Eurocodes evolution – what will it mean to you?

How it is occurring?
View from Mandate M/515 Project Team

Mungo Stacy,
Technical Director

WSP | PARSONS BRINCKERHOFF

- **Member of project team:**
  - **SC1.T9 for EN 1991-2 Traffic Actions on Bridges**
- **Leader of project team:**
  - **HG-B.T1 – Bridges – consultation activities / ease of use**
- **BSi committee:**
  - **B/525/10 WG1 mirror group for traffic actions**
- **Training**

Mungo Stacy,
Technical Director

ACTIVITIES THIS MONTH

TC250 and PT leader meeting
Brussels 15-16 Sept

SC1.T9 meeting
Madrid 19-20 Sept

HGB.T1 meeting
Copenhagen 26 Sept

HGB meeting
Vienna 20-21 Oct

TC250 MEETINGS

Overview

→ **Phase 1 (of 4) - in progress**

→ **25 project teams**

→ **140 PT members (22 from UK)**

TC250 and PT leader meeting
Brussels 15-16 Sept

TC250 MEETINGS

Key objectives

→ **Improve ease of use**

→ **Reduce NDPs**

→ **Verb forms**

→ **Achieve positive vote**

TC250 and PT leader meeting
Brussels 15-16 Sept

PT WORK

Tasks

1. **Reduction of NDPs**
2. **Improve ease of use**
3. **Systematic review comments**
4. **Specific tasks**

SC1.T9 meeting
Madrid 19-20 Sept

PT WORK

1. Reduction of NDPs

→ Objectives

1. To reduce the number of National Determined Parameters
2. To develop Standards that can be implemented by CEN members
3. To maintain consensus, evidenced through positive formal votes by CEN members

→ Principles

1. The development of the second generation of the Eurocodes is an 'evolution', thus the approach to reviewing NDPs should build from the basis for them set out in Guidance Paper L (see Annex A);
2. Some parameters must be NDPs, even if all countries agree on a specific value or choice;
3. Some parameters are subject to variation for geographic or climatic reasons; these must be NDPs although the Eurocodes should be as clear as possible on how they are to be determined;
4. Effort should be made to limit the number of other NDPs, but this must be done pragmatically and respectfully of national positions.

PT WORK

1. Reduction of NDPs

Eurocode	No of Parts	No of Pages	No of NDPs
EN 1990	1 + Annex A2	90 + 30	54
EN 1991	10	770	292
EN 1992	4	450	176
EN 1993	20	1250	236
EN 1994	3	330	42
EN 1995	3	225	21
EN 1996	4	300	31
EN 1997	2	340	42
EN 1998	6	600	103
EN 1999	5	500	58

