



First International Conference on  
**STRUCTURES AND ARCHITECTURE**  
21-23 July, Guimarães, PORTUGAL



University of Minho  
School of Architecture



Cover

Photographer: Tibor Bognar

Location: Montréal, Québec, Canada

Title: Biosphère Montréal

Date: May 1998

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The symbol of Expo '67, Buckminster Fuller's sphere is a landmark in the history of contemporary architecture and the most important building of its kind in the world. Its structure reproduces more than 97% of a sphere (62.8 metres in height and 76.2 metres in diameter).

The original structure was covered with 1,900 transparent acrylic panels.

The building's complete transparency created an almost invisible barrier between the inside and the outside. In 1976, while the structure was being repaired, a fire broke out and completely destroyed the acrylic skin. Only the tubular frame remained intact.

The outer shell of the Biosphère was awarded to Buckminster Fuller (1895-1983), who called himself a "comprehensive anticipatory design scientist", but the design of the US pavilion's inner structure was given to Cambridge Seven Associates Inc., a group of Harvard University architecture and design professors.

The original inner structure consisted of four large platforms divided into seven levels and connected by escalators, bridges and elevators. During Expo '67, the gigantic structure included a 37.5-metre (123-foot) escalator. The longest escalator ever built, it was the equivalent of eight floors.

In 1990, Environment Canada signed an agreement with the City of Montreal to convert the structure into a site devoted to eco-action. Montreal architect Éric Gauthier won an architectural competition and was commissioned to convert the interior structure in keeping with the original design, in line with Fuller's avant-garde philosophy: seeking maximum efficiency for minimum effort.

Since its opening in 1995, Environment Canada's Biosphère has been a showcase for environmental education. As an Environment Museum, the Biosphère raises the awareness of young people and their families, and the general public about major environmental issues, including those related to water and climate change, and the sustainable development, through exhibitions, interactive activities and multimedia presentations.

# WELCOME TO ICSA2010

Although Architecture and Structural Engineering have both had their own historical development, their interaction has led to the many fascinating and delightful existing structures nowadays. However, there is still the need to stimulate the creative and original design of architectural structures and to persuade architects and structural engineers to further collaborate in this process and to take advantage of constructive principles and aesthetic and static values jointly. Therefore, it was considered appropriate to bring together all of the very best work that has been carried out in the field of structures and architecture during the First International Conference on Structures and Architecture (ICSA2010), held in Guimarães, Portugal, July, 21-23, 2010.

ICSA2010 covered all major aspects of structures and architecture, including comprehension of complex forms, computer and experimental methods, concrete and masonry structures, emerging technologies, glass structures, innovative architectural and structural design, lightweight and membrane structures, special structures, steel and composite structures, the borderline between architecture and structural engineering, the history of the relationship between architects and structural engineers, the tectonic of new solutions, the use of new materials and timber structures, among others.

*Structures and Architecture* contains the lectures and papers presented at ICSA2010. It consists of a book of abstracts and a CD-ROM containing the full texts of the lectures and papers presented at ICSA2010, including the 8 keynote lectures and 249 selected contributions from more than 40 countries.

On behalf of ICSA2010, the chair of the Conference would like to take this opportunity to express his most sincere gratitude to the authors, organizers of mini-symposia and special-seminar to the participants for their contributions, to the members of the Conference Scientific Committee for their work and commitment and to the members of the Local Organizing Committee for the time and effort they have dedicated to make ICSA2010 a successful event.

Last, but not least, our sincere thanks to all the sponsors of ICSA2010, for their willingness to embrace this event from its very beginning.

Paulo J. S. Cruz  
ICSA2010 Chair

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TheStructuralEngineer.info Website

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### GENERAL INFORMATION

The ICSA2010 will be held at the Convention Centre of the University of Minho - Campus of Azurém, Guimarães, Portugal.

The city of Guimarães is like no other city in Portugal. Its past is so intimately intertwined with the History of Portugal that it is commonly and proudly referred to as the Cradle of the Nation.

The Historic Centre of Guimarães has remained basically unchanged since the 15th century and was declared a World Heritage Site in 2001 by UNESCO, due to its Middle Age historical monuments. Guimarães was chosen by the Portuguese government to be the European Capital of Culture in 2012.

### PROCEEDINGS

The book of abstracts and a CD-ROM will be distributed with registration's materials at the Conference.

### SCHEDULE

Onsite registration fees are:

600€ - Authors and participants

300€ - Students

250€ - Accompanying Persons

The registration fees includes: Conference attendance, the Book of Abstracts and the CD-ROM Proceedings, coffee-breaks, gala-diner (except for students) and welcome reception.

