What's New
Scia Engineer 14

Write your own calculations that connect to Scia Engineer

"Expanding Design": The latest version of Scia's structural analysis and design software delivers capabilities to move beyond the traditional limits of 3D structural analysis software by integrating engineering design workflow, even with customized modifications.

Open Design Checks – integrated workflow

Open Design Checks enable engineers to integrate their tailor-made calculations into Scia Engineer and to follow the standard workflow they are used to. They can exploit all powerful features in Scia Engineer (3D interactive modelling, adaptive FE mesh, advanced checks performed in a 3D interactive graphical environment, table input and results…) and integrate the external outputs into the Engineering Report.

Open Design Checks bring an extraordinary level of transparency to all performed calculations and new checks on beams & columns. Its reports provide a deep insight into the calculation, including images, formulas, substituted values and results.

Scia Engineer 14

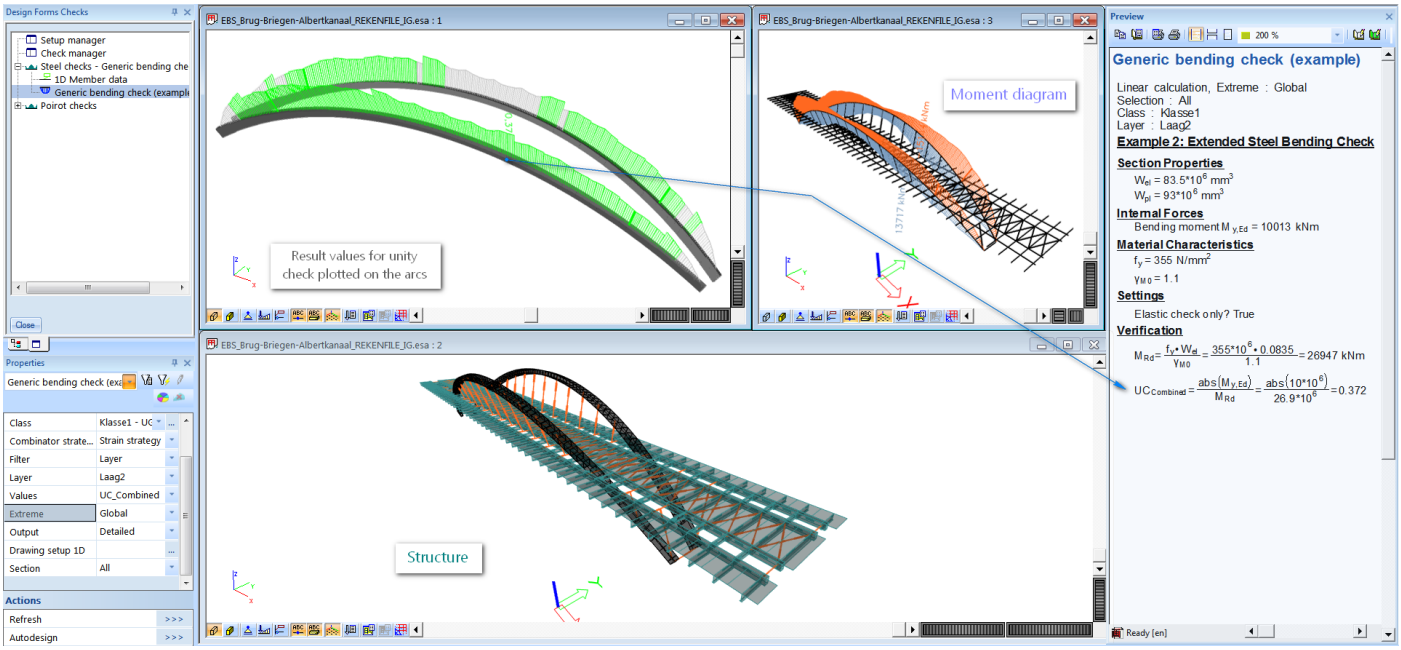
Expanding Design

Analysis & Results

One of the key factors affecting the accuracy and relevancy of results obtained via the finite element method is the quality (size) of the mesh. In the traditional approach it is the user and his/her experience that controls the process of adjustment and local refinement of the finite element mesh. In Scia Engineer 14 we are proud to present the automatic adaptive mesh refinement which represents the outcome of the research project realised in the cooperation with Prof. Patzak from the Department of Mechanics of the Civil Engineering Faculty, Technical University of Prague (Czech Republic).

