New version of program STeelCON 2013.099

Dear colleagues,

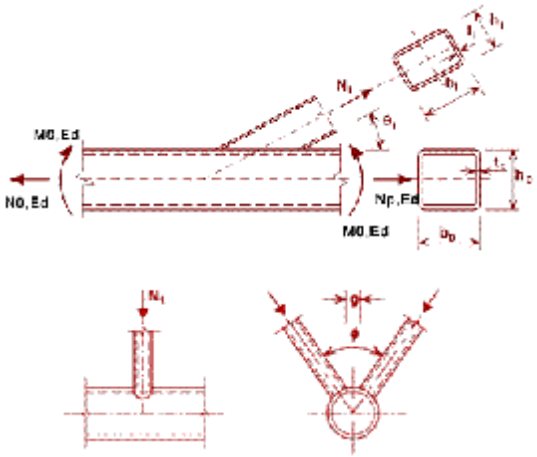
A new version of the “STeel CONnections” program for the design of bolted and welded steel connections has been released.

This new version offers many new features :

- **New connections between tubes. T and Y type connections uniplanar or multiplanar.**

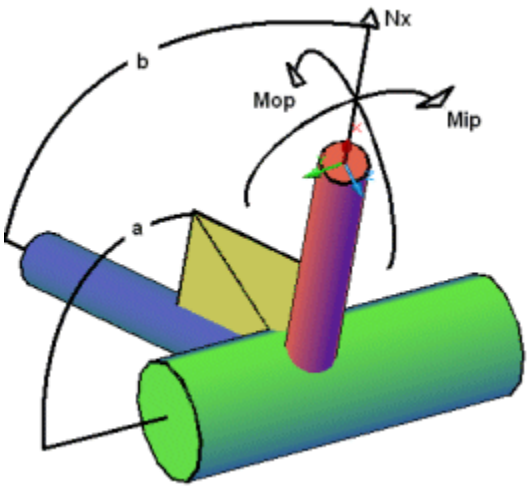
The types of the connections according to the connected member types are:

CHS Brace to CHS Chord
I/H Brace to CHS Chord
RHS Brace to CHS Chord
CHS Brace to RHS Chord
I/H Brace to RHS Chord
RHS Brace to RHS Chord
CHS Brace to I/H Chord
RHS Brace to I/H Chord



The checks that are performed are based on chapter 7 of EN 1993-1-8 and are :

Chord face failure.
Chord web (side wall) failure.
Chord shear failure.
Punching shear.
Brace failure.
Local buckling.

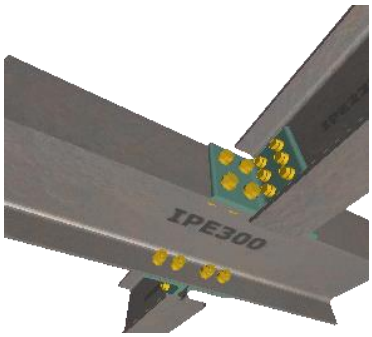


Based on the geometrical characteristics of the nodes, the rule defines a range of connections that can be calculated analytically. The validity range evaluation ensures that the failure modes of the connection will be the same with the expected ones by the rule. For connections that belong into the validity range, some failure types can be neglected under certain conditions. However, for connections outside that range some failure modes that are not documented in the rule and need separate handling may occur. The program performs all the necessary geometrical checks and informs the user in the case that the node is outside the validity range.

Furthermore, the user has the option to add appropriate stiffener plates at the flanges or the web of the chord in order to reinforce the strength of the connection. The program will calculate the minimum dimensions and weld thicknesses.

The members can have axial force, tension or compression, and in plane and out of plane moments, according to the connection type. The program calculates the interaction of these forces according to EN 1993-1-8.

- In this version **two new shear resistant connections** have been added, beam to beam and beam to column but with the main member rotated by 90 degrees compared to the previously existing shear connections. The calculation is complete following the standards of the other shear connections.

