Update on ECCS TC10 and Eurocode 3 Efforts

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ABSTRACT

In this paper, a short overview is presented on the activity of Technical Committee 10 of the European Convention for Constructional Steelwork (ECCS TC10). This committee deals with Structural Steelwork Connections.

Furthermore the status of the conversion process of Eurocode 3 from European pre-standard (ENV) to European standard (EN) is reported. The focus is on Eurocode 3 part 1.8, which deals with connections.

1. ACTIVITY REPORT OF ECCS TECHNICAL COMMITTEE 10

The Technical Committee of the European Convention for Constructional Steelwork (ECCS TC10) deals with structural steelwork connections. The committee forms a European Network for practitioners and researchers from ECCS member countries. In total, the committee has 30 full members and 17 corresponding members. A number of corresponding members maintain relationship with other Technical Committees of the ECCS. The committee meets twice a year, with normally about 20 to 25 participants.

The objectives of the committee are as follows:
• steel promotion by simple and safe rules for economical connections;
• preparation of background material for Eurocode 3 and 4, especially concerning connections;
• contribution to CEN-TC 135. This committee works on ENV 1090 (execution);
• forming an international platform for discussion;
• harmonising and co-ordinating research in the field of steel connections;
• defining gaps in knowledge;
• preparation of publications.

Presented at the international AISC/ECCS workshop on Connections in Steel Structures IV, Roanoke, Virginia, USA, October 22-25, 2000
Figure 1 shows the organisation scheme of the committee. The committee has three working groups:
- Working group 1: connection practice. This group is chaired by practitioners;
- Working group 2: joints;
- Working group 3: connectors.

![Diagram of ECCS TC10 organisation]

Working Group 1 is market driven, whereas Working Groups 2 and 3 are technology pushed. The relation between Working Group 1 and the two other working groups is important. The Working Group 1 encounters questions from practice, which are brought to the attention of the other working groups.

The topics of Working Group 1 (Connection Practice) are: economy, valorisation, dissemination, education, innovation, benchmarking, etc. etc. Recent and current activities are: collection of questions from practice, preparation of a guide for fasteners, preparation of benchmark examples, development of a design guide for base plate joints and special connections.

The topic of Working Group 2 (Joints) is: joint representation for structural analysis. This involves characterisation, idealisation, modelling classification of joint properties in structural analysis. Recent and current activities are: design rules for moment-normal force (M-N) behaviour of beam to column connections, technical assistance to Working Group 1, support to CEN TC135 (ENV 1090), support to CEN TC135 (conversion of ENV 1993, Eurocode 3 to EN, see further on in this paper).

The topics of Working Group 3 (Connectors) are: bolts, rivets, welds, studs, play and finish connections, clamps, etc. etc. Recent and current activities are: support to CEN TC135 (ENV 1090), support to CEN TC135 (conversion of ENV 1993, Eurocode 3 to EN), technical assistance to Working Group 1, publication about use of bolts and test reports on requirements for preloaded bolts, tightening, fitness for purpose etc.
2. CONVERSION PROCESS OF EUROCODE 3 FROM ENV TO EN

As intended in the European Commission's original objectives, the primary intention of the Eurocodes was to establish a set of common rules for the design of Buildings and Civil engineering works. It will serve as reference documents to be recognised by authorities of the Member states. In essence, two main ideas are substantiating the Eurocodes program: "harmonisation" and "competitiveness" of the European construction sector as a whole.

In the next years, all Eurocodes will be converted from European Prestandard (ENV) to European Standard (EN). This process concerns the following Eurocodes, see Table 1.

<table>
<thead>
<tr>
<th>EN 1990</th>
<th>Basis of design</th>
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<tbody>
<tr>
<td>EN 1991</td>
<td>Eurocode 1: Actions on structures</td>
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<tr>
<td>EN 1992</td>
<td>Eurocode 2: Design of concrete structures</td>
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<tr>
<td>EN 1993</td>
<td>Eurocode 3: Design of steel structures</td>
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<tr>
<td>EN 1994</td>
<td>Eurocode 4: Design of composite steel and concrete structures</td>
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<tr>
<td>EN 1995</td>
<td>Eurocode 5: Design of timber structures</td>
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<td>EN 1996</td>
<td>Eurocode 6: Design of masonry structures</td>
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<tr>
<td>EN 1997</td>
<td>Eurocode 7: Geotechnical design</td>
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<tr>
<td>EN 1998</td>
<td>Eurocode 8: Design of structures for earthquake resistance</td>
</tr>
<tr>
<td>EN 1999</td>
<td>Eurocode 9: Design of aluminium structures</td>
</tr>
</tbody>
</table>

At this moment, the Eurocodes may be used in the different European CEN-Member countries together with a Nation Application Document (NAD). This situation will change after completion of the conversion process. The converted Eurocode may then be used together with a National Annex.

