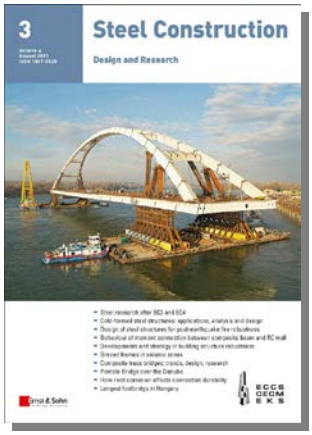
Steel Construction 3/2012

Design and Research

The international journal for steel construction in research and practice



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  05 – 07 September 2012, Oslo / Norway
- HUSUM WindEnergy
  18 – 22 September 2012, Husum / Germany
- ECCS ANNUAL MEETING
  21 – 23 September 2012, Lissabon / Portugal
- Steel Structures and Bridges 2012
  26 – 28 September 2012, Podbanske / Slovakia
- Deutscher Stahlbautag 2012
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Editorial Content

Per Kr. Larsen, NTNU, Norway and Bjørn Aasen:
Editorial "Nordic Steel 2012"

Bjarke Laustsen, M. P. Nielsen, Thomas Hansen, Jesper Gath:
Stability of brackets and stiffeners in steel structures

A special class of steel plates named bracket plates are commonly used for brackets and stiffeners. Design of these structural elements has proven to be a complex problem involving many parameters and different types of behavior. The methods used for design purposes are often conservative and simplified because the subject has received little attention. This paper attempts to shed light on the problem and develop new and improved design method for triangular bracket plates, derived on basis of a consistent theory. The new design method proposed rests on the theory of plasticity, practically, the yield line theory. Using the theory to solve the buckling problem for bracket plates leads to a method, which compared to existing test results, gives very good results.

Ana Ožbolt, Ulrike Kuhlmann, José Henriques, Luís Simões da Silva:
Behaviour of steel-to-concrete joints

This paper presents the innovative solutions to connect steel and composite beams to structural reinforced concrete walls developed within the RFCS research project "InFaSo". Two types of joints were studied: pinned and moment resistant. The evaluation of the joints behaviour was performed experimentally and complemented with the development of analytical component based models. The comparison of results showed a good agreement between models and experiments. The analyzed joints demonstrated to be competitive solutions taken into account their structural performance, simplicity of modelling and of execution.

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Anja Renner, Jörg Lange:

Load bearing behavior of high strength bolts under combined tension and shear

To estimate how bolts generally behave under combined tension and shear, what influence the strength grade has and to be able to assess the validity of the old and new standard functions, bolts were tested under different combinations of tension and shear. To assure results, which not only represent the behaviour of round steel, but of a bolt as such, a test setup was developed that ensured a maximum realistic construction situation. The results of these tests are summarized in this paper.

Pekka O. Ritakallio:

Cold formed high strength tubes for structural applications

Cold formed hollow sections are dominating tubular construction material. Applicability of cold formed tubes is sometimes questioned because of doubts on low temperature ductility, deformation capacity of welded joints, suitability for welding in the cold formed corner, poor fatigue behavior of the corner or suitability for hot dip galvanizing. It is also claimed that by choosing hot finished tubes one can naturally avoid above mentioned risks. This study confirms that appropriate tube manufacturing yields cold formed EN 10219 tubes in Grades S355J2H – S460MH with equal or better performance than hot finished tubes. Properly made cold formed high strength tubes are available for fabrication of efficient light weight structures and can be safely used even at low temperature without above mentioned doubts.

Markus Schiborr, Natalie Stranghöner:

Experimental investigations on the application of direct tension indicators with preloaded structural bolting assemblies (System HV) according to EN 1090-2

EN 1090-2 provides several tightening methods for preloading of bolting assemblies. One of the regulated procedures is the use of Direct Tension Indicators, so called DTIs, with lubrication according to *k*-class K0. According to the definition of *k*-class K0 the lubrication should not have an influence on the achievement of the required preloading force $F_{p,C}$. For this reason, the main focus of the presented investigations was placed on the influence of the lubrication on the behaviour of preloaded HV bolting assemblies with and without DTIs. The experimental investigations were carried out on the institute's own tighthening torque testing machine.

Diego Somaini, Markus Knobloch, Mario Fontana:

Buckling of steel columns in case of fire: Nonlinear behavior and design proposal

In case of fire the buckling strength of steel columns is strongly influenced by the distinct nonlinear material behaviour of steel at elevated temperatures. A general analytical model which explicitly includes the nonlinear material behaviour is presented and verified with full scale tests at elevated temperature. Based on test results and this general model a new model for flexural buckling applicable for the design of slender columns is developed, which allows considering nonlinear stress-strain-relationships, geometrical imperfections and load eccentricities. In addition the model can easily be extended to include local instabilities of the cross section describing the interaction between local and global buckling phenomena.

Rolf Kindmann, Jan Vette:

General information and improvements for the design with scheduled torsion according to EN 1993-1-1

The design rules for torsional loading according to EN 1993-1-1 are shown and discussed in this article. Afterwards the partial internal force method for I-sections, U-sections and Z-sections is presented. The verification for arbitrary internal forces is possible with this alternative method. The methods will be compared and verified by existing test results.

Chrysanthos Maraveas, Thomas Swailes, Yong Wang:

A detailed methodology for the finite element analysis of assymetric slim floor beams in fire

The objective of this paper is to present a detailed methodology for the three dimensional finite element analysis of asymmetric slim floor beams under fire conditions. A fully controlled solution process is suggested through a detailed step-by-step presentation of the simulation parameters that are incorporated into the model. There is an effort to cope with any asymmetric slim floor beam using the same consistent method, which is validated against two reported fire tests. Time-temperature and time-vertical displacement curves are calculated for the appropriate comparisons with experimental results showing that the suggested methodology can accurately predict the thermal and structural behavior of these beams.

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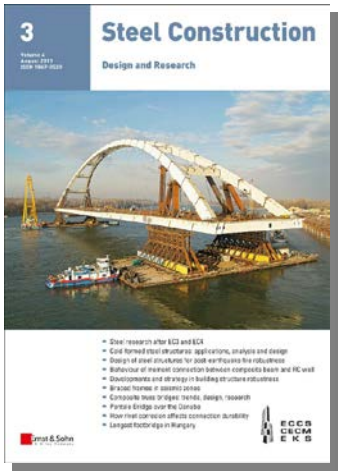

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