Usability improvements

Like previous versions, version 14 is focusing on enhancements helping users with their day-to-day tasks. The improvements cover many areas: project manager, geologic areas, loads and load combinations, steel connections, design of steel structures, BIM, exchange of models with third-party applications, protection, installation …



Open Design Checks – integrated workflow

Powerful 3D modelling system expands to include dedicated, tailor-made calculations, prepared by engineers like you

In Scia Engineer 2013 we opened the door towards a new technology for preparation of code checks and other calculations in Open Design Checks. In Scia Engineer 14, we bring the full power of this breakthrough approach into your hands.

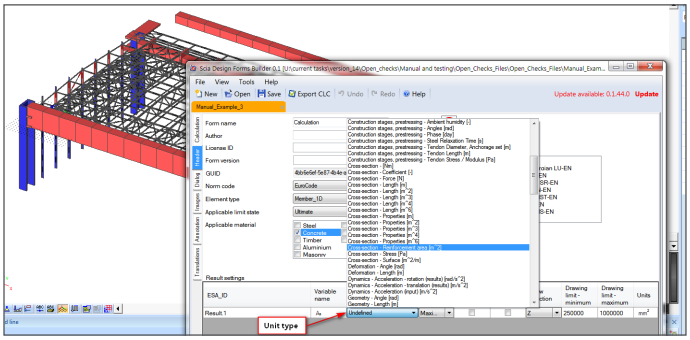
'Open Design Checks' enable the engineers to integrate tailor-made calculations into Scia Engineer and follow the standard workflow they are used to, exploiting all powerful features of Scia Engineer (3D interactive modelling, adaptive FE mesh, advanced calculations, checks performed in a 3D interactive graphical environment, table input, table results, etc.), as well as integrating the externally prepared output reports into Engineering Report.

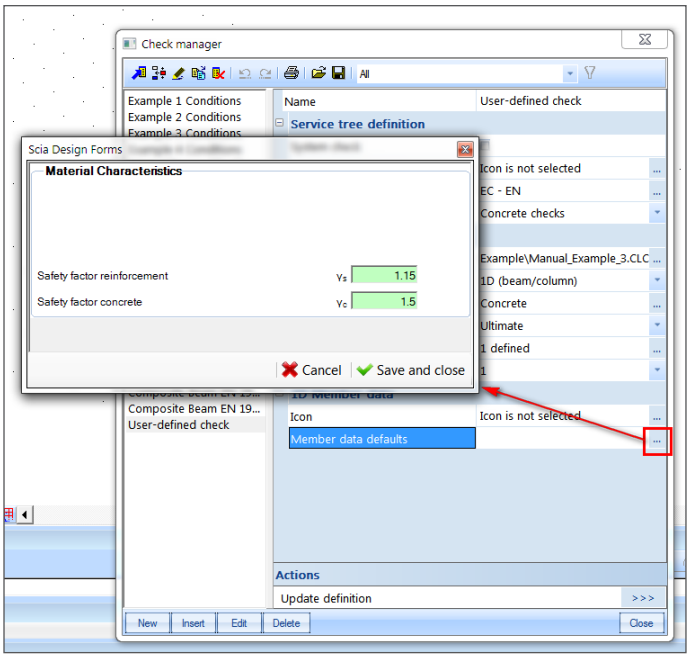
'Open Design Checks' bring an extraordinary level of transparency to all performed calculations and checks. The reports provide a deep insight into the calculation, including images, formulas, substituted values and results. This overcomes common objections raised against versatile CAE software systems that they behave like a black-box and tell little about what exactly is done in individual types of calculations and code-checks.