### OPENING CEREMONY

Time: Wednesday, July 21, 9:00 – 9:30

Place: Main Auditorium

### CLOSING CEREMONY

Time: Friday, July 23, 18:30 – 19:00

Place: Main Auditorium

### KEYNOTE LECTURES

Ian Ritchie, Ian Ritchie Architects Ltd, London, England

**“Architectural values, altruism and innovation in a changing world”**  
(Wednesday, July 21, Main Auditorium)

Julio Martínez Calzón, MC2, Madrid-Spain

**“Treatment of the form in structural engineering”**  
(Wednesday, July 21, Main Auditorium)

Bjørn N. Sandaker, Oslo School of Architecture and Design, Oslo, Norway

**“An ontology of structured space”**  
(Thursday, July 22, Main Auditorium)

António Reis, Technical University of Lisbon / GRID, Lisbon, Portugal

**“The architecture of special structures”**  
(Thursday, July 22, Main Auditorium)

Yves Weinand, EPFL, Lausanne, Switzerland

/ Bureau d'études Weinand, Liège, Belgium

**“Innovative timber constructions”**  
(Thursday, July 22, Main Auditorium)

Angus MacDonald, School of Arts, Culture and Environment, Edinburgh, Scotland

**“The changing relationship between architects and structural engineers”**  
(Friday, July 23, Main Auditorium)

André Tavares, University of Minho, Guimarães, Portugal

**“Concrete immaterial structures”**  
(Friday, July 23, Main Auditorium)

Robert Off, Anhalt University of Applied Sciences

/ I.M.S .e.V, Bobingen, Germany

**“New trends on membrane and shell structures – Examples of bat-sail and cushion-belt technologies”**  
(Friday, July 23, Main Auditorium)

### ICSA2010 SPECIAL SEMINAR

ThM, ThA & ThE - 1

#### **Megastructures - Architecture\_Play\_Structure**

The seminar will focus on some megastructural proposals, designed in the 60s and 70s of the twentieth century, in order to discuss the social and cultural context that stimulated, then, a playful and expressive relationship between Architecture and Structure: from quotidian experience to radical utopia. In this sense, the symposium will not only count on the testimony of notorious authors of some of those proposals (Gian Piero Frassinelli, Dennis Crompton, Fumihiko Maki and Yona Friedman), but also on the vision of important researchers lately specialized on the matter (Mary Louise Lobsinger, Dominique Rouillard, Paul E. Kassabian and Simon Sadler).

Coordinated by:

Nuno Grande

Department of Architecture, University of Coimbra, Portugal;

Pedro Bandeira

School of Architecture, University of Minho, Portugal.



**ICSA2010 MINI-SYMPOSIA**

WeM 1, WeA 1 & WeE 1

**Mini-Symposium on "Tectonics" in Architecture:  
Between Aesthetics and Ethics**

The mini-symposium will provide a forum for the presentation of fundamental, theoretical, and practical aspects of the art of building, focusing the attention on the relations among mechanics, mathematics, structural and architectural design. The symposium is expected to bring together researchers (architects, engineers, mathematicians) for dealing with the influence of the scientific and technical knowledges on the architectonic culture, in order to underline the role played by the structural conception in designing processes during the centuries. The symposium will also discuss developments concerning the importance of the Vitruvean firmitas, pointing out the risks arising when the structural instances are neglected.

Although not limited to those topics the content of sessions will emphasise the following themes: theoretical issues; calculus and algorithms in architecture; various approaches to structural complexity.

Coordinated by:

Patrizia Trovalusci & Lucio Valerio Barbera  
Sapienza University of Rome, Rome, Italy.

WeM 2, WeA 2 & WeE 2:

**Mini-Symposium on Transparent Structural Materials - Glass and Plastic**

The use of glass and transparent plastic material in modern architecture continues to gain in importance. To combine architectural and structural demands they can be used as structural elements. Therefore it is very important to know the detailed mechanical behaviour of the materials and to explore appropriate joining technologies. Based on this knowledge architectural planning and structural design can be merged. Composite elements and hybrid structures that consist of transparent and conventional building materials can also play an important role in the design of architectural structures.

The design parameters and methods for the successful use of transparent thermoplastics and glass can be presented in this Mini Symposium as well as their connections and detailing. The presentation scan also includes life cycle and safety considerations.

Coordinated by:

Johann-Dietrich Wörner  
University of Darmstadt, German Aerospace Center, Germany  
Konrad Bergmeister  
University of Natural Resources and Applied Life Sciences,  
Vienna, Austria  
Jens Schneider  
University of Darmstadt, Germany

FrM 1, FrