You can now multi-select loading cases and suspend/unsuspend in one operation.

MasterFrame Finite Element

43. Drawing of FE Surface local axis. When a zoom filter was applied to part of an FE surface the local surface axis may not have been drawn. The axis is now always drawn in the part the FE surface visible.
44. FE Surface details in the View/Print Data file, giving material properties and loading.
45. Attached beams warning message now also includes the associated FE surfaces.
46. Area of Steel Required FE contour output legend values and screen annotation values now shown to nearest integer and not three decimal places.
47. Z ordering of section diagram annotation values improved so values are drawn above certain surfaces.
48. In FE Surface Codified Material option, the material properties are listed.
49. In FE Surface Codified Material option, the material density can be changed.
50. Graphical result – FE Section diagrams – improved performance where there was a large number of section diagrams in the ultimate envelope display case.

MasterFrame Report Generator

51. Member diagram wizard: create diagrams for any number of members with any number of load cases
52. Internal forces wizard: export internal forces for multiple members with any number of load cases
53. Graphical output wizard: allows you to very quickly produce potentially 100s of diagrams based on the set of graphical output options, for each selected load case and each selected snapshot
54. Graphical output Member diagrams added to report generator.

MasterKey Wind Analysis

- 55. Option in MasterFrame to use the maximum pressure value from all directions, which is useful in the situation where the building orientation is not yet known.
- 56. Note added to data file output that BS 6399 pt 2 Directional method is used for all appropriate C_p values as per PD 6688-1-4:2015 3.9.
- 57. EN 1991-1-4 7.4.1 implemented for parapets. Previously BS 6399-2 was used, which is very similar with some subtle differences, in that EN 1991-1-4 does not allow for L/h reduction in C_p values for in parapets with return corners, whereas BS 6399 -2 does.
- 58. In calculation of C_p value for free standing canopies, option to use the local C_p ABCD zones rather than the single overall C_p value.

MasterCAD

- 59. Exporting of composite shear stud number, dims and spacing together with transverse mesh reinforcement can now be separated into different drawing components.
- 60. IFC export can optionally include haunches

MasterKey Timber Design

- 61. Member Design Groups in integrated design, with option to make timber section identical for all members in the group.
- 62. Timber design printing/exporting - Table extended to include all unity ratios as per composite and steel.
 - 63. Includes graphical selection of members in integrated design
 - 64. Export to word now uses the same manager as printing. Previously only Export all or Current was available.
 - 65. Print/Export summary table of all briefs and unity ratios

MasterKey Connections

- 66. New load case print management – provides a full list of load cases with their design unity ratio summary for all aspects of design, enabling you to make informed decisions on which loading cases you would like to print a full report on. You can also auto select the critical print cases, either based on a unity ratio or the specified top number of cases. There is also a connection multi-select mode, whereby you can specify the print cases for all selection connections in one operation.
- 67. A full tabular load case summary with all unity ratios can also be printed/exported.
- 68. Implementation of EN 1992-4 Anchor Bolts – all four edge distances from base plate can now be specified to facilitate these checks
 - 69. Improved pullout checks which include edge conditions for all four edges
 - 70. Bolt shear with lever arm checks
 - 71. Concrete edge shear checks
- 72. Bracing RHS can be rotated through 90 degrees
- 73. Variable bolt spacing in flexible endplates – very helpful in cases where you have different sized beam on either side of web and you require a step in the bolt spacing of the larger beam to avoid crashing with the web flange of the smaller beam on the other side.

74. Beam to beam simple connection – set beam vertical offset for each beam independently, meaning top flanges no longer need to be at the same level
75. In simple connections you can change the type of the connection by copying to a new connection, e.g., change flexible endplate to fin plate.
76. Hollow section bracing connections – double cover plate to tab plate and gusset plate, making the connection concentric.
77. Base plate CHS pitched circle diameter bolts – you can now specify a phase shift on the bolts
78. Improved checking of bolt hole clearance for base plate
79. Base plate forces from integrated design – new option to derive forces from the total of all members above the base level. This helps in situations where you have concrete ground beams or a slab at the base level and bracing members at the base plate node above this. Previously the options were total support reaction, or column member end forces, neither of which obtained the desired base plate design forces in this situation.
80. PFC Simple flexible end plate connection can now have a single sided end plate (only on the side of the flanges) with a single column of bolts. Previously the flexible ends plate extended to both sides of the web and was symmetrical.
81. Column Splice – where staggered bolts are used, a flange elevation drawing is now provided showing the staggered bolt pattern.
82. Simple flexible endplates. Previously the option to use full depth flexible endplate was a global setting for all connections in the same file. This can now be done per connection.
83. Beam moment connections (Eaves and Apex) - Clarified that the haunch end moment is the 'Sharp' end of the haunch.
84. Bracing connection drawing now shows hidden line edge of gusset plate
85. Joint template database is migrated to SQLite, and can be stored in any location, including network shared location, meaning the template database can be shared between multiple MasterSeries users.
86. SHS/RHS Hollow Section Splice – New option to check complete end plate only yielding. SCI P358 states that Check 2 complete end plate yielding is not required provided plate thickness is between 12 and 26mm. However, on investigation it was considered that configurations could arise (e.g. a large connection with a 12 mm plate) where the complete end plate yielding is more critical than the Check 3 Plate and bolt resistance. This option is on by default for new connections, but off for existing connections.
87. Fin plates - Note added to design method output to indicate support model (flexible or rigid) used, as per the global default value specified.
88. Fin plate welds – Where fin plate shear and bending capacity is low (less than 0.5 unity ratio) the SCI P358 Appendix C.4 Alternative design method is used, which states if vertical loads are not significant then full strength welds are not required and the weld is design for the shear and moment.
89. Default plate grade can be set independantly from the section grade.
90. Base Plates to Eurocode – New option in Global default Setting 'Allow larger inner concrete compression projection'. When the concrete compression projection limited by the edge of the base plate was less than the standard 'c' projection (based on max plate bending capacity), this reduced projection was used on all round the section. The new option (on by default) allows for the full 'c' projection to be achieved where possible, hence providing a larger compression area.

