

# Final Invitation

## INTERNATIONAL CONFERENCE

# Timber Bridges

## ICTB2010



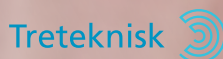
Tynset Bridge. Photo: Johan Brun

**Lillehammer, Norway 12-15 September 2010**

**[www.vegvesen.no/ICTB2010](http://www.vegvesen.no/ICTB2010)**



**Statens vegvesen**  
Norwegian Public Roads  
Administration



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Technische Universität München, Germany

**Professor Kurt Schwaner,**  
Biberach University of Applied Sciences, Germany

**Professor Gerhard Schickhofer,**  
Graz University of Technology, Austria

**Professor em. Aarne Jutila,**  
Helsinki University of Technology, Finland

**Professor Robert Kliger,**  
Chalmers University of Technology, Sweden

**Research Engineer James Wacker,**  
USDA Forest Products Laboratory, USA

**Professor Kjell Arne Malo,**  
Norwegian University of Science and Technology,  
Norway

**Amanuensis Nils Ivar Bovim,**  
The Norwegian University of Life Sciences, Norway

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- **Conference Chair,**  
Norwegian Public Roads Administration

**Mr Erik Aasheim, Conference Co-Chair,**  
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**Professor Kjell Arne Malo,**  
**Programme Co-Chair,**  
Norwegian University of Science and Technology,  
Norway

**Mr Otto Kleppe,**  
Norwegian Public Roads Administration

## Organising Committee

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**Mr Nils Ivar Bovim,**  
The Norwegian University of Life Sciences

**Mr Rune B. Abrahamsen,**  
Sweco Norway

**Mr Åge Holmestad,**  
Moelven Limtre AS

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Norsk Treteknisk Institutt (NTI)

**Mr Trond Arne Stensby**  
Norwegian Public Roads Administration

**Mr Tormod Dyken**  
Norwegian Public Roads Administration

## Contact Information

### Conference Secretariat

Please contact the Conference Secretariat for matters concerning the schedule, programme and commercial exhibition:

ICTB 2010  
c/o Norwegian Public Roads Administration  
P.O. Box 8142 Dep  
NO-0033 Oslo, Norway  
Tel: +47 2207 3925 (Ragnhild Dahl)  
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[www.vegvesen.no/ictb2010](http://www.vegvesen.no/ictb2010)

## Welcome to Lillehammer

Over the past twenty years, timber bridge construction has gathered headway in many countries. Research in the area has produced significant results; new materials and connections have been developed and various structural systems have been explored. New developments have been presented in journals and at general timber construction conferences. The time is now ripe for a specialised international conference on timber bridges to present the state of the art.



In Norway, the ready availability of timber and the tradition of utilising timber in houses and other structures makes it natural to consider timber an adequate construction material for bridges with spans of up to 100 meters or even more. Today, there are many timber bridges in Norway – both road and pedestrian bridges. Since 1995, the Norwegian Public Roads Administration has built more than 100 timber bridges with spans up to 70 metres.

The main objective of the conference is to showcase and discuss the state of the art in timber bridge technology. The conference topics are:

- Design aspects
- Environmental aspects
- Historical bridges
- Protection and durability
- Monitoring
- Timber bridge aesthetics
- Components, connections and detailing
- Pedestrian bridge projects
- Bridge decks
- Composite bridges

A post-conference tour will provide an opportunity to visit a selection of different Norwegian timber bridges. The primary emphasis of the conference will be on the design of durable, environmentally-friendly and cost-efficient timber bridges.

The Norwegian Public Roads Administration, which has played an active role in the development of timber bridges in Norway, together with the Norwegian University of Science and Technology and Treteknisk Institutt are pleased to invite you to ICTB 2010 in Lillehammer, Norway.

We have received 45 interesting abstracts from various countries, showing a variety of different approaches to timber bridge construction. Our hope is that ICTB 2010 will be a source of inspiration for designers, researchers, architects and others working within the field of timber bridges.

The conference is organised by the Norwegian Public Roads Administration, the Norwegian University of Science and Technology and Treteknisk Institutt (the Norwegian institute of wood technology) with economic support from Innovation Norway.

On behalf of the facilitating organisations, I wish you welcome to Lillehammer.

### **Børre Stensvold**

Bridge Director, Norwegian Public Roads Administration  
Conference Chair

## General information

### Dates

The conference dates are 12-15 September 2010. A post-conference tour will be organised, see separate information in this brochure.

### Conference venue

The conference will take place at the Radisson Blu Lillehammer Hotel.

