

# IALCCE 2012 Final Program

Third International Symposium on  
**Life-Cycle Civil Engineering**

Hofburg Palace, Vienna, Austria | October 3 - 6, 2012



**iaLcCce**  
International Association for  
Life – Cycle Civil Engineering



University of Natural Resources  
and Life Sciences



# Program Overview

<b>Wednesday, 3 October, 2012</b>						
15.00 - 19.00	Registration (Hofburg Palace)					
19.00 - 21.00	Welcome Reception (Hofburg Palace)					
<b>Thursday, 4 October, 2012</b>						
08.15 - 09.00	Opening Ceremony (Hall of Ceremonies)					
09.00 - 09.30	Fazlur R. Khan Lecture (Hall of Ceremonies)					
09.30 - 10.30	Keynote Lectures (Hall of Ceremonies)					
	<b>Hall of Ceremonies</b>	<b>Artists' Room</b>	<b>Trabantenstube</b>	<b>Radetzkyapp I.</b>	<b>Radetzkyapp III.</b>	<b>Entrée Room</b>
	ThM-1	ThM-2	ThM-3	ThM-4	ThM-5	ThM-6
11.00 - 13.00	MS: Maintenance and rehabilitation of aged bridges	SS: Life-cycle and reliability assessment of anchorage systems in concrete, masonry and steel constructions	SS: Management of existing building stocks	GS: Life-cycle cost analyses / Stone arch bridges / Successful health monitoring applications	SS: Increasing durability of concrete structures	
	ThA-1	ThA-2	ThA-3	ThA-4	ThA-5	ThA-6
14.00 - 16.00	SS: Life-cycle cost analyses	MS: Maintenance and rehabilitation of aged bridges	SS: Life-cycle design and engineering of facades and building envelopes	SS: Probabilistic durability assessment of concrete structures	SS: Life-cycle cost optimization in cross asset management (ERA-NET road projects)	
	ThE-1	ThE-2	ThE-3	ThE-4	ThE-5	ThE-6
16.30 - 18.30	SS: Seismic system identification for life-time-prediction (SEISMID)	SS: Actions and interventions upon existing structures	GS: Uncertainties in life-cycle assessments and reliability engineering / Structural and thermal retrofitting of buildings	GS: End of LC of buildings: Sustainable management of construction and demolition practices	SS: Numerical modelling of long-term behaviour of concrete structures using B3 model	
<b>Friday, 5 October 2012</b>						
08.00 - 10.00	Keynote Lectures (Hall of Ceremonies)					
	<b>Hall of Ceremonies</b>	<b>Artists' Room</b>	<b>Trabantenstube</b>	<b>Radetzkyapp I.</b>	<b>Radetzkyapp III.</b>	<b>Entrée Room</b>
	FrM-1	FrM-2	FrM-3	FrM-4	FrM-5	FrM-6
10.30 - 12.30	MS: Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures	SS: Industrial risk reduction system	SS: Sustainability certification of new and of existing buildings	MS: Prediction models for ageing / deterioration	SS: Performance based evaluation of corrosion in reinforced and pre-stressed concrete structures	
	FrA-1	FrA-2	FrA-3	FrA-4	FrA-5	FrA-6
13.30 - 15.30	SS: Probabilistic lifetime assessment of concrete structures under combined environmental attack	MS: Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures	SS: Life-cycle assessment for sustainability evaluation of buildings	MS: Prediction models for ageing / deterioration	GS: Optimization of bridge lifetime by use of structural health monitoring / Advanced remote sensing techniques for structural damage assessment	
	FrE-1	FrE-2	FrE-3	FrE-4	FrE-5	FrE-6
16.00 - 18.00	SS: Structural retrofitting for maintenance and rehabilitation	MS: Monitoring and assessment of bridges using novel techniques	SS: Life-cycle assessment for sustainability evaluation of buildings	SS: Application of special non-destructive testing methods to different kind of structures	SS: Analysis of rehabilitation needs and maintenance strategies	
18.00 - 18.45	General Assembly (Hall of Ceremonies)					
19.30 - 23.30	Gala Evening (Vienna's Rathaus)					
<b>Saturday, 6 October 2012</b>						
08.00 - 10.00	Keynote Lectures (Hall of Ceremonies)					
	<b>Hall of Ceremonies</b>	<b>Artists' Room</b>	<b>Trabantenstube</b>	<b>Radetzkyapp I.</b>	<b>Radetzkyapp III.</b>	<b>Entrée Room</b>
	SaM-1	SaM-2	SaM-3	SaM-4	SaM-5	SaM-6
10.30 - 12.30	SS: Life-cycle cost analysis and risk analysis for buildings	MS: Monitoring and assessment of bridges using novel techniques / Optimization of bridge life-time by use of structural health monitoring	SS: Towards sustainable dams and embankments / Life-cycle engineering in the field of cableways and cable structures	SS: Life-cycle engineering tools for risk-based decision under uncertainty	GS: Inverse Reliability Analysis techniques for the lifetime assessment of bridges / Integral bridges – design and construction	
	SaA-1	SaA-2	SaA-3	SaA-4	SaA-5	SaA-6
13.30 - 15.30	SS: Life-cycle cost analysis and risk analysis for buildings	GS: Tunnel - Infrastructure Systems	SS: Fatigue of concrete – experiments, models, applications	SS: Structural health monitoring of civil infrastructures in a life-cycle analysis	GS: Inverse analysis: From material parameters identification to reliability assessment / Simulation software tools for virtual reliability and life-cycle testing of concrete structures	
15.30 - 16.15	Closing Ceremony (Hall of Ceremonies)					
18.15 - 21.30	Farewell					

# Welcome to IALCCE 2012



**Alfred Strauss**

University of Natural  
Resources and Life Sciences  
Vienna, Austria  
Chair, IALCCE 2012



**Dan M. Frangopol**

Lehigh University  
Bethlehem, PA, USA  
Chair, IALCCE 2012



**Konrad Bergmeister**

University of Natural  
Resources and Life Sciences  
Vienna, Austria  
Chair, IALCCE 2012

Civil engineering structures have to meet long-term availability and sustainability requirements, with particular emphasis placed on technical safety, efficiency and ecology. Life-cycle civil engineering relates to the design, inspection, monitoring, assessment, maintenance, and rehabilitation of civil engineering structures in order to effectively manage the function of these structures throughout their lifetime.

The objective of the International Association for Life-Cycle Civil Engineering (IALCCE) is to promote international cooperation in the fields of life-cycle civil engineering for the purpose of enhancing the welfare of society (<http://www.ialcce.org>). For this reason, it was deemed appropriate to bring together all the very best work that has been undertaken in the field of life-cycle civil engineering at the Third International Symposium on Life-Cycle Civil Engineering (IALCCE 2012) held in one of Vienna's most famous venues, the Hofburg Palace, October 3-6, 2012. The First International Symposium on Life-Cycle Civil Engineering (IALCCE 2008) was held in Varenna, Lake Como, Italy (June 10-14, 2008), and the Second International Symposium on Life-Cycle Civil Engineering (IALCCE 2010) was held in Taipei, Taiwan (October 27-30, 2010).

IALCCE 2012 has been organized on behalf of the IALCCE under the auspices of the University of Natural Resources and Life Sciences, Vienna (BOKU). This four-day symposium encompasses all aspects of life-cycle civil engineering. The interest of the international civil engineering community in fields covered by the IALCCE has been confirmed by the significant response to the IALCCE 2012 call for papers. In fact, over 600 abstracts from 53 countries were received by the Symposium Secretariat, and approximately 60% of them were selected for publication. Contributions presented at IALCCE 2012 deal with state-of-the-art as well as emerging applications related to the key aspects of the life-cycle civil engineering field.

All major aspects of life-cycle engineering are addressed, including aging of structures, deterioration modeling, durable materials, earthquake and accidental loadings, sustainability, fatigue and damage, structure-environment interaction, design for durability, failure analysis and risk prevention, lifetime structural optimization, long-term performance analysis, performance-based design, service life prediction, time-variant reliability, uncertainty modeling, damage identification, field testing, health monitoring, inspection and evaluation, maintenance strategies, rehabilitation techniques, strengthening and repair, structural integrity, decision making processes, human factors in life-cycle engineering, life-cycle cost models, project management, lifetime risk analysis and optimization, whole life costing, artificial intelligence methods, bridges and viaducts, high rise buildings, offshore structures, precast systems, runway and highway pavements, tunnels and underground structures.

The proceeding *Life-Cycle and Sustainability of Civil Infrastructure Systems* contains the lectures and papers presented at the Third International Symposium on Life-Cycle Civil Engineering. It consists of a book of extended abstracts and a DVD with 345 full papers presented at IALCCE 2012, including the Fazlur R. Khan Lecture, 10 Keynote Lectures and 334 Technical Papers from 52 countries.

The aim of the editors is to provide a valuable source for anyone interested in *life-cycle and sustainability of civil infrastructure systems*, including students, researchers and practitioners from all areas of engineering and industry.

On behalf of the International Association for Life-Cycle Civil Engineering and the University of Natural Resources and Life Sciences, the chairs wish to wholeheartedly thank all contributing authors and those individuals who were actively involved in the organization of the IALCCE 2012 Symposium and in the production of the Proceedings. The chairs also wish to acknowledge the members of the International Scientific Committee and the National Advisory Committee for their efforts. In addition, the chairs would like to thank the members of the National Organizing Committee for their time and efforts dedicated in making IALCCE 2012 a successful event.

The chairs also take this opportunity to thank all sponsors, whose support contributed to the success of this Symposium. A special acknowledgment must also be given to the University of Natural Resources and Life Sciences, Vienna (BOKU) for organizing and co-sponsoring the Symposium along with the International Association for Life-Cycle Civil Engineering (IALCCE), as well as BOKU's Department of Civil Engineering and Natural Hazards, whose support facilitated the Symposium's organization.

We look forward to meet you all at the IALCCE 2012 symposium.

Sincerely,

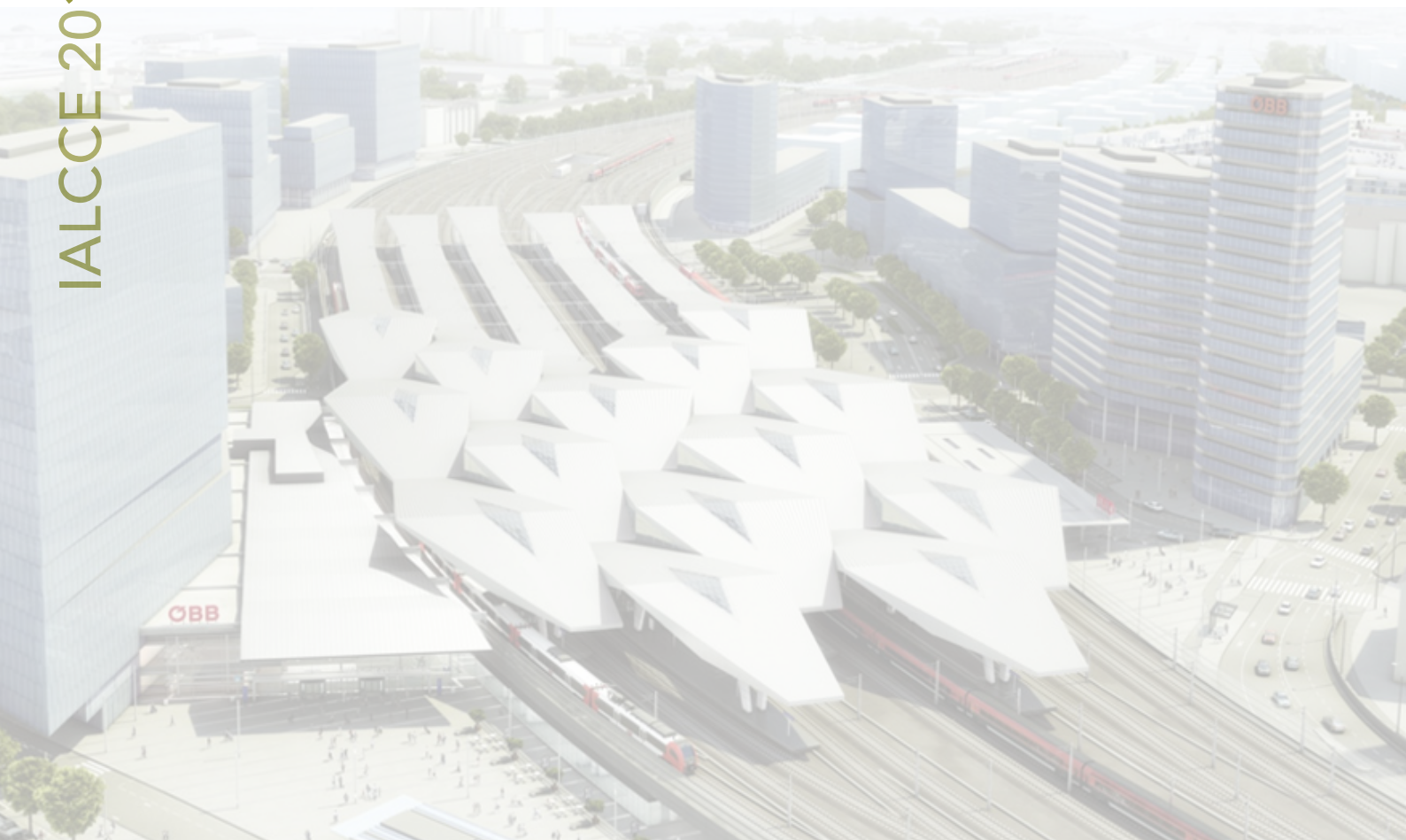
**Alfred Strauss, Dan M. Frangopol, Konrad Bergmeister**