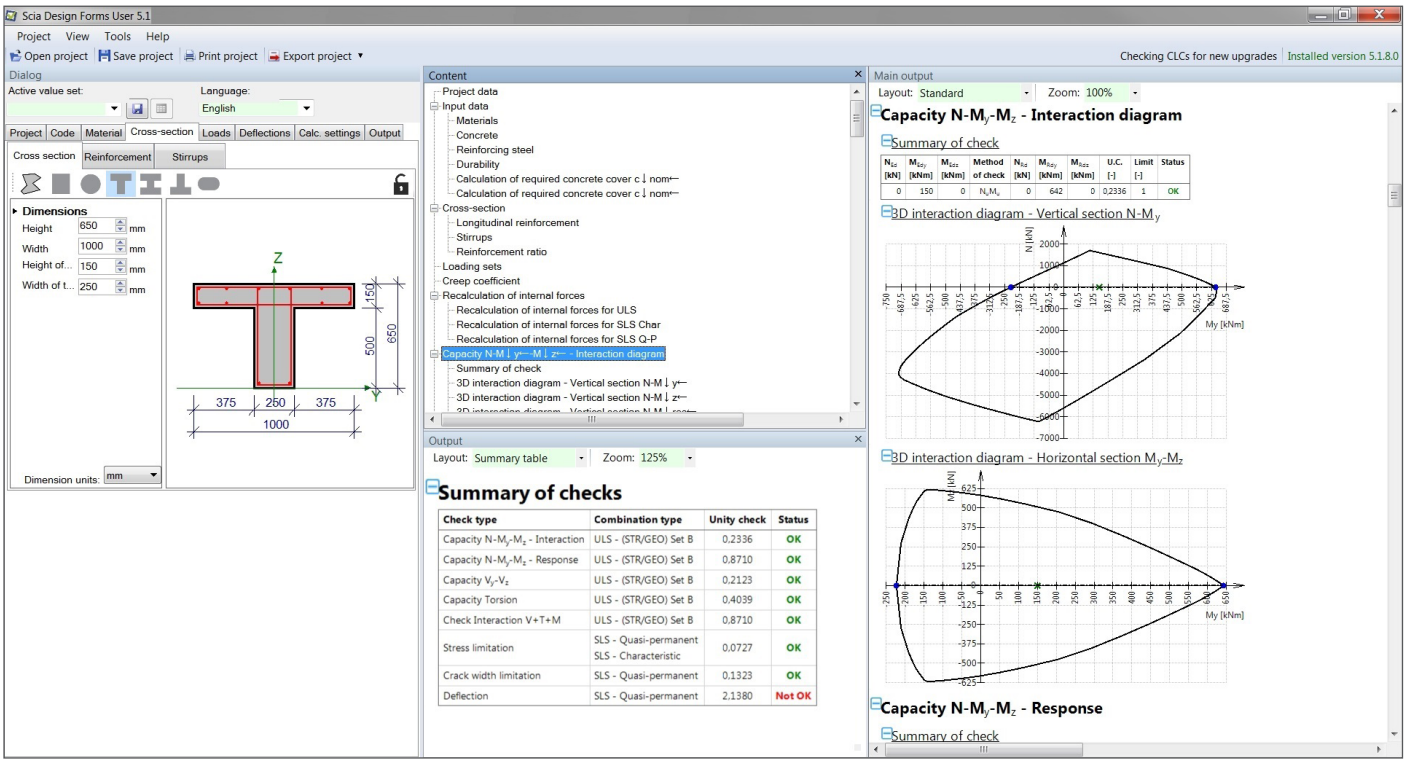
This full integration of "home-made" calculations helps engineers to successfully tackle the challenge of exceptional situations such as making checks according to special design codes or performing highly dedicated calculations not supported by a CAE system.

Open Design Checks offer a straightforward and simple solution. The structural engineers can prepare the dedicated calculations themselves in Scia Design Forms, they can share Design Forms prepared by their colleagues or members of the Scia Design Forms community or they may ask the Nemetschek Scia Support Team for assistance.

Many engineers already have various dedicated calculations and checks prepared in e.g. MS Excel or another spreadsheet tool. If so, they can transfer their calculations into Scia Design Forms, attach those forms to Scia Engineer 14 and immediately have all their calculations available inside the CAE system.