Turisthotellveien 6,

NO-2609 Lillehammer, Norway

Tel: +47 6128 6000

Fax: +47 6125 7333

E-mail: [post@lillehammerhotel.no](mailto:post@lillehammerhotel.no)

[www.lillehammerhotel.no](http://www.lillehammerhotel.no)

The hotel is located 1.4 km from the railway station.

### Language

The official language of the conference is English. No interpretation will be provided.

### Time

Norway's time zone is GMT plus one hour.

### Official invitations

Upon request, the Conference Secretariat will send an official letter of invitation. Please note that the organisers will not cover any conference-related expenses for participants who are provided with an official letter of invitation.

### Liability and insurance

It is recommended that participants and accompanying persons arrange for personal travel and health insurance. The organisers will not assume any responsibility for injury or damage to persons or property during the conference.

## Transportation

Lillehammer is situated in the eastern part of Norway, about 180 km north of Oslo and about 145 km north of Oslo Airport Gardermoen (OSL).

Travelling time by train from the airport to Lillehammer is about 1 hr 45 min. The train station is situated on the ground floor of the airport. There is a connection by regional train every hour, and a one-way fare costs NOK 248 (€ 30) per person.

### Train schedule

from Oslo S	from Oslo airport	arrival Lillehammer
14.37	15.05	16.55
15.37	16.05	17.58
16.07	16.33	18.10
16.37	17.05	19.02

The schedule may be checked at the [www.nsb.no](http://www.nsb.no) website.

### By car

Follow the E6 north to Lillehammer. Take the first exit to Lillehammer, proceed across the bridge and then follow the sign to Maihaugen. At Maihaugen, drive straight on and turn right at the second crossing. The hotel is situated to the left approx. 200 m up the hill.

### Weather in Lillehammer

September is considered early autumn in Lillehammer. The temperature may vary between 4-20°C; the average for this time of year is 10°C. Rain showers can be expected – please bring your umbrella with you.



# Registration and payment

## General information

Registration and payment for the conference, conference events and hotel accommodation should be completed online using the following link: [www.vegvesen.no/ictb2010](http://www.vegvesen.no/ictb2010). The registration is valid when the participant has paid. Payment is made by credit card together with the online registration. An e-mail confirming registration will automatically be sent to the e-mail address provided.

*The deadline for registration and payment is 23 August 2010.*

Rooms have been reserved for conference participants at Radisson Blu Lillehammer Hotel, which is also the conference venue. To benefit from the special hotel rates, reservations must be made together with the online registration. Those who wish other accommodation may make arrangements themselves.

## Conference fees

	Until July 1 2010	After 1 July 2010	On site registration
Participants	NOK 2500(€300)	NOK 3000 (€360)	NOK 3200 (€380)
Students	NOK 500(€60)	NOK 600 (€70)	NOK 650 (€80)
Accompanying person	NOK 1000 (€120)	NOK 1200 (€140)	NOK 2500 (€160)
Speakers	NOK 500 (€60)	NOK 600 (€70)	NOK 650 (€80)

(Fees are in Norwegian kroner, amounts in € are approximate)

**The conference fee for participants, speakers and students covers:**

- participation in all sessions during the conference days 13-15 September
- conference bag and conference documentation
- coffee, lunch and refreshments during the conference

For cancellations prior to 2 August 2010, 50% of the conference fee will be refunded. For cancellations after that date, there will be no refund.

## Conference registration desk

Participants should register here to obtain full documentation for the conference and a name badge that should be worn throughout the conference. The registration desk is in the conference area at Radisson Blu Lillehammer Hotel and will be open at the following times:

Sunday, 12 September from 17.00 to 19.30  
Conference days from 08.00 to 17.00

## Accommodation in Lillehammer

Accommodation at the Radisson Blu Lillehammer Hotel will cost NOK 895 per night when booked together with registration.

Additional cost for an accompanying person sharing the room is NOK 645 per night.

**The conference fee for accompanying persons covers:**

- the opening session on Monday at 09.00
- participation in the accompanying persons programme
- the closing session on Tuesday

Please note that the accompanying person's programme does not include the scientific programme (i.e. the lectures).

## Social programme

### Get together party

Date:	Sunday, 12 September
Time:	19.00 to 21.00
Place:	Radisson Blu Lillehammer Hotel
Price:	NOK 150
Dress:	Casual

All delegates and accompanying persons are cordially invited to take part in the get together party on Sunday evening. This event is an excellent opportunity to meet old friends and colleagues, as well as to make new acquaintances.