Table A.1: Analysis of NDPs in current Eurocodes

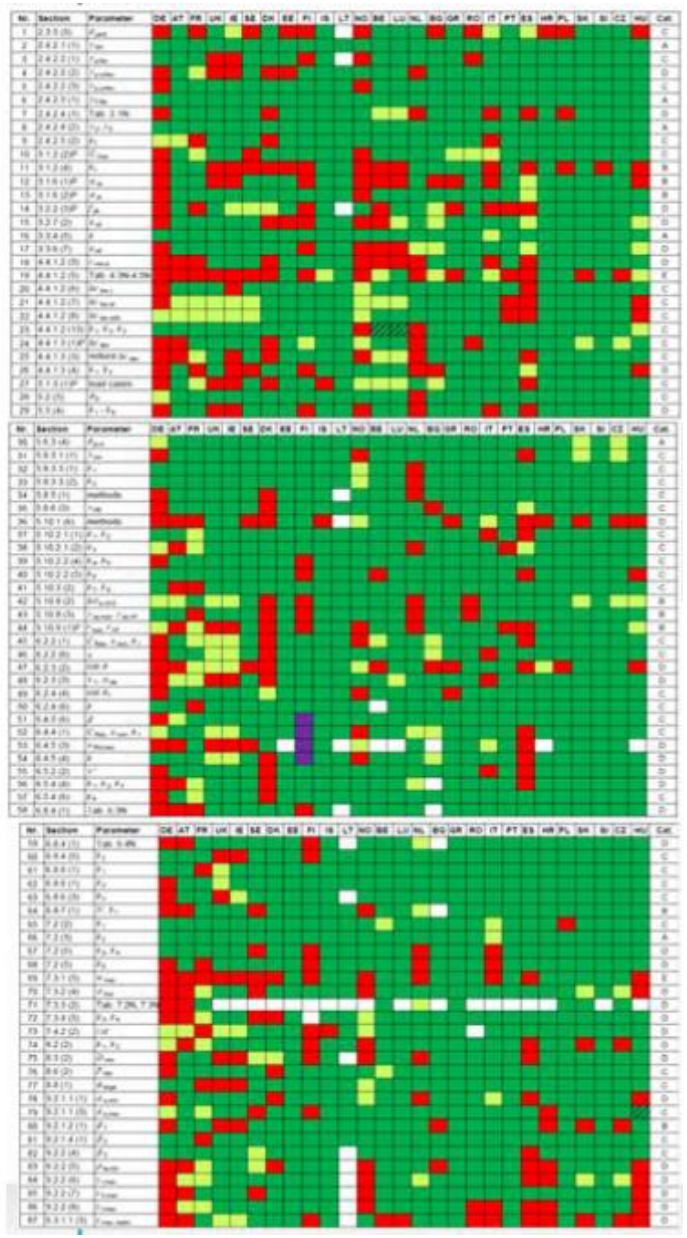
PT WORK

1. Reduction of NDPs

→ **Identify parameters that must be NDPs**

→ **Review of other NDPs**

→ **Reporting**



PT WORK

1. Reduction of NDPs

→ **Example: horizontal force transmitted by expansion joints**

4.4 Horizontal forces - Characteristic values

4.4.1 Braking and acceleration forces

(6) The horizontal force transmitted by expansion joints or applied to structural members that can be loaded by only one axle should be defined.

~~NOTE The National Annex may define the value for Q_{lk}.~~ The ~~recommended~~ value Q_{lk} is :

$$Q_{lk} = 0{,}6\alpha_{Q1}Q_{1k} \qquad (4.6a)$$

→ **Limitations: 10 of 38 National Annexes for EN 1991-2 available in English**

PT WORK

2. Ease of use

Primary principles	
1	Improving clarity and understandability of technical provisions of the Eurocodes
2	Improving accessibility to technical provisions and ease of navigation between them
3	Improving consistency within and between the Eurocodes
4	Including state-of the-art material the use of which is based on commonly accepted results of research and has been validated through sufficient practical experience
5	Considering the second generation of the Eurocodes as an “evolution” avoiding fundamental changes to the approach to design and to the structure of the Eurocodes unless adequately justified
Secondary principles	
6	Improving consistency with product standards and standards for execution
7	Providing clear guidance for all common design cases
8	Providing only general and basic technical provisions for special cases that are very rarely encountered by designers
9	Not inhibiting the freedom of experts to work from first principles and providing adequate freedom for innovation
10	Limiting the inclusion of alternative application rules
11	Including simplified methods where satisfying specific tests for their introduction
12	Providing technical provisions that are not excessive sensitive to execution tolerances beyond what can be practically achieved on site

PT WORK

2. Ease of use

→ **Example: improving navigation**

4.7.2.2 Collision forces on decks

(1) Collision forces on decks are defined in EN 1991-1-7.

~~(1) If relevant the vehicle collision force should be specified.~~

~~NOTE 1 The National Annex may define the collision force on decks, possibly in relation to vertical clearance and other forms of protection. See EN 1991-1-7.~~

→ **Example: clear guidance for common design cases**

4.9 Load models for abutments and walls adjacent to bridges

4.9.1 Vertical loads

(1) The carriageway located behind abutments, wing walls, side walls and other parts of the bridge in contact with earth, shall be loaded with load model illustrated in figure 4.11.