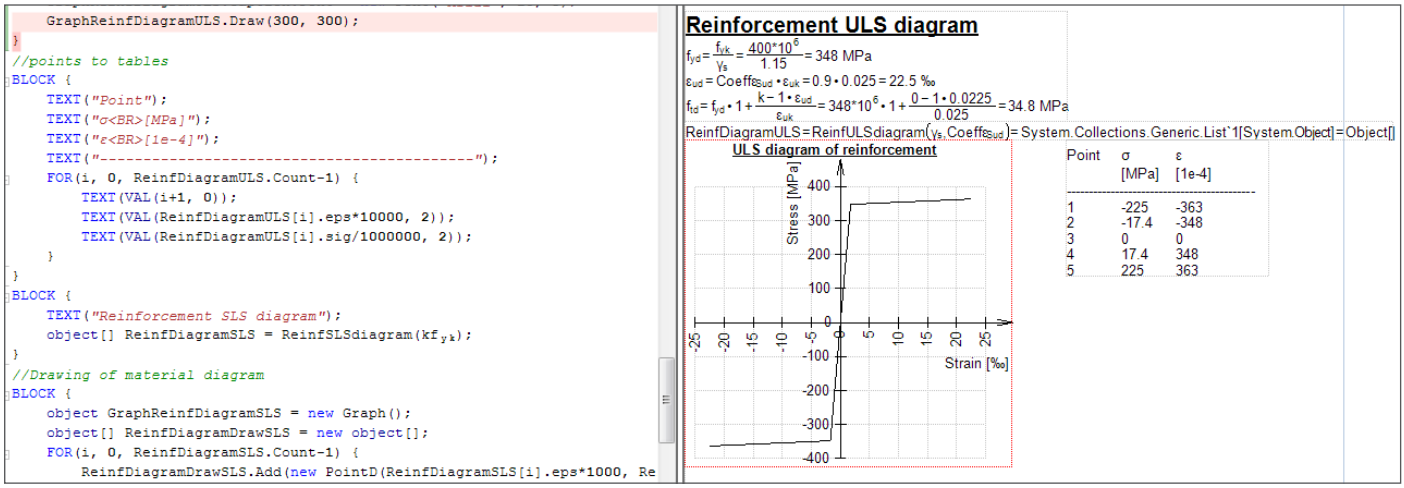


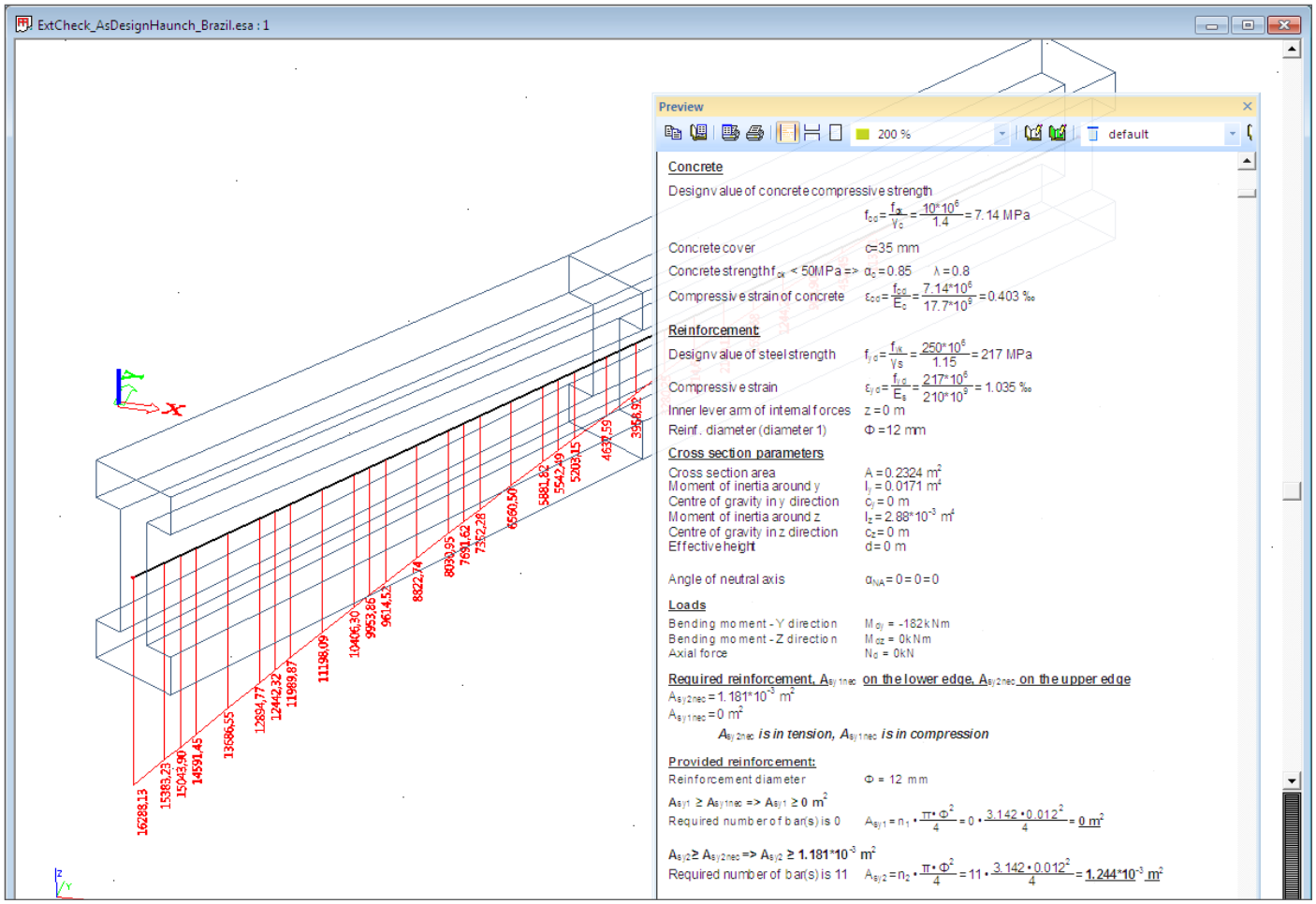
Practical application

- Design checks related to the resistance or stability of members with irregular geometry, or members made of new undefined material.
- Design and checks in accordance with local or specialized standards not supported by Scia Engineer's integrated checks.
- Foundation checks based on sophisticated deformation theories.
- And much more...