Traditional Norwegian food and refreshments will be served and are included in the price.

### Evening arrangement:

#### Lillehammer – the Winter Olympic City

Date:	Monday, 13 September
Time:	18.20 to approx. 22.00
Place:	Olympic ski jumping hill, Håkons Hall Arena and Olympic Museum
Transport:	by bus from the hotel
Price:	NOK 150
Dress:	Casual

All delegates and accompanying persons are cordially invited to take part in this event on Monday evening. Håkons Hall was built for the ice hockey competitions at the 1994 Winter Olympics. The roof structure consists of double-trussed glulam arches with a maximum span of 85.3 m.

Food and beverages will be available at a buffet in the VIP section. On the way to Håkons Hall, the bus will go through Lillehammer's town centre and up to the top of the Olympic ski jumping arena, Lysgårdsbakkene, where you can enjoy the view.

### Evening arrangement:

#### Guided tour at Maihaugen

Date:	Tuesday, 14 September
Time:	17.30 to 19.00
Place:	Maihaugen open air museum
Transport:	Guided walk from the hotel
Price:	Free
Dress:	Casual

All delegates and accompanying persons are cordially invited to take part in this event on Tuesday evening. Maihaugen is an open air museum with 200 old and new buildings, exhibitions, cafes and many activities. It was founded by the dentist, Anders Sandvig, in 1887. In 1904, the museum was moved to Maihaugen. Among other things, the museum has a wide range of old Norwegian timber buildings.

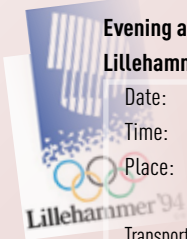
The entrance fee is included.

### Conference dinner

Date:	Tuesday, 14 September
Time:	20.00 to 23.00
Place:	Radisson Blu Lillehammer Hotel
Price:	NOK 200
Dress:	International business attire

All delegates and accompanying persons are cordially invited to the conference dinner on Tuesday evening.

The dinner will consist of cold starters, a main course and dessert. Wine, beer and refreshments are included in the price.



MAIHAUGEN

## Programme for accompanying persons

### Round-trip tour with bus

Date:	Monday, 13 September
Time:	10.30 to 16.00
Place:	Radisson Blu Lillehammer Hotel
Price:	Included in the accompanying person fee
Dress:	Casual

A bus will take you to places of interest in the Lillehammer region. You will enjoy the lovely scenery and a visit to a cultural museum. Lunch is included.

### Sights and shopping in Lillehammer

Date:	Tuesday, 14 September
Time:	10.00 to 13.00
Place:	Radisson Blu Lillehammer Hotel
Price:	Included in the accompanying person fee
Dress:	Casual

A guide will meet you at the hotel and accompany you on a walk to see the sights in the town centre and visit the Lillehammer Art Museum. Lunch is included. After 13.00, you are free to explore Lillehammer on your own.

## Post-conference tour

### Timber bridge excursion

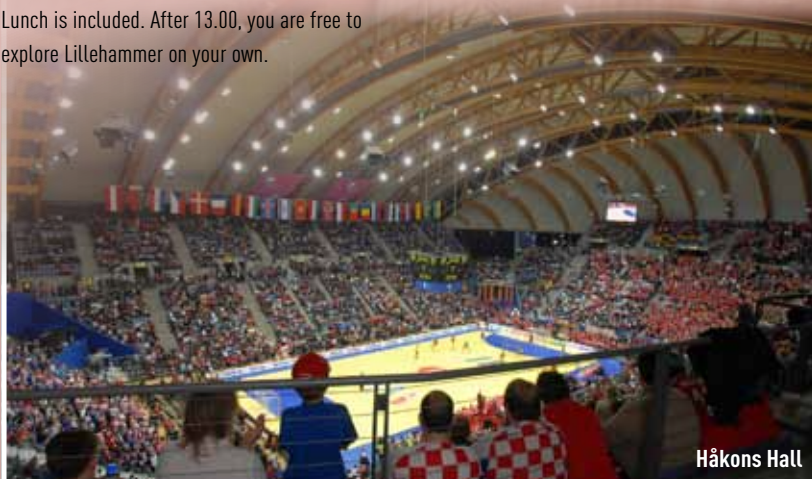
Date:	Wednesday, 15 September
Time:	08.00 – 18.00
Place:	Radisson Blu Lillehammer Hotel
Price:	NOK 600
Dress:	Casual

A bus will take you from Lillehammer to Oslo Airport Gardermoen via a number of significant timber bridges. After stopping at the airport, the bus will continue to Oslo.