Chairs IALCCE 2012

Vienna, Austria and Bethlehem, Pennsylvania, USA, August 2012

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# Symposium Organization

## ORGANIZING ASSOCIATION

### IALCCE

International Association for Life-Cycle Civil Engineering, <http://www.ialcce.org>



## ORGANIZING INSTITUTION

### BOKU

University of Natural Resources and Life Sciences, Vienna, Austria, <http://www.boku.ac.at>



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#### IALCCE WEBSITE

<http://www.ialcce.org>



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Hottinger Baldwin Messtechnik GmbH, Austria

### HOCHTIEF

Hochtief Construction, Austria

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International Association for Bridge Maintenance  
and Safety

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Instituto Brasileiro do Concreto, Brazil

### IFSTTAR

French Institute of Science and Technology for  
Transport, Development and Networks, France

### INFAP

Industrial Fibre Applications GmbH, Germany

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Internationale Seilbahn-Rundschau, Austria

### mageba

Switzerland

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Austrian Federal Railway Agency

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### umdaschgroup

Umdasch AG, Austria

### UIBK

University of Innsbruck, Austria

### V&C

Cathodic protection, GmbH

### VCE

VCE - Vienna Consulting Engineers, Austria



# Symposium Information

## VENUE

### HOFBURG VIENNA

Botschafterstiege, Schweizerhof, 1010 Vienna

## SECRETARIAT OFFICE

### IALCCE 2012 SECRETARIAT

University of Natural Resources and Life Sciences,  
Peter-Jordan Strasse 82, 1190 Vienna

## SLIDE CENTER & PRESENTATION GUIDELINES

Speakers will not be allowed to use their personal laptop computers for presentations. Presentations saved on a USB key or DVD/CD-Rom have to be brought to the Slide Center and uploaded in the conference room network at least 24 hours prior to the start of the Session. The Slide Center is located at Level 1 of the Hofburg Palace. Speakers are kindly requested to carefully check their presentation at the Slide Center at least 60 minutes before the start of the Session. Technicians will assist Speakers to preview their presentation to ensure that they display correctly on the screens. Speakers are also required to fill out the Speaker Information Form and deliver it to the Session Chairs at least 15 minutes before the Session begins.

## WI-FI & INTERNET POINT

Wi-Fi internet access will be available inside the Hofburg Palace. An internet point is also available at Level 1 (Slide Center in the Radetzky Apartment II). User ID and passwords are required for internet access and are available to all registered participants.

## ON-SITE REGISTRATION

Registration may be undertaken in the Hofburg Palace's Ambassador's Staircase (Botschafterstiege on Level 0) for the duration of the symposium within the opening hours of the Registration desk:

Wednesday, 3 October	15.00 - 19.00
Thursday, 4 October	07.00 - 18.30
Friday, 5 October	07.00 - 19.00
Saturday, 6 October	07.00 - 16.00

## REGISTRATION FEES

Delegate - IALCCE Member <sup>(a)</sup>	EUR 700
Delegate - IALCCE Non Member <sup>(b)</sup>	EUR 800
Students <sup>(c)</sup>	EUR 450
Students (under 26 years) <sup>(d)</sup>	EUR 300
Accompanying Persons <sup>(e)</sup>	EUR 250

(a), (b) Symposium attendance, proceedings (Book DVD), Symposium bag, Welcome Reception, lunches, coffee breaks, Gala Evening and Farewell Party.

(c), (d) Symposium attendance, proceedings (DVD only), Symposium bag, Welcome Reception, lunches and coffee breaks. Students need to provide proof of their status to complete the registration.

(e) Welcome Reception, lunches, Gala Evening and Farewell Party.

## SYMPOSIUM BADGE

Participants are kindly requested to wear their symposium badge at all times during the symposium.

## PERSONAL PROPERTY

Participants are invited to take good care of their personal belongings and to not leave them unattended. Neither the symposium organizers nor their staff will be responsible for any loss of or damage to personal property of participants.

## COFFEE BREAKS

Coffee breaks will be offered to all participants twice a day, in the morning (between 10.00 - 10.30 or 10.30 - 11.00) and in the afternoon (between 15.30 - 16.00 or 16.00 - 16.30), and will be served in the Marbel Hall, the Antechamber and the Knight's Hall on Level 1 of the Hofburg Palace.

## OPENING CEREMONY

The Opening Ceremony will take place on Thursday, 4 October from 08.15 - 09.00 in the Hall of Ceremonies on Level 1 of the Hofburg Palace.

## GENERAL ASSEMBLY

The General Assembly of the IALCCE will be held on Friday, 5 October from 18.00 - 18.45 in the Hall of Ceremonies on Level 1 of the Hofburg Palace.

## CLOSING CEREMONY

The Closing Ceremony is scheduled for Saturday, 6 October from 15.30 - 16.15 in the Hall of Ceremonies on Level 1 of the Hofburg Palace.

## TRANSPORT

The Symposium venue is located in downtown Vienna, approximately 40 minutes from Vienna International Airport. Information for planning your trip and details on transportation possibilities from Vienna International Airport and the main railway station Westbahnhof are provided below.

### Private Transport from the Airport

The fastest and easiest way to reach Vienna city and get directly to your hotel is to arrange a private transfer from Vienna International Airport. A driver will meet you upon arrival at the gate and take you directly to your hotel.

Airport transfer services are provided by Airport Services ([www.airportservices-vie.com](http://www.airportservices-vie.com)). You have the possibility to arrange your personal chauffeured transportation online. You can choose between a Mercedes sedan for up to 3 passengers for EUR 33.00, and a minivan for up to 8 passengers for EUR 49.00, including luggage.

### Arriving by Train

From Vienna International Airport, take the CAT Airport Express to Landstrasse, change to the eastbound U3 (orange) underground and alight at Herrengasse.

The trip from Westbahnhof station (Western Railway terminal) takes approximately 15 minutes. Take the eastbound U3 (orange) underground line and alight at Herrengasse. From Südbahnhof station (southern railway terminal), the journey time is also approximately 15 minutes. Take the D tram and alight at Burgring.

## Public Transport

Vienna's public transportation system ranks amongst the most efficient in Europe. A day pass to get around Vienna by U-Bahn (Vienna's Metro System), tram and bus costs EUR 6.70, while individual journeys cost EUR 2.20.

## Taxi Services

Taxi stands can be found in front of Vienna's Westbahnhof station and are a common sight across the city. A taxi cab can be reserved by calling 60160, 40100 or 31300.

## OTHER INFORMATION

### Time Zone

Vienna falls under Central European Time, one hour ahead of Greenwich Meantime.

### Electricity

Electricity in Austria runs at 220 volts, with 50 cycles alternating current. Austrian sockets are designed to accept round pins.

### Weather

On a sunny day in October in Vienna, one can marvel at the display of a fine show of autumn colours in the city's parks. Temperatures can reach up to 14°C (57°F) but can drop down to as low as 7°C (45°F) at night. Rain is not uncommon during this period, though mostly sunny weather prevails during a month when the wine harvest is in full swing.

### Currency

The currency in Austria is the EURO. You can convert most international currencies to EUROS at any bank during your visit. If you do not want to exchange your currency, you can also use credit or debit cards. MasterCard and Visa are widely accepted by most merchants. However, it is recommended that you carry a little cash for small expenses.

# Symposium Overview

TIME		3 OCT. (WE)	4 OCT. (TH)	5 OCT. (FR)	6 OCT. (SA)	
07.00	08.00		Registration	Registration	Registration	
08.00	08.15					
08.15	09.00		Opening Ceremony	Keynote Lectures	Keynote Lectures	
09.00	09.30		Fazlur R. Khan Lecture			
09.30	10.00		Keynote Lectures			
10.00	10.30			Coffee Break	Coffee Break	
10.30	11.00		Coffee Break			
11.00	11.30		ThM Sessions	FrM Sessions	SaM Sessions	
11.30	12.00					
12.00	12.30					
12.30	13.00		Lunch	Lunch	Lunch	
13.00	13.30					
13.30	14.00					
14.00	14.30		ThA Sessions	FrA Sessions	SaA Sessions	
14.30	15.00					
15.00	15.30	Registration				
15.30	16.00			Coffee Break		Closing Ceremony
16.00	16.15					
16.15	16.30			Coffee Break		
16.30	17.00					
16.30	17.00			ThE Sessions	FrE Sessions	
17.00	17.30					
17.30	18.00					
18.00	18.15				General Assembly	
18.15	18.30					
18.30	18.45					
18.45	19.00					
19.00	19.30	Welcome Reception Hall of Ceremonies, Hofburg Palace				
19.30	20.00					
20.00	20.30				Gala Evening Festival Hall, Town Hall (Rathaus)	
20.30	21.00					
21.00	21.30					
21.30	23.30					Farewell Heuriger Evening, Neustift
21.30	23.30					

Thursday, 4 October 2012

Third International Symposium on  
Life-Cycle Civil Engineering

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IALCCE 2012

**Fazlur R. Khan Lecture 09.00 - 09.30 | Chairs: A.H.-S Ang & H. Budelmann**



Fazlur Khan's legacy: Towers of the future  
M. Sarkisian

**Keynote Lectures 09.30 - 10.30**



Pervasive lifetime inadequacy of long-span box girder bridges and lessons for multi-decade creep prediction  
Z.P. Bažant



Sustainable design of structures: The outcomes of the COST Action C25-WG3  
R. Landolfo

**Concurrent Technical Sessions 11.00 - 13.00**

ThM-1	Maintenance and rehabilitation of aged bridges Organizers: M.A. Ahrens & P. Mark
ThM-2	Life-cycle and reliability assessment of anchorage systems in concrete, masonry and steel construction Organizers: R. Mihala & J. Hofmann
ThM-3	Management of existing building stocks Organizer: C. Bahr
ThM-4	Life-cycle cost analyses / Stone arch bridges / Successful health monitoring applications Organizers: H.G. Jodl, P. Veit, J. Glatzl, T. Simandl, B. Harvey, D. Proske, R. Geier & R. Wendner
ThM-5	Increasing durability of concrete structures Organizer: J.L. Vitek

**Concurrent Technical Sessions 14.00 - 16.00**

ThA-1	Life-cycle cost analyses Organizers: H.G. Jodl, P. Veit, J. Glatzl & T. Simandl
ThA-2	Maintenance and rehabilitation of aged bridges Organizers: M.A. Ahrens & P. Mark
ThA-3	Life-cycle design and engineering of facades and building envelopes Organizers: O. Englhardt & A. Merl
ThA-4	Probabilistic durability assessment of concrete structures Organizers: B. Teplý & D. Novák
ThA-5	Life-cycle cost optimization in cross asset management (ERA-NET road projects) Organizers: A.J. O'Connor & S. Deix

**Concurrent Technical Sessions 16.30 - 18.30**

ThE-1	Seismic system identification for life-time-prediction (SEISMID) Organizers: H. Wenzel & P. Furtner
ThE-2	Actions and interventions upon existing structures Organizers: R. Caspeele, S. Matthews & G. Mancini
ThE-3	Uncertainties in life-cycle assessments and reliability engineering / Structural and thermal retrofitting of buildings Organizers: O. Englhardt, J. Li & X. Gao
ThE-4	End of LC of buildings: Sustainable management of construction and demolition practices Organizer: J. Daxbeck
ThE-5	Numerical modelling of long-term behaviour of concrete structures using B3 model Organizers: L. Vráblík & V. Kristek

