1E6 Timber bridges

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<table>
<thead>
<tr>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Introduction</td>
</tr>
<tr>
<td>• Brief historical note</td>
</tr>
<tr>
<td>• Types and sizes</td>
</tr>
<tr>
<td>- Footbridges</td>
</tr>
<tr>
<td>- Road bridges</td>
</tr>
<tr>
<td>• Structural systems</td>
</tr>
<tr>
<td>- Arches</td>
</tr>
<tr>
<td>- Trusses</td>
</tr>
<tr>
<td>- Challenges and problems</td>
</tr>
<tr>
<td>• Bridge decks</td>
</tr>
<tr>
<td>• Connections</td>
</tr>
<tr>
<td>• Details</td>
</tr>
<tr>
<td>• Dynamic effects</td>
</tr>
<tr>
<td>• Protection and durability</td>
</tr>
<tr>
<td>maintenance</td>
</tr>
<tr>
<td>• Erection</td>
</tr>
</tbody>
</table>
Introduction

The choice of the best structural form of a bridge depends on several parameters:

- topography and landscape,
- span,
- loading,
- clearance and clear width,
- soil conditions,
- architectural features.
Brief historical note
Types and sizes
footbridges

Essing, Germany
Rádlo, Czech Republic
The Leonardo footbridge, Ås, Norway

Lardal, Norway
Magdeburg, Germany

Benešov u Semil, Czech Republic
road bridges

Wennerbrücke, Austria
Vihantasalmi
Mäntyharju
Finland

Tynset
Norway
Structural systems

Arches:

(a) horizontal thrust
(b) C (crown)
(c)

Trusses:

(a) upper chord
(b) road
(c) lower chord
challenges and problems

$M_{\text{max}} = 7295 \text{ kNm}$

$M_{\text{max}} = 540 \text{ kNm}$

moment

shear force

problem

$$\frac{\tau_d}{f_{v,d}} + \frac{\sigma_{t,90,d}}{k_{\text{dis}} k_{\text{vol}} f_{1,90,d}} \leq 1$$
Bridge decks

(a) nut

anchorage plate

prestressing rod

h

t

lamination

(b) butt joint

(c)

SUSCOS
SUSTAINABLE STEEL AND STEEL CONSTRUCTIONS

$\ell_i$
Evenstad bridge, Norway

Måsør bridge, Norway
Connections

Tynset, Norway
Details

Tynset, Norway
Dynamic effects

Lardal footbridge, Norway
Protection and durability maintenance

Keep the water out!

If it gets in (which it almost certainly will), make sure it can get out
- drainage,
- ventilation.

The details are very important.

Fretheim bridge, Norway
## durability

<table>
<thead>
<tr>
<th>Element</th>
<th>Objective</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conceptional design</td>
<td>Prevention or decrease of intense weather exposure</td>
<td>Roof or covering of the main structure</td>
</tr>
<tr>
<td>Choice of material</td>
<td>Prevention of damage through adequate choice of materials</td>
<td>Use of either naturally durable or preservatively treated timbers; low moisture content during erection</td>
</tr>
<tr>
<td>Design of details</td>
<td>Prevent unfavourable consequences of shrinkage and swelling due to water contact</td>
<td>Covering of horizontal surfaces, of joints and of end grain; enable quick end grain; enable quick drying out of wet parts</td>
</tr>
<tr>
<td>Preservative treatment</td>
<td>Prevention of fungi or insect attack</td>
<td>Pressure treatment using chemical solutions</td>
</tr>
<tr>
<td>Surface treatment</td>
<td>Prevent weathering of surfaces, achieve dimensional stability and avoid cracks; limited protection against fungi or insect attack</td>
<td>Several layers of pigmented coating</td>
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Erection

Evenstad bridge, Norway
Thank you for your kind attention!