Organization of Eurocodes for the design of bridges

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The design of bridges with Eurocodes is recommended: the usability of Eurocodes has been checked, the design loads cover correctly actual physical loads and their rules are modern and reliable.
Many beautiful bridges have been designed in the past without the Eurocodes …
Design of Bridges with Eurocodes

Coalbrooddale Bridge
U.K. 1779

Viaur viaduct
F - 1902

Timber Bridge in Bassano (I – Palladio 1569)

Steel Bridge in St. Petersboug (Trinity Bridge)
Of course ...
You can ignore the Eurocodes

Or you can limit the traffic volume and magnitude of loads
But …

Bridge design with Eurocodes is better

EN 1991

- EN 1991-1-1: Densities, self-weight, imposed loads for buildings
- EN 1991-1-3: Snow loads
- EN 1991-1-4: Wind actions
- EN 1991-1-5: Thermal actions
- EN 1991-1-6: Actions during execution
- EN 1991-1-7: Accidental actions
- EN 1991-2: Traffic actions on bridges
EN 1992 1-1+2 : Concrete bridges
EN 1993 1+2 : Steel bridges
EN 1994 1+2 : Steel and concrete composite bridges

EN 1995-1+2 : Timber bridges
EN 1997-1 : Foundations
EN 1998-1+2+5 : Bridges in seismic zones
Field of application of the Eurocodes

- Portal bridges
- Slab bridges
- Composite steel-concrete bridges
- Bridges built by the cantilever method or by the incremental launching method
- Cable stayed bridges (1)
- Cable stayed bridges (2)
- Suspension bridges (1)
- Suspension bridges (2)
- Footbridges
Organization of Eurocodes

*Organization of the Eurocodes*

- **Part 1-1**
  - General rules and rules for buildings

- **Part 1-2**
  - Fire Design

- **Part 2**
  - Bridge Design

- **Bridge Parts**
  - EC 2, 3, 4, 5, 8

- No Bridge Parts (At present)
  - EC6 (Masonry)
  - EC9 (Aluminium)
Design of Bridges with Eurocodes

EN 1990
Basis of Structural Design
Combinations of Actions

EN 1991
Self-weights
Traffic Loads
Climatic Actions
Accidental Actions
Actions during execution

EN 1998
Design of Structures
for earthquake resistance

EN 1997
Geotechnical Design

STRUCTURAL EUROCODES
EN 1991 - EN 1993
EN 1994 - EN 1995
(EN 1999)

EXECUTION STANDARDS
EN 13670 (Concrete)
EN 1090 (Steel)

MATERIAL STANDARDS
EN 206 (Concrete)
EN 10025 (Steel)
...
GENERAL PRINCIPLES OF EUROCODES
Design of Bridges with Eurocodes

RESISTANCE, SAFETY

SERVICEABILITY
Corrosion

Alkali-silica reaction
Design of Bridges with Eurocodes (Durability (2))

FATIGUE
Design of Bridges with Eurocodes (Robustness)
EN 1990 - 3.2 (3)P The selected design situations shall be sufficiently severe and varied so as to encompass all conditions that can reasonably be foreseen to occur during the execution and use of the structure.
Design of Bridges with Eurocodes
Accidental actions and situations (1)
Design of Bridges with Eurocodes
Accidental actions and situations (2)
Design of Bridges with Eurocodes
Accidental actions and situations (3)
The magnitude of traffic loads is increasing on roads as well as on railway lines (in particular due to dynamic effects for High Speed Trains)
Traditional railway traffic loads

Models for high speed trains and dynamic interaction bridge-train

Design of Bridges with Eurocodes
Dynamic behaviour and serviceability criteria for slender structures
Vibration of footbridges
Rain-Wind induced vibrations
Interaction loads - structure
Design of Bridges with Eurocodes
A dream: building bridges with Eurocodes for a better world, a link between planets!

Thank You for your attention