## Concurrent Technical Sessions (ThM 1-3) 11.00 - 13.00 | Thursday Morning, 4 October 2012

ThM-1 Hall of Ceremonies	ThM-2 Artists' Room	ThM-3 Trabantenstube
<p><b>Mini-Symposium:</b> Maintenance and rehabilitation of aged bridges</p> <p><b>Chairs:</b> <u>M.A. Ahrens</u> &amp; <u>P. Mark</u></p> <p>Asset management and life-cycle cost optimization for bridges on network, asset and element level <u>M. Hoffmann</u> &amp; <u>A. Kammersberger</u></p> <p>Technical cycle of modern bridge maintenance – an overview <u>P. Mark</u>, <u>M.A. Ahrens</u> &amp; <u>Ch. Fust</u></p> <p>Bridge management and effective tools to ensure sustainable construction schedules <u>T. Izaveas</u></p> <p>Modern bridge stock management in a regional metropolis – structural assessment, data management and cost control <u>A. Blöme</u>, <u>H. Neuß</u>, <u>P. Mark</u> &amp; <u>U. Lambertz</u></p> <p>Examples of different strategies of bridge preservation: Part 1 <u>T. Klöcker</u> &amp; <u>D. Lehnen</u></p> <p>Examples of different strategies of bridge preservation: Part 2 <u>D. Lehnen</u> &amp; <u>T. Klöcker</u></p> <p>Inspection and maintenance of the orthotropic deck of Avonmouth Bridge <u>B.J. Frey</u></p> <p>Strengthening of existing bridge decks by additional concrete layers – new research results and design rules <u>J. Feix</u> &amp; <u>A. Andreatta</u></p>	<p><b>Special Session:</b> Life-cycle and reliability assessment of anchorage systems in concrete, masonry and steel construction</p> <p><b>Chairs:</b> <u>R. Mihala</u> &amp; <u>J. Hofmann</u></p> <p>Sustained load performance of adhesive anchor systems in concrete <u>T.M. Davis</u>, <u>R.A. Cook</u>, <u>R. Blochwitz</u> &amp; <u>J. Hofmann</u></p> <p>Time-to-failure behavior of epoxy based bonded anchor systems <u>R. Blochwitz</u>, <u>J. Hofmann</u>, <u>R.A. Cook</u> &amp; <u>T.M. Davis</u></p> <p>Service life design for bonded anchors - a rheological approach <u>T. Kraenkel</u>, <u>D. Lowke</u> &amp; <u>C. Gehlen</u></p> <p>Gluing to masonry for efficient and sustainable anchoring <u>C. Kurz</u>, &amp; <u>J. Hofmann</u></p> <p>Serviceability and ultimate limit states for anchorages in concrete - effects of assembly tolerances <u>P. Spyridis</u>, <u>A. Unterwiesing</u>, <u>S. Lachinger</u> &amp; <u>K. Bergmeister</u></p> <p>The functionality of fasteners with small embedment depth in carbonated concrete <u>M. Stipetic</u> &amp; <u>J. Hofmann</u></p> <p>Aspects of long-term behaviour of power-actuated fasteners made to steel and concrete <u>H. Beck</u></p> <p>Durability proof of steel metal screws in accordance with European technical approvals <u>M. Siemers</u></p> <p>Implementation of the basic requirement 'sustainability' on construction works according to the construction products regulation in the field of anchor technology <u>G. Lange</u></p>	<p><b>Special Session:</b> Management of existing building stocks</p> <p><b>Chairs:</b> <u>K. Lennerts</u> &amp; <u>U. Ertl-Balga</u></p> <p>LCC as a decision tool for strategic development of the public building portfolio: A Norwegian study <u>T. Meistad</u>, <u>M.S. Valen</u>, <u>H. Brattas</u> &amp; <u>H. Gissing</u></p> <p>MultiMap: A tool for strategic analysis of building portfolios <u>S. Bjørberg</u>, <u>A.K. Larssen</u> &amp; <u>Ch.A. Listerud</u></p> <p>Decision aiding &amp; multi criteria optimization for existing buildings holistic retrofit <u>M. Rivallain</u>, <u>P.E. Leger</u>, <u>O. Baverel</u> &amp; <u>B. Peuportier</u></p> <p>The challenge of existing building stocks <u>C. Bahr</u>, <u>J. Bossmann</u> &amp; <u>K. Lennerts</u></p> <p>The Bridge-Management-System (BMS) in Germany as a basis for life-cycle considerations <u>R. Holst</u></p> <p>Cost-benefits and environmental impact of seismic retrofit for low-rise reinforced concrete buildings <u>C.-K. Chiu</u></p> <p>Seismic insurance market for the Italian building stock <u>D. Asprone</u>, <u>F. Jalayer</u>, <u>G. Manfredi</u>, <u>S. Simonelli</u> &amp; <u>A. Accocia</u></p> <p>Numerical simulations of occupants evacuation within the context of life-cycle engineering in building construction <u>C. Albrecht</u>, <u>D. Hosser</u>, <u>W. Abu Abed</u>, <u>N. Rinke</u> &amp; <u>V. Berkhahn</u></p>


**Concurrent Technical Sessions (ThM 4-6) 11.00 - 13.00 | Thursday Morning, 4 October 2012**

ThM-4 Radetzkyapp. I	ThM-5 Radetzkyapp. III	ThM-6 Entrée Room
<p><b>General Session:</b> Life-cycle cost analyses / Stone arch bridges / Successful health monitoring applications</p> <p><b>Chairs:</b> B. Harvey &amp; D. Proske</p> <p>Load induced damage in masonry bridges, some observations on stiffness and force flow  <u>B. Harvey</u></p> <p>Optimised monitoring concepts for historical masonry arch bridges  <u>A. Krawttschuk</u>, O. Zeman, A. Strauss, C. Scheidl, M. Chiari &amp; D. Proske</p> <p>Transverse load distribution in masonry arch bridges  <u>H. Dunne</u> &amp; J. Murphy &amp; K. Ruane</p> <p>Safety evaluation of masonry arch bridges by nonlinear finite element analyses  <u>S.A. Franck</u>, V. Slowik &amp; S. Marx</p> <p>Testing of pre-stressed masonry corner for tri-axial stress-strain analysis  <u>R. Cajka</u>, <u>P. Mateckova</u>, M. Stara &amp; M. Janulikova</p> <p>Life-cycle optimization based on progressive collapse monitoring of irregular RC structures located in seismic active areas in Europe  <u>S. Crjjanovschi</u> &amp; <u>G.M. Atanasiu</u></p> <p>Risk-based monitoring, inspection and maintenance framework for coastal structures  <u>N. Horstmann</u>, S. Schimmels, K. Hinze &amp; H. Oumeraci</p> <p>Health monitoring of civil engineering structures – what we can learn from experience  <u>R. Cantieni</u></p>	<p><b>Special Session:</b> Increasing durability of concrete structures</p> <p><b>Chairs:</b> J.L. Vitek &amp; S.M.C. Diniz</p> <p>Design of concrete structures for durability  <u>J. Bilcik</u> &amp; I. Holly</p> <p>Improvement of performance of concrete precast elements using FRC  <u>A. Kohoutkova</u></p> <p>Impact of cracks on the durability and on the service-life of fiber reinforced ultra high performance concrete – evaluation, modeling and structural measures  <u>M. Schmidt</u> &amp; A. Rafiee</p> <p>High performance concrete for the Troja Bridge in Prague  <u>J.L. Vitek</u> &amp; <u>R. Coufal</u></p> <p>Durability design of structural cover concrete based on bleeding rate  <u>Y. Kato</u> &amp; K. Hayakawa</p> <p>Increasing concrete resistance to deicing chemicals by using metakaolin  <u>P. Máca</u>, <u>D. Jandeková</u>, R. Sovják &amp; P. Konvalinka</p> <p>Epoxy-coated reinforcement – optimization of life-cycle costs?  <u>M. Zintel</u> &amp; <u>C. Gehlen</u></p> <p>Probability based optimized design of concrete structures  <u>P. Štěpánek</u>, I. Laniková, <u>P. Šimunek</u> &amp; F. Gírgle</p>	



## Concurrent Technical Sessions (ThA 1-3) 14.00 - 16.00 | Thursday Afternoon, 4 October 2012

ThA-1 Hall of Ceremonies	ThA-2 Artists' Room	ThA-3 Trabantenstube
<p><b>Mini-Symposium:</b> Life-cycle cost analyses</p> <p><b>Chairs:</b> H.G. Jodl &amp; P. Veit</p> <p>Life-cycle cost analysis considerations for accelerated bridge construction                      U. Attanayake, A.W. Mohammed, Y. Hu, O. Abudayyeh &amp; H.M. Aktan</p> <p>Life-cycle cost management for newly constructed infrastructure                      J.D. Bakker, J. Helmer &amp; J. Schavemaker</p> <p>Challenges for RAMS/LCC analysis of railway rails                      A. Lamik &amp; G. Girsch</p> <p>The calculation of life-cycle costs for road tunnels under the influence of uncertainties                      P. Vogt &amp; M. Thewes</p> <p>Life-cycle financial modeling of long term infrastructure projects "PPP-BOT Projects" under uncertainty and risk                      M. Attarzadeh, D. Kin Huat Chua, L. Zhu &amp; M. Beer</p> <p>Life-cycle costs of tunnels                      J. Schwarz, S. Engelhardt, &amp; M. Keuser</p> <p>Monitoring of an LCC-oriented maintenance of rail routes                      G. Eibinger &amp; U. Puz (M. Oberegge)</p> <p>Stochastic cost estimation for large infrastructure projects: A computational framework                      A.E. Tamparopoulos, D. Alfreider &amp; K. Bergmeister</p>	<p><b>Mini-Symposium:</b> Maintenance and rehabilitation of aged bridges</p> <p><b>Chairs:</b> M.A. Ahrens &amp; P. Mark</p> <p>The application of sacrificial cathodic protection as a corrosion control measure for the protection of reinforced concrete bridges                      M. Moore, F. Jesmin, S. Tao &amp; A. Beedles</p> <p>Precision-assessment of lifetime prognoses based on SN-approaches of RC-structures exposed to fatigue loads                      M.A. Ahrens</p> <p>Nondestructive evaluation of stress state of steel bars reinforcing concrete structures                      E. Schneider, S.-K. Balijepalli, Ch. Boller, P. Bindseil &amp; W. Kurz</p> <p>Structural flexibility in relation to integrated service life design of buildings                      R. Blok &amp; E. Koopman</p> <p>Analysis of influential factors and association rules for bridge deterioration using national bridge inventory data                      R.-Y. Huang &amp; P.-F. Chen</p> <p>Estimation of steel weight loss due to corrosion in RC members based on digital image processing of X-ray photograph                      M. Akiyama &amp; D.M. Frangopol</p> <p>Rehabilitation of concrete bridges using Ultra-High Performance Fibre Reinforced Concrete (UHPFRC)                      E. Brühwiler</p> <p>Flexible floor slab systems for long service life                      J. Hegger, M. Claßen, T. Dreßen &amp; J. Gallwoszus</p>	<p><b>Special Session:</b> Life-cycle design and engineering of facades and building envelopes</p> <p><b>Chairs:</b> O. Enghardt &amp; A. Merl</p> <p>Implementation of energy efficient measures in apartments in Macedonia                      T. Samardzioska, M. Cvetkowska, M. Lazarevska &amp; A. T. Gavriloska</p> <p>Parameter study of a prefabricated retrofit façade system                      S. Ott &amp; S. Winter</p> <p>Life-cycle of building's facades: Service life prediction of natural stone wall claddings using the factor method                      A. Silva, J. de Brito &amp; P.L. Gaspar</p> <p>Analysis of influence of water vapor condensation in building construction envelopes                      J. Skramlik, O. Fuciman, M. Novotny &amp; Z. Mastna</p> <p>Decision support method for flat roofs with focus on life-cycle costs using a probabilistic method                      C. Harreither, T. Bednar &amp; B. Nusser</p> <p>Optimizing a structure's life with genetic algorithms and emergence theory                      M.P. Sarkisian</p> <p>The development of combined LCC analysis system for bundling public facility maintenance                      C.K. Lee &amp; T.K. Park</p> <p>Development and verification of a typhoon wind hazard model for Taipei                      R.-H. Cherng, W.-C. Hsu, C.-C. Li &amp; C.-S. Chen</p>

Concurrent Technical Sessions (ThA 4-6) 14.00 - 16.00   Thursday Afternoon, 4 October 2012		
ThA-4 Radetzkyapp. I	ThA-5 Radetzkyapp. III	ThA-6 Entrée Room
<p><b>Special Session:</b> Probabilistic durability assessment of concrete structures</p> <p><b>Chairs:</b> B. Těplý &amp; D. Novák</p> <p>The role of modeling in the probabilistic durability assessment of concrete structures  <u>B. Těplý</u>, <u>M. Chromá</u>, <u>P. Rovnaník</u> &amp; <u>D. Novák</u></p> <p>Probabilistic analysis on shear resistance degradation of reinforced concrete beams induced by corrosion  <u>J. Zhang</u>, <u>W. Ding</u> &amp; <u>L. Hu</u> (<u>X. Yin</u>)</p> <p>Time-dependent reliability analysis of reinforced concrete beam under different failure modes  <u>Y. Liu</u>, <u>Y.J. Bao</u>, <u>C.X. Li</u> &amp; <u>J. Zhang</u></p> <p>Time-dependent reliability analysis of RC bridge under incomplete information  <u>L. Wang</u>, <u>Y. Ma</u> &amp; <u>Z. Zuo</u></p> <p>Life-cycle assessment of RC structures in Czech regional conditions  <u>P. Hajek</u>, <u>C. Fiala</u> &amp; <u>M. Kynclova</u></p> <p>Probabilistic deterioration models of reinforced concrete structures under complex environments  <u>J. Peng</u>, <u>H. Wang</u>, <u>C. Li</u> &amp; <u>X. Liu</u> (<u>X. Yin</u>)</p> <p>Life-cycle performance assessment of PSC bridges exposed to coastal zones under uncertainty: I. Theory  <u>H. Tian</u>, <u>D.M. Frangopol</u> &amp; <u>A. Chen</u></p> <p>Life-cycle performance assessment of PSC bridges exposed to coastal zones under uncertainty: II. Application  <u>H. Tian</u>, <u>D.M. Frangopol</u> &amp; <u>A. Chen</u></p>	<p><b>Special Session:</b> Life-cycle cost optimization in cross asset management (ERA-NET road projects)</p> <p><b>Chairs:</b> A.J. O'Connor &amp; S. Deix</p> <p>Bayesian identification of uncertainties in chloride ingress modeling into reinforced concrete structures  <u>E. Bastidas-Arteaga</u>, <u>F. Schoefs</u>, <u>S. Bonnet</u> &amp; <u>A.J. O'Connor</u></p> <p>From road asset management to cross asset optimization procedures  <u>S. Deix</u>, <u>K. Alten</u> &amp; <u>A. Weninger-Vycudil</u></p> <p>Development of procedures for cross-asset management for road infrastructure  <u>A.J. O'Connor</u>, <u>S. Deix</u> &amp; <u>V. Pakrashi</u></p> <p>Cross asset management procedures in practice  <u>A. Weninger-Vycudil</u>, <u>S. Deix</u>, <u>K. Gragger</u> &amp; <u>J. Litzka</u></p> <p>A holistic life-cycle approach for traffic infrastructure  <u>J. Sauer</u>, <u>S. Xalter</u>, <u>O. Fischer</u> &amp; <u>S. Freudenstein</u></p> <p>Cost effective maintenance to supply end user value: Visionary or utopian  <u>J. Wessels</u>, <u>K. Alten</u>, <u>M.R. Turk</u> &amp; <u>S.Š. Palic</u></p> <p>Rehabilitation of two bridges in construction in the motorway M-410 in Madrid, Spain  <u>C.J. Cabañes</u></p> <p>A multi-dimensional approach on maintenance of distributed infrastructure: ASFINAG's maintenance strategy  <u>A. Fromm</u> &amp; <u>R. Liskounig</u></p>	