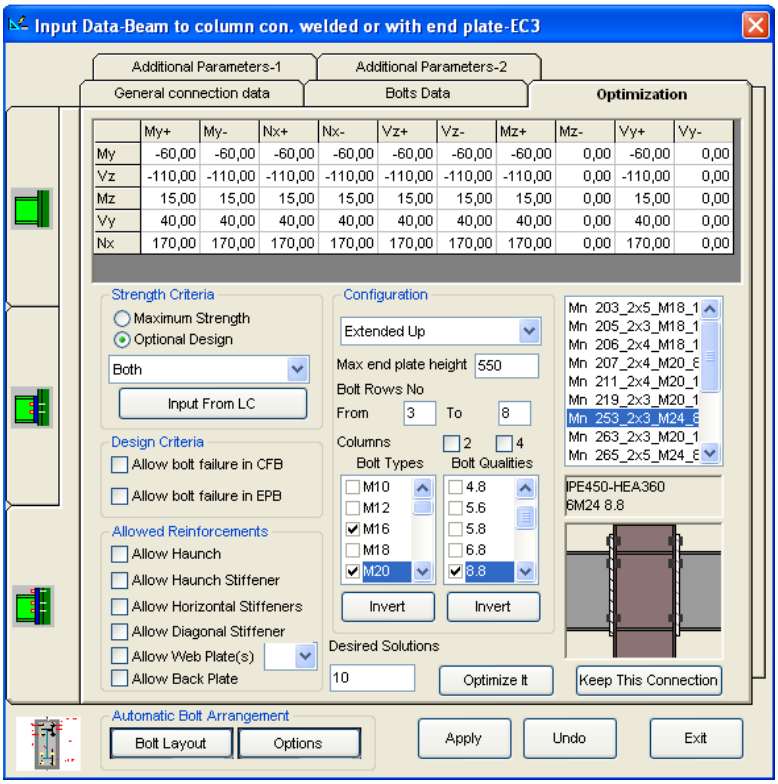


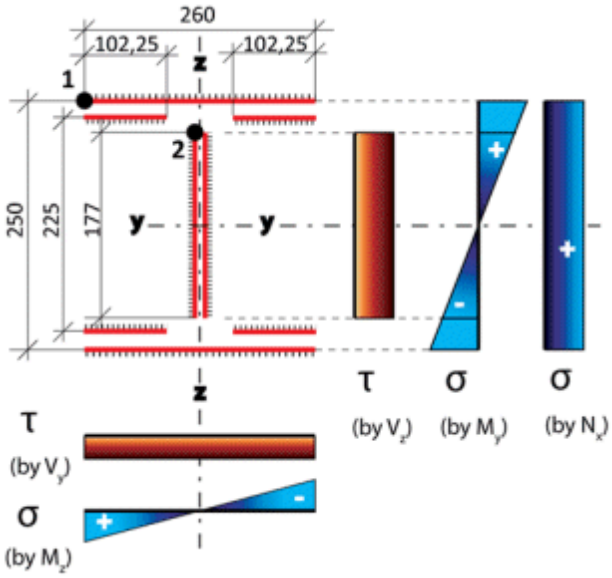
Fin plate connections can transfer shear force in the major and/or minor axis as well as compressive or tensile axial force. Each component is checked according to the final provisions of EN 1993-1-1 and EN 1993-1-8, with the generalized 3D loading that includes forces in all 3 directions as well as bending moments due to load eccentricities.

In particular, the following checks are performed:

- bolt in shear,
- bolts in combined shear and tension,
- block tearing of the beam web due to shear as well as axial force,
- bolts bearing on the beam web due to shear as well as axial force,
- block tearing of the fin plate due to shear as well as axial force,
- bolts bearing on the fin plate due to shear as well as axial force,
- fin plate and beam in combined biaxial bending,
- axial and shear at the most stressed net section and at the notch,
- column/main beam web in bending due to the axial load applied to the (secondary) beam and
- check of the welds using the directional method.

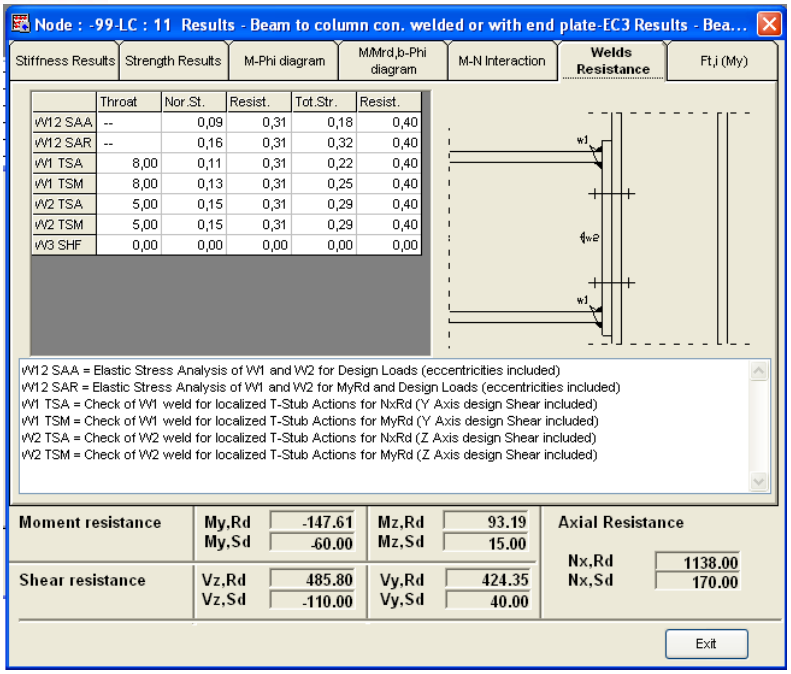
- Many **new capabilities for the end plate connections** have been added. A new, advanced optimization dialog has been created in order to take into account all the internal forces of the beam. The program imports automatically all the loadcase values for each maximum internal force and the connection is optimized for all these cases. Furthermore, the input form has been enriched with all the new features of the previous versions, such as haunch stiffener and four bolt columns.