Highlights

- Freedom to create your own calculation algorithms and use the graphical, computational and reporting capabilities of Scia Engineer and Engineering Report to execute them.
- A fully integrated solution that does not require retyping of data, cell mapping of spreadsheets, or scrutiny of transferred data during the checks.
- Intelligent handling of variables, units, graphical display, user-defined menus and trees.
- High calculation speed due to parallel processing and file-free transfer of data inside the open platform.
- Support for AutoDesign optimisation for 1D steel members.
- Export of calculation reports to project documentation in the Engineering Report
- Intellectual property protection as a step towards creating a market place where users may share or sell their plug-in calculations, or collaborate to create powerful design packages.
- Open Design Checks in Scia Engineer 14 support calculations and checks for beams, columns, ties and other 1D members. In version 14.1 coming later this year the Open Design Checks capabilities will be extended to slabs, walls and other 2D members.





Analysis improvements and presentation of results

Adaptive FE mesh

Scia Engineer 14 offers a new technological feature - the Automatic Mesh Refinement. A fine mesh of finite elements produces more accurate result than a coarse mesh. Manual finding of the optimal refinement of the mesh is sometimes a hard task for a practical user. He has to define all needed parameters (e.g. the ratio for mesh refinement) and select the optimal method from a list of suggestions.

Therefore, Scia is releasing a new method for automatic mesh refinement that has been developed in collaboration with the Czech Technical University in Prague. Our solution reflects state of the art in a-posteriori error estimation methods. The benefit of the method is also the information about the quality of results due to mesh density of two-dimensional mesh elements.

Check of singularity

Check of singularity allows the user to check whether the model is unstable and/or is missing some translations or rotations. Also the unconnected members are detected. The check can detect problems with cross-links as well. The check is performed after an unsuccessful calculation and the user can interactively see the shape of instability (translations, rotations) of the structure or its parts. Then the user can easily repair the problem shown in the animation window.

The theory behind this check is based on the computation of zero eigenvalue and detection of the corresponding eigenshape.

Clear and illustrative presentation of results

Creating the analysis model and obtaining required results are important steps in the process of civil engineering design. It is, however, not less important to present the results and prepare the final report. And Scia Engineer 14 focuses also on this phase.

Table results

Scia Engineer 14 comes with a brand new feature that allows the user to view the results in a tabular form. Standard Windows clipboard can be used to copy tables to third party spreadsheets including MS Excel ©. The content can be filtered based on multiple criteria and sorted. The layout of tables is customisable. The result items listed in the tables are independent from what is graphically plotted in the 3D CAD window.