ThE-1 Hall of Ceremonies	ThE-2 Artists' Room	ThE-3 Trabantenstube
<p><b>Special Session:</b> Seismic system identification for life-time-prediction (SEISMID)</p> <p><b>Chairs:</b> H. Wenzel &amp; C. Adam</p> <p>Remote sensing and GIS contribution to earthquake disaster preparedness in the Vienna area  <u>B. Theillen-Willige</u>, H. Wenzel &amp; P. Furtner</p> <p>The assessment of soil-structure-interaction by measurements  <u>F. Kopf</u>, A. Bekö, D. Schäfer, M. Pietsch &amp; L. Rossbacher</p> <p>Seismic capacity of old masonry buildings in Vienna: Numerical modeling of load-bearing brick masonry walls  <u>T. Furtmüller</u> &amp; <u>C. Adam</u></p> <p>Seismic capacity of old masonry buildings in Vienna: Laboratory testing on bricks, mortar, and small-scale brick masonry  <u>T. Furtmüller</u>, <u>C. Adam</u> &amp; <u>C. Niederegger</u></p> <p>Evaluation of the safety index of old masonry buildings in Vienna: Non-linear analysis based on seismic capacity  <u>T. Zimmermann</u> &amp; <u>A. Strauss</u></p> <p>Assessment of the global dynamic behavior of a historic residential brick-masonry building in Vienna  <u>G. Achs</u> &amp; <u>C. Adam</u></p> <p>Measurement principles for masonry buildings  <u>F. Kopf</u>, <u>D. Schäfer</u>, <u>M. Pietsch</u> &amp; <u>L. Rossbacher</u></p> <p>Post-earthquake geomatic survey of a monumental building in L'Aquila, Italy  <u>D. Dominici</u>, <u>M. Elaiopoulos</u>, <u>D. Galeota</u> &amp; <u>A. Gregori</u></p>	<p><b>Special Session:</b> Actions and interventions upon existing structures</p> <p><b>Chairs:</b> R. Caspeele &amp; M. Sykora</p> <p>Target reliability levels for the assessment of existing structures – case study  <u>M. Sykora</u> &amp; <u>M. Holický</u></p> <p>Evaluation of Bayesian updated partial factors for material properties in existing concrete structures  <u>R. Caspeele</u> &amp; <u>L. Taerwe</u></p> <p>Girder shear resistance assessment – applications of SIA 269/2  <u>D. Zwickly</u></p> <p>Verification of older prestressed concrete road bridges according to the German structural assessment provisions  <u>D. Dunkelberg</u>, <u>K. Zilch</u>, <u>M. Hennecke</u> &amp; <u>M. Heinze</u></p> <p>Load-carrying capacity and refurbishment of a historic RC Viendeel bridge  <u>P. Van Bogaert</u></p> <p>Decision making tool for seismic retrofit of existing structures based on marginal costs and actualized costs of the retrofiting operations  <u>D. Asprone</u>, <u>F. Jalayer</u>, <u>A. Prota</u> &amp; <u>R. Russo</u></p> <p>Rehabilitation design methodology for public hospital using seismic monitoring throughout structural life-cycle  <u>G.M. Atanasiu</u> &amp; <u>V. Murarasu</u></p> <p>Verification of existing reinforced concrete structures using the design value method  <u>M. Sykora</u> &amp; <u>M. Holický</u></p>	<p><b>General Session:</b> Uncertainties in life-cycle assessments and reliability engineering / Structural and thermal retrofitting of buildings</p> <p><b>Chairs:</b> J. Li &amp; X. Gao</p> <p>New envelopes for old buildings – the potential of using membrane systems for the thermal retrofitting of existing buildings  <u>W. Lang</u>, <u>J. Cremers</u>, <u>A. Beck</u> &amp; <u>J. Manara</u></p> <p>Indicators for sustainability assessment of renewables  <u>P. Schaumann</u>, <u>A. Bechtel</u>, <u>H.-J. Wagner</u> &amp; <u>N. Stranghöner</u></p> <p>Seismic reliability and LCCs of a RC buildings considering earthquake events within a specified service period  <u>C.-K. Chiu</u> &amp; <u>W.-Y. Jean</u></p> <p>The research on the time-dependence of recurrence times of great earthquakes based on the historical records in North area of China  <u>Z.H. Chen</u> &amp; <u>X.L. Liu</u></p> <p>Construction rating attempt under life-cycle design  <u>D. Grecea</u>, <u>M. Georgescu</u> &amp; <u>M. Szitar</u></p> <p>Life-cycle considerations for reinforced concrete structures in case of fire with respect to spalling  <u>E. Tabeling</u>, <u>P. Schaumann</u>, <u>F. Cramer</u>, <u>D. Dinkler</u>, <u>C. Albrecht</u> &amp; <u>D. Hosser</u></p> <p>Wooden products – positive material in life-cycle analysis  <u>A. Hafner</u>, <u>S. Winter</u> &amp; <u>A. Takano</u></p> <p>“Mountain wood vs. lowland wood”, an ecological process assessment – a case study  <u>A. Krailer</u>, <u>V. Krismer</u> &amp; <u>G. Wieland</u></p>

## Concurrent Technical Sessions (ThE 4-6) 16.30 - 18.30 | Thursday Evening, 4 October 2012

ThE-4 Radetzkyapp. I	ThE-5 Radetzkyapp. III	ThE-6 Entrée Room
<p><b>General Session:</b> End of LC of buildings: Sustainable management of construction and demolition practices</p> <p><b>Chairs:</b> J. Daxbeck &amp; R. Smutny</p> <p>A comparative analysis of environmental impacts of ordinary concrete and structural lightweight concrete  <u>J. Lukic</u>, M. Malesev, V. Radonjanin &amp; V. Milovanovic</p> <p>On the sustainability of deconstruction and recycling: A discussion of possibilities of end-of-lifetime measures  <u>P. Kamrath</u></p> <p>Study of the identification of aggregates of construction and demolition waste by using object recognition methods  <u>E. Linß</u>, H.-M. Ludwig &amp; K. Anding</p> <p>Total life-cycle assessment of steel constructions  <u>G. Lener</u>, D. Reiterer &amp; A. Hauser</p> <p>Threshold-based network-level transportation infrastructure management  <u>J.C. Chu</u> &amp; Y.J. Chen</p> <p>"Whitetopping" of asphalt and concrete pavements with thin layers of Ultra-High-Performance Concrete: Construction and economic efficiency  <u>C. Schmidt</u>, M. Schmidt &amp; P. Racky</p> <p>A standardized life-cycle costing framework for flexible and rigid pavements in Austria  <u>M. Hoffmann</u> &amp; R. Blab</p> <p>Estimation of asphalt pavement performance by using risk analysis method  <u>V. Rosauer</u></p>	<p><b>Special Session:</b> Numerical modelling of long-term behaviour of concrete structures using B3 model</p> <p><b>Chairs:</b> V. Kristek &amp; Q. Yu</p> <p>Model B3.1 for multi-decade concrete creep and shrinkage: Calibration by combined laboratory and bridge data  <u>R. Wender</u>, <u>Z.P. Bažant</u> &amp; M.H. Hubler</p> <p>Updating B3 model for long-term basic creep  <u>V. Šmilauer</u>, M. Lepš &amp; M. Gregorová</p> <p>Modeling of concrete creep based on microprestress-solidification theory  <u>P. Havlásek</u> &amp; M. Jirásek</p> <p>Application of B3 prediction model to analyze prestress loss in prestressed concrete members  <u>L. Vrablik</u>, V. Kistek &amp; B. Teplý</p> <p>Influence of repeated variable load on long-term behavior of concrete elements  <u>T. Arangjelovski</u>, G. Markovski &amp; P. Mark</p> <p>Life-cycle design of concrete structures under consideration of advancing reinforcement corrosion  <u>C. Siebert</u> &amp; M. Empelmann</p> <p>Time-dependent compressive strength of concrete in existing buildings  <u>X.L. Gao</u>, Y.Y. Yan &amp; J. Li</p> <p>Simulation technique for service life assessment of façade refurbishment  <u>E. Vesikari</u> &amp; R.M. Ferreira</p>	

Friday, 5 October 2012

Keynote Lectures 08.00 - 10.00   Chairs: B.R. Ellingwood & D. Novák	
	Minimizing the effects of uncertainty in life-cycle engineering A.H.-S. Ang
	Structural damage accumulation and control for life-cycle optimum seismic performance of buildings L. Esteva
	Sustainable asset preservation at the Austrian Federal Railways A. Matthä
	Life-cycle design for the world's longest tunnel project K. Bergmeister
Concurrent Technical Sessions 10.30 - 12.30	
FrM-1	Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures Organizers: C. Papadimitriou, G. Lombaert, G. De Roeck & E. Reynders
FrM-2	Industrial risk reduction system Organizer: H. Wenzel
FrM-3	Sustainability certification of new and of existing buildings Organizers: A. Passer & H. Wallbaum
FrM-4	Prediction models for ageing / deterioration Organizer: M. Petschacher
FrM-5	Performance based evaluation of corrosion in reinforced and pre-stressed concrete structures Organizer: U. Schneck
Concurrent Technical Sessions 13.30 - 15.30	
FrA-1	Probabilistic lifetime assessment of concrete structures under combined environmental attack Organizers: R. Caspeele, N.D. Belie, C. Gehlen & S. Kefßler
FrA-2	Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures Organizers: C. Papadimitriou, G. Lombaert, G. De Roeck & E. Reynders
FrA-3	Life-cycle assessment for sustainability evaluation of buildings Organizers: R. Smutny & M. Treberspurg
FrA-4	Prediction models for ageing / deterioration Organizer: M. Petschacher
FrA-5	Optimization of bridge lifetime by use of structural health monitoring / Advanced remote sensing techniques for structural damage assessment Organizers: M. Reiterer, S. Arangio, M. Manunta & M. Marsella
Concurrent Technical Sessions 16.00 - 18.00	
FrE-1	Structural retrofitting for maintenance and rehabilitation Organizer: A. Unterweger
FrE-2	Monitoring and assessment of bridges using novel techniques Organizers: A. Strauss & D.M. Frangopol
FrE-3	Life-cycle assessment for sustainability evaluation of buildings Organizers: R. Smutny, C. Neururer & M. Treberspurg
FrE-4	Application of special non-destructive testing methods to different kinds of structures Organizer: M. Reiterer
FrE-5	Analysis of rehabilitation needs and maintenance strategies Organizers: M. Hastak & Y. Yoon

## Concurrent Technical Sessions (FrM 1-3)

10.30 - 12.30 | Friday Morning, 5 October 2012

FrM-1 Hall of Ceremonies	FrM-2 Artists' Room	FrM-3 Trabantenstube
<p><b>Mini-Symposium:</b> Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures</p> <p><b>Chairs:</b> G. Lombaert &amp; E. Reynders</p> <p>Monitoring of a riveted steel railway bridge V. Zabel, A. Schmidt, I. Reichert &amp; S. Höll</p> <p>Structural health monitoring of a centenary iron arch bridge F. Busatta, C. Gentile &amp; A. Saisi</p> <p>Damage detection on the Champangshiehl bridge using blind source separation V.H. Nguyen, C. Rutten, J.-C. Golinval, J. Mahowald, S. Maas &amp; D. Waldmann</p> <p>Dynamic methods for health monitoring and structural identification of bridges F. Benedettini, A. Morassi &amp; F. Vestroni</p> <p>Output-only structural health monitoring by vibration measurements under changing weather conditions E. Reynders, G. Wursten &amp; G. De Roeck</p> <p>Dynamic damage identification using linear and nonlinear testing methods on a two-span prestressed concrete bridge J. Mahowald, S. Maas, F. Scherbaum, D. Waldmann &amp; A. Zuerbes</p> <p>Monitoring of ground-structure-interaction of an arch bridge J. Stoerzel, M. Spitzer, N. Randl &amp; C. Stadler</p> <p>The influence of design life in life-cycle civil engineering S.G. Reid</p>	<p><b>Special Session:</b> Industrial risk reduction system</p> <p><b>Chairs:</b> P. Furtner &amp; R. Veit-Egerer</p> <p>Monitoring and evaluation of an arch bridge over the Traun River – Austria affected by the blasting of the adjacent highway bridge R. Veit-Egerer, M. Widmann &amp; H. Wenzel</p> <p>Management concept for highway infrastructure based on life-cycle analysis providing heavy maintenance instructions and cross asset harmonisation R. Veit-Egerer, P. Furtner, K. Gragger &amp; W. Neumann</p> <p>Reliability of decisions based on lifetime functions and monitoring data A. Del Grosso &amp; F. Lanata</p> <p>Contribution to US long-term bridge performance program with regard to life-cycle investigations – reference bridge New Jersey H. Wenzel, M. Widmann, A.E. Aktan &amp; F. Moon</p> <p>International investigation on the earthquake damaged Chi Lu Cable Stayed Bridge after repair and several years of operation H. Wenzel, R. Veit-Egerer, T.-K. Lin &amp; Z.-K. Lee</p> <p>Evaluation of structural behaviour of a fire damaged highway bridge in Lagos-Nigeria with BRIMOS® structural health monitoring P. Furtner, R. Veit-Egerer, J. Buchmann &amp; M. Buschlinger</p> <p>Seepage analysis of a gate dam with a layered deep deposit foundation M.X. Wu, L.Z. Yang &amp; X.H. Hu</p> <p>Ultrasonic monitoring of high temperature pipes in power plants using wave guides B. Weihnacht, T. Klesse, U. Lieske &amp; B. Frankenstein</p>	<p><b>Special Session:</b> Sustainability certification of new and of existing buildings</p> <p><b>Chairs:</b> A. Passer &amp; H. Wallbaum</p> <p>EU-project OPEN HOUSE: Benchmarking and mainstreaming building sustainability in the EU based on transparency and openness (open source and availability) from model to implementation R. Hardziewski, H. Wallbaum, N. Essig &amp; S. Eberl</p> <p>Tools and processes for life-cycle engineering: Experience from the European project OPEN HOUSE V. Peyramale</p> <p>Case studies with the DGNB certificate and the OPEN HOUSE methodology – practical experiences and results N. Essig &amp; S. Eberl</p> <p>Building sustainability assessment system corresponding to needs of users A. Lupišek</p> <p>Rating tools for the evaluation of building sustainability T. Dencsak &amp; C. Bob</p> <p>Interdependency of LCCA and LCA in the assessment of buildings H. Kreiner &amp; A. Passer</p> <p>Statistical cluster analysis as a means to complement LCA of buildings V. John &amp; H. Wallbaum</p> <p>Life-cycle assessment of buildings for sustainable development Z. Stránská &amp; J. Sedláč</p>

Concurrent Technical Sessions (FrM 4-6) 10.30 - 12.30 | Friday Morning, 5 October 2012

FrM-4 Radetzkyapp. I	FrM-5 Radetzkyapp. III	FrM-6 Entrée Room
<p><b>Mini-Symposium:</b> Prediction models for ageing / deterioration</p> <p><b>Chairs:</b> M. Petschacher &amp; J.S. Kong</p> <p>Remaining life prediction of an aged bridge based on field inspections A. Miyamoto</p> <p>Analytical prediction model for concrete cover cracking due to reinforcement corrosion E. Bohner &amp; H.S. Müller</p> <p>Bridge condition assessment based on long-term strain and vehicle monitoring L.M. Sun &amp; S.W. Sun</p> <p>A stochastic prediction model of degrading process for tunnel management systems O. Maruyama, A. Sutoh, H. Tanaka &amp; T. Sato</p> <p>Modelling of the saturation behaviour of hardened cement paste during freezing and thawing action Z. Djurić, M. Haist, H.S. Müller &amp; E.H. Hardy</p> <p>Bridge maintenance education system based on E-learning T. Koyama, K. Ishibashi, K. Nakatsu &amp; H. Furuta</p> <p>Structural, economic and environmental performance of fibre reinforced wood profiles vs. solutions made of steel and concrete C. Manthey, E. Guenther, A. Heiduschke &amp; P. Haller</p> <p>Optimal next inspection time for bridges based on corrosion deterioration D. De León, C. González-Pérez, V. Bisadi, P. Gardoni, M. Head &amp; S. Hurlabaas</p>	<p><b>Special Session:</b> Performance based evaluation of corrosion in reinforced and pre-stressed concrete structures</p> <p><b>Chairs:</b> U. Schneck &amp; S. Keßler</p> <p>Non-destructive corrosion surveys: Methods and opportunities U. Schneck</p> <p>Prediction of remaining service life of cracking concrete box girder bridges Y. Xiang, J. Xu, L. Liu &amp; X. Li</p> <p>The impact of resistivity on potential mapping S. Keßler &amp; C. Gehlen</p> <p>Approaches for non-destructive corrosion surveys of bridge decks from the soffit and under traffic: A case study U. Schneck</p> <p>Probabilistic assessment for structural performance of port RC structure E. Kato, Y. Kawabata, M. Iwanami &amp; H. Yokota</p> <p>Corrosion-induced cracking evolution and reliability prediction of aging RC structures H.-P. Chen &amp; N. Xiao</p> <p>Durability of cooling tower constructions and methods of their repair and reinforcement M. Kaminski &amp; M. Maszczak</p> <p>Probabilistic aspects of Offshore Wind Turbines: Influences of in situ assembly of grouted joints L. Lohaus &amp; M. Werner</p>	

## Concurrent Technical Sessions (FrA 1-3)

13.30 - 15.30 | Friday Afternoon, 5 October 2012

FrA-1 Hall of Ceremonies	FrA-2 Artists' Room	FrA-3 Trabantenstube
<p><b>Special Session:</b> Probabilistic lifetime assessment of concrete structures under combined environmental attack</p> <p><b>Chairs:</b> N. De Belie &amp; C. Gehlen</p> <p>Effect of internal freeze-thaw deterioration on chloride migration in concrete C. Milachowski, S. Keßler, R. Chillé &amp; C. Gehlen</p> <p>Influence of sulphates on chloride diffusion and the effect of this on service life prediction of concrete in a submerged marine environment M. Maes, R. Caspeele, P. Van den Heede &amp; N. De Belie</p> <p>Probabilistic lifetime assessment of concrete structures in consideration of combined deterioration mechanisms and singular risks M. Vogel &amp; H.S. Müller</p> <p>Influence of combined mechanical and environmental loads on service life of reinforced concrete structures F.H. Wittmann, F. Jiang, X. Wan, P. Zhang &amp; T. Zhao</p> <p>Chloride diffusion tests as experimental basis for full probabilistic service life prediction and life-cycle assessment of concrete with fly ash in a submerged marine environment P. Van den Heede, M. Maes, R. Caspeele &amp; N. De Belie</p> <p>Validation of diffusion models for life-cycle assessment of concrete structures A. Titij &amp; F. Biondini</p> <p>Poor life-cycle performance versus engineering design process S. Zmigrodzki</p> <p>Hybrid genetic algorithm to system identification and damage assessment of a high-rise building G.S. Wang &amp; F.K. Huang</p>	<p><b>Mini-Symposium:</b> Vibration-based health monitoring, damage identification, and parameter estimation for civil engineering structures</p> <p><b>Chairs:</b> G. Lombaert &amp; E. Reynders</p> <p>Fast Bayesian structural damage localization and quantification using high fidelity FE models and CMS techniques D.-C. Papadimitriou &amp; C. Papadimitriou</p> <p>Structural identification of a super-tall tower by GPS and accelerometer data fusion using a multi-rate Kalman filter E.N. Chatzi &amp; C. Fuggini</p> <p>Influence of the prediction error correlation model on Bayesian FE model updating results E. Simoen, C. Papadimitriou, G. De Roeck &amp; G. Lombaert</p> <p>Structural health monitoring from on-line monitored vibration measurements T.S. Maung, H.-P. Chen &amp; A. Alani</p> <p>Non-stationary random vibration for a high-pier bridge under vehicular loads X.F. Yin, Y. Liu, J.R. Zhang &amp; C.S. Cai</p> <p>Maintenance and rehabilitation of 19th century masonry buildings – life-cycle aspects A. Kolbitsch</p> <p>Fast Bayesian ambient modal identification with separated modes incorporating multiple setups F.L. Zhang &amp; S.K. Au</p> <p>Utilizing GIS as a geospatial tool to inventory LEED certified buildings and Construction and Demolition (C&amp;D) waste flows in the United States K.A. Marcellus, S. Spatari &amp; P.M. Gallagher</p>	<p><b>Special Session:</b> Life-cycle assessment for sustainability evaluation of buildings</p> <p><b>Chairs:</b> R. Smutny &amp; M. Treberspurg</p> <p>Has sustainability become the norm in the planning and execution of building projects? A. Tautschnig &amp; D. Burtscher (M. Pongratz)</p> <p>LCM – Life-Cycle Management, integrated management philosophy for building projects R. Stempkowski &amp; M. Wallner-Kleindienst</p> <p>Life-cycle assessment as a planning tool for sustainable buildings L. Messari-Becker, K. Bollinger &amp; M. Grohmann</p> <p>Environmental assessment of building refurbishments in SBToolCZ – criteria setup S. Mancik &amp; J. Ruzicka</p> <p>LCA of multi-storey timber building and comparative estimation with alternative building materials Y. Yeh &amp; P. Haller</p> <p>Life-cycle assessment of a passive house and a traditional house – comparative study based on practical experiences D. Stoian, T. Dencsak, S. Pescari &amp; I. Botea</p> <p>Passive House – best practice examples of cost effective building solutions with high-quality living M. Treberspurg &amp; M. Djallili</p> <p>Ecological life-cycle assessment of structures made of UHPC – systematic and practical relevance M. Schmidt</p>



Concurrent Technical Sessions (FrA 4-6) 13.30 - 15.30 | Friday Afternoon, 5 October 2012

FrA-4 Radetzkyapp. I	FrA-5 Radetzkyapp. III	FrA-6 Entrée Room
<p><b>Mini-Symposium:</b> Prediction models for ageing / deterioration</p> <p><b>Chairs:</b> M. Petschacher &amp; R. Pukl</p> <p>Seismic intensity paramereers as damage potential descriptors for life-cycle analysis of buildings  <u>A. Elenas</u>, <u>A. Liolios</u>, <u>L. Vasiliadis</u>, <u>M. Favata</u> &amp; <u>A. Liolios</u></p> <p>Selective maintenance planning based on a Markovian approach  <u>N. Basso</u>, <u>E. Garavaglia</u> &amp; <u>L. Sgambi</u></p> <p>Reliability of deterioration prediction with Markov model for mooring facilities  <u>H. Yokota</u>, <u>K. Furuya</u>, <u>K. Hashimoto</u> &amp; <u>S. Hanada</u></p> <p>Gamma processes for the degradation analysis of engineering structures  <u>A. Strauss</u>, <u>H. Abebe Demissie</u> &amp; <u>K. Bergmeister</u></p> <p>Numerical analysis of degradation processes in reinforced concrete during life-cycle  <u>F. Cramer</u>, <u>U. Kowalsky</u> &amp; <u>D. Dinkler</u></p> <p>A consideration on the deterioration of tunnel lining based on actual inspection data  <u>A. Sutoh</u>, <u>O. Maruyama</u>, <u>T. Sato</u> &amp; <u>H. Nishi</u></p> <p>Time dependent reliability for existing structure based on the moment method  <u>W.-L. Fan</u>, <u>S. Zhang</u>, <u>Z.-L. Li</u> &amp; <u>P. Deng</u></p> <p>Probabilistic working life assessment of power-producing components  <u>J. Markova</u>, <u>M. Holický</u> &amp; <u>K. Jung</u></p>	<p><b>General Session:</b> Optimization of bridge lifetime by use of structural health monitoring / Advanced remote sensing techniques for structural damage assessment</p> <p><b>Chairs:</b> M. Reiterer &amp; S. Arangjo</p> <p>Extension of bridge lifetime by use of structural health monitoring  <u>M. Reiterer</u> &amp; <u>A. Kammersberger</u></p> <p>Determination of mechanical and temperature induced deflection based on monitoring data for assessing the load factor  <u>A. Krawtschuk</u>, <u>T. Zimmermann</u> &amp; <u>K. Haider</u></p> <p>The influence of bridge maintenance on their durability and bearing capacity  <u>G. Markovski</u>, <u>T. Arangjelovski</u>, <u>O. Kolevski</u> &amp; <u>D. Nakov</u></p> <p>Dynamic-based performance updating of high-speed concrete railway bridge  <u>S. Yang</u>, <u>L. Dieleman</u> &amp; <u>A.D. Orcesi</u></p> <p>The use of advanced remote sensing techniques for monitoring of slopes affected by slow movements  <u>M.E. D'Effremo</u> &amp; <u>E. Fontanella</u></p> <p>Assessment of structural damage due to ground settlements by using the DInSAR technique  <u>S. Arangio</u>, <u>M. Di Mauro</u>, <u>M. Marsella</u>, <u>A. Sonnessa</u> &amp; <u>M. Manunta</u></p> <p>Application of satellite radar interferometry for structural damage assessment and monitoring  <u>C. Giannico</u>, <u>A. Ferretti</u>, <u>L. Jurina</u> &amp; <u>M. Ricci</u></p> <p>The SBAS-DInSAR technique: A tool for deformation monitoring in the urban damage assessment  <u>M. Bonano</u>, <u>F. Calò</u>, <u>M. Manunta</u> &amp; <u>M. Marsella</u></p>	

## Concurrent Technical Sessions (FrE 1-3)

16.00 - 18.00 | Friday Evening, 5 October 2012

FrE-1 Hall of Ceremonies	FrE-2 Artists' Room	FrE-3 Trabantenstube
<p><b>Special Session:</b> Structural retrofitting for maintenance and rehabilitation</p> <p><b>Chairs:</b> A. Untenweger &amp; P. Bocchini</p> <p>Strengthening of historical stone masonry buildings: Experimental testing and modeling of a 2-storey plain masonry building E. Vintzileou, H. Mouzakis, C.-E. Adami &amp; L. Karapitta</p> <p>The functional-structural rehabilitation of a building belonging to the archaeological industrial heritage B. Faggiano &amp; L. Fiorino</p> <p>Strengthening and repair of damaged structural elements of revitalized apartment, public service and industrial buildings from the turn of the 19th and 20th century in Poland P. Berkowski &amp; G. Dmochowski</p> <p>Post installed fastenings at retrofitting systems in Japan A. Untenweger, Y. Nakano &amp; K. Bergmeister</p> <p>Rehabilitation of existing structures by optimal placement of viscous dampers A. Gh. Pricopie &amp; D. Cretu</p> <p>Behaviour of interfaces in repaired / strengthened RC elements subjected to cyclic actions: Experiments and modelling V. Palieraki, E. Vintzileou &amp; C. Zeris</p> <p>Experimental and numerical investigation of model tests strengthened by overlays Y. Theiner, M. Aschaber &amp; G. Hofstetter</p> <p>Damage due to traffic before and after rehabilitation of a reinforced concrete bridge M. Pircher, J. Wagner, B. Lechner &amp; A. Kammersberger</p>	<p><b>Mini-Symposium:</b> Monitoring and assessment of bridges using novel techniques</p> <p><b>Chairs:</b> A. Strauss &amp; R. Geier</p> <p>A year-long monitoring using in-service vibration data from a multi-span plate-Gerber bridge C. W. Kim, S. Kitauchi, K. Sugijura &amp; M. Kawatani</p> <p>Detection of traffic loads by structural and geodetic measurements C. von der Haar, S. Marx, M. Hansen &amp; H. Neuner</p> <p>Service life management of infrastructure systems – application of corrosion and moisture monitoring T. F. Mayer &amp; Ch. Sodeikat</p> <p>Prediction of fatigue damage accumulation in metallic structures by the estimation of strains from operational vibrations C. Papadimitriou, E.-M. Lourens, G. Lombaert, G. De Roeck &amp; K. Liu</p> <p>Probabilistic fatigue crack growth modeling for reliability-based inspection planning R. Schneider, S. Thöns &amp; D. Straub</p> <p>Reliability-based inspection planning with application to orthotropic bridge deck structures subjected to fatigue R. Schneider, S. Thöns &amp; D. Straub</p> <p>Bayesian forecasting of structural bending capacity of aging bridges based on dynamiclinear model D. G. Lu &amp; X. P. Fan</p> <p>Some difficult monitoring problems and some interesting outcomes B. Harvey &amp; H. Harvey</p>	<p><b>Special Session:</b> Life-cycle assessment for sustainability evaluation of buildings</p> <p><b>Chairs:</b> R. Smutny &amp; C. Neurer</p> <p>Sensitivity of life-cycle analysis results to the required service life of buildings H. König, T. Lützkendorf &amp; M. L. De Cristofaro</p> <p>Environmental life-cycle analysis of housing estates in Austria R. Smutny</p> <p>Ecological and economic impact of various materials and constructions for buildings over the whole life-cycle A. Hafner &amp; S. Winter</p> <p>MINERGIE-ECO® 2011 – definition of thresholds in an LCA-based building label D. Kellenberger</p> <p>Life-cycle assessment of steel constructions M. Feldmann, D. Pyschny, B. Döring &amp; M. Kuhnhenne (M. Brieden)</p> <p>Environmental evaluation of steel plates and steel sections sold on the French market F. Gomes, A. Feraille, G. Habert &amp; C. Tessier</p> <p>Sustainable thermal retrofitting solutions for multi-storey residential buildings V. Ungureanu, A. Ciutina &amp; D. Dubina</p> <p>Sustainable retrofitting solutions for precast concrete residential buildings A. A. Botici, V. Ungureanu, A. Ciutina, A. Botici &amp; D. Dubina</p>

Concurrent Technical Sessions (FrE 4-6) 16.00 - 18.00   Friday Evening, 5 October 2012		
FrE-4 Radetzkyapp. I	FrE-5 Radetzkyapp. III	FrE-6 Entrée Room
<p><b>Special Session:</b> Application of special non-destructive testing methods to different kinds of structures</p> <p><b>Chairs:</b> M. Reiterer &amp; A. Titi</p> <p>Damage process monitoring on the hot spot of a real steel component by means of ultrasonic guided waves  <u>M. Vospernig</u>, <u>M. Reiterer</u> &amp; <u>R. Heuer</u></p> <p>Modern acoustic NDT methods for the off- and online detection of damages in composite aeronautic structures  <u>M. Scheerer</u>, <u>A. Peldszus</u>, <u>M. Stadtschnitzer</u> &amp; <u>R. Wagner</u></p> <p>Concrete fatigue monitoring on large scale structures using acoustic emission and an ultrasonic actuation and sensing system  <u>R. Wagner</u>, <u>M. Reiterer</u>, <u>A. Strauss</u> &amp; <u>S. Urban</u></p> <p>Development of a virtual reality-based support system for bridge inspectors  <u>S. Sawamura</u> &amp; <u>A. Miyamoto</u></p> <p>Low-cost sensor for integrated durability monitoring and life-cycle assessment of reinforced concrete structures  <u>A. Holst</u> &amp; <u>H. Budelmann</u></p> <p>Experimental modeling of fatigue processes to detect the real degree of deterioration  <u>S. Urban</u>, <u>A. Strauss</u>, <u>M. Reiterer</u> &amp; <u>R. Wagner</u></p> <p>Fatigue safety examination of a 150-year old riveted railway bridge  <u>E. Brühwiler</u></p> <p>Maintenance costs calculation over the life-cycle: A method for the usage of elementary influence factors on the technical durability of technical components and constructed assets  <u>G. Hardkopf</u></p>	<p><b>Special Session:</b> Analysis of rehabilitation needs and maintenance strategies</p> <p><b>Chairs:</b> M. Hastak &amp; Y. Yoon</p> <p>Multyear infrastructure rehabilitation strategy within the context of MR&amp;R  <u>Y. Yoon</u> &amp; <u>M. Hastak</u></p> <p>Strategies and methods to increase the life-cycle of RC buildings in seismic prone areas  <u>S.E. Dritsos</u>, <u>E.C. Apostolijci</u> &amp; <u>N.P. Karela</u></p> <p>The economic impact of photocatalytic concrete in an urban industrial setting  <u>C.J. Churchill</u> &amp; <u>D.K. Panesar</u></p> <p>Life-cycle considerations in bridge deck rehabilitation strategy  <u>B. Czarniecki</u>, <u>W. Johnston</u> &amp; <u>G. Wilkins</u></p> <p>Life-cycle cost and life-cycle carbon dioxide analyses of the new/renewable energy systems and the energy-saving measures in the elementary school facilities in South Korea  <u>T. Hong</u>, <u>H. Kim</u>, <u>Ch. Koo</u> &amp; <u>T. Kwak</u></p> <p>Fibrement recycling as raw material for Portland clinker production  <u>J. Schoon</u>, <u>L. Van der Heyden</u>, <u>I. Van Driessche</u> &amp; <u>N. De Belie</u></p> <p>Optimal allocation of resources in MR&amp;R planning for heterogeneous bridge networks  <u>Z. Essahli</u> &amp; <u>S. Madanat</u></p> <p>Life-cycle assessment of historical structures towards sustainable architectural heritage in Kosovo  <u>V. Nushi</u> &amp; <u>S. Nixha</u></p>	



Poster Sessions (FrP 1-10)

14.00 - 16.00 | Friday, 5 October 2012

FrP-1	Influential variabilities in reliability of reinforced concrete pipes <u>J.L. Silva</u> & M.K. El Debs
FrP-2	Production of pervious concrete by using construction and demolition wastes <u>G. Vardaka</u> , S. Tsimas & C. Leptokaridis
FrP-3	The environmental impacts of concrete containing Nano-SiO <sub>2</sub> and typical concrete on global warming and fossil fuel depletion: A comparison <u>M. Yekkalar</u> , M.R. Sabour & M. Nikravan
FrP-4	Study of the quality of gypsum in Construction & Demolition Waste (CDW) T. Schulz, <u>E. Linß</u> , A. Müller & K. Weimann
FrP-5	New approaches in evaluating vibration and physical monitoring techniques <u>M. Österreicher</u> , A. Strauss, K. Bergmeister & L. Ibáñez
FrP-6	Vulnerability analysis of a park of small dams to natural hazards through GIS <u>K. Bouzelha</u> , H. Hammoum, F. Saradouni, M. Fernane & S. Lounnas
FrP-7	Reliability analysis for rainfall stability of municipal solid waste landfills on slope <u>F.K. Huang</u> & G.S. Wang
FrP-8	Concrete sludge water recycling: An essential practice for the sustainability of a ready-mix concrete plant <u>M. Zervaki</u> , M. Mappouridou, S. Tsimas & C. Leptokaridis
FrP-9	Performing of non-destructive measurement methods on existing arch bridge structures <u>F. Dengg</u> , K. Mendlig, A. Krawtschuk & A. Strauss
FrP-10	Utilization times of railway bridges <u>T. Simandl</u>

## Saturday, 6 October 2012

Keynote Lectures 08.00 - 10.00   Chairs: A. Chen & F. Biondini	
	Life-cycle performance goals for civil infrastructure: intergenerational risk-informed decisions B.R. Ellingwood
	Lessons from the 2011 Great East Japan Earthquake: Emphasis on life-cycle structural performance M. Akiyama
	Computational methods for time-variant structural reliability analysis C. Bucher
	Durability related life-cycle assessment of concrete structures: Mechanisms, models, implementation H. Budelmann
Concurrent Technical Sessions 10.30 - 12.30	
SaM-1	Life-cycle cost analysis and risk analysis for buildings Organizers: T. Lützkendorf, S. Geissler & H. Kreiner
SaM-2	Monitoring and assessment of bridges using novel techniques / Optimization of bridge life-time by use of structural health monitoring Organizers: A. Strauss, D.M. Frangopol & M. Reiterer
SaM-3	Towards sustainable dams and embankments / Life-cycle engineering in the field of cableways and cable structures Organizers: M. Wieland, W. Wu, D. Bobacz & M. Posch
SaM-4	Life-cycle engineering tools for risk-based decision under uncertainty Organizers: C.F. Cremona, A.D. Orcesi & H. Gervásio
SaM-5	Inverse reliability analysis techniques for the lifetime assessment of bridges / Integral bridges – Design and construction Organizers: K. Bergmeister, R. Geier, A. Strauss, D. Novák, R. Pukl & R. Wendner
Concurrent Technical Sessions 13.30 - 15.30	
SaA-1	Life-cycle cost analysis and risk analysis for buildings Organizers: T. Lützkendorf, S. Geissler & H. Kreiner
SaA-2	Tunnel - Infrastructure Systems Organizers: A. Rieder, D. Alfreider & K. Bergmeister
SaA-3	Fatigue of concrete – experiments, models, applications Organizers: S. Seitzl, Z. Keršner, R. Pukl & D. Pryl
SaA-4	Structural health monitoring of civil infrastructures in a life-cycle analysis Organizers: C.F. Cremona, A.D. Orcesi & A. Courtois
SaA-5	Inverse analysis: From material parameters identification to reliability assessment / Simulation software tools for virtual reliability and life-cycle testing of concrete structures Organizers: D. Lehký, D. Novák, A. Strauss & R. Pukl

## Concurrent Technical Sessions (SaM 1-3) 10.30 - 12.30 | Saturday Morning, 6 October 2012

SaM-1 Hall of Ceremonies		SaM-2 Artists' Room		SaM-3 Trabantenstube	
Special Session: Life-cycle cost analysis and risk analysis for buildings	Chairs: T. Lützkendorf & H. Kreiner	Mini-Symposium: Monitoring and assessment of bridges using novel techniques / Optimization of bridge life-time by use of structural health monitoring	Chairs: M. Reiterer & W. Wu	Special Session: Towards sustainable dams and embankments / Life-cycle engineering in the field of cableways and cable structures	Chairs: M. Wieland & D. Bobacz
LCC in Norway: State of the art 2012 Ch.A. Listerud, S. Bjørberg & A.K. Larssen		Dynamic testing and structural identification of "New People's Bridge" in Verona K. Islami, A. Bisson, F. Casarin & C. Modena		Safety aspects of sustainable storage dams M. Wieland	
Specific life-cycle cost indicators and design recommendations for life-cycle cost optimized buildings H. Floegl		Structural monitoring of a steel bridge with the longest arch span in Poland – selected issues H. Onysyk		Life-cycle assessment of Tuttle Creek Dam seismic retrofit J.F. Hubler, P.M. Gallagher & S. Spatari	
Life-cycle cost method for the early design phase of non-residential buildings G. Hofer, M. Grim, B. Herzog & M. Pongratz		Maintenance life-cycle costs for bridges of Egnatia Motorway, Northern Greece, considering their seismic risk assessment P. Panetos, A. Liolios, K. Liolios, N. Theodoulidis & P. Spyridis		Effect of geogrid in rockfill dams during strong earthquakes E. Soranzo, W. Wu & M. Wieland	
Combined database for LCC, LCA and life-cycle quality T. Schrag, E. Stocker, Ch. Wartha, E. Hasler & H. Leindecker		Long-term maintenance of deteriorating infrastructure: Inspection strategies for incipient failures G.-A. Klutke, M. Sánchez-Silva & J. Riascos-Ochoa		Fatigue behavior of stay cables J. Novoszel, W. Träger & J. Kollegger	
Prevent corruption – measures to increase integrity in organizations A. Walcher, R. Stempkowski & M. Apfalter		Tension stiffening of RC members subject to biaxial tensile stresses W. Ibrahim, J. Hegger & A. Sherif		Overall environmental impact for structural polymers: A material selection process R.A. Khorasgani, T. Poli & A. Rezaallah	
Life-cycle cost analysis of building components and materials used in hospitals T. Halder, H. Kreiner & A. Passer		Structural health monitoring system using recurrence quantification analysis of ambient vibration H. Furuta, Y. Nomura, K. Nakatsu & K. Yoshida		Probabilistic description of foundation capacity for design of electrical transmission lines C.B.P. Azevedo & S.M.C. Diniz	
OPIK-International: An international comparison of single life-cycle processes in hospitals M. Baneji-Schafiq & K. Lennerts		Reducing CO <sub>2</sub> -emission by using CEM V eco-cements K. Voit, K. Bergmeister & I. Janotka		Harvesting factor in hydropower generation J. Wall & A. Passer	
Life-cycle assessment and construction costs of a low energy residential building M. Paleari, M. Lavagna & A. Campioli		Stochastic models for degrading infrastructure systems M. Sánchez-Silva, J. Riascos-Ochoa & G.-A. Klutke			

