

1E6 Timber bridges

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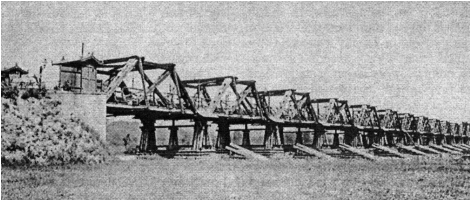
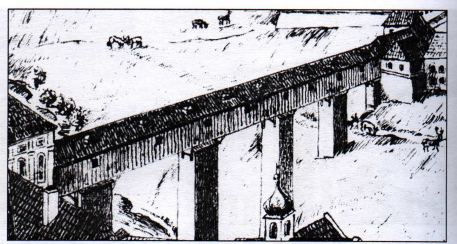
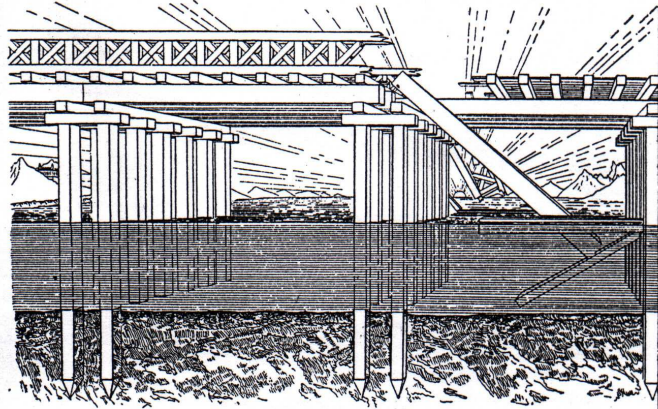
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Introduction

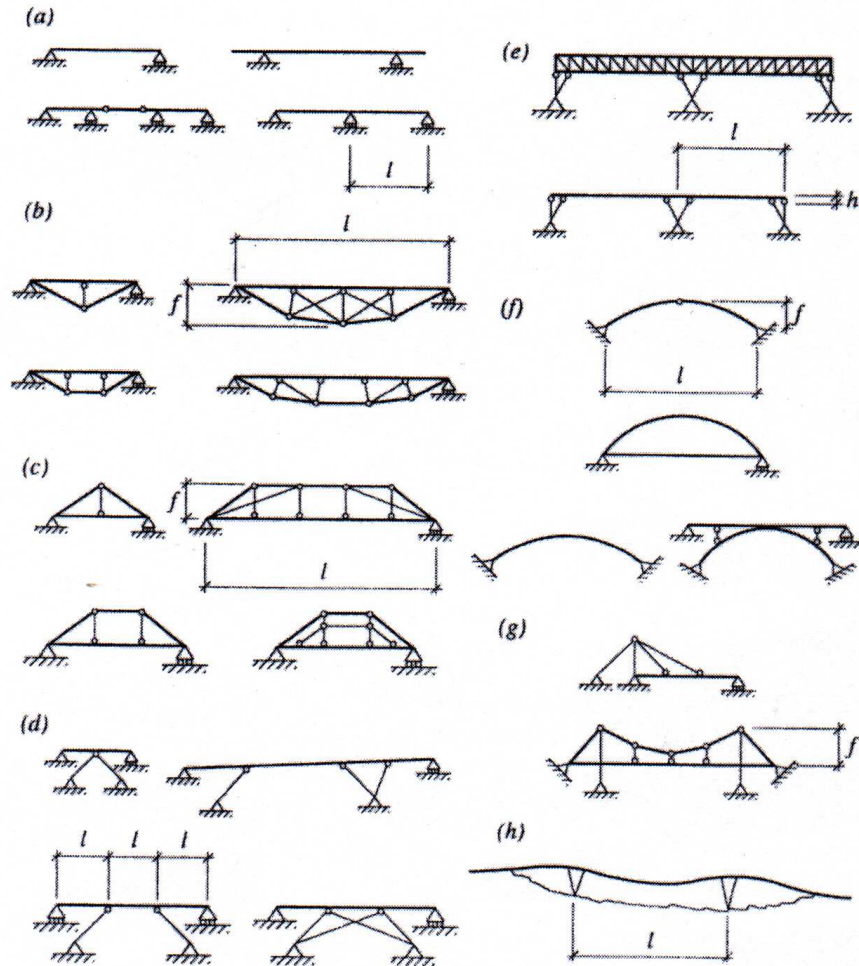
The choice of the best structural form of a bridge depends on several parameters:

- topography and landscape,
- span,
- loading,
- clearance and clear width,
- soil conditions,
- architectural features.

