

The added value of European  
cooperation in Steel Structures research  
-Research topics for the next 5 years-

Milan Veljkovic

The Technology Day  
18.05.2016

## OUTLINE

- European Convention for Constructional Steelwork, ECCS



- Two examples of EU research projects.

- Visions and plans for future
  - Working methodology

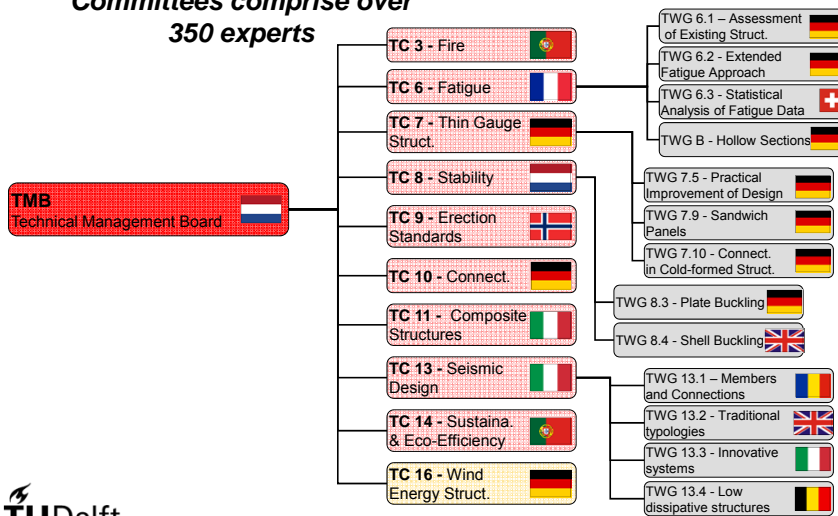
## ACTIVITY OF ECCS

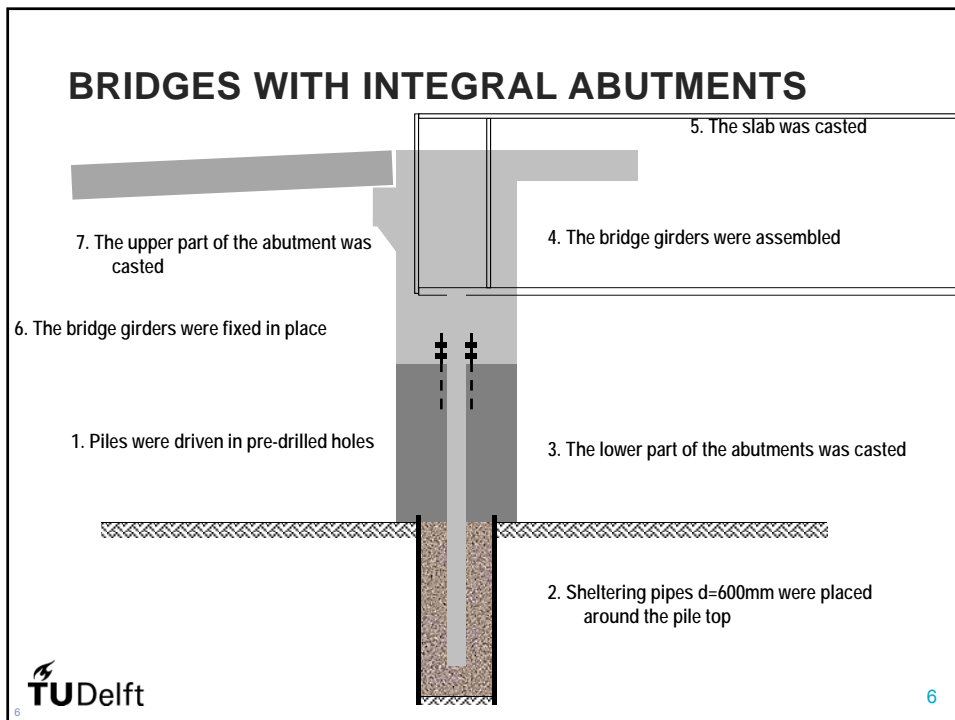
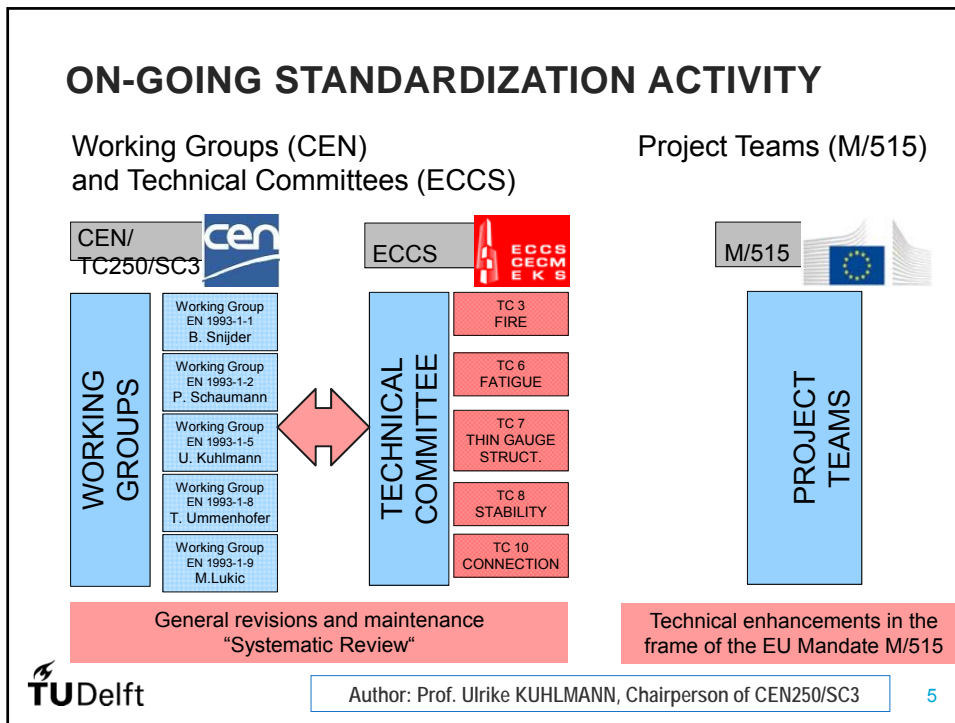
The expert meeting place technical and promotional activity:

- Contributes to **harmonization on European practice**;  
**Develop EN1993\*, EN1994\*, EN1090\*, ...**  
**Publication of design manuals, recommendations, APPs, ...**
- **Identifies on-going developments** in specific fields;  
**Research and dissemination projects,**
- Lobbying activity, help to **identifies priorities for R&D**;  
**Identify Strategic Research Agenda, new projects and initiatives.**

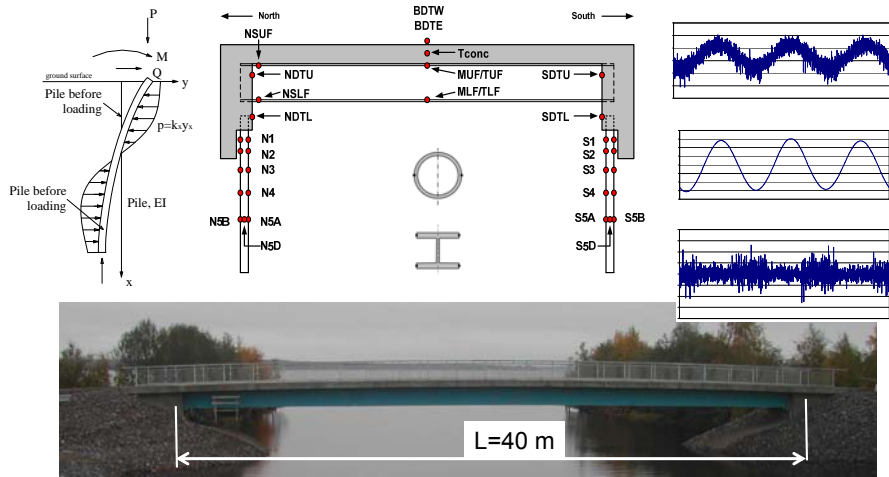
## TECHNICAL COMMITTEES (2016)

*10 ECCS Technical Committees comprise over 350 experts*





# LEDUÅN BRIDGE, SWEDEN

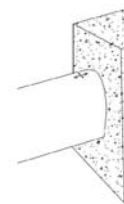
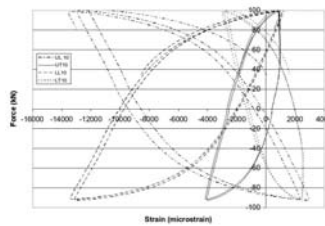


$$\varepsilon_{p_i} = \frac{(N_{pile}^{dead} + N_{pile}^{traffic})}{A_{pile} \cdot E} - \left( \frac{3 \cdot \varnothing}{L_{equ,h}^2} \right) \cdot (\Delta_{abut} + H(\theta_{\Delta T} + \theta_{traffic} + \theta_{dead})) - \left( \frac{2 \cdot \varnothing}{L_{equ,m}} \right) \cdot (\theta_{\Delta T} + \theta_{traffic} + \theta_{dead})$$



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# THE MAIN RESULT OF INTAB PROJECT

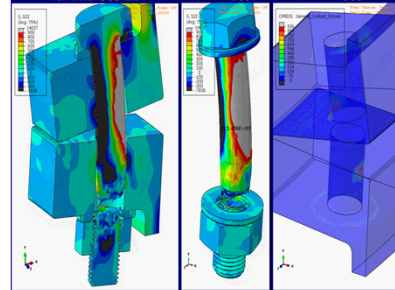


**LOW CYCLIC fatigue is no problem for IAB**

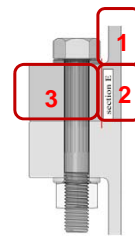
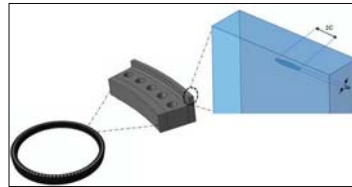
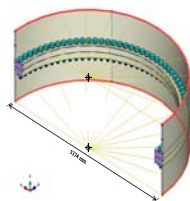


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## RING FLANGE CONNECTION FOR TUBULAR TOWERS FOR WIND TURBINES



REPOWER 5M assembled in 2004, Germany



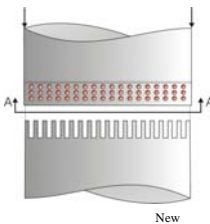
TU Delft

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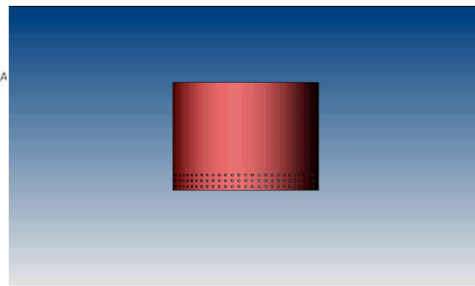
## RING FLANGE VS FRICTION CONNECTION FOR TUBULAR TOWER FOR WIND TURBINES



REPOWER 5M assembled in 2004, Germany



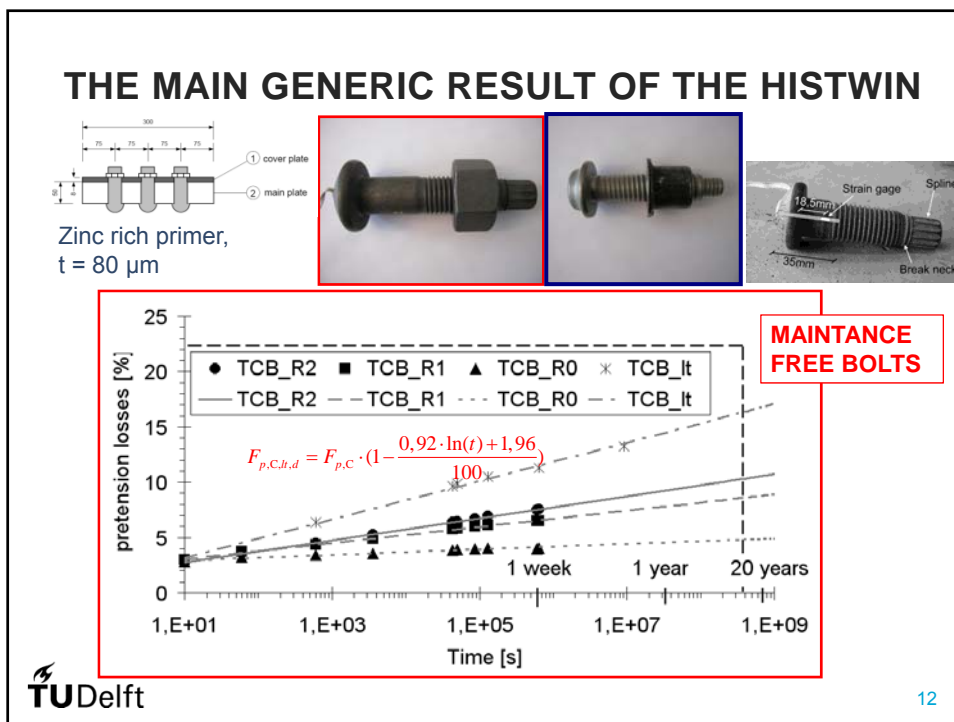
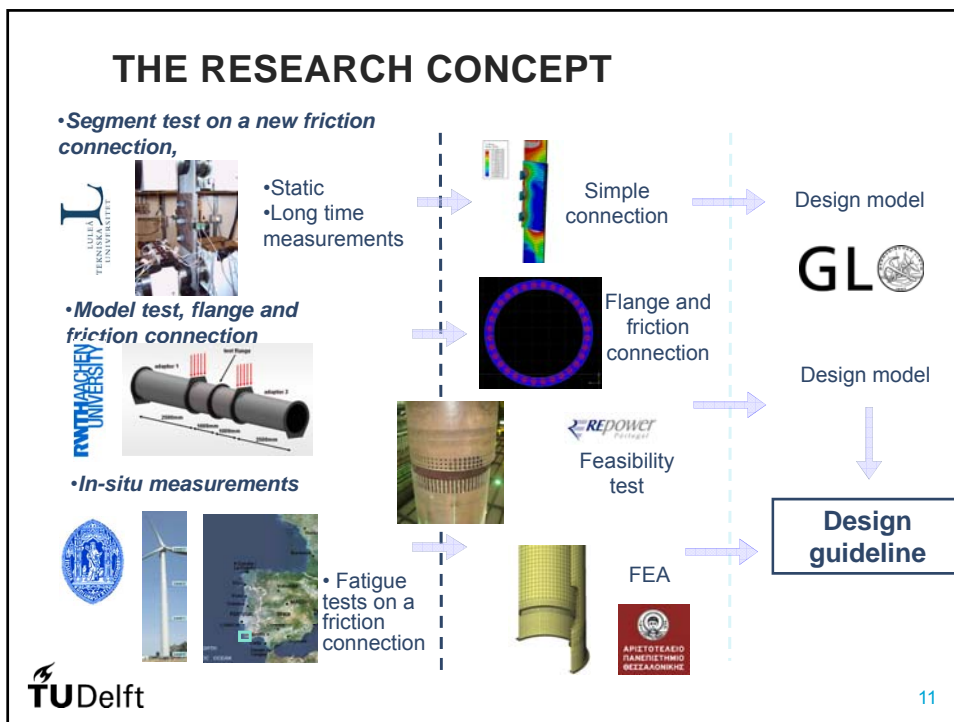
New



HISTWIN, 2006-2009  
High-Strength Steel Tower for  
Wind Turbine

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## FUTURE PLANS AND VISIONS

- Encourage **entrepreneurship and innovation** in education
    - Product/concept development.
    - Inspiration from entrepreneurs in teaching (*guest lectures, tasks for lab project for specialization courses*, evaluators).
    - Development and research projects at various levels (BSc, MSc, PhD).
    - Regular meetings with companies.
    - Exchange/secondment of staffs.
- More civ. eng. should start own companies.

## FUTURE PLANS AND VISIONS

- Components should be possible to **disconnect** and reuse



- **Modularization** leads from linear to **circular economy**



[http://www.steelconstruction.info/Recycling\\_and\\_reuse](http://www.steelconstruction.info/Recycling_and_reuse)



**All structural application**

## THE FIVE YEAR PLAN

- Minimize influence on **environment**

Reuse of building and structural components

Integration of design and manufacturing

REDUCE

Reuse and demountability using steel structures and the circular economy (2016-2019)

sci

bouwvereniging **staal**

TATA

Lindab

AEC 3

uni.lu  
UNIVERSITE DU LUXEMBOURG

TU Delft

Site management

Erection scheduling

Fabrication integration

Drawings & reports

Multi-material detailing

General Arrangements drawings

Integration with A&D and MEP

Conceptual design

Architectural integration

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## THE FIVE YEAR PLAN

Contribute to standardization of the **automatized manufacturing**.

STEEL and HYBRIDE Structures incl. **FRP**

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# ENLARGE THE PARTNERSHIP



**UNIVERSITY OF TECHNOLOGY**

**RWTH AACHEN UNIVERSITY**

**ULg** UNIVERSITÉ de Liège

**TU/e** Technische Universiteit Eindhoven University of Technology

**Imperial College London**

**Research Fund for Coal & Steel**

**Leibniz Universität Hannover**

**RUB**

**UNIVERSITA DEGLI STUDI FIRENZE**

**GL**

**SCI**

**ERASMUS MUNDUS**

**FORJAS IRAETA** Heavy Industry S.L.U.

**TWI** Technology Engineering

**EUROPEAN COOPERATION IN SCIENCE AND TECHNOLOGY**

**HORIZON 2020**

**SEVENTH FRAMEWORK PROGRAMME**

**OCOST**

**MARTIFER GROUP**

**THE KTH INSTITUTET FOR FIBER OPTICS**

**SSF Ingenieure**

**ArcelorMittal**

**Vestas**

**REpower Portugal**

**SENVION** wind energy solutions

**SIEMENS**

**acciona**

**ECCS** ECEM EKS

**SWECO**

**VM**

**VALLOUREC & MANNESMANN TUBES**

**GVE** CAMBRIDGE VACUUM ENGINEERING

**INETEC** Institute of Information Technology

**TU Delft**

**RAMBOLL**

**SANBORN**