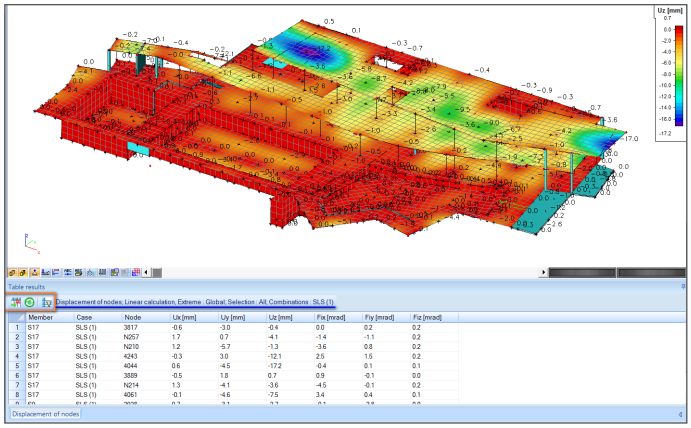


Table results

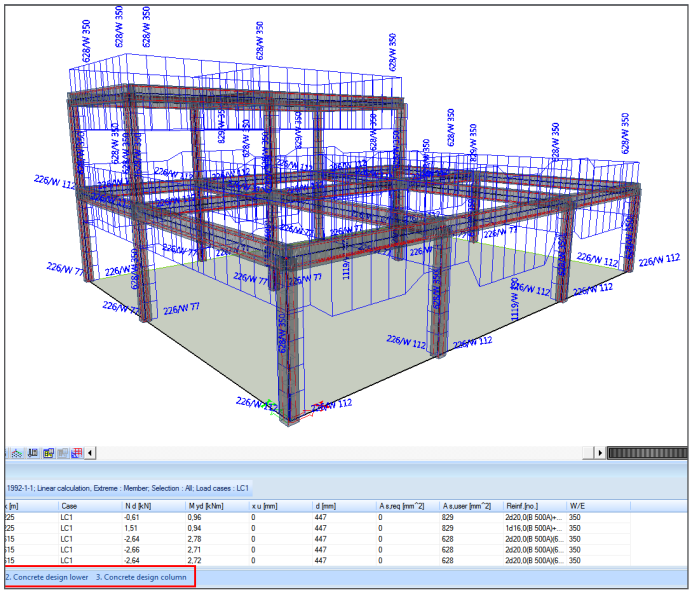
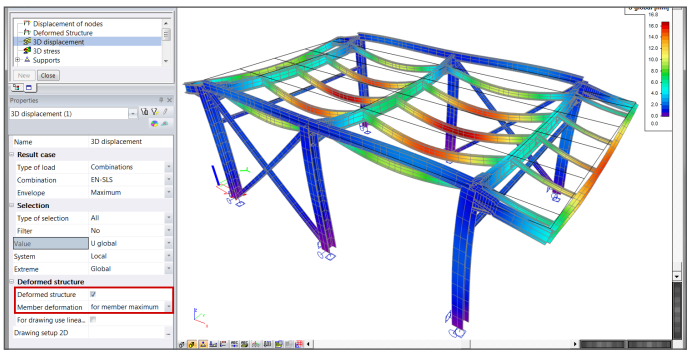


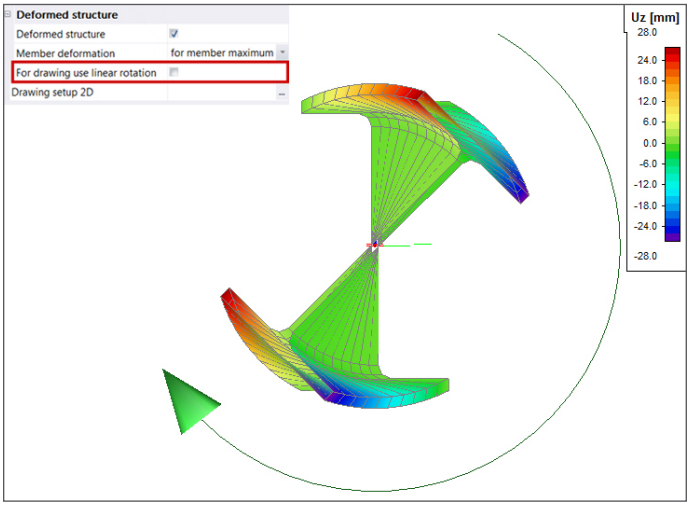
Table results

3D results

To better understand the behaviour of the analysed structure, calculated displacements and stresses can now be displayed on the 3D rendered surface of columns and beams. On top of that, the results may be shown on both the initial and deformed structure. This feature helps to identify potential issues and their cause.



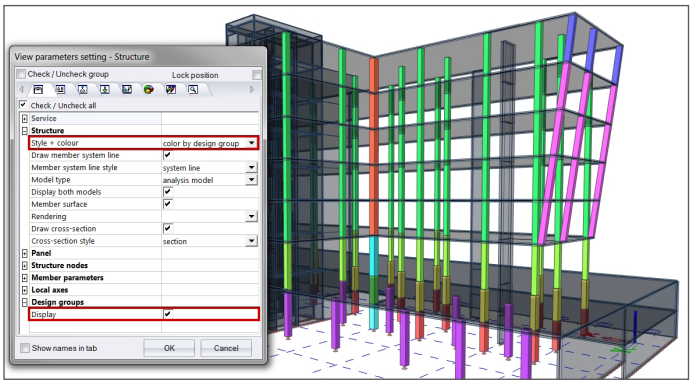
3D results



3D results

Design groups

Design group is a concept that allows the engineer to easily manage design and checks of members that share a certain property, such as member type, length or cross-section. This concept simplifies the design process as it shifts the focus from a single member to a whole group of similar members. The design of all members in one design group is performed in one step for the envelope of result values obtained from all members in the group.