The excursion will provide an opportunity to visit some of the most significant timber bridges constructed in Norway during the past 20 years.

### Other tours on your own

The conference organisers encourage participants to book other tours independently. For those who are interested in visiting timber bridges on their own, the organisers will be pleased to assist in identifying the location of timber bridges of interest.



## Programme overview

Sunday, 12 September			
17.00	Registration		
From 19.00	Get together at the Radisson Blu Lillehammer Hotel		
	Weidemannsal 4+5	Weidemannsal 3	Social programme
Monday, 13 September			
08.00	Registration		
09.00	Opening session		
10.00	Coffee		
10.30	Design aspects part I		Excursion by bus for accompanying persons
12.00	Lunch		
13.00	Design aspects part II		
14.30	Coffee		
15.00	Environmental aspects	Historical bridges	
15.50	Coffee		
16.20	Protection and durability		
18.20	Evening arrangement Lillehammer – the Winter Olympic City		
Tuesday, 14 September			
08.30	Monitoring	Timber bridge aesthetics	
10.20	Coffee		Guided walk through Lillehammer for accompanying persons. Starts at 10.00
10.50	Components, connections and detailing	Pedestrian bridge projects	
12.20	Lunch		
13.20	Bridge deck		
14.30	Coffee		
15.00	Composite bridges		
16.10	Closing the conference		
16.30	End of Technical Programme		
17.30	Evening arrangement – Guided tour of the Maihaugen open air museum		
20.00	Conference dinner		
Wednesday, 15 September			
08.00	Post-conference tour		
18.00	Arrival at Gardermoen airport (OSL)		
19.00	Arrival at Oslo Central Station		
08.00-16.00	Poster exhibition in the Birkebeinersal 2 on Monday and Tuesday		



## Detailed Technical Programme

Monday, 13 September	
<b>Opening session</b> <b>Chair: Marit Brandtsegg</b>	
09.00	The Mayor of Lillehammer, Ms Synnøve Brenden Klemetrud wishes us welcome to Lillehammer
09.10	The Director General of Norwegian Public Roads Administration, Mr Terje Moe Gustavsen, opens the conference
09.30	Mr Kurt Schwaner: Timber bridges - <i>different countries, different approaches</i>
<b>Design aspects Part I</b> <b>Chair: Aarne Jutila</b>	
10.30	Michael Flach, Austria - <i>How to design timber bridges</i>
10.50	Per Kr. Ekeberg, Norway - <i>Technical concepts for long span timber bridges</i>
11.10	Hauke Kepp, Norway - <i>Thermal actions on timber bridges</i>
11.30	Kolbein Bell, Norway - <i>Structural system for glulam arch bridges</i>
11.50	Discussion
<b>Design aspects Part II</b> <b>Chair: Heinrich Kreuzinger</b>	
13.00	João Nuno Amado Rodrigues, Portugal - <i>Use of timber-concrete solution in Portugal</i>
13.20	Jarle Svanæs, Norway - <i>Verification of material properties of Kebony modified wood</i>
13.40	Hilde Rannem Isaksen, Norway - <i>Construction cost of Timber Bridges in Norway - A comparison with Steel and Concrete</i>
14.00	Ove Solheim, Norway - <i>Large timber bridges - Case study of a 1500 m Timber Bridge across Lake Mjøsa</i>
14.20	Discussion
<b>Environmental aspects</b> <b>Chair: Otto Kleppe</b>	
15.00	Johanne Hammervold, Norway - <i>Environmental analysis of bridges in a life cycle perspective</i>
15.20	Jarle Svanæs, Norway - <i>Environmental timber bridges – Environmental improvement through product development</i>
15.40	Discussion
<b>Historical Bridges</b> <b>Chair: Erik Aasheim</b>	
15.00	Tsuneo Igarashi, Japan - <i>The 62nd reconstruction of a traditional wood bridge</i>
15.20	Guillermo Iñiguez and Miguel C. Fernández-Cabo, Spain <i>Review of any remarkable ancient timber bridges to 1850: lessons from the past</i>
15.40	Discussion
<b>Protection and Durability</b> <b>Chair: Kurt Schwaner</b>	
16.20	Otto Kleppe, Norway - <i>Durability of Norwegian timber bridges</i>
16.40	Anna Pousette, Sweden - <i>Outdoor tests of timber beams and columns</i>
17.00	Masahiko Karube, Japan - <i>Report of collapsed wooden bridges in Japan: One destructively loaded, and one spontaneously broken</i>
17.20	Elisabet Michelson, Norway - <i>Polyurea based bridge membrane on wooden bridges</i>
17.40	Discussion