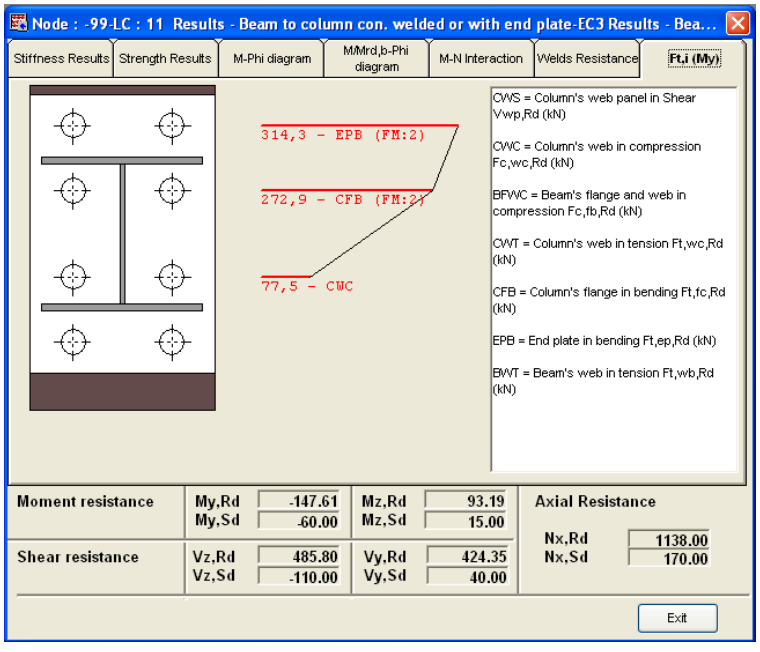


- **New, detailed form for welds calculations** that includes flange butt welds option. The program calculates the stress from all forces in 3D space and applies the Von Mises criterion on every critical point. It also calculates the strength of the welding for moment equal to the moment resistance of the connection and the strength of the welds locally at the T-Stub Area in order to take into account the stress concentration in this region.

All the maximum results are presented in full detail in the results forms for the best evaluation of the connection behavior.



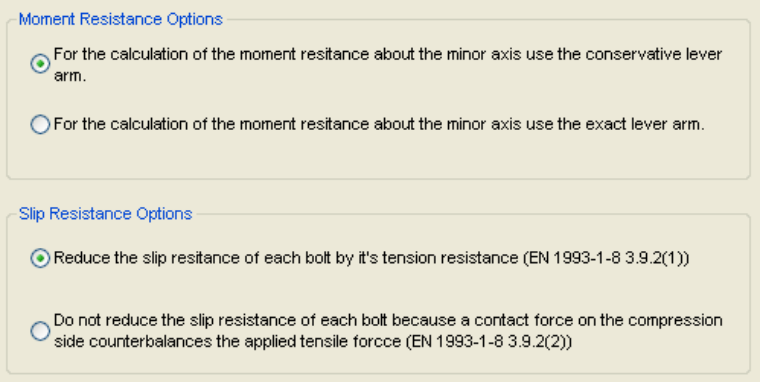
- In the results form of the end plate connections the user can now **find a new graphical representation of the tension force resistance of every bolt row**. In this way the user can see in one glance the axial resistance of every row (and the forces distribution through the whole connection), and the failure mode of the critical component. Through this representation, the user can immediately see if the elastic distribution of the force -, due to a third failure mode - has happened.



- For the end plate connections some **new options for the calculation of the slip resistance and the bending strength in the weak axis** have been added. The user can decide to consider that the tension force in one side of the connection is counterbalanced by equal compression on the other side, so the additional friction on the compressed side ensures the slip resistance of the connection without any reduction, as described at paragraph 3.9.2(2) of EN 1993-1-8. This

approach is followed widely in the literature and leads to larger slip resistances compared to those calculated using the conservative reduction of paragraph 3.9.2(1) of EN 1993-1-8.

For the calculation of the connections weak axis moment resistance, the program was using the conservative lever arm of 0.5W + 0.25Bf. Now the user has the option to use the exact lever arm, calculated by the forces equilibrium between the tensioned and compressioned area. In this case higher moment resistances may result in some cases.



- Many improvements in graphics and in the serial files manager, together with the **French Annex** are also included.

SteelCON is SOFiSTiK Version 25 (2010) as well as Version 27 (2012) compatible and can be operated within the SSD integrated SOFiSTiK environment. All geometrical and topological data as well as forces can be imported from the overall structure. Connection design results are then a part of the SOFiSTiK Output Report.

Installs the following Plugins :
- SSD V27 Plugin (and SSD V25 plugin)

26.04.2013, Munich Germany