Brief historical note



Types and sizes



footbridges



Essing, Germany



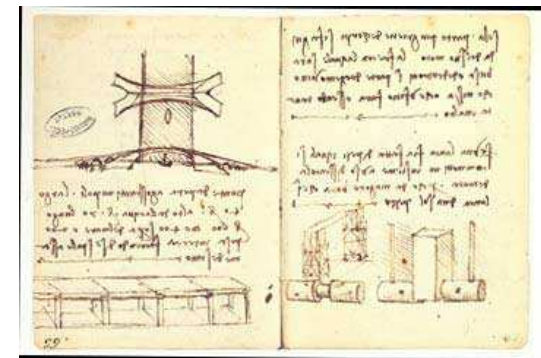
Rádlo, Czech Republic



The Leonardo
footbridge,
Ås, Norway



Lardal, Norway



Magdeburg, Germany



Benešov u Semil,
Czech Republic

road bridges



Wennerbrücke, Austria



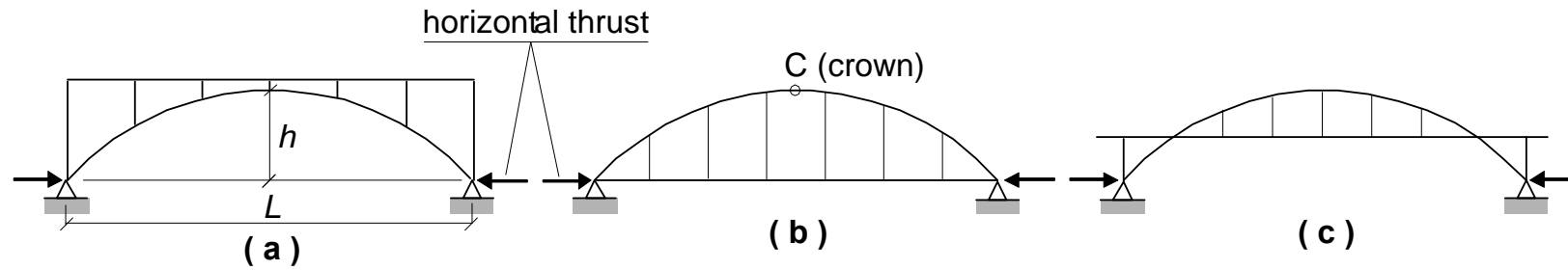
Vihantasalmi
Mäntyharju
Finland



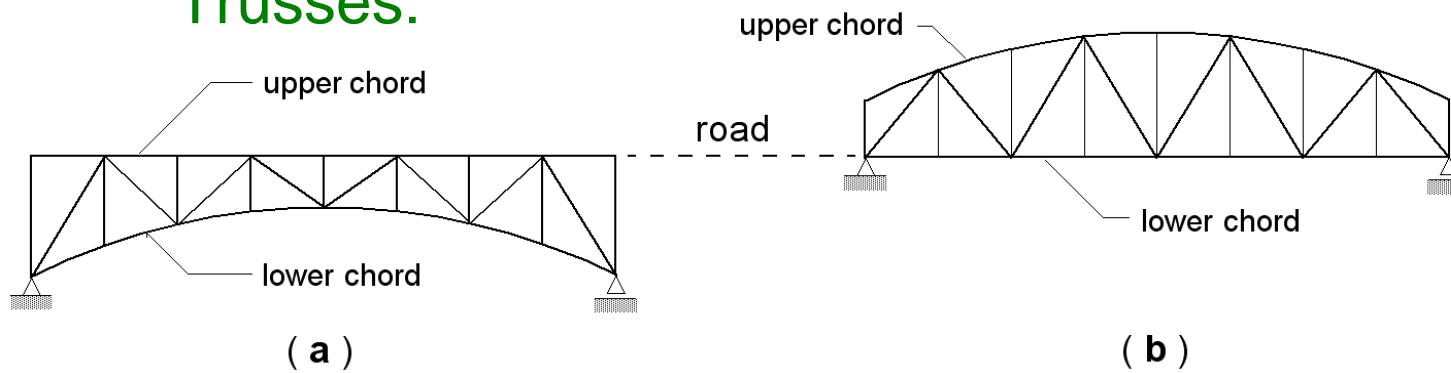
Tynset
Norway

Structural systems

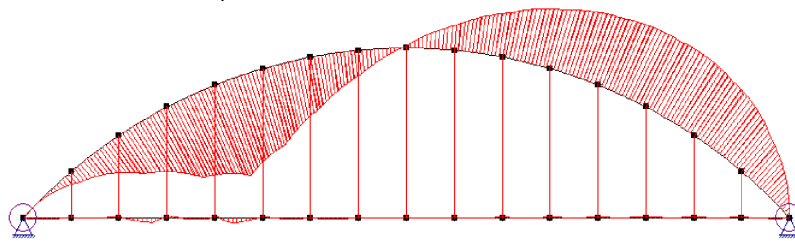
Arches:



Trusses:

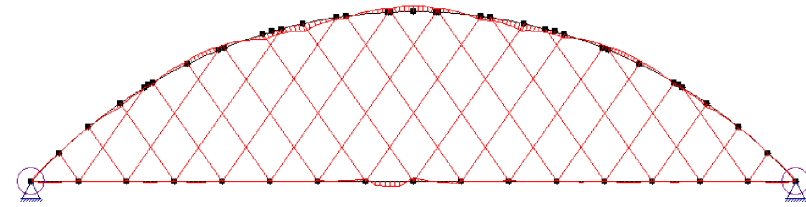


challenges and problems



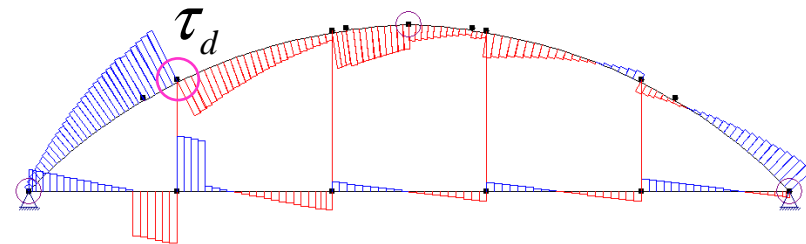
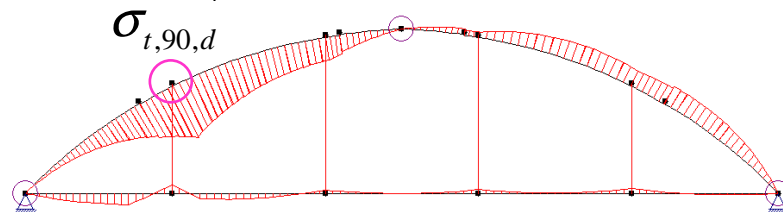
$$M_{max} = 7295 \text{ kNm}$$

moment



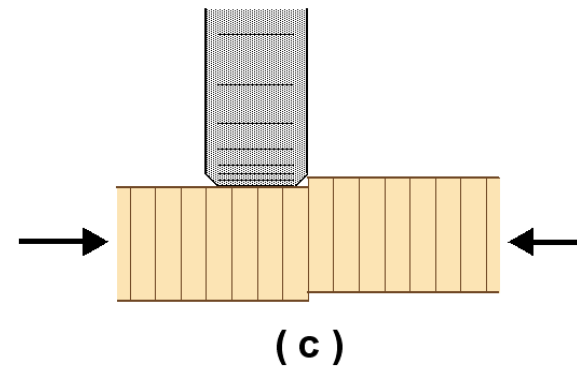
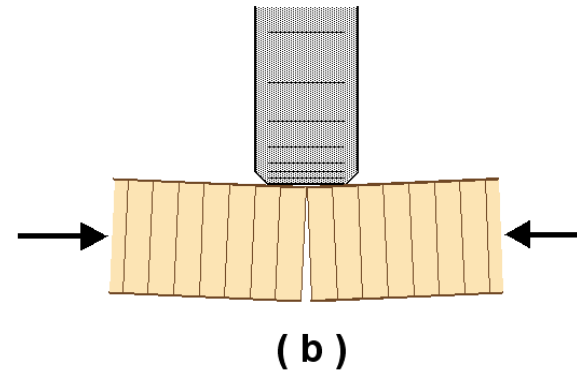
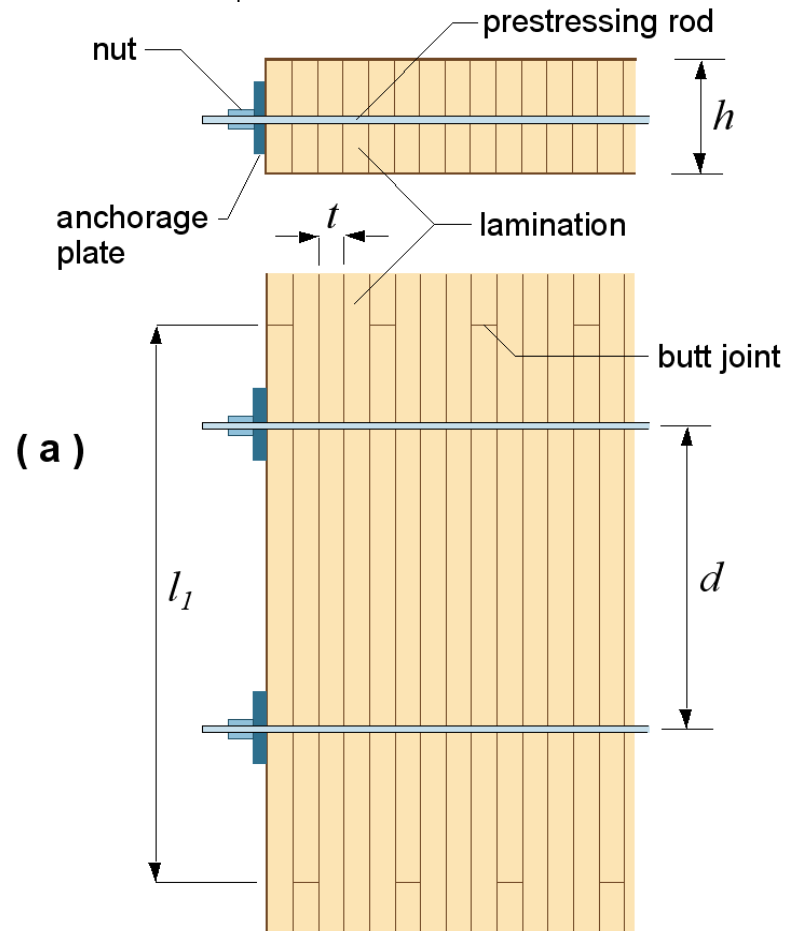
$$M_{max} = 540 \text{ kNm}$$

shear force



problem \longrightarrow
$$\frac{\tau_d}{f_{v,d}} + \frac{\sigma_{t,90,d}}{k_{dis} k_{vol} f_{t,90,d}} \leq 1$$

Bridge decks



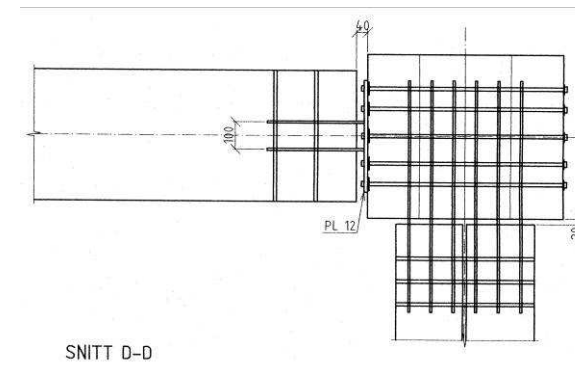
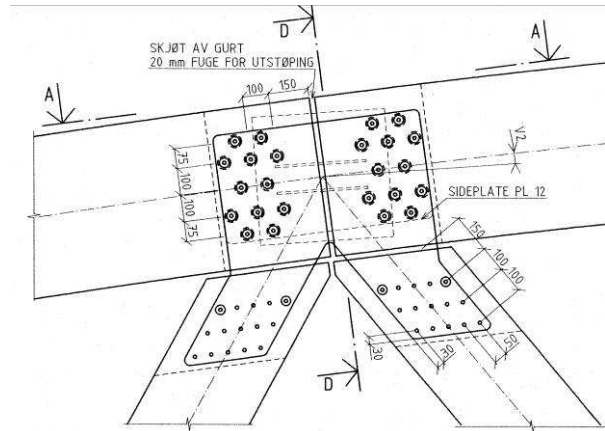
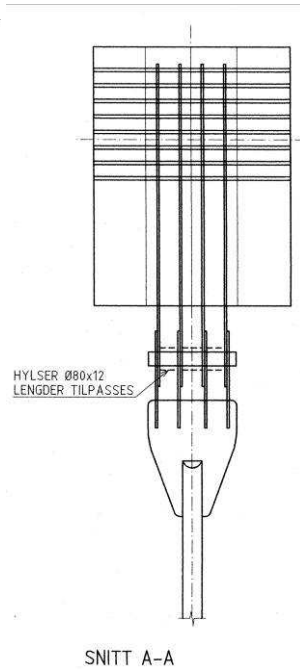
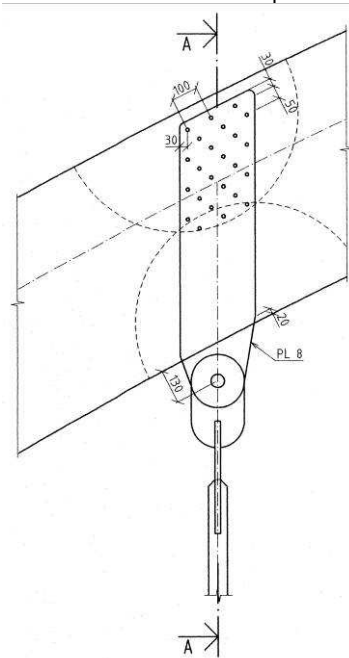