SaM-4 Radetzkyapp. I	SaM-5 Radetzkyapp. III	SaM-6 Entrée Room
<p><b>Special Session:</b> Life-cycle engineering tools for risk-based decision under uncertainty</p> <p><b>Chairs:</b> A.D. Orcesi &amp; H. Genvásio</p> <p>A probabilistic approach for life-cycle environmental analysis of motorway bridges  <u>H. Genvásio</u> &amp; L. Simões da Silva</p> <p>A comparative life-cycle cost analysis of steel-concrete composite bridges  <u>N.B. Ta</u>, A.D. Orcesi &amp; C.F. Cremona</p> <p>A stochastic aging model for life-cycle assessment  <u>M. Petschacher</u></p> <p>Relative performance concepts: A new approach in life-cycle management of concrete structures  L. Lohaus &amp; <u>J. Gerlach</u></p> <p>DIOGEN: Environmental impact database for life-cycle assessment of civil engineering structures  <u>Y. Tardivel</u> &amp; C. Tessier</p> <p>Life-cycle design of concrete bridges  T. Kovács &amp; <u>L.E. Laczák</u></p> <p>Model for negotiation of refinancing gain from public-private partnership  <u>L. Zhu</u> &amp; D.K.H. Chua</p>	<p><b>General Session:</b> Inverse Reliability Analysis techniques for the lifetime assessment of bridges / Integral bridges – design and construction</p> <p><b>Chairs:</b> R. Geier &amp; R. Pukl</p> <p>Reliability index for wind turbines subjected to wind and seismic actions  L.E. Pérez Rocha, <u>A. López López</u>, D. Maldonado Jiménez, L.E. Manjarrez Garduño &amp; D. de León Escobedo</p> <p>Coupled damage in assessing the lifetime of bridge and viaducts  <u>A. Pipinato</u>, C. Pellegrino &amp; C. Modena</p> <p>An optimum design approach for the wind and seismic design of wind turbine supports in Mexico  <u>A. López López</u>, L.E. Pérez Rocha &amp; D. Maldonado Jiménez</p> <p>Integral railway bridges for high speed trains – from conceptual design to construction by the example of the Gaensebachtal Bridge  <u>A. Goldack</u> &amp; M. Schlaich</p> <p>RC precast bridges with joint-less deck: An Italian experience  <u>G. Tecchio</u>, K. Islami &amp; C. Modena</p> <p>Efficient design and construction of the APM major bridge project in Saudi Arabia  <u>E. Ayoub</u>, C. Malek &amp; G. Helmy</p> <p>Simulation of random behavior of engineering structures: From parameters identification to reliability assessment  <u>D. Novák</u> &amp; R. Pukl</p> <p>Extension of sample size in Latin Hypercube Sampling – methodology and software  <u>M. Vorechovský</u></p>	

Concurrent Technical Sessions (SaA 1-3) 13.30 - 15.30   Saturday Afternoon, 6 October 2012		SaA-3 Trabantenstube
SaA-1 Hall of Ceremonies		SaA-2 Artists' Room
Special Session: Life-cycle cost analysis and risk analysis for buildings	General Session: Tunnel - Infrastructure Systems	Special Session: Fatigue of concrete – experiments, models, applications
Chairs: T. Lützkendorf & S. Geissler	Chairs: A. Rieder & D. Alfreider	Chairs: S. Seitl & Z. Keršner
Life-cycle cost analysis for real estate G. Mendel & U. Käding	Preservation of structural and functional integrity in the interaction of new and existing structures: The case of London Underground's Green Park Station A. Feiersinger, I. Mitsch & P. Spyridis	Fatigue and cumulative damage of concrete grain silos G. Vlaicu & T. Pascu
Green homes through LCC(A)-based planning of multi-functional building skin L. Messari-Becker, K. Bollinger & M. Grohmann	Sustainability of tunnelling based on life-cycles analysis M. Flora & G. Frösch	Damage evolution in concrete under high compressive cyclic loadings A. Rogge & M. Thiele
A comparison of three schools renovated to the Passive House standard G. Kopeinig	The tunnel inspection database of the cold region tunnel for maintenance T. Sato, H. Nishi & A. Sutoh	Experimental study on fatigue durability of RC road bridge decks subjected to chloride induced deterioration I. Iwaki
Impact of semi-transparent building-integrated photovoltaics on building life-cycle cost K. Fath, J. Stengel, F. Schultmann, S. Mende, H.R. Wilson & T.E. Kuhn	Durability of temporary anchors in rock A. Rieder, D. Marini, G. Estrafallaces & A. Strauss	Study on wind-induced fatigue of transmission tower-line in hilly terrain wind field Z. Wang, Z. Li, Ch. Zhang & P. Deng
Risk management and robustness as part of sustainability assessment P. Maydl & D. Schalter	Combining resilience and sustainability in infrastructure projects T. Zinke, P. Bocchini, D.M. Frangopol & T. Ummenhofer	Fatigue crack growth in cement based composites: Experimental aspects S. Seitl, Z. Knésl, H. Šimonová & Z. Keršner
Thinking future with risk management – a substantial tool of life-cycle management E. Waldauer & R. Stempkowski	Progressive collapse of seismic resistant multistory frame buildings M. Ferraioli & A.M. Avossa	Modelling high-cycle fatigue of concrete specimens in three point bending D. Pyl, R. Pukl & J. Cervenka
The use of life-cycle analysis for planning and assessment of construction works: Topics and trends T. Lützkendorf	Energy harvesting for the life-cycle of structures and infrastructures: State of art, recent trends and future developments K. Gkoumas, F. Petriani & F. Bontempi	Numerical modeling of crack growth in quasibrittle structures under compressive fatigue J.-L. Le & J. Eliáš
Findings in life-cycle engineering T. Lützkendorf	An energy harvesting application in a long span suspension bridge F. Petriani, O. De Gaudenzi & K. Gkoumas	Experimental investigation of transitional size effect and crack length effect in concrete fracture C.G. Hoover, Z.P. Bažant, R. Wendner, J. Vorel, M.H. Hubler, K. Kim, M. Gattu, K. Kirane, J. Le & Q. Yu



SaA-4 Radetzkyapp. I	SaA-5 Radetzkyapp. III	SaA-6 Entrée Room
<p><b>Special Session:</b> Structural health monitoring of civil infrastructures in a life-cycle analysis</p> <p><b>Chairs:</b> A.D. Orcesi &amp; A. Courtois</p> <p>Automated geomatic system for monitoring historical buildings during tunneling in Roma, Italy M. Crespi, F. Giannone, M. Marsella &amp; A. Sonnessa</p> <p>In-service inspection of reinforced concrete cooling towers – EDF's feedback A. Courtois, Y. Genest, F. Afonso, E. Diday &amp; A.D. Orcesi</p> <p>Force monitoring with contact free elasto-magnetic sensors on single strands for multi strand anchorages A. Märzluft &amp; W. Brand</p> <p>A vibration-based framework for structural health monitoring of railway bridges W. Guo, A.D. Orcesi, C.F. Cremona, J.P. Santos, S. Yang &amp; L. Dieleman</p> <p>High precision structural health monitoring system using wireless sensor networks A. Araujo, F. Tirado, J. Garcia &amp; J. Blesa</p> <p>Management system for infrastructures at waterways J. Bödefeld &amp; K. Kloé</p>	<p><b>General Session:</b> Inverse analysis: From material parameters identification to reliability assessment / Simulation software tools for virtual reliability and life-cycle testing of concrete structures</p> <p><b>Chairs:</b> D. Lehký &amp; D. Novák</p> <p>Early warning system of roofs overloaded by snow based on measurements and inverse analysis D. Lehký</p> <p>Artificial neural networks in calibration of nonlinear models T. Mareš, E. Janouchová &amp; A. Kucerová</p> <p>Uncertainty in multivariate modelling: Main concepts and an application on fracture mechanics A.E. Tampakopoulos, P. Spyridis &amp; K. Bergmeister</p> <p>Model-free identification of uncertain time-dependent material behaviour for long term structural analysis S. Freitag, W. Graf &amp; M. Kaliske</p> <p>Probabilistic assessment of working life for bridges J. Markova</p> <p>An advanced probabilistic updating algorithm for life-cycle analysis of civil structures J.C. Matos, I.B. Valente, P.J.S. Cruz &amp; L.C. Neves</p> <p>Performance-based retrofit of a prestressed concrete road bridge in seismic area A.M. Avossa, R. Di Camillo &amp; P. Malangone</p> <p>Deterministic versus probabilistic reliability analysis of existing bridge structures C. Unger &amp; M. Empelmann</p>	

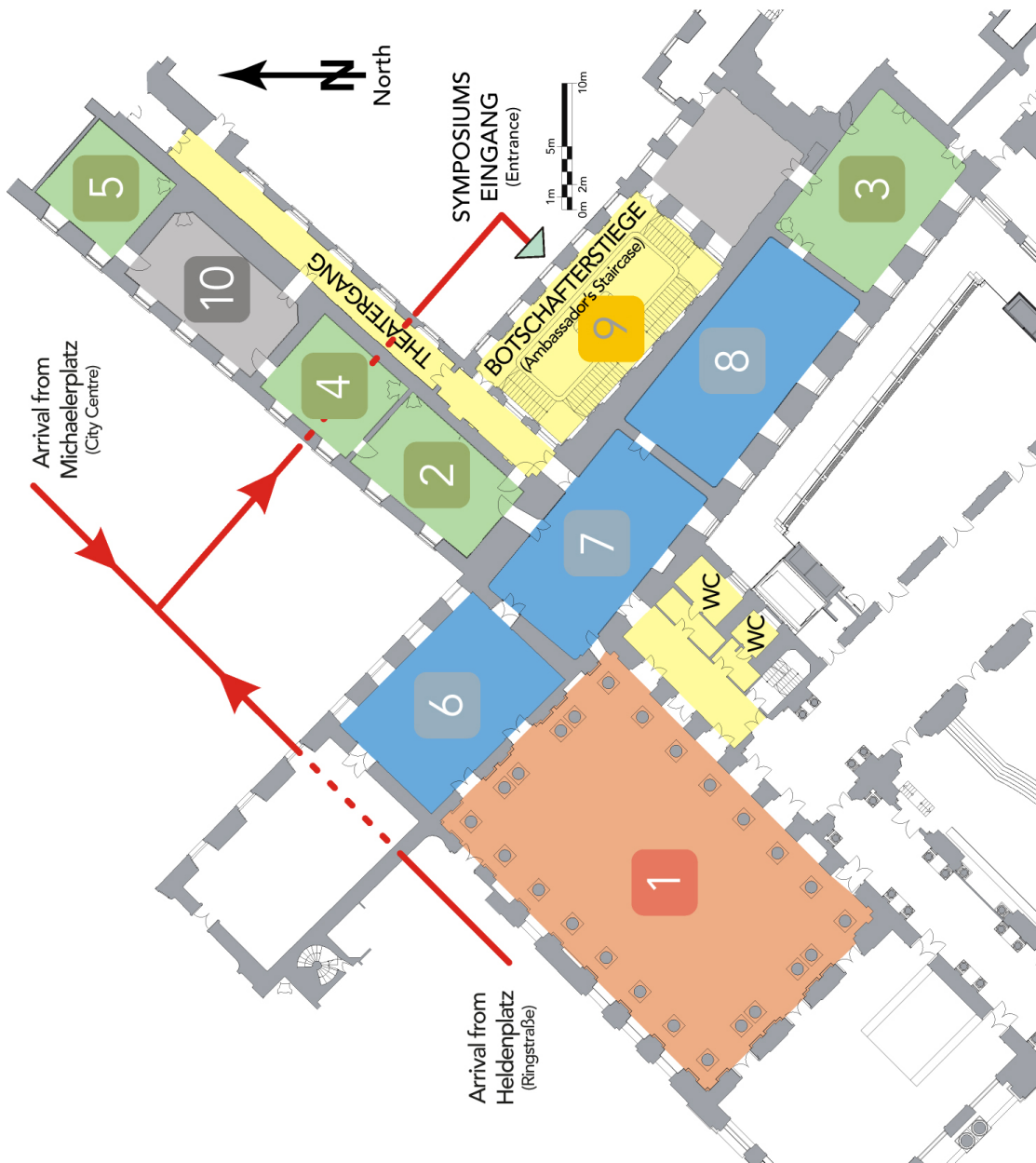


# Symposium Rooms

Third International Symposium on  
Life-Cycle Civil Engineering

Lecture Rooms (Level 1)	
1	Hall of Ceremonies
2	Artists' Room
3	Trabantenstube
4	Radetzkyapp I.
5	Radetzkyapp III.
Break Rooms (Level 1)	
6	Marbel Hall
7	Antechamber
8	Knight's Hall
Registration (Level 0)	
9	Ambassador's Stairs
Slide Centre (Level 1)	
10	Radetzkyapp II.

