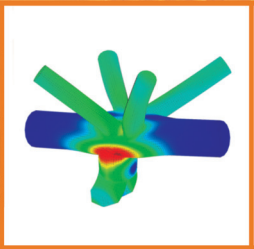
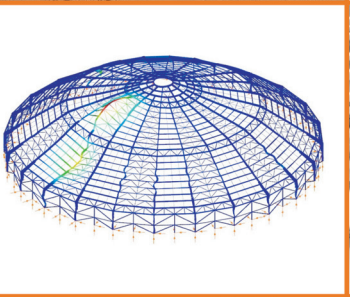
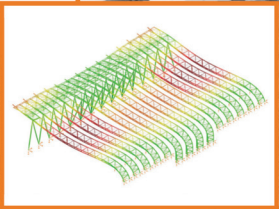
CONSTEEL
the steel expert

FREEDOM
KNOWLEDGE
INTELLIGENCE



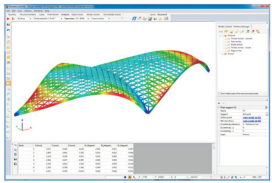

www.consteelsoftware.com

ConSteel software yields optimal solution for engineering offices mainly involved in constructions of steel and composite structures. The innovative automation of the structural analysis and design processes significantly speeds up the work of the offices, thus increasing the cost efficiency substantially. The basic philosophy of supports the working with the realistic global model where the engineer's creativity is assisted by the thorough knowledge of the complete structural behavior.

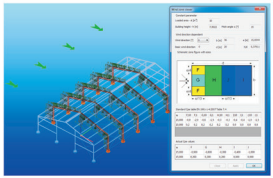
ConSteel provides refined results for the deformations, internal forces, reactions of planar or spatial structures, offers advanced solution for vibration and buckling problems. The transparent and user friendly interface allows quick and easy learning of the efficient application.

MODELING – more freedom

- Spectacular 3D graphic user interface, four different model view
- Parametric grid in arbitrary plane
- Plentiful CAD functionality
- Section plane, partial model and storey management
- Comprehensive steel, concrete and composite cross section and material library
- Wide range of structural elements: column and beam members; plates, walls and slabs with arbitrary shapes and holes; rigid body; diaphragm; haunch and tapered member for steel members; various support types
- Free Modeling System (FMS): unrestricted placement and interconnection of any point, line and surface object (structural member, support, load) with arbitrary eccentricity
- Automatic steel member conversions to plates
- Great number of load type: point, line and surface load, temperature load, prescribed displacement, tension force, global imperfections
- Surface load transfer to line members with several options
- Automatic wind load generation for walls and roofs according to EuroCode and Spanish standard
- Fire effect and protection definition according to EuroCode
- Automatic load group and combination generation according to EuroCode, Spanish and American standards
- Import of the most general file formats: Tekla Structure ASCII (*.asc), BOCAD sc1 (*.sc1), StruCAD snf (*.anf, *.snf) and DXF ASCII (*.dxf)



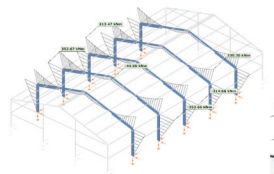
User interface of ConSteel



Automatic wind load generation

ANALYSIS – more knowledge

- The first design software using the Natural Steel Element (NSE) for the global structural analysis
  - Elastic analysis taking into account the complete and accurate effect of torsion and section warping
  - Complex second order analysis considering the second order effect of the whole set of internal forces (axial forces, bending and torsional moments and warping)
  - Compound spatial structural behavior based overall stability analysis calculating all types of global buckling modes (lateral, torsional, lateral-torsional buckling considering the effect of member, support and load eccentricities) for the complete and partial model
- Conventional element for the analysis of reinforced concrete and composite beams and columns
- Triangular planar element for the analysis of surface members
- Tension-only bar, 3-node link element
- Automatic generation of the analysis model based on the completely separated engineering model created by the Free Modeling System (FMS)
- Vibration analysis – calculation of eigenfrequencies and free vibration modes
- Analysis of independent structural model parts
- Modal analysis and response spectrum-based earthquake design
- Automatic calculation of the effect of connection stiffness for joints created in the csjoint module



Analysis result illustration for partial model

RÉSULTATS

- Présentation des résultats du modèle complet et partiel ,
- Différents types de modes d'affichage pour la déformation, les contraintes, forces internales, flambement et les modes de vibration et la souche, le flambage, modes de vibration, et les réactions dans tout point de vue
- Plusieurs tables de résultats avec plusieurs fonctionnalités de sélectionnement
- Exportation des résultats pour les application de tableur.