Evenstad bridge, Norway



Måsør bridge, Norway

Connections



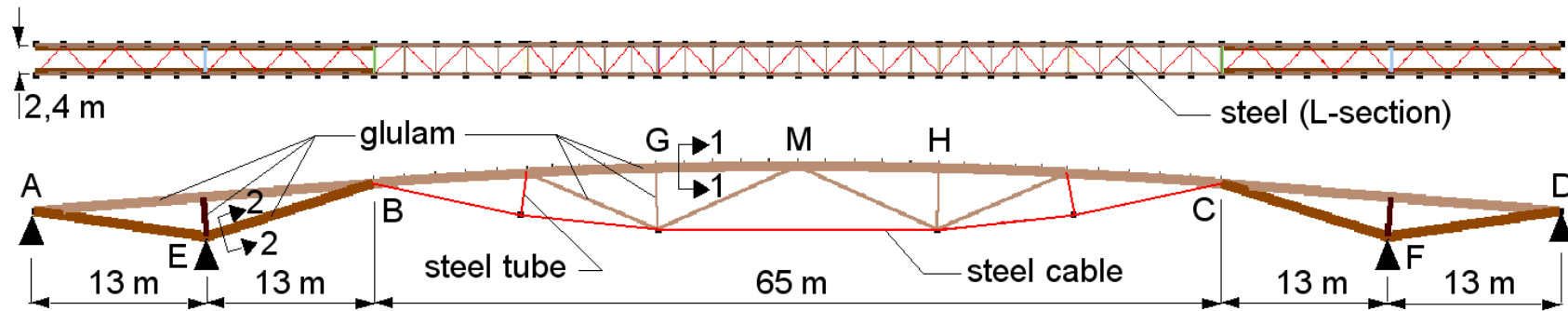
Tynset, Norway

Details

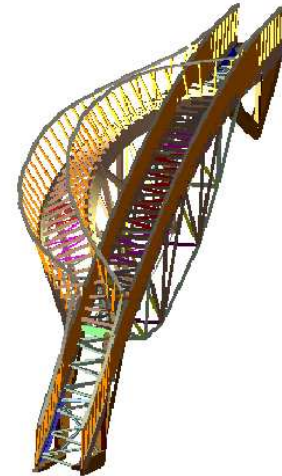
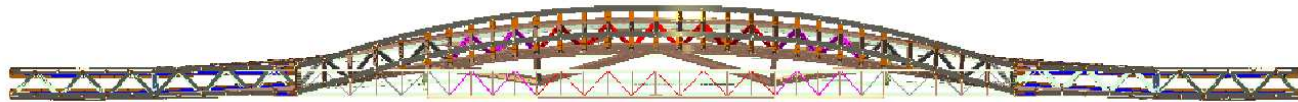


Tynset, Norway

Dynamic effects



Lardal footbridge, Norway



Protection and durability maintenance



Fretheim bridge, Norway

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.

durability

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

Erection



Evenstad bridge, Norway

**Thank you
for your kind attention!**