IALCCE 2012  
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# Exhibition

Exhibition (Level 1)	
<b>7</b>	<b>Antechamber</b>
<b>1</b>	Ernst & Sohn A Wiley Company, Germany
<b>2</b>	T&F - Taylor & Francis Group
<b>8</b>	<b>Knight's Hall</b>
<b>1</b>	IALCCE - International Association for Life-Cycle Civil Engineering
<b>2</b>	PC - Petschacher Consulting
<b>3</b>	CC - Cervenka Consulting
<b>4</b>	HBM - Hottinger Baldwin Messtechniker GmbH
<b>5</b>	AIT - Austrian Institute of Technology
<b>6</b>	RED BERNARD - Bernard Civil Engineering
<b>7</b>	SZ - Schimetta Ziviltechniker GmbH
<b>8</b>	INFAP - Industrial Fibre Applications
<b>9</b>	VCE - Vienna Consulting Engineering



# Gala Evening Program

TIME	EVENT	
19.30 - 20.00	Arrival of Guests	<b>J. HAYDN</b> "Londoner Trio Nr. 1" in C Major HV IV: 1
20.00 - 20.15	Welcome from the Representative of Vienna	
	Welcome from Prof. D.M. Frangopol, President of the IALCCE	
20.15 - 20.30	<b>W. A. MOZART</b> Ouvertüre zu "Die Entführung aus dem Serail"	
	<b>F. KREISLER</b> "Liebesfreud"	
	<b>F. KREISLER</b> "Schön Rosmarin" <i>Violine solo: Martin Zalodek, Mitglied der Wiener Philharmoniker</i>	
	<b>E. STRAUß</b> "Bahn frei", Galopp op. 45	
20.30 - 22.30	Appetizer	
	Opening Gala Evening Representative of the University of Natural Resources and Life Sciences	
	<b>GALA DINNER</b>	
	<b>J. HAYDN</b> "Londoner Trio Nr. 2" in G Major HV IV: 2	
	<b>AWARDS CEREMONY</b> Hosted by Alfredo H.-S. Ang, Honorary President of the IALCCE Accompanied by <b>B. SULZER</b> "IALCCE 2012 Fanfare"	
22.30 - 23.30	<b>CONCERT</b> Cocktail & Dessert	<b>J. STRAUß</b> Ouverture zu "Zigeunerbaron"
		<b>J. STRAUß</b> "Vergnügungszug", Polka schnell
		<b>J. STRAUß</b> "Wiener Blut", Walzer op. 354
		<b>J. FUCÍK</b> Florentiner Marsch, op. 214
		<b>J. GADE</b> Wo ich auch bin, ich denke dein... (Tango)
		<b>J. STRAUß</b> "Mein Herr Marquis...", aus der Fledermaus Sopran: Marta Poliszot
		<b>J. STRAUß</b> "Donauwalzer", op. 314
<b>J. STRAUß</b> "Radetzky Marsch", op. 228		

# Social Program

TIME		3 OCT. (WE)	4 OCT. (TH)	5 OCT. (FR)	6 OCT. (SA)	7 OCT. (SU)
07.00	07.30		Registration	Registration	Registration	
07.30	08.00					
08.00	08.30		Registration	Registration	Registration	
08.30	09.00		Exhibition			
09.00	09.30					
09.30	10.00			Half-Day Panoramic Coach Trip Schönbrunn Palace		Vienna Boys' Choir
10.00	10.30				Half-Day Guided Walk Historical Vienna	
10.30	11.00					
11.00	11.30					
11.30	12.00				Registration	Spanish Riding School
12.00	12.30				Exhibition	
12.30	13.00			Lunch		
13.00	13.30		Lunch	Registration	Lunch	
13.30	14.00		Half-Day Guided Walk Architecture of Vienna	Exhibition		
14.00	14.30					
14.30	15.00					
15.00	15.30	Registration				
15.30	16.00					
16.00	16.30					
16.30	17.00					
17.00	17.30	Registration				
17.30	18.00					
18.00	18.15					
18.15	18.30					
18.30	19.00					
19.00	19.30	Welcome Reception Hall of Ceremonies, Hofburg Palace	Fidelio Vienna State Opera House		Farewell Heuriger Evening, Neustift	
19.30	20.00					
20.00	20.30		Vienna Hofburg Orchestra Redouten Hall, Hofburg Palace	Gala Evening Festival Hall, Rathaus (Town Hall)		
20.30	21.00					
21.00	21.30					
21.30	22.00					
22.00	22.30					
22.30	23.00					
23.00	23.30					

Full Day Trip to Wachau Region  
Full Day Trip to Salzburg

The Symposium Social Program includes a Welcome Reception, a Gala Evening, concerts and operas in some of Vienna's world-renowned venues and a farewell apéritif in one of Vienna's traditional wine taverns (or 'Heuriger'). These events will be offered to all registered Symposium Delegates and Accompanying Persons. An optional Post-Symposium Tour for Delegates and Accompanying Persons, as well as a series of other optional tours for Accompanying Persons during the symposium, will also be organized. For ticket details of all listed events in the Social Program and Post-Symposium Tour, please visit [www.ialcce2012.org](http://www.ialcce2012.org).

### WELCOME RECEPTION

**Hall of Ceremonies, Hofburg Palace**

Wednesday, 3 October 2012 | 19.00 - 21.00

The Welcome Reception will be held in the centuries-old Hall of Ceremonies ('Zeremoniensaal') of the Hofburg Palace. Formerly the throne room of the ruling Habsburg family, the beautifully-ornate Hall of Ceremonies has perennially played host to balls, concerts, exhibitions and other prestigious events.

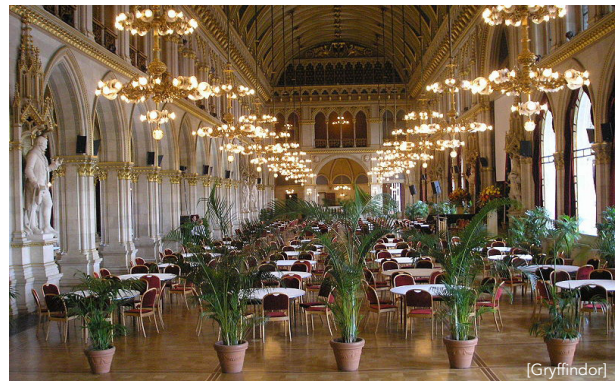


### GALA EVENING

**Festival Hall, Town Hall (Rathaus)**

Friday, 5 October 2012 | ca. 19.30 - 23.30

At the time of its construction in the late 19th century, the Festival Hall ('Festsaal') of Vienna's town hall ('Rathaus') was the largest in the country. With its distinct architectural features such as the vast barrel-type vault ceiling, the Festival Hall is befitting as the venue for our Gala Dinner exclusively for symposium delegates and accompanying parties. The program of the Gala Evening will also include the IALCCE 2012 Awards Ceremony.



**FIDELIO**

**Ludwig v. Beethoven, Vienna State Opera House**  
Thursday, 4 October 2012 | 19.00

The Vienna Opera ('Wiener Staatsoper') is one of the world's most famous opera houses. It was opened in 1869 with the world premiere of Mozart's Don Giovanni. The members of the world famous Vienna Philharmonic Orchestra are recruited from the ranks of the Vienna State Opera Orchestra for the performance of Beethoven's 'Fidelio'.

**VIENNA HOFBURG ORCHESTRA**

**Hofburg, Redouten Hall, Josefplatz**  
Thursday, 4 October 2012 | 20.30

The Vienna Hofburg Orchestra boasts 36 professional orchestra musicians and 6 international vocal soloists. In one of Vienna's most beautiful concert halls, the Vienna Hofburg Orchestra will present the most popular waltz and operetta pieces by Johann Strauss, Emmerich Kalman and Franz Lehar, as well as opera arias and duets by Wolfgang Amadeus Mozart.

**FAREWELL HEURIGER EVENING**

**Fuhrgassl Huber, Neustift**  
Saturday, 6 October 2012 | 18.15 - 21.30

In Austria, the current year's wine is served in the legendary wine taverns (Heuriger), and the Fuhrgassl Huber ranks among the most famous in Vienna. Based in the Neustift district amongst a maze of rustic vineyards, visitors can enjoy the unique Wiener Gemütlichkeit (relaxed, companionable coziness) over a glass of local wine. The Heuriger is also a popular dining venue amongst locals, where guests can enjoy a fine selection of sauerkraut, dumplings and salads and various meats such as barbecued chicken, knuckle of smoked meat, lean loin, rost cumin and neck of pork.

Transport to the Heuriger will be by bus. The meeting point for the bus transfer will take place at 18.15 at the Hofburg Heldenplatz in the 1st district, next to the main entrance of the Österreichische Nationalbibliothek. The bus trip back to Heldenplatz will leave from the Furgassl Huber at 21.15, with an expected arrival time at Heldenplatz of 21.30.



# Accompanying Persons

## HALF-DAY GUIDED WALK

### Architecture of Vienna

Thursday, 4 October, 2012 | ca. 14.00 - 17.30

We discover the first parts of the city center on foot. Our historic journey will bring us closer to modern and ancient buildings, streets, courtyards and churches ranging from the Roman times to the Renaissance. The buildings on the Ringstrasse and the surrounding parks are some of the City's prized jewels, reminding us of Vienna's glorious tradition as a home to talented artists, architects and sculptors.



## HALF-DAY PANORAMIC COACH TRIP

### Vienna and Schönbrunn Palace

Friday, 5 October 2012 | ca. 09.30 - 12.30

Today, we will discover Vienna and its diverse districts. In the comfort of a coach, we will cross the Danube into the modern parts of the city. We will see the Vienna International Center, also known as 'UNO City', the modern 'Gedächtniskirche' (Memorial Church) and the riverside recreational areas 'Alte Donau' and 'Neue Donau'. Then, we'll visit the historical city centre, across the Schwarzenbergplatz and up to the arresting 19th century structure of the Arsenal. The next stop is Belvedere Palace, where we can stretch our legs and enjoy a promenade of the landscaped gardens, never losing sight of the impressive façade of the baroque palace. The tour then takes us to Schönbrunn Palace, the most popular historical building in Vienna. We will tour the opulent State Rooms where we will be immersed into the history of the Habsburg dynasty. The view of the exquisite surrounding gardens will remain an unforgettable memory of this trip.



## HALF-DAY GUIDED WALK

### Historical Vienna

Saturday, 6 October 2012 | ca. 09.30 - 12.30

In a leisurely walk, we will explore the old town of Vienna, famed internationally as the cradle of baroque and classical music. One of the city's most famous inhabitants was none other than Wolfgang Amadeus Mozart, and we will visit his Vienna apartment situated in one of the City's picturesque cobbled streets. Our tour will also take us to the statue of Johann Strauss, situated in Vienna's City Park.





# Post-Symposium

## WIENER SÄNGERKNABEN

### Hofburgkapelle

Sunday, 7 October 2012 | 09.00

The Wiener Sängerknaben ('Vienna Boys' Choir') may be the world's most famous boys' choir. The youngsters are recruited mainly from Austria, but also from many other countries globally. Over the centuries, the choir has worked with many famous composers such as Mozart, Salieri and Bruckner. Interest in this event should be announced to the IALCCE 2012 secretary by 20 September.



## SPANISH RIDING SCHOOL

### Hofburg, Michaelerplatz 1

Sunday, 7 October 2012 | 11.00

Experience the perfection of the various 'High School' lessons including the 'pas de deux' and the 'great school quadrille' which requires 8 stallions. The airs above ground are performed in the classical style of the levade, the courbette and the capriole, and are one of the highlights of the shows.



## FULL DAY COACH TRIP

### Wachau Region

Sunday, 7 October 2012 | ca. 08.00 - 18.00

Through the enchanting Wachau landscape lies Melk Abbey, the most prominent baroque abbey in Austria. Its unique library and the Marble Hall captivate all its visitors. We then board a river boat which sails us past medieval castles, historical villages and vineyards. We'll take a leisurely stroll through the quaint town of Dürnstein, the 'Pearl of the Wachau', before our return trip to Vienna.



## FULL DAY COACH TRIP

### Salzburg

Sunday, 7 October 2012 | ca. 08.00 - 21.00

Two hours west takes us to the city of Salzburg. We get off at Mirabel Palace and stroll on into the world famous Getreidegasse, where we pass Mozart's house of birth. Further highlights are Salzburg's Festival Halls, the Monastery of St. Peter (1696), the oldest restaurant in Central Europe (803 AD), the Salzburg Cathedral and the Imperial Residence.







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