



## Måsør timber bridge A brief presentation

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*Half of the 100 years old bridge  
across the river Finna in the central  
part of Norway*



*Old Dønnessund Bridge (1896)*

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## Why build timber bridges today?

- ❖ **Economy:**
  - Widened range of construction materials*
  - *increased competition*
- ❖ **Aesthetics:**
  - New possibilities in design and shaping*
- ❖ **Environment:**
  - *Low energy consumption*
  - *CO<sub>2</sub>-bonding – not emission*
  - *Renewable material*



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*Keywords in the Design  
of Norwegian Timber  
Bridges:*

- **Simplicity**
- **Robustness**
- **Durability**
- **Aesthetics**



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## Confidence in wood as a bridge construction material

- ❖ Loadbearing structure in glulam
- ❖ Bridge deck in stress laminated timber
- ❖ And beyond that:
  - > Wood where wood is advantageous
  - > Steel where steel is advantageous
  - > Concrete where concrete is advantageous

*We aren't timber fanatics?*



## Typical construction elements in modern Norwegian timber bridges



Slotted-in steelplates

Steel cross girders



Glulam arch

Stress laminated timber deck



Timber railing

## Måsør bridge



## .... and more typical construction elements

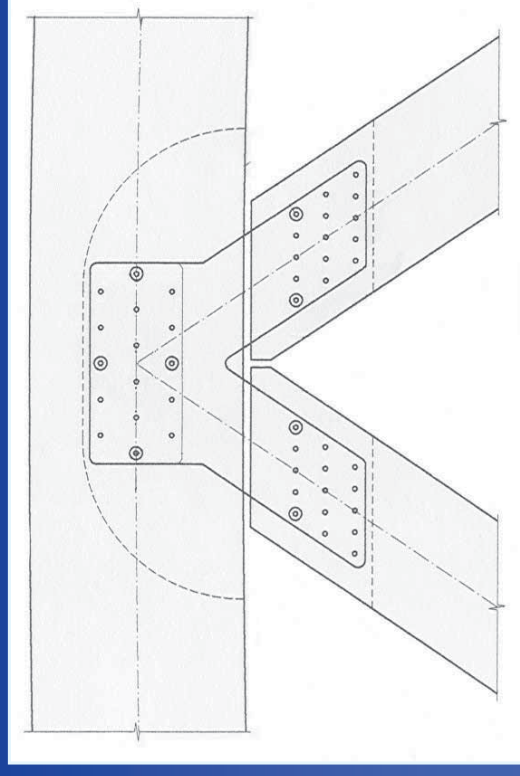


Måsør bridge

Stress laminated timber deck with  
prestressing rods



## Example of “slotted-in steel plates”



Truss with glulam members jointed with  
“slotted-in steel plates”



## Protection

*when aiming at 100 years service life*

- ❖ **Pressure treatment with Creosote**
- ❖ **Copper cladding on exposed surfaces**
- ❖ **Liquid bitumen membrane on stress laminated timber deck**
- ❖ **Careful detailing with respect to water traps**



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Cross section of  
pressure treated  
glulam

“Light creosote  
treatment” with  
sapwood not fully  
penetrated



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## Protection of exposed surfaces by copper cladding

The arch  
Måsør Bridge



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## Protection of exposed surfaces by copper cladding

Tynset  
Bridge  
(2001)

Trussed  
arch



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## Curved, stress laminated decks



Deck built up of two by two lamellas, glued together in bent condition



## The efficient timber bridge

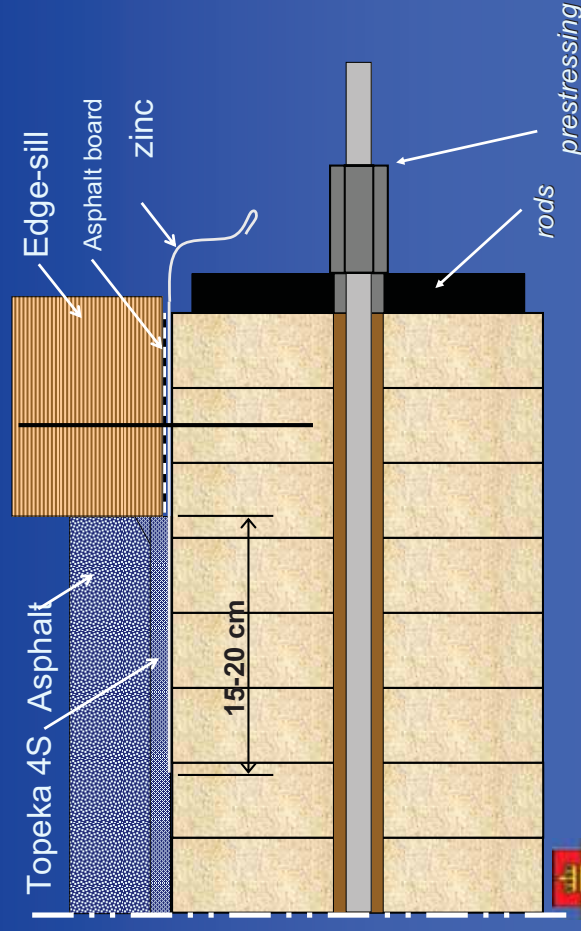
Arch bridge with the bridge deck intermediate the structure

Advantages:

- ❖ Low material consumption
- ❖ Low effective construction depth
- ❖ Quick assembly at site
- ❖ No need for scaffolding
- ❖ Cost-efficient



## Stress laminated timber deck– edge-ending



## Måsør bridge – E6 Steinkjer

- Designprosess – useful development
- Bridge i horisontal curve – a challenge. 1050 glulam beams in bridge deck were bent beforehand
- Geometric challenge
- Rail in timber – a new approval after computer-simulation
- Developed a new screw



## Måsør bridge – E6 Steinkjer

- The process gives more solutions
- *Landscape-analysis.*
- It's a small landscape, and we had to make the bridge and the arch fit this landscape and also the neighbour bridge
- The bridge gives a mirror reflection in the water (not to long)
- *Economic and technique.*
- One span – monumental, but simple. Viaducts important for the experience.
- One span without pilar – waterspeed and erosion not changed
- Archbridge in horizontal curve gives good dynamics to the road user.
- The arch and the viaducts gives access along the riverside – and also lower roadway embankment.
- We avoid filling into riverside



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## Måsør bridge – E6 Steinkjer



Strong reinforcement from the bottom-plate to the arch-foundation (kemper)



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## Måsør bridge – E6 Steinkjer



Instrumentation

- Humidity
- stress



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## Måsør bridge – E6 Steinkjer

*På E6 i Steinkjer ligg Måsøra bru  
Så njuft over Figgja, harmonisk ei "fru"  
I treverk frå storskogen, bær ho si bor  
All stamevegtrafikken frå nord og te sør  
Tenk ho e den første i laune  
Og står som et symbol på visdom og klokt  
Med vilje te satsing på tida som kjør  
- når'n bærre itj lætt se skjær!*

On E6 in Steinkjer the Måsøra bridge crosses so softly the river Figgja, looking harmonious and ladylike.

With timber from the big woods she carries her load; all the main traffic from the north to the south.

Behold! She is the first in this country, she is a symbol of wisdom and cleverness with a willingness to openly welcome the future -when one resists being intimidated!



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