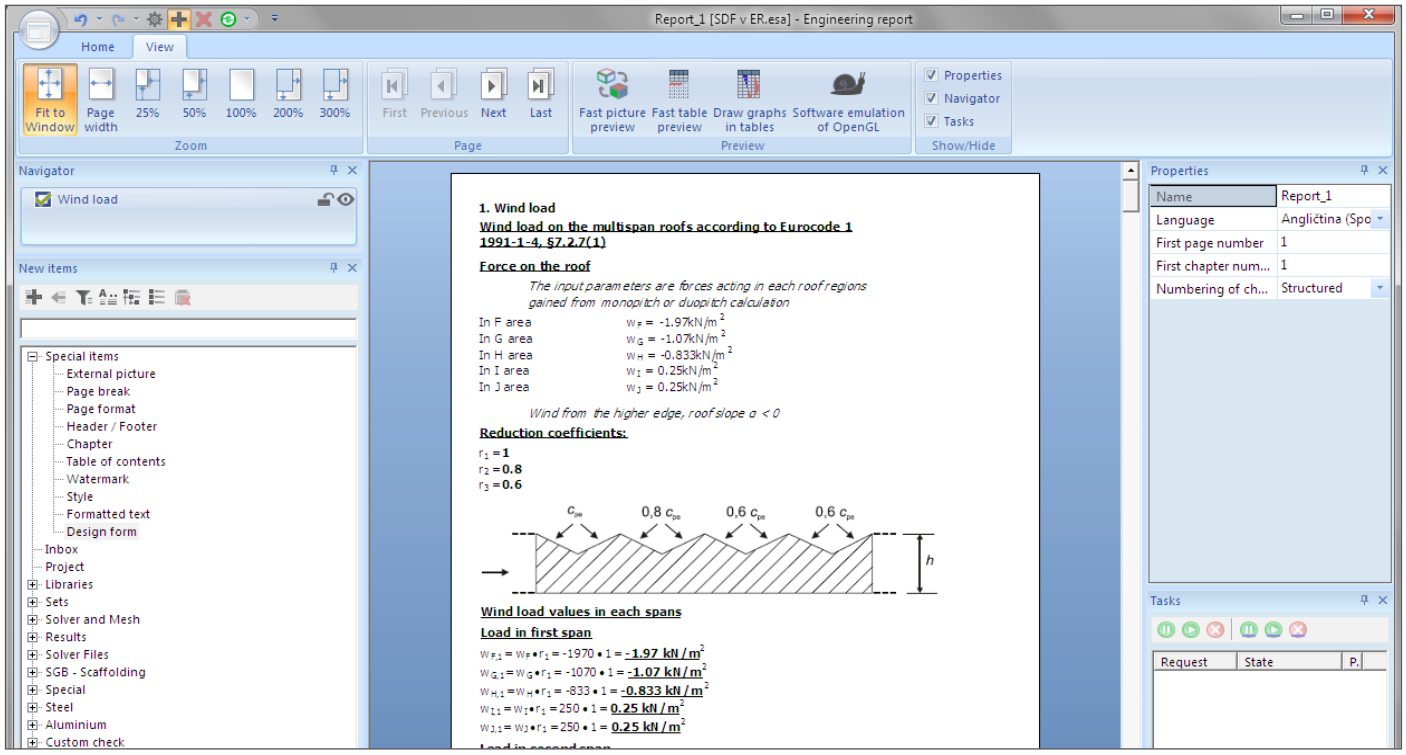
Design groups

Engineering Report

In Engineering Report the users are now capable of creating their own report templates. You can create your own template (= content + layout of Engineering Report); this may be a full document or only a 'snippet' (block of Engineering Report items). For the latter, the final document is composed of several templates optionally accompanied by ad-hoc added passages. Next to that, some default/system templates have been predefined as well.

Scia Design Forms in Engineering Report

Scia Design Forms was one of the major novelties last year. As you know, Scia Design Forms is a standalone tool, complementary to Scia Engineer, and focuses on small and dedicated calculations with a clear and transparent output. Engineering Report in Scia Engineer 14 features a new item in the "Special Items" group which enables the user to insert the layout (output report) of the desired Design Forms directly into the Engineering Report.



Scia Design Forms in Engineering Report

Load enhancements

Load combinations according to IBC 2012 (ASCE 7-10)

Scia Engineer now automatically generates load combinations according to the recent International Building Code (IBC 2012) and the"Minimum Design Loads for Buildings and Other Structures" code (ASCE 7-10). These most recent versions of the standards contain modified rules (equations) for the combination of loads - both the components in the equations and the combination coefficients have been modified; also additional equations have been added to replace some of the obsolete old ones.

3D Wind Loading according to ASCE 7-10

Scia Engineer 14 now supports 3D wind load application per ASCE/SEI 7-10. The release of the new specification for Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-10) includes major changes to the determination and application of wind loading on structures. These changes are focused around the change in the calculation of the velocity pressure (qz) which is applied to the structure.