MasterKey Pile Cap Design

- 91. Scan for failure in all briefs
- 92. Shading in pile cap drawing.
- 93. In integrated design you can now design pile caps where there is no column but have a nodal support, e.g., in a ground beam only models. Previously the user had to add a stub column above the support.

MasterKey Masonry Design

- 94. Point loads can be applied in a MasterKey Masonry PowerPad licence.
- 95. Point loads – spreader pad stone thickness added to allow application of point load over partial wall thickness
- 96. Option to input unit compression strength and the software then calculates the Normalised mean Compressive strength using the conversion shape factor from En 772-1 Annex A.
- 97. Vertical spacing of bed joint reinforcement can be specified as any value rather than the fixed value from the drop list.

Revit Link

- 98. Hollow sections with additional plates now supported through additional custom family in Revit.

MasterSeries Tekla Link

- 99. Bi-directional functionality for cellular beams
- 100. Bi-directional functionality for beams with web openings

MasterKey Concrete FE Slab Design

- 101. Punching shear – National Annex value added for $v_{rd,max}$ factor. UK value default to 0.4, euro norm value 0.5.

MasterKey Concrete

- 102. Print selection option to print visible beam, column and pads only.
- 103. Pad foundation size can be greater than 9999mm.
- 104. Column design and design groups – local column design parameters for slenderness (end conditions and bracing) can now be specified in a column design group.

MasterPort Portal Frame Analysis & Design

- 105. Connection design groups now available from MasterPort
- 106. Roof Wind Zone designation updated to those from BS EN 1991-1-4 UK NA. Cpe values are as per BS 6399 pt2, however zone letters differ.

MasterBeam Composite Design

- 107. New printing summary, giving a table to all unity ratios for all design briefs.
- 108. In integrated design the items in the print table can be selected graphically from the model.
- 109. Composite beam design group improvements – more settings are available in the group. There are also options to make the studs or mesh the same for all beams in the group.
- 110. Graphical member highlighting of members in design group
- 111. The option to 'Use modified program defaults' has been removed and the input values this included are now always present.
- 112. Span over depth and mm deflection default values are updated to more appropriate value to latest guidance.
- 113. Improved interface for deflection value checking inputs.
- 114. Modified deflection set values can now be saved as default, saved to or loaded from a file.
- 115. Checking of metal deck in plane shear capacity in the construction stage for its ability to provide lateral restraint to secondary composite beams is now done. SCI P360 Eqns 3.10, 3.11 and 3.12.
- 116. Component values of vibration deflection values are now given
- 117. Precamber of composite beams – new option to only preamber beams above a certain length. Option to limit preamber to a % of beam length. Precamber can now be rounded down as well as up (using a -ve rounding value).
- 118. Cot theta angle in Eurocode shear design can now be adjusted from the defaults tab
- 119. Shear stud strength f_u user define input to override default value.
- 120. In accordance with SCI AD 360 nominal stud height is used in the check of stud projection above top of deck, rather than length after welding.
- 121. Width of flange of shear studs in pairs now checked as per SCI P300. We check if the $4d + 40\text{mm}$ is ok, and if not, we check to see if a staggered pattern will work ($3d + 40$) if the average trough width is greater than $4d + 50\text{mm}$. We advise if the studs need to be placed in the staggered pattern.
- 122. Concrete ponding warning note added if dead load deflection is above limiting value.
- 123. Export frame graphics from composite design to Word, allowing exporting of design unity ratio member labels.
- 124. Quickly delete all briefs in the current view using the 'Select Visible' option in the Sort/Delete brief area.
- 125. The 'MasterFrame' menu in integrated composite beam design has a new function to 'Delete briefs from non-composite members'. This will delete all briefs that are not applied to a valid composite beam in the MasterFrame model, which includes stand-alone briefs not applied to any MasterFrame member.

MasterKey Steel Design

- 126. New steel design print manager. View all unity ratios components is a grid format for all design briefs. Sort grid based on unity ration, design brief type, member number etc.
- 127. New print summary that includes all major unity ratios and clearer representation of all brief information.
- 128. Shear Design Check – previously the shear design was only presented for the critical section of moment + axial design, which often meant that the shear check included in the design report was for a different point than the maximum shear value. The shear was checked at all locations along the beam and would have been presented if it caused a failure. A separate shear check is now included in the design report for the maximum shear unity ratio in the major and minor axis.
- 129. Quickly delete all briefs in the current view using the 'Select Visible' option in the Sort/Delete briefs area.
- 130. Modified deflection set values can now be saved as default, saved to or loaded from a file.
- 131. When a column members lateral sway deflection is greater than its in span deflection, we present the lateral sway deflection in the steel design check, noting it as such.

MasterFrame Dynamic

- 132. Ability to control the contours output for response factors. The number of contours and max response factor value can be set. Response factors above and below the max value are shaded distinct colour ranges.
- 133. Characteristics points are labeled on the FE surface contour plot
- 134. Place value at chosen point on the FE contour plot