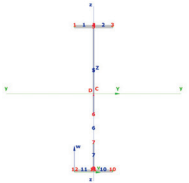
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STRUCTURAL DESIGN – more intelligence

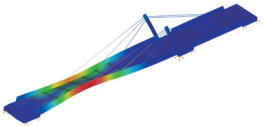
Based on the refined analysis results, the required code checks of the different types of structural members – steel and composite – can be conveniently evaluated based on the proper parts of the EuroCodes (Part 1, 3, 4 and 8), Spanish (EAE) and American (AISC) standards.

The following National Annexes (NA) are available for the European Standard:

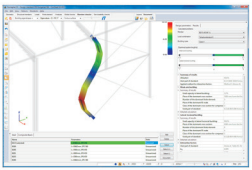
- EN Austrian NA
- EN British NA
- EN Dutch NA
- EN Finnish NA
- EN German NA
- EN Hungarian NA
- EN Polish NA
- EN Portuguese NA
- EN Singapore NA
- EN Swedish NA
- EN Recommended Values



Generated effective model for a class 4 cross section



Result for buckling analysis



Member buckling design for interaction of compression and bending

STEEL DESIGN

ConSteel implemented an Intelligent Design Procedure (IDP) for the most efficient steel structural design. The IDP automatically identifies the proper design situation with all the necessary code check formulas and parameters based on the cross section, member and complete model results and design attributes. After the evaluation a single dominant utilization value at every point of the structural model is selected from all of the combinations and necessary code checks giving a transparent

Cross section check

- The Intelligent Design Procedure (IDP) identifies the design attributes of the cross section (type, shape, loading, and class of the section) and the section components (type, stress distribution, class) and defines the section evaluation accordingly
- Automatic cross section classification considering each section component (flange, web, etc.)
- In case of class 4 sections, **ConSteel** generates the effective section based on the overall normal stress distribution
- Automatic selection of the necessary code checks based on the design attributes: general elastic stress design, pure resistances, plastic or linear interactions, local web buckling

Stability check

Stability is one of the most important, but also most complicated, design situation, therefore ConSteel provides a multilevel solution method for the safe and economic results.

- **General stability method**
- **Global buckling analysis based overall method for the complete or partial model**
- **All the possible complex buckling types can be checked**
- **Quick and accurate estimates for the buckling sensitive parts of the structural model**

- **Member check**
- **Structural member level stability check for single or group of members**
- **Evaluation of pure and interactive buckling cases**
- **Manual or eigenmode analysis-based automatic definition of the design parameters (effective lengths, torsional lengths, moment gradient factors)**
- **Intelligent identification of the different design cases considering the loading and the restraints, supports and connecting members along the member length**

COMPOSITE DESIGN

Composite structural members can be checked according to the EuroCode 4: Design of composite steel and concrete structures standard.

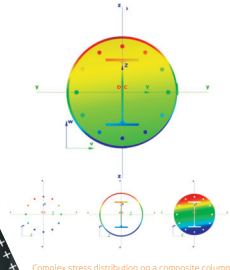
Resistance calculation of composite cross sections is based on an inhomogeneous general solid section model. In this model the exact contribution of all the components (concrete, rebar reinforcement, steel profile) is taken in account when calculating different properties, stresses or design resistance parameters.

Composite column design

The following cross section types can be examined:

- Concrete encased I section
- Partially encased I section
- Partially encased Maltese section
- Rectangular hollow section with/without encased I section
- Circular hollow section with/without encased I section

- Section properties with arbitrary reference material
- Multiple choice for the section stiffness considering the effect of reinforcement, different levels of concrete elastic modulus, cracking, and creep
- Automatic evaluation of all the necessary standard code checks: pure resistances, interaction resistance, local buckling control
- Calculation of the spatial failure surface with arbitrary plane section view
- Complex stress calculation for the complete cross section or the components

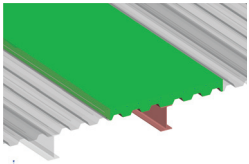


Complex stress distribution on a composite column cross section

Composite beam design

- Composite beam with solid concrete slab
- Composite beam with profiled steel sheeting and concrete slab

- Effective width of the cross section and the optimal number and layout of the shear studs are automatically calculated during the analysis
- Automatic evaluation of all the necessary standard code checks: pure resistances, longitudinal shear resistance, headed stud connector resistance, crushing resistance of the concrete flange, shear buckling resistance
- Complex stress calculation for the complete cross section or the components



Composite beam

DOCUMENTATION

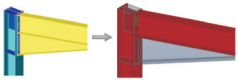
- Automatic generation of reports containing complete model and result description with several built-in options
- Possibility for inserting user-defined tables, texts and pictures
- User-defined front page and header
- Multilingual documentation: English, German, French, Spanish, Portuguese, Russian, Chinese, Turkish, Greek, Hungarian, Polish, Czech, Slovak, Slovenian, Serbian, Romanian, Bulgarian

MODEL EXPORT

Direct model export with cross sections, materials and structural connections to Tekla Structures detailing software

Wireframe model export in the following formats: *.snf, *.sc1 and *.dxf

CONSTEEL TEKLA Structures



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