Seismic combinations and the 30% rule

The 30% rule in seismic design presumes that seismic actions perpendicular to the main earthquake direction that is currently considered should be taken into account with reduced intensity of the resulting load effects, namely 30% of the values originally calculated. In previous versions of the software, the user needed to create three load combinations and manually implement the 30% rule by assigning 0.3 coefficients where needed.

Model factor "Pond load"

The derivation of water accumulation loads is an iterative procedure during which the structural deformations caused by permanent loads and loads from water ponding are taken into account at each iteration. The load functions are then generated automatically on all loaded beams. Since version 14 of Scia Engineer, the user may reduce the structure stiffness during the derivation of pond loads. To do that, the "model factor" for water accumulation is used. This stiffness reduction has no effect on the static and other analyses that are performed after the loads have been derived.

Usability improvements

Design of foundations

Geologic areas

The 3D model with defined subsoil and geologic profiles displays the subsoil surface. This surface defines the area where soil properties between boreholes are inter- and extra-polated. To be able to define a geologic fault, the basic surface polygon has been divided to separated areas which are inter- and extrapolated but the first area does not affect the next one. Different numbers of layers in the geologic profile may be used in different areas.

Borehole improvements

During the definition of the geological profile in Scia Engineer you can copy/paste the content of the table to/from a clipboard.

Design of steel structures

Description fields

Additional references, descriptions and examples of application have been added to the setup with options related to the EC-EN 1990 code as well as to the Setup for steel connection design.

Steel connections

The setup for steel connections has been reorganised and is now much clearer. Separate sub-menus have been provided for bolt properties, weld/stiffeners properties, and structural joints. The latter contains options related to the transformation of nodal forces, methods of calculation, etc. For every item in the new menu, a reference, a description and an application are provided.

The warning and message system of the steel connections module has been improved, especially with respect to the limits for maximum and minimal distances between bolts. The messages are colour coded to facilitate the bolt definition.

The calculation report has improved component "column web in compression." Tables with intermediate values have been added for effective lengths, stresses in the column, etc.

New materials in the Material Library

Previous versions of the Material Library contained the steel grades listed in EN 1993-1-1 and EN 10025-1. In this version, materials according to the following codes are also available:

EN 10025-2EN 10025-3EN 10025-4EN 10025-5EN 10025-6EN 10210-1EN 10219-1

Thickness reduction rules are also included, according to the same standards.

New profiles in the Profile Library

Profiles from the profile gamma of the steel producer Voestalpine have been added to the Profile library. The profiles are cold-formed C-, U-, Z- and other shapes.

Other enhancements

Table Input

The Table Input functionality simplifies both modelling and editing, and provides a versatile overview of the previously defined input in a model. The tool has been improved in version 14 of Scia Engineer. Additional features such as filtering, clipboard support, use of parameters, new tabs, and improved management of properties speed-up the model definition while the user needs to do less graphical searching.

Confirmation question before deleting results

The user is now offered a confirmation question when attempting to make a modification that would cause the results to be deleted. If the action is confirmed, the deletion of the results is accepted as well. If it is rejected, no changes take effect and the results remain available.

The question appears when e.g.

- adding, deleting, adapting structural members or additional data
- making changes in the Solver or Mesh setup
- modifying library properties.

New settings during installation

Customer information

During installation the user name and company name can be registered. These may be printed in the header of the .

Copy user settings from previous version

Select this option to automatically copy the following items from a previous version of Scia Engineer:

- Content of the [User] folder, containing templates for tables / header / footer in the Engineering Report, toolbar positions, ...
- Registry settings containing your default language, Options settings, ...
- Location of the [Project] folder

BIM Improvements

- Scia Engineer 14 expands BIM interoperability with support for Revit 2015 and introduces a new Model Compare technology that highlights and tracks changes as models are exchanged between the two programs.
- Scia Engineer 14 supports the 64-bit version of Tekla Structures.
- The Allplan link has been updated to support Allplan 2014-1.
- Moreover, Scia Engineer 14, as the only structural analysis program software certified of IFC 2x3, continues to push Open BIM making it easy to share models with designers, contractors and fabricators regardless of what CAD/CAE software they are using.

GUI improvements

- A new Project Manager helps the user with creation of a new project and with opening of an existing one. While browsing through the list of 'recent projects', a preview of the model is displayed together with main project information. Moreover, a few sample projects including tutorial are accessible from the 'new project' dialogue.
- The new project dialogue now allows you to directly access the protection settings and verify the settings.
- Version number is displayed in the tile bar
- Check of the default Windows language is performed. If the language does not match the adjusted Scia Engineer language, a notification dialogue is displayed which allows you to either access the Scia Engineer settings or just continue in English.

14.scia-engineer.com

help.nemetschek-scia.com

resources.nemetschek-scia.com

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