Development of timber bridges

Inventive design by Bloc-Glueing and timber-concrete-composite

Field report from practice in central Europe
History

evidence of durability

constructive wood protection of the structure
Requirements

accordance with German DIN 1074 as standard - Issue 09/2006

State of the art "protected structures"
durability

of bloc laminated structures
System of bloc gluing
In production
different way of orientation
Horizontal Bloc-Lamination
Bridge Gera/Ronneburg - D

Length: 225.0m
Width: 2.5-3.8m
Built: 2006
Bridge Gera/Ronneburg - D

Length: 225,0m  
Width: 2,5-3,8m  
Built: 2006
Wooden decks on girder / blocklaminated bridges
Winschoten - NL

Length: 75,0m
Width: 2,5m
Built: 2005
Asphalt on block carrier

- Gussasphalt
- Bitumenbahnen
- Holzwerkstoff- Platte
- hinterlüftete Unterkonstruktion

Block verteilter Hauptträger

Unterkonstruktion hinterlüftet
Bridge Schwäbisch Gmünd - D

Length: 28,0m
Width: 2,5m
Built: 2013
Natural stone on block carrier
vertical Bloc-Lamination
Bridge Hochstetten - D

Length: 45.5m  Width: 2.5m  Built: 2003
Bridge Hochstetten - D

Length: 45.5m  
Width: 2.5m  
Built: 2003
prefab concrete deck on block carrier
Bridge Almere - NL

Length: 75m

Width: 3,0m

Built: 2007
twisted Bloc-Lamination
Bridge Sneek-NL

Length: 32,0m
Width: 8,8m
Built: 2010
Bridge Sneek-NL

Length: 32,0m
Width: 8,8m
Built: 2010
Timber concrete composite

Advantages in comparison to conventional timber bridges:
- higher load capacity with lower height of construction
- good structural wood protection through cantilevered concrete slab on the top side
- optimal load spreading of point loads by the concrete slab
- better cross bracing
- use of proven details in connections to the concrete

Advantages in comparison to conventional concrete bridges:
- lower weight of the superstructure and thus more efficient structure
- fast and efficient installation with high degree of prefabrication without extensive formwork
- cost savings in foundation and the abutment
- improved energy balance and eco-balance, sustainability through CO\textsuperscript{2} reduction
Timber concrete composite

Option 1: HBV-Shear connector
bridge Ruhpolding - D
bridge Ruhpolding - D

with glued in metal sheetings
bridge Winschoten NL
bridge Winschoten NL
Installation without supporting structure / scaffolding

bridge Winschoten NL
Bridge Winschoteren-NL

Length: 40,0m (23/17m)  
Width: 4,0m  
Built: 2012
timber – concrete – composite (TCC) bridges

Option 2: head bolts
bridge Wipra - D

with shear connector
bridge Wippra - D
Timber concrete composite

Option 3: notches and glued in reinforcement bars

Bridges in Schwäbisch Gmünd DE

design: graf ingenieure, Schwäbisch Gmünd - D
Notches with glued in rods (construction steel)
Bridge Schwäbisch Gmünd - D

Length: 28,0m  Width: 3,2m  Built: 2013
Bridge Schwäbisch Gmünd - D

Length: 28,0m  Width: 3,2m  Built: 2013
Bridge planning Lohmar- D

Length: 40,0m  
Width: 4,5m  
Built: 2013/14
Bridge in progress: Lohmar- D

Length: 40,0m  Width: 4,5m  Built: 2013/14
Design for the future?!
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