New Development of timber bridges

Inventive design by block-gluing and timber-concrete-composite
Ingenieurbüro Miebach  
Timber Engineering  
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Germany

Foundation: April 2005  
Director: Dipl.-Ing. (FH) Frank Miebach  
Personnel: 5 Engineers  
Software: Statik - RFEM (Dlubal)  
CAD - cadwork

Core area: Planning of timber bridges
- Analysis & conception
- design & forming
- construction supervision

www.ib-miebach.de
Why timber bridges?

Ecobalance different materials in bridge constructions

reference bridge 25m span x 3m width

Input primary energy

$\text{CO}_2$ Balance

![Diagram showing energy balance and CO2 emissions for different materials in bridge constructions. The diagram compares the primary energy consumption and global warming potential for aluminium, steel, steel concrete, and timber. The results indicate that timber bridges have a lower primary energy requirement and CO2 emissions compared to other materials.]
Design flexibility: Block-laminated-Timberbeam
Durability of block-laminated structures
Realized projects - selection
Deck bridges
Block girder bridge Schwäbisch Gmünd, DE

length: 27,10 m width: 2,50 m
Block girder bridge Schwäbisch Gmünd, DE

length: 27.10 m
width: 2.50 m
Block girder bridge Schwäbisch Gmünd, DE

length: 27,10 m width: 2,50 m
Box girder bridge Ijsselstein, NL

- length: 117,00 m
- width: 3,00 m
Box girder bridge Ijsselstein, NL

length: 117,00 m width: 3,00 m
Box girder bridge Ijsselstein, NL

length: 117,00 m width: 3,00 m
Block girder bridge Leewarden, NL

Length: 26,00 m Width: 3,50-5,50 m
Block girder bridge Leewarden, NL

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Block girder bridge Leewarden, NL

Length: 26,00 m Width: 3,50-5,50 m
Timber-concrete-composite bridges
Timber-concrete-composite bridges

**Block girder bridge**
- greater construction height
- complex waterproofing
- complex parapet attachment
- distribution of concentrated loads

**Concrete bridge**
- complex shuttering
- extremely high weight
- complex dismantling
- high cross sections
- high primary energy demand

**Timber-concrete-composite bridge**
+ low construction height
+ constructional weather protection
+ cross bracing
+ concrete construction details
+ low overall weight
+ simple shuttering works
Timber-concrete-composite bridges

**Advantages over standard timber:**

- higher load capacity
- solid weather protection by concrete slab
- even load distribution of concentrated load
- easy cross bracing
- standardized details for connection details

**Advantages over concrete bridges:**

- lower weight
- high degree of prefabrication
- cheaper abutments
- better ecological balance and CO₂ storage
Timber-concrete-composite bridge  Winschoten, NL

Length: 40,00 m Width: 4,00 m
Timber-concrete-composite bridge  Winschoten, NL

Length: 40,00 m Width: 4,00 m
Montageablauf innerhalb weniger Stunden
Errichtung ohne Gerüststellung im Wasser
Timber-concrete-composite bridge  Winschoten, NL

Length: 40,00 m  Width: 4,00 m
Holz-Beton-Verbundbrücke Winschoten, NL

Length: 40,00 m Width: 4,00 m
Timber-concrete-composite bridge  Winschoten, NL

Length: 40,00 m Width: 4,00 m
Timber-concrete-composite bridge  Winschoten, NL

Length: 40,00 m Width: 4,00 m
Timber-concrete-composite bridge  Schiffarth, DE

Length: 39,00 m  Width: 4,75 m
Timber-concrete-composite bridge  Schiffarth, DE

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Timber-concrete-composite bridge Schiffarth, DE

Length: 39,00 m Width: 4,75 m
Timber-concrete-composite bridges Schwäbisch Gmünd, DE  
Length: 27.66/25.29 m  
Width: 3.00/2.50 m
Timber-concrete-composite bridges Schwäbisch Gmünd, DE

Length: 27.66/25.29 m Width: 3.00/2.50 m
Timber-concrete-composite bridges Schwäbisch Gmünd, DE

Length: 27.66/25.29 m Width: 3.00/2.50 m
Cable-stayed bridges
Cable-stayed bridge Winschoten, NL

Length: 70,00 m Width: 3,00 m
Cable-stayed bridge Winschoten, NL

Length: 70,00 m Width: 3,00 m
Aufbau:
Granitplatten Tittlinger Feinkorn
Hinterlüftete Unterkonstruktion
Diffusionsoffene Bahn Tyvek
Blockverleimter Hauptträger
unter den Plattenstössen Titanzinkrinnen

Cable-stayed bridge „Aggerbogen“ Lohmar, DE

Length: 63,32 m Width: 2,00 m
Cable-stayed bridge „Aggerbogen“ Lohmar, DE

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Cable-stayed bridge „Aggerbogen“ Lohmar, DE

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Cable-stayed bridge „Aggerbogen“ Lohmar, DE

Length: 63.32 m Width: 2.00 m
Cable-stayed bridge Wolfratshausen, DE

Length: 47,00 m
Width: 3,00 m
Cable-stayed bridge Wolfratshausen, DE

Length: 47,00 m Width: 3,00 m
Arch bridges
Arch bridge Gutenstein, DE

Length: 42.80 m Width: 5.75 m
Arch bridge Gutenstein, DE

Length: 42.80 m Width: 5.75 m
Arch bridge Gutenstein, DE

Length: 42.80 m Width: 5.75 m
Arch bridge Lohmar Höngesberg, DE

Length: 65,00 m Width: 3,50 m

Aufbau:
Schrammborde als Betonfertigteile
Gussasphaltbelag
Holzwerkstoffplatte
Blockverleimter Fahrbahnträger
Querträger aus Stahl
Arch bridge Lohmar Höngesberg, DE

Length: 65,00 m Width: 3,50 m
Arch bridge Lohmar Höngesberg, DE

Length: 65,00 m Width: 3,50 m
Arch bridge Lohmar Höngesberg, DE

Length: 65,00 m Width: 3,50 m
Arch bridge Lohmar Höngesberg, DE

Length: 65,00 m Width: 3,50 m
Timber bridges Lohmar, DE
Design suspension bridge crossing the river Sieg

Length: 94,0m  
Width: 2,5m
1. Prize competition Rhine bridge Rheinfelden, DE/CH

Length: 94,0m  Width: 2,5m
1. Prize competition Rhine bridge Rheinfelden, DE/CH

Length: 94,0m
Width: 2,5m
1. Prize competition Rhine bridge Rheinfelden, DE/CH

Length: 94,0m  
Width: 2,5m
Design Rhine bridge Cologne, DE

Length: 425,0m
Width: 4,0m
Design Rhine bridge Cologne, DE

Length: 425,0m
Width: 4,0m