PT WORK

3. Systematic review comments

→ **5-yearly systematic review comments received**

→ **e.g. 207 comments for EN 1991-2 from 12 countries**

→ **Review and respond to comments**

→ **Update standard**

CZ 04		4.3.3		te	Application of the Model LM2 (including the dynamic factor) leads to significantly high values of action effects on members of bridge deck (e.g. concrete slab of a composite bridges) for which it is difficult to design common structures. Moreover this action significantly exceeds the local load effects of the model LM1 which may be also used for the assessment of local members of the structure.		To be considered by the PT	PT DC
DE 07		4.3.3		te		Delete whole sub-clause; in Germany not allowed	Proposal needs justification. To be considered by the PT	PT DC
GB 10		4.3.3(1)		te	**LM2 – Value of axle load** One wheel is 200 β_Q kN. For α_Q = 1.0, β_Q = 1.0, and for variable load factor γ_Q = 1.35, the design single wheel load = 270 kN. This seems excessive compared to UK design practice where the maximum single wheel load, prior to the application of a load factor, for normal traffic permitted to use UK roads is 159 kN.	Suggest the recommended value in 4.3.3(2) for β_Q = 0.8. Alternatively consider reduction of the value for Q_{ak} to 300 kN.	To be considered by the PT	PT DC
DE 08		4.3.4		te		Delete whole sub-clause; in Germany not allowed	Proposal needs justification. To be considered by the PT	WG RD
BE 04	p. 41	4.4.1(2)	NOTE		The upper limit of Q_{1k} in (4.6, esp. NOTE 2) seems very high, e.g. for the design of small frame bridges. It is proposed that the upper limit of 900 kN	Proposal (from Belgian NA): The upper limit of 900 kN in (4.6) can be replaced by the value Q_{lmax} defined as	To be considered by the PT	PT DC

PT WORK

4. Specific sub-tasks

→ **Request for revision made by European Railway Agency**

→ **Road traffic evolution**

→ **Pedestrian bridges**

→ **Fatigue models**

→ **Aerodynamic effects on railway structures**

Sub-task Ref.	Sub-task name	Brief description, background and reasons for the work	Key benefits
4	Road Traffic Evolution	Taking into account modern systems (LHV), incorporation of the results of international studies.	New load models for sustainable and economical constructions without restrictions. Collection of updated real traffic measurements around the Europe, especially those containing Long and Heavy Vehicles (LHVs) having total mass up to 60 t and total length up to 25 m, which could result very demanding for existing bridges and infrastructures.
5	Pedestrian bridges	Providing additional special requirements and basic methods for pedestrian bridges including dynamic actions and pedestrian induced vibrations. Including state-of-the-art literature. Reviewing guidelines and/or largely/commonly accepted methods and results.	Basics for calculations, common methods for future needs. Incorporate the state-of-the art of recent research
6	Fatigue models	Review of Road and Railway fatigue models in order to ensure sounder consistency of different bridge parts in the various relevant Eurocodes.	Consistent requirements in the different Eurocodes Review Railway Fatigue Load Models and approaches/methods, in order to ensure sounder consistency of different bridge parts of Eurocodes (in liaison with HG-B). Review of φ and α factors (related to dynamic behaviour and fatigue) Review Road Fatigue Load Models and approaches/methods, in order to ensure sounder consistency of different bridge parts of Eurocodes. Simplification by reducing the number of fatigue load models to be used.

PT LEADER

Specific sub-tasks

- → **Fatigue verification for bridges**
- → **Robustness requirements**
- → **Cable stayed bridges**
- → **Integral bridges**
- → **Partial prestress and crack control**
- → **Footbridge vibrations**
- → **Light rail and tram load models**

HGB.T1 meeting
Copenhagen 26 Sept

PT LEADER

Key dates

→ **Start Sept 2015**

→ **First draft April 2016**

→ **Final draft Oct 2017**

→ **National comments Nov 2017- Jan 2018**

→ **Final document April 2018**

HGB.T1 meeting
Copenhagen 26 Sept

Year	2015												2016												2017												2018										
Month	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December	January	February	March	April	May	June	July	August	September	October	November
Month number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
Task specific (the schedule represents the deadlines for these tasks)																																														
A																																														
Start of the Project Team																																														
Preparation of first Draft by PT																																														
preparation of background document(s) by PT																																														
Delivery of first Draft by PT to NEN																																														
Review of first Draft by SC or WG																																													
Preparation of Second Draft by PT, taking into account comments from SC or WG																																													
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preparation of Final Draft by PT, taking into account comments from SC or WG																																														
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Commenting period for NSBs (Enquiry)																																														
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End of the Project Team																																														

PT LEADER

d) Project Team Leaders

The responsibilities of Project Team Leaders are to:

- lead the Project Team and coordinate the input from its members;
- communicate the vision and priorities for the evolution of the Eurocodes, agreed with CEN/TC 250, to their Project Team;
- ensure that the work of the Project Team aligns with the objectives of Mandate M/515 and the requirements of CEN/TC 250 and the relevant Subcommittee (SC), Working Group (WG) or Horizontal Group (HG);
- plan the delivery of the task and drive delivery to programme;
- organize and chair (face-to-face and online) meetings of the Project Team;
- present and discuss the result of the work within the responsible SC/WG or HG, when required;
- evaluate and report on comments received from SC/WG/HG or through the enquiry process;
- review and incorporate proposals from the SC/WG/HG in the drafts, ensuring consistency and coherence with the rest of the draft; and,
- prepare progress and final reports.

The Project Team Leader shall inform NEN of any event or risk liable to substantially affect the contribution of the Project Team to the CEN/TC 250 work programme and/or delay delivery to the required timetable.

COMMITTEE STRUCTURE

Delivery

→ **Reporting to HG-B**

→ **Representation from SCs/WGs**

→ **Next steps**

- Commenting from National Standards Bodies
- Preparation of final documents
- Issue
- Revision of National Annexes

HGB meeting
Vienna 20-21 Oct

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Ispra 16-18 June

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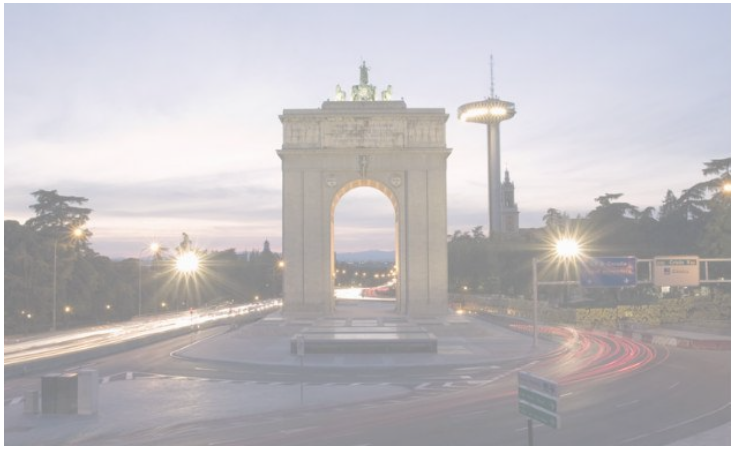

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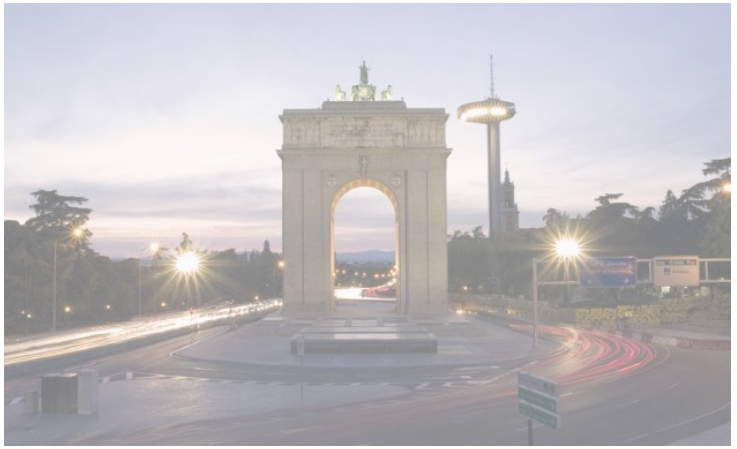

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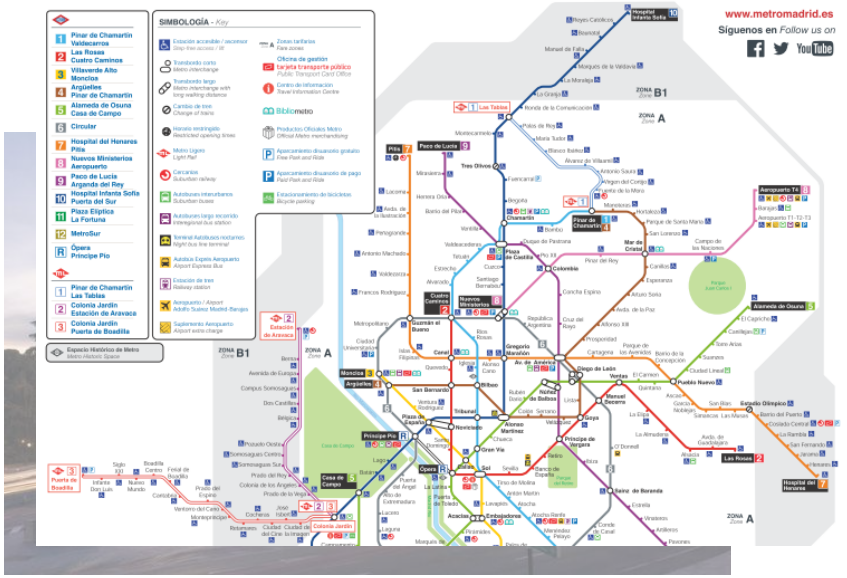

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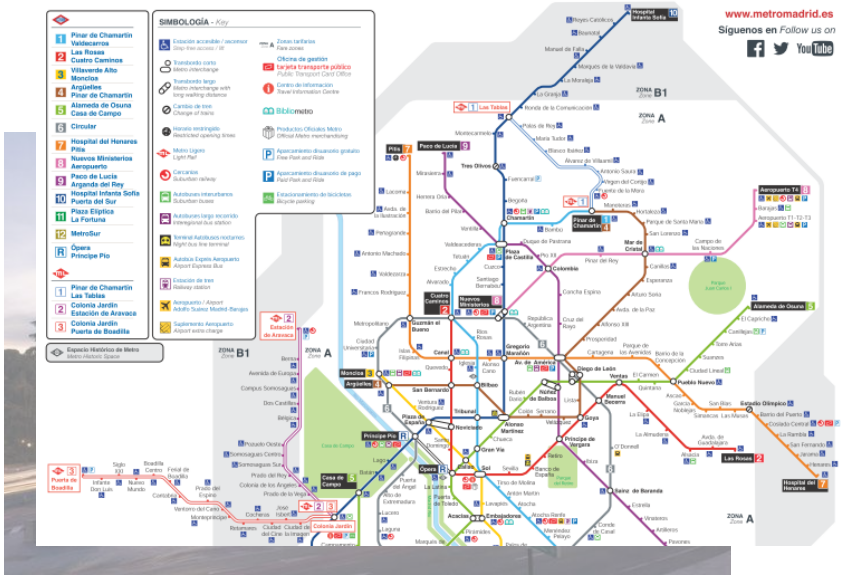

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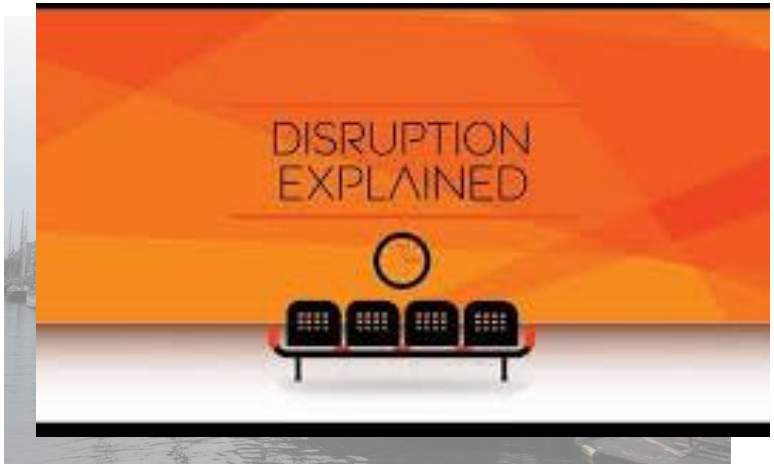

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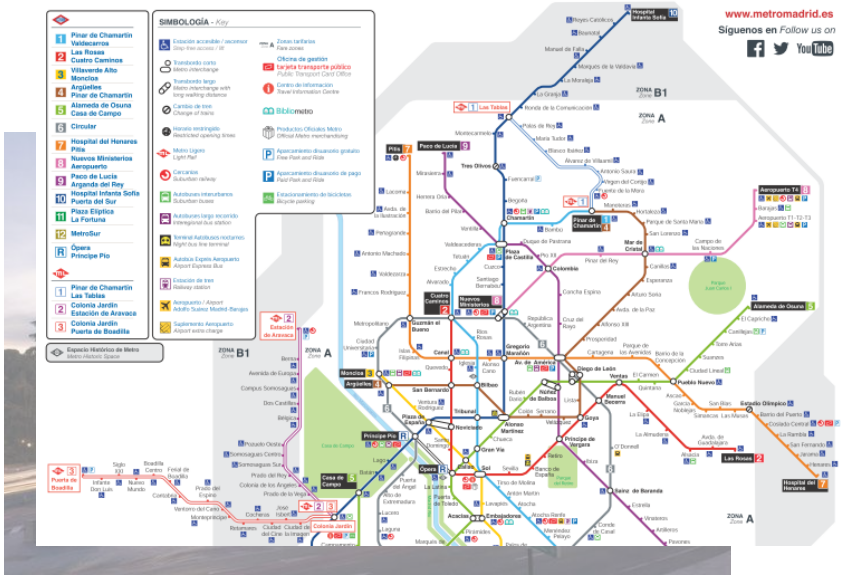

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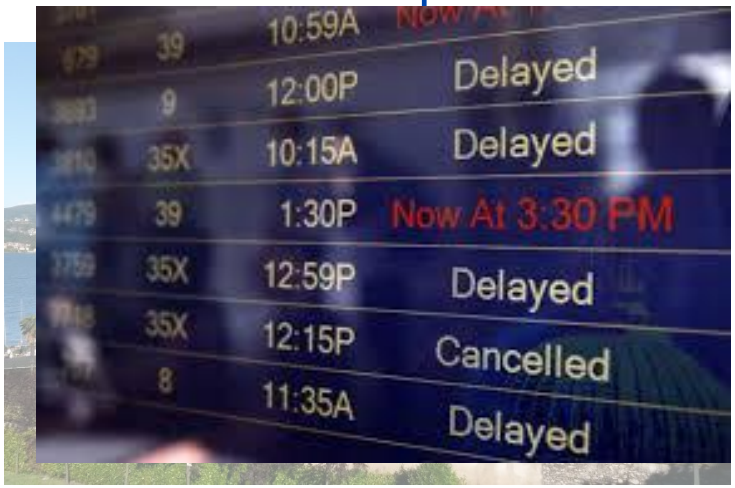

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How it is occurring?

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