Tuesday, 14 September	
Monitoring <span style="float: right;">Chair: Robert Kliger</span>	
08.30	Andreas Müller, Switzerland - <i>Structural health monitoring of timber bridges</i>
08.50	Anders Gustavsson, Sweden - <i>Health Monitoring of timber bridges September 2010</i>
09.10	Tormod Dyken, Norway - <i>Monitoring the moisture content of timber bridges</i>
09.30	Antti Karjalainen, Finland - <i>Bridge Information Modelling (BIM) and Laser Scanning In Renovation Design, Case Pyhäjoki Bridge</i>
09.50	James Wacker, USA - <i>Development of a Smart Timber Bridge – Integration of Fiber Optic Sensors into Glulam Beams</i>
10.10	Discussion
Timber Bridge Aesthetics <span style="float: right;">Chair: Morten Løvseth</span>	
08.30	Richard J. Dietrich, Germany - <i>Six timber bridges of special interest</i>
08.50	Arne Eggen, Norway - <i>The «Wave» and other footbridge concepts</i>
09.10	Yngve Aartun, Norway - <i>Design and function</i>
09.30	Bernt Jakobsen, Norway - <i>Spectacular Wooden Truss Bridges as Traffic Safety Enhancing Measures</i>
09.50	Knut Selberg, Norway - <i>Possibilities in timber bridge design</i>
10.10	Discussion
Components, Connections and Detailing <span style="float: right;">Chair: Nils-Ivar Bovim</span>	
10.50	P. Zarnani, New Zealand - <i>Analytical Method and Experimental Verification of Timber Rivet Connections in Radiata Pine LVL</i>
11.10	Bjørn A. Lund and Matteo Pezzucchi, Norway - <i>Development of a new barrier system for stress laminated timber road bridge decks</i>
11.30	Kjell Arne Malo, Norway - <i>On Connections for Timber Bridges</i>
11.50	Abdy Kermani, United Kingdom - <i>Developments in stress-laminated arch construction for footbridges</i>
12.10	Discussion



Nybergsund Bridge, Length: 117 m. Main span: 39,2 m. Construction year: 2005

Photo: Betongmast AS

<b>Pedestrian Bridge Projects</b>		<b>Chair: Gerhard Schickhofer</b>
10.50	Rolf Broennimann, Switzerland - <i>Design, construction and monitoring of a bowstring arch bridge made exclusively of timber, CFRP and GFRP</i>	
11.10	José L. Fernández-Cabo, Spain - <i>Construction aspects of a 19.2 m Timber Truss cantilevered view walkway in Vitoria, Spain</i>	
11.30	Anssi Laaksonen, Finland - <i>Malminmaki Pedestrian Overpass</i>	
11.50	Vanessa Baño, Spain - <i>Design and installation of a covered timber footbridge over the A8 motorway in Bilbo, Spain</i>	
12.10	Discussion	
<b>Bridge decks</b>		<b>Chair: James Wacker</b>
13.20	Mats Ekevad, Sweden - <i>Prestressed Timber Bridges: Simulations and experiments of slip</i>	
13.40	Roberto Crocetti, Sweden - <i>Anchorage to reduce the loss of pre stress in stress laminated timber deck</i>	
14.00	Rune B. Abrahamsen, Norway - <i>Bridge deck rehabilitation using cross-laminated timber</i>	
14.20	Discussion	
<b>Composite bridges</b>		<b>Chair: Rune B. Abrahamsen</b>
15.00	Aarne Jutila, Finland - <i>Wood Concrete Composite Bridges – Finnish Speciality in the Nordic Countries</i>	
15.20	Jeno Balogh, USA - <i>Fatigue Testing of Wood Concrete Composite Beams with Shear - Key Anchor Detail</i>	
15.40	Leander A. Bathon, Germany - <i>Performance of single span wood concrete -composite bridges under dynamic loading</i>	
16.00	Discussion	
<b>Closing of the conference</b>		<b>Chair: Rune B. Abrahamsen</b>
16.10	Børre Stensvold - <i>Closing remarks</i>	
16.20	End of conference	



Leonardo da Vinci Bridge, Length: 110 m. Main span: 40 m. Construction year: 2001


Photo: Jiri Havran



ICTB 2010 conference is sponsored by:

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Flisa Bridge. Photo: Johan Brun



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