In the course of this paper, it will be focussed on Eurocode 3 - Design of steel structures. The proposed structure of Eurocode 3 in EN version contains different subsets:

- The internal subset
  The "internal" subset which contains essentially the EC3 documents, is itself subdivided into:
  - "slave documents" which comprises the generic design parts ("general rules" and particular generic rules). The generic or basic design parts cover self sufficient and independent sets of design rules (for example: Fatigue, Plates and Shells buckling, ...).
  - "master documents" which gathers together all design application parts relevant to specific fields of construction (Buildings, Bridges, Towers and Masts, ...).

- The external subset
  The "external" subset to EC3 is essentially composed of the Parts making up the whole of "Basis of design" and "Actions on Structures" (Eurocode 1).

The idea behind this sub-division is that from "master documents", for instance EN 1993-3 (Buildings), reference is made towards the relevant clauses in the "slave documents", for instance EN 1993-1-8 (Design of joints). Between "master documents" references are not allowed and from "slave documents" it is not referred back to master documents. With help of these principles a clear structure will be achieved and no information will be repeated, as is the case in the ENV version of Eurocode 3.
The "slave documents" will be contained in EN 1993-1. The preliminary titles of the different parts of EN 1993-1 are:
- EN 1993-1-1, Design of steel structures - General rules
- EN 1993-1-2, Design of steel structures - Fire
- EN 1993-1-3, Design of steel structures - Cold-formed structures
- EN 1993-1-4, Design of steel structures - Stainless steel
- EN 1993-1-5, Design of steel structures - Plates structures
- EN 1993-1-6, Design of steel structures - Shell structures
- EN 1993-1-7, Design of steel structures - Plated structures transversely loaded
- EN 1993-1-8, Design of steel structures - Design of joints
- EN 1993-1-9, Design of steel structures - Fatigue strength of steel structures
- EN 1993-1-10, Design of steel structures - Selection of material for fracture toughness and through-thickness properties

The following "master documents" are foreseen:
- EN 1993-2, Design of steel structures - Bridges
- EN 1993-3, Design of steel structures - Buildings
- EN 1993-4, Design of steel structures - Silos, tanks and pipelines
- EN 1993-5, Design of steel structures - Piling
- EN 1993-6, Design of steel structures - Cranes
- EN 1993-7, Design of steel structures - Towers, masts and chimneys

The work on Eurocode 3, Design of steel structures is dealt with in CEN Technical Committee 250 Sub Committee 3 (CEN TC250/SC3). An overview of the organisation scheme is given in Figure 2.
Figure 2 shows how a project team, in this case PT 1.1 is supported in the conversion work by the ECCS Validation Group and the National Technical Contact. The latter are people appointed by the National Standards Organisations. The ECCS Validation Group consists of the chairman of the respective ECCS Technical Committees. In case of ECCS TC10, an ad-hoc working group gives support to the Project team on rules for joints.

At this moment, work is in progress on EN 1993 Parts 1.1, 1.8, 1.9, 1.10 and Part 3. The time schedule is for these standards is:
- first draft to the Secretariat before 31 December 1999;
- final draft to the Secretariat before 31 October 2001;
- formal vote launched, 2002.

Most rules on joints are foreseen to be placed in EN 1993-1-8 (Design of joints). However, EN 1993-1-1 (General Rules) contains (for the moment) some basic rules on connectors as welds and bolts. The proposed table of contents of EN 1993-1-8 (Design of joints) is:
1 Basis
2 Basis of Design
3 Connections made with bolts, rivets or pins
4 Welded connections
5 Analysis, modelling and classification
6 Structural joints connecting H or I sections
7 Hollow section lattice girder joints

Project Teams for Part 1.3, Part 1.4, Part 1.5 and Part 2 have started their work in 2000. It is expected, that the formal voting for these parts will be in 2002-2003.

KEY WORDS
ECCS Technical Committee 10, Structural Connections, Eurocode 3, Conversion, ENV, EN

APPENDIX: LIST OF EUROCODE CONVERSION ABBREVIATIONS

EU European Union
CEN European Committee for Standardisation
ENV European prestandard
EN European standard
ECCS European Convention for Constructional Steelwork
SC Sub-committee
PT Project Team
NAD National Application Document
NA National Annex
NTC National Technical Contact
VG Validation Group