

The Story of Eurocode 7

The challenges in developing a European
geotechnical limit state design code
for the Eurocode Era

Trevor L.L. Orr

Trinity College, Dublin University
Ireland

Special Session in the Spirit of Krebs Ovesen

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and Geotechnical Engineering

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Story of Eurocode 7

- **What would Niels have done?**
 - Focused on key aspects
 - Presented them very clearly
 - Pointed out the logic and advantages
 - Acknowledged the contribution of all those involved
 - Kept his presentation to the time allotted
- **What would Niels not have done?**
 - Taken personal credit for any aspect
 - Said anything derogatory about anyone involved

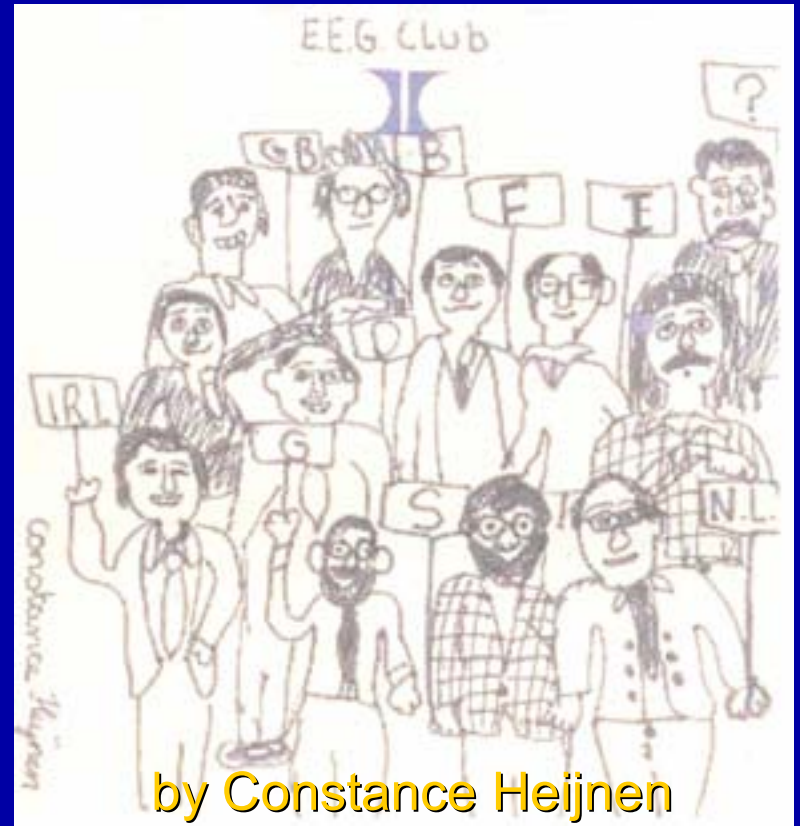
Outline of Talk

- **Start of Eurocode 7**
 - How first committee was set up
- **Stages and Organisations**
 - Model Code, ENV and EN - ISSMFE, CEC and CEN
- **Challenges and issues in drafting EC7**
 - 3 challenges, 6 issues
 - How they were addressed
- **Committee meetings**
 - Interactions, technical and social aspects

Model Code Stage

- 1980 **Professor Fukuoka**, President ISSMFE, asked Kevin Nash, Secretary General to invite Niels Krebs Ovesen to be Chairman of Eurocode 7 Committee to produce a model code for Eurocode 7
- 1981 ISSMFE **Sub-committee for EC7** formed from 9 EEC countries
- 1982 ISSMFE Board considered code work not appropriate so **sponsorship withdrawn**. Committee became **ad-hoc committee**
- 1981-87 Committee met **22 times** in different EEC countries to draft code and learn about local geotechnical practices
- 1987 Committee produced **Model Code** for Eurocode 7

Dublin Meeting 1983

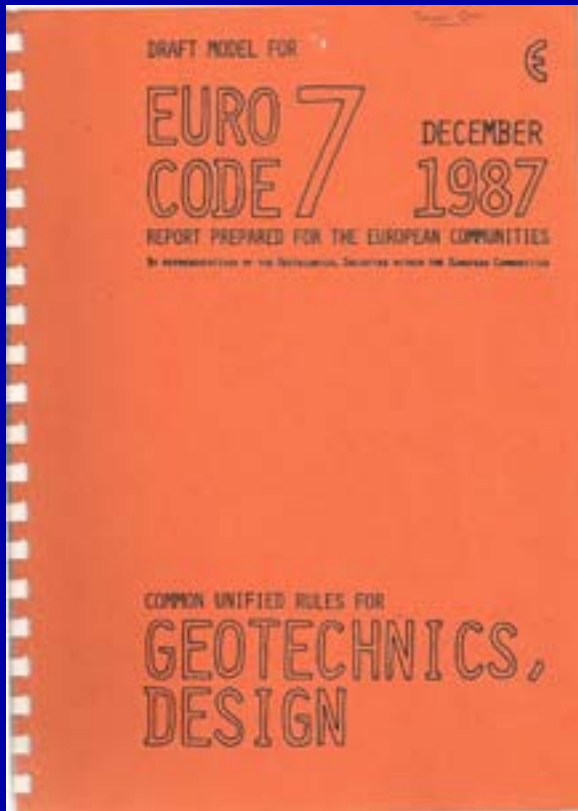


Simpson (GB), Lousberg (B) Baguelin (F) Japelli (I)

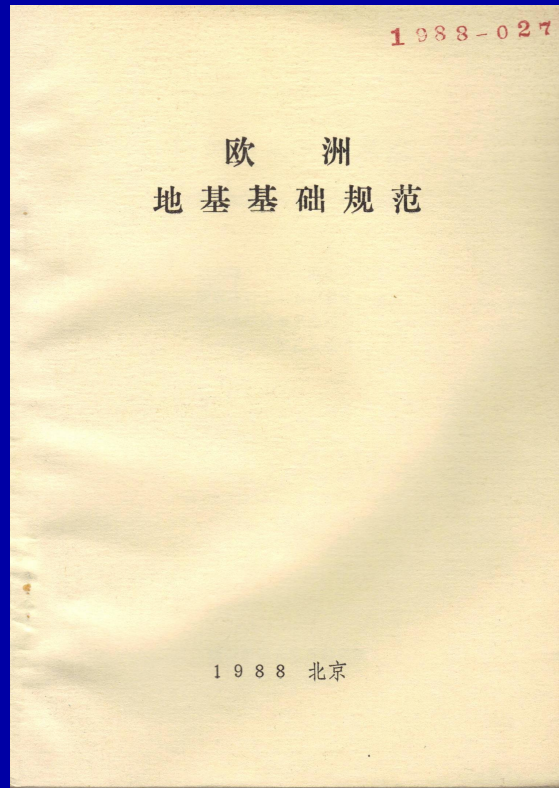
Sadgorski (D), Thorp (D) Farrell (IRL) Nelissen (NL)

Orr (IRL) Coumoulos (G) Krebs Ovesen (S) Heijnen (NL)

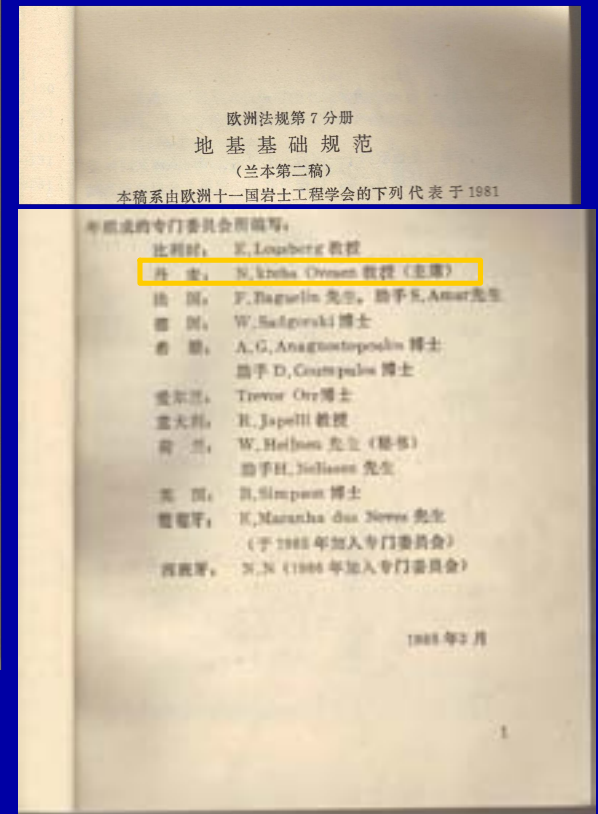
Model Code



Model Code 1987



Chinese translation of
Model Code in 1988



First Draft Stage

1988 European Commission (**CEC**) formed a 7-member **Drafting Panel** for Eurocode 7 with Niels Krebs Ovesen as Chairman

- Working under **CEC**, obliged to have most meetings in **Brussels** organised by CEC
- Work on all Eurocodes expanded so much that CEC was having difficulty managing it
- At 13th Drafting Panel meeting members **locked out of room!**

1989 **EC** decided to **transfer** Eurocodes to **CEN**

- **First incomplete draft** of Eurocode 7 geotechnics, design produced for CEC

Eurocode 7 Meetings



European Commission
Berlaymont Building, Brussels



Far side: Simpson (GB), Japelli (I)
Lousberg (B) Coumoulos (GR)
Uriel (S)

Near side: Maranha das Neves (P)
Baguelin (F) Sadgorski (G)

ENV Stage

1990 All Eurocode work under CEN

- **SC7 formed** and **Niels Krebs Ovesen** appointed **convenor**
- **December - First SC7 Meeting**
- **Drafting Panel** became **Project Team 1** for Eurocode 7 Part 1

1991-1992 PT1 collected 1848 comments on draft EC7 and **provided responses** to these

1992 November: Meeting in Copenhagen with National Technical Contacts

- **Development of Cases A, B and C**

1993 Completion of ENV by **PT1** after **22 meetings**

- **25 May: Adoption of ENV** at **5th SC7 Meeting** in Copenhagen

1994 Publication of **ENV** by **CEN**

ENV 1997-1

FORM H

 **cen**
EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITE EUROPEEN DE NORMALISATION
EUROPEISCHES KOMITEE FÜR NORMUNG

Notification of National Translation of an European Standard is to be returned to CEN/CS (NF/SN/SI).
Communication de la Traduction Nationale d'une Norme Européenne à retourner au CEN/CS (NF/SN/SI).
Mitteilung der Nationalen Übersetzung einer Europäischen Norm zurück zu senden an CEN/CS (NF/SN/SI).

ADOPTED EUROPEAN STANDARD NORME EUROPÉENNE ADOPTÉE ANGENOMMENE EUROPÄISCHE NORMEN	ENV 1997-1:1994
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Eurocode 7: Seismic design - Part 1: General rules

Date of notification (date): 1993-05-25

Title of National Standard in the language of publication
Titre de la Norme Nationale dans le langage de publication
Titel der Nationalen Norm in der Sprache der Veröffentlichung

National reference Référence nationale Nationale Bezeichnung für	Edition Édition Ausgabe
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Issue of the member's official journal announcing the implementation
Édition du bulletin officiel du membre annonçant la mise en application
Ausgabe des offiziellen Mitteilungsblattes des Mitglieds
in der die Normenveröffentlichung wird

In Übereinstimmung mit den Bedingungen der Vertragsvereinbarung (Artikel 17, Absatz 1 B des Übereinkommens) über die Anerkennung gegenseitiger Normenvereine, wird die folgende Norm auf eigene Verantwortung in die deutsche Sprache übertragen.

In accordance with the requirements set out in clause 17, paragraph 1 B of the CEN/CEN/CEC Mutual Recognition Agreement, the technical involved national committee hereby declares that the above national standard, if taken in force, is intended, translated in language.

Conformément aux exigences stipulées dans l'article 17, paragraphe 1 B du Règlement relatif au CEN/CEN/CEC, l'organisme technique de reconnaissance mutuelle déclare que le norme nationale susdite, en tant qu'elle est prise, a été traduite en langue pour être appliquée.

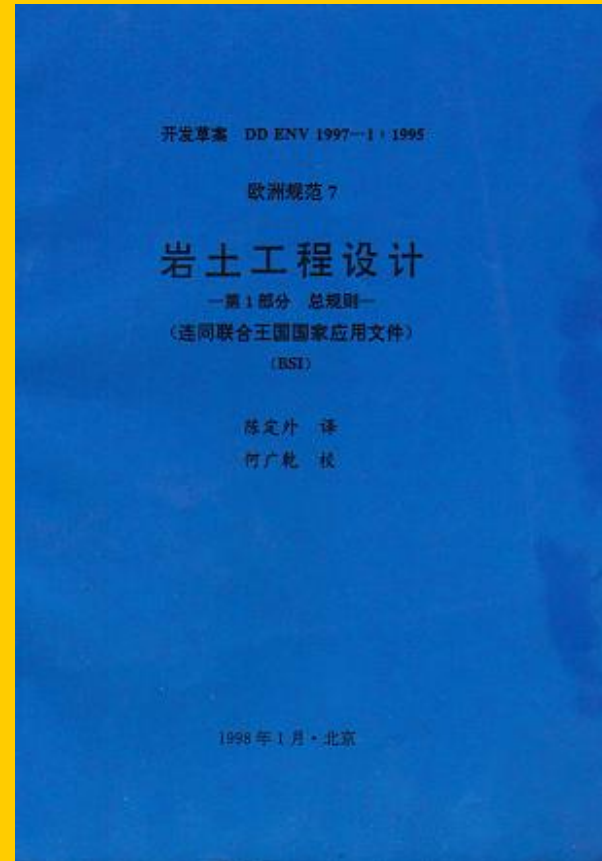
Entsprechend den Bedingungen der Vereinbarung über gegenseitige Anerkennung von Normenvereinen (Artikel 17, Absatz 1 B des Übereinkommens) erklärt der technische beteiligte nationale Komitee, dass die obige nationale Norm, falls sie in Kraft tritt, als Übersetzung in Sprache vorgesehen ist.

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Model Code: 1994



Chinese translation of ENV in 1998

WG1 Stage

- **1994-1996 Trial calculations and discussions about ENV**
 - e.g. Meeting at **Institution of Structural Engineers, London Sept-Oct 1996**
 - **Some strong views against ENV and partial factors**
 - *“If the present method of EC7 is adopted in this respect it will be a disservice to the industry which will restrain its development for the next decade”*
 - *“EC7 is a very strange document On present evidence, it appears that the method proposed in EC7 needs considerably more development before it can be considered for use”*
- **1997 In order to involve all the CEN countries more directly in the transformation of the ENV into an EN. SC7 decided to form Working Group 1 with Ulrich Smolczyk as convenor**
- **1997-1998 WG1 met 6 times and produced a draft EN with Design Cases A, B, C, D1 and D2 with partial resistance as well as partial material factors**

EN Stage

- 1999 **PT1** established to convert **ENV** to **EN**; **Ulrich Smolczyk** convenor
 - Ongoing discussions about partial factors
 - 3 Design Approaches adopted
- 2001 Final **draft adopted** by SC7 at Milan SC7 meeting in April
- 2004 **January: Issued** all CEN members **for formal vote**
 - April: **Positive vote** received – Date of Ratification (**DOR**)
 - November: **Definitive** text made available **by CEN**
- 2007 December: National implementation with **National Annexes**
- **2010 December: Withdrawal of conflicting standards**
 - Start of **Eurocode Era**

Irish National Annex



Irish NA: 2005

3 Challenges in Preparing Eurocode 7

To prepare a geotechnical standard that:

1. **Harmonized** geotechnical design with structural design
 - Consistent with EN 1990
2. **Took account of** special features of soil **and** geotechnical design
3. **Was acceptable to the European geotechnical engineering community**
 - Accommodated different national design practices

1. Consistent with EN 1990

- Based on **limit state design** method
- Have **partial factors** applied to **characteristic values**
- Use **partial action factors** in **EN 1990**
- Provide **partial material factors**
- Characteristic value and partial factors **reliability based**

2. Special Features of Soil and Consequences for EC7

Comparison between Soil and Steel

Soil

- Natural
- 2 or 3 phase
- Non-homogeneous
- High variability
- Frictional
- Ductile
- Compressible
- Non-linear

Steel

- Manufactured
- Single phase
- Homogeneous
- Low variability
- Non-frictional
- Non-ductile
- Non-compressible
- Linear

Consequences for EC7

- Properties determined not specified
- Consider water as well as soil
- Characteristic value not 5% fractile of test results
- Need judgement selecting characteristic value
- Loads affect resistances so need care factoring permanent loads
- Causes load redistribution in structures so lower factors may be used on structural loads
- Design often controlled by SLS – not by ULS
- SLS calculations often difficult – design using ULS calculation

3. National Design Practice

- Throughout Europe, there are different national geotechnical design practices involving:
 - Ground investigation methods
 - Soil testing methods
 - Geotechnical design methods
- Due to different:
 - Ground conditions
 - Climatic conditions
 - Design traditions
- Due to different regulatory regimes and cultures, e.g.
 - In Germany the calculation methods are prescribed in the national standards
 - In the UK, the calculation methods are not prescribed and the standards are codes of good practice
- Different design practices needed to be accommodated

6 Design Issues in Development of Eurocode 7

- Scope of Eurocode 7
- Definition of the characteristic value of a geotechnical parameter
- Partial factor on permanent loads
- Application of partial factors to material parameters or resistances
- Treatment of water pressures and forces
- Accommodation of national design practice

Scope and Style

- **Eurocode 7 differs from other Eurocodes** because geotechnical design is different from structural design
- **Importance** of geotechnical investigations and testing **emphasised**
- There is **Part 2** on “**Ground investigation and testing**”
- There are **no calculation models** in the text
- **Important statement** in EC7 (2.4.1(2)):

*“It should be considered that **knowledge of the ground conditions** depends on the **extent and quality** of the **geotechnical investigations**. Such knowledge and the **control of workmanship** are usually **more significant** than is **precision** in the **calculation models** or the **partial factors**”*

EC7 Meetings

From the start Niels set a **particular style** to the meetings

- **Relaxed and friendly**
- **Well prepared** and kept to Agenda and kept to time
- He **listened** to everyone's view
- If any issue was not being resolved within the meeting he would **discuss** it later over a **beer** or a **meal**
- e.g. **Mussels in Brussels**
- Provided **excellent summary of meetings**, taking for account of all views

EC7 meetings were used as opportunities for members to **meet local geotechnical engineers** and learn about **local design practices**

- **Good social occasions**

EC7 Socialising



**EC7 members all aboard for dinner
in Roskilde, near Copenhagen
September 1982**



**EC7 members at Chantilly, France
in extreme winter conditions
January 1885**

Cultural Visits

Acropolis, Athens

June 1982



The Catacombs, Rome

**Seeking inspiration
from above?**

September 1983

Technical Visit January 1982



**Deep excavation for British Library
King's Cross, London**



**Inspecting London Clay
in deep excavation**

Discovering Design Problems



**Differential settlement
Delft**



**Building on expansive soil
Seville (1987)**

Relaxing after Lisbon Meeting July 1987



ISSMFE President, Pedro Seco e Pinto with Emanuel Maranha das Neves (P) playing guitar



Singing ISSMFE President, Pedro Seco e Pinto assisted by Sam Amar (F)

Appreciation

Niels Krebs Ovesen presented each ad hoc committee member a glass tankard with the signatures of all the committee members in appreciation of their work after 22 meetings over 6 years drafting the Model Code



Acknowledgements

Alasdair Beal
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