Organization of Eurocodes for the design of bridges

4 April 2013

EU - RUSSIA Regulatory DIALOGUE
Construction Sector Subgroup
Worked Examples on
BRIDGE DESIGN
WITH
EUROCODES
VENUE tbd
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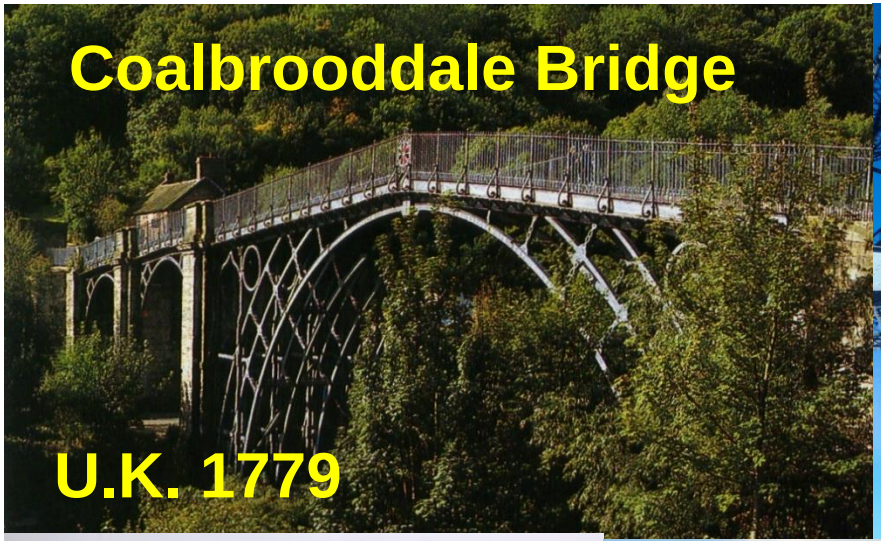
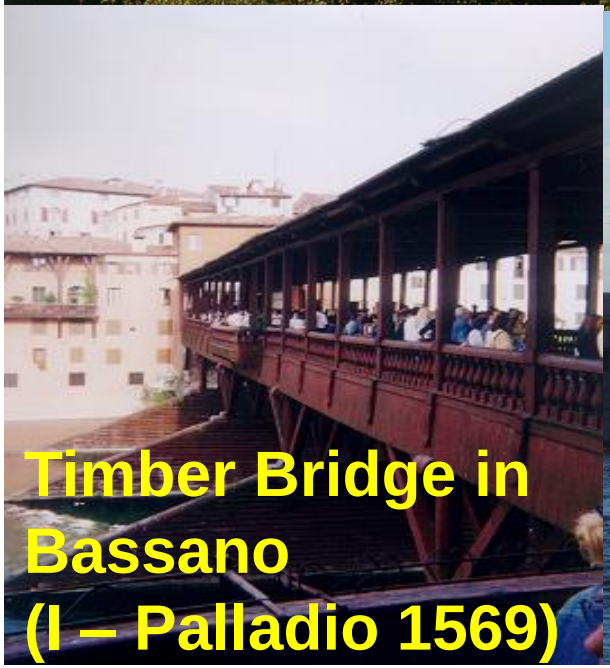
The design of bridges with Eurocodes is recommended: the usability of Eurocodes has been checked, the design loads cover correctly actual physical loads and their rules are modern and reliable.

Many beautiful bridges have been designed in the past without the Eurocodes …


Coalbrooddale Bridge
U.K. 1779

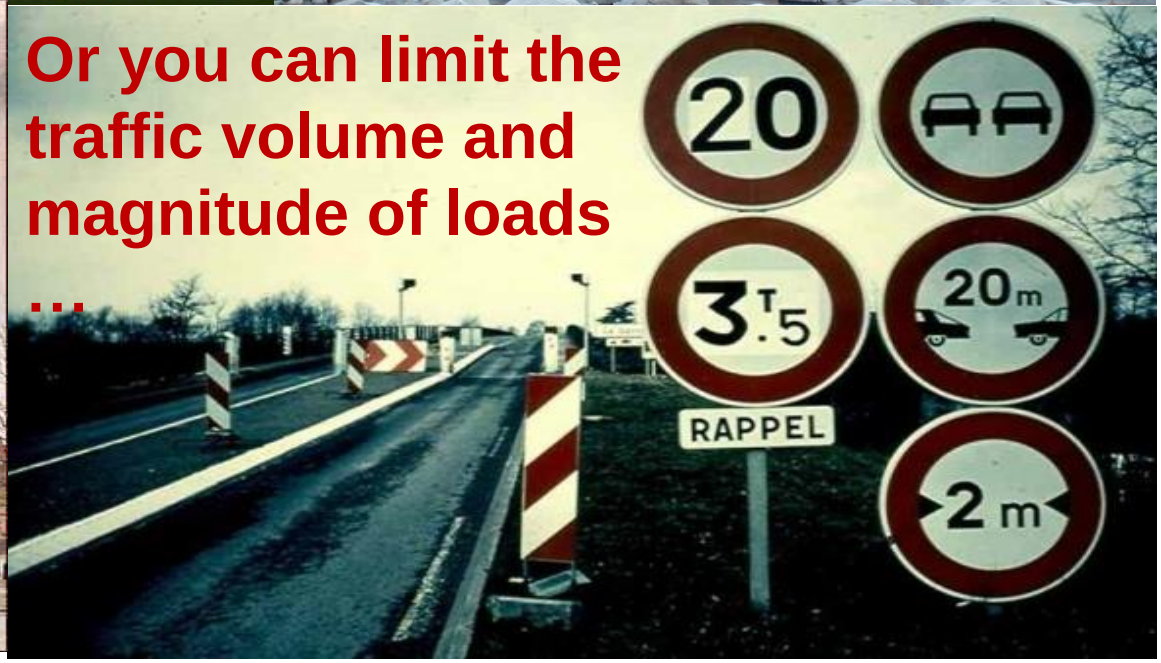

Viaur viaduct
F - 1902


Timber Bridge in Bassano
(I – Palladio 1569)


Steel Bridge in St. Petersboug (Trinity Bridge)

Of course …


You can ignore
the Eurocodes

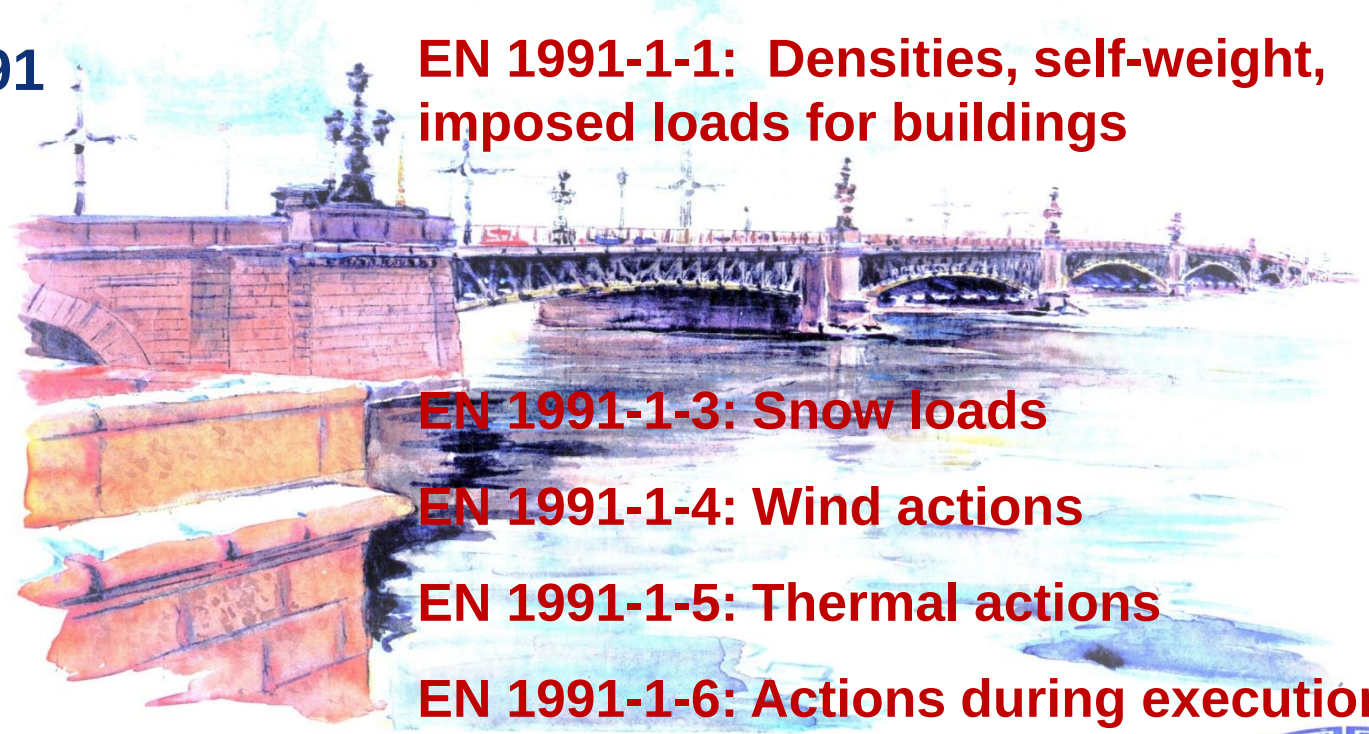

Or you can limit the
traffic volume and
magnitude of loads
…
20
3.5
20m
RAPPEL
2 m

But …

Bridge design with Eurocodes is better

EN1990 + Annex A2 (EN 1990/A1): Basis of Structural Design and application for bridges

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

ТРОИЦКИЙ ПРОЕКТ ИНЖЕНЕРНАЯ ГРУППА

Троицкий мост через Неву в Санкт-Петербурге

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)

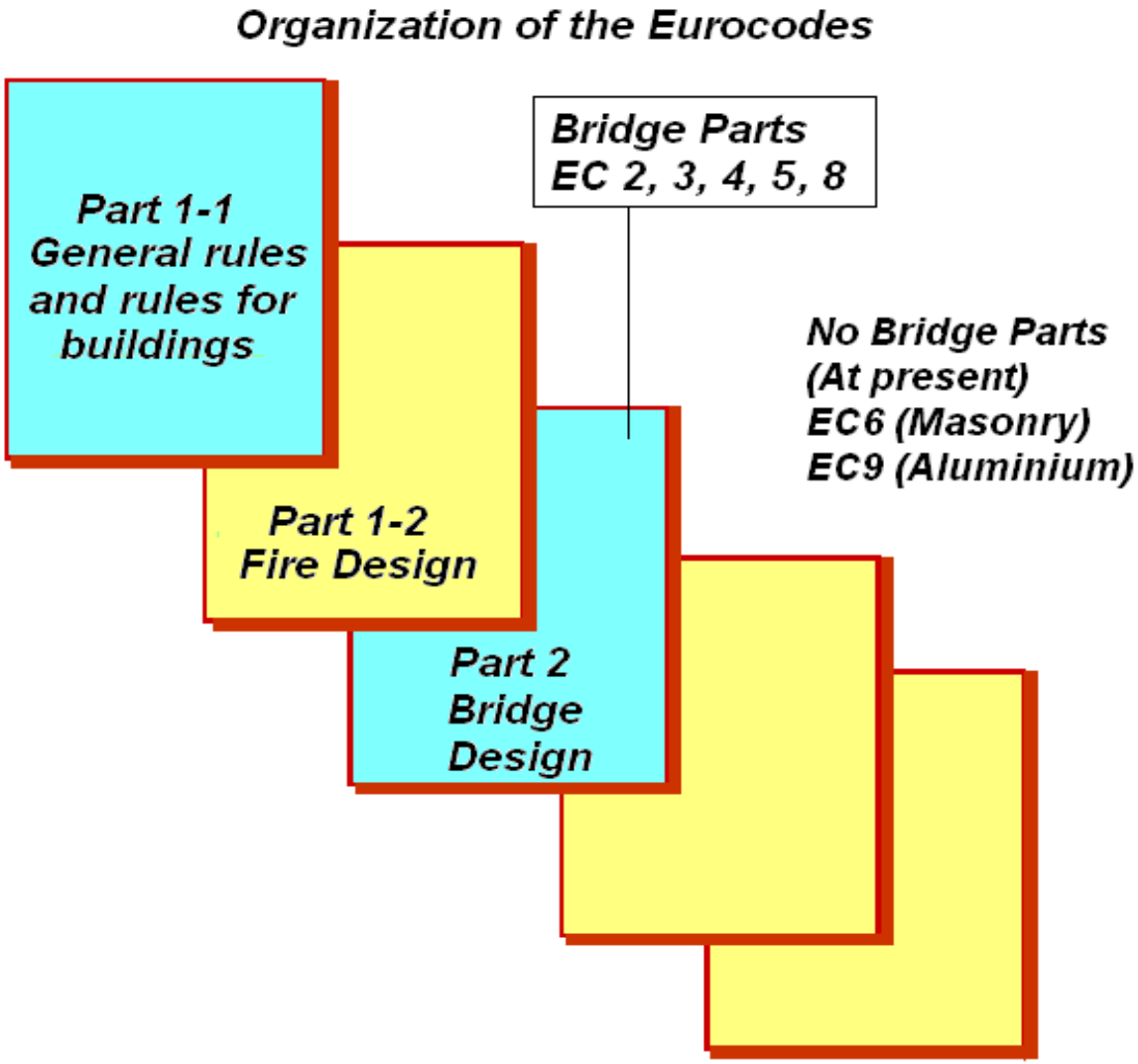
Cable stayed bridges (2)

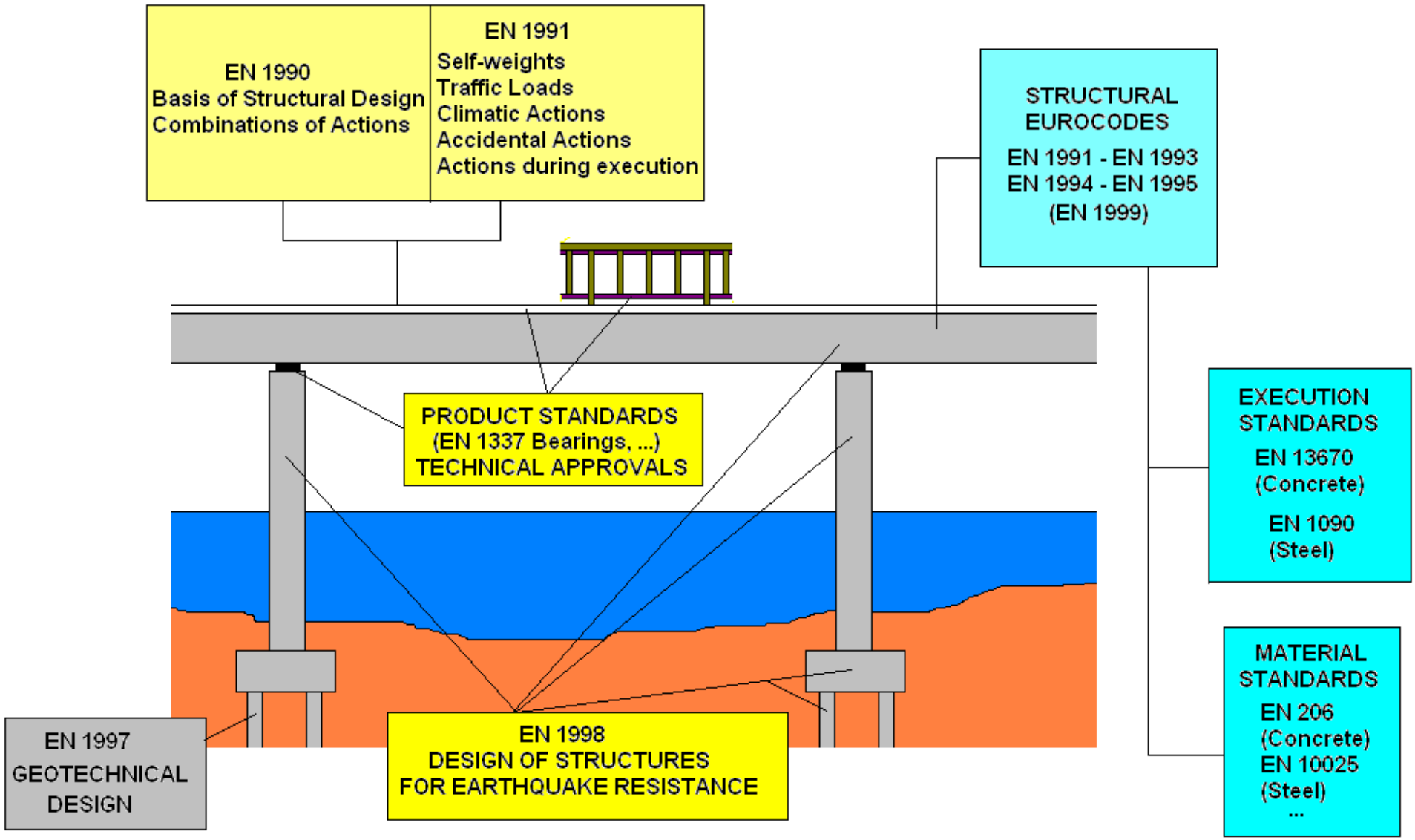
Suspension bridges (1)

Suspension bridges (2)

Footbridges

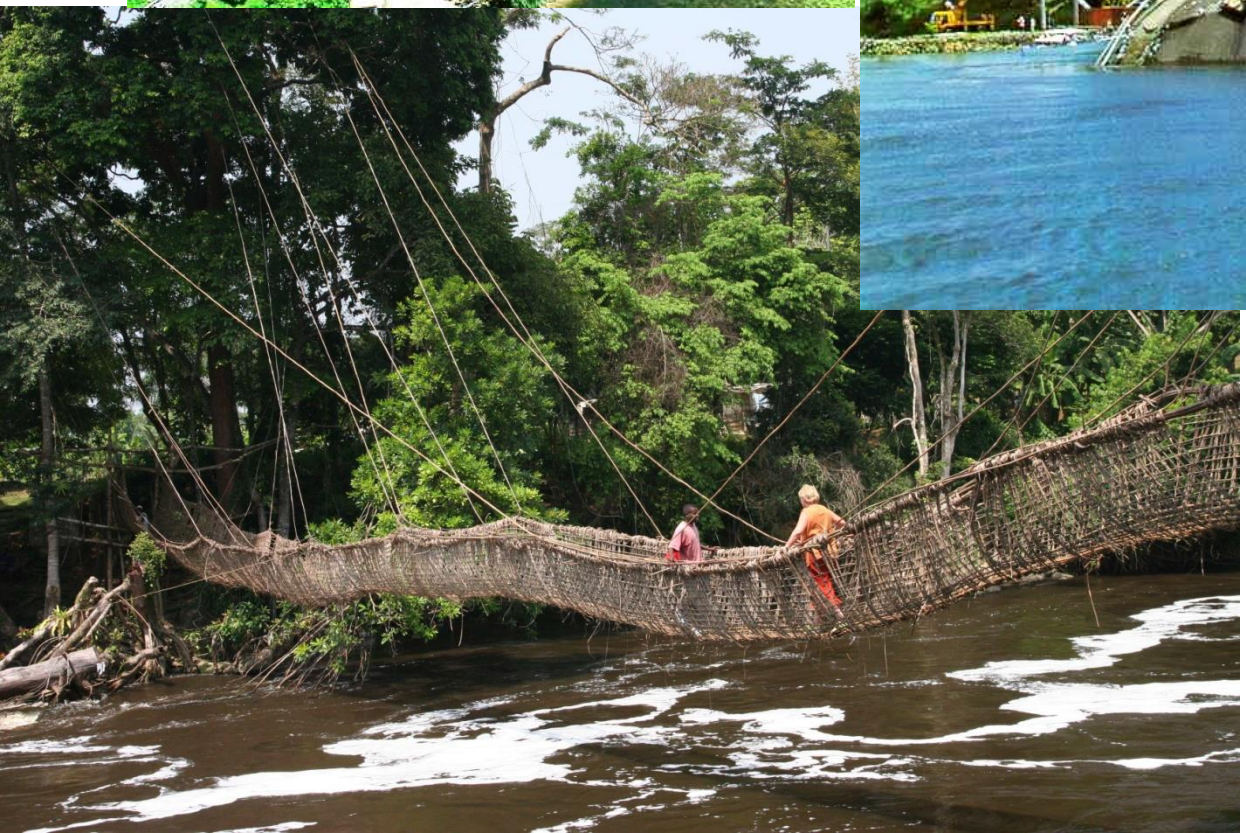
Organization of Eurocodes




EN 1990
Basis of Structural Design
Combinations of Actions
EN 1991
Self-weights
Traffic Loads
Climatic Actions
Accidental Actions
Actions during execution
STRUCTURAL EUROCODES
EN 1991 - EN 1993
EN 1994 - EN 1995
(EN 1999)
PRODUCT STANDARDS
(EN 1337 Bearings, ...)
TECHNICAL APPROVALS
EXECUTION STANDARDS
EN 13670
(Concrete)
EN 1090
(Steel)
MATERIAL STANDARDS
EN 206
(Concrete)
EN 10025
(Steel)
...
EN 1997
GEOTECHNICAL DESIGN
EN 1998
DESIGN OF STRUCTURES
FOR EARTHQUAKE RESISTANCE

GENERAL PRINCIPLES OF EUROCODES

RESISTANCE,
SAFETY



SERVICEABILITY

Design of Bridges with Eurocodes (Durability (1))

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)

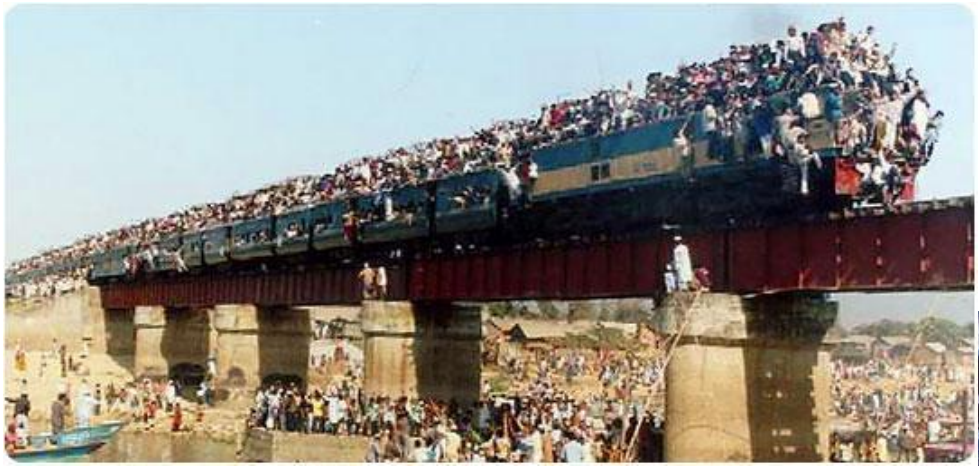
Design of Bridges with Eurocodes
Accidental actions and situations (2)

Design of Bridges with Eurocodes
Accidental actions and situations (3)

EN 1991-2 defines Load Models for road bridges, footbridges and railway bridges

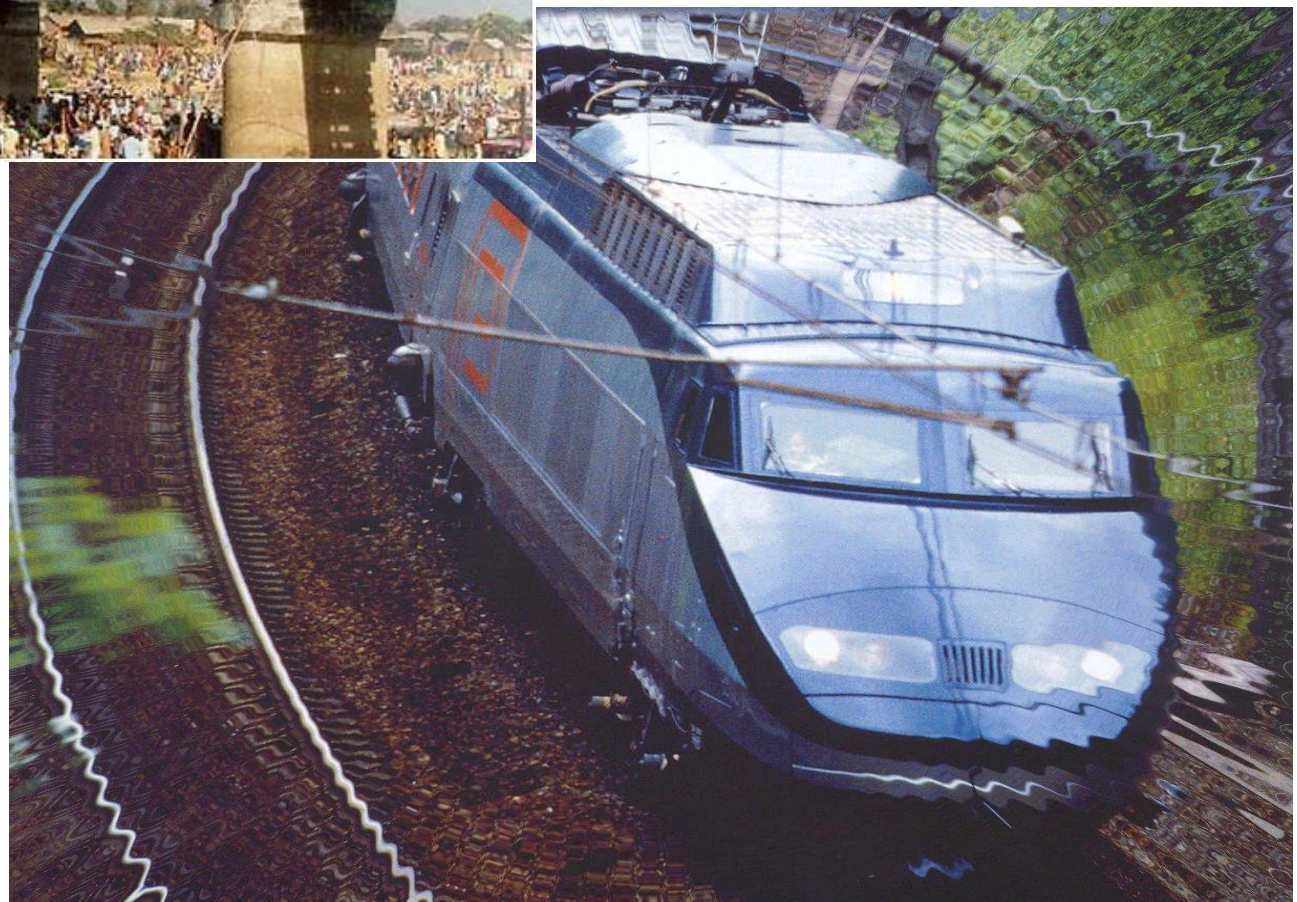
The magnitude of traffic loads is increasing on roads as well as on railway lines (in particular due to dynamic effects for High Speed Trains)


100



Traditional railway traffic loads

Models for high speed trains and dynamic interaction bridge-train



Dynamic behaviour and serviceability criteria for slender structures

Vibration of footbridges

Rain-Wind induced vibrations

Interaction loads - structure

A dream : building bridges with Eurocodes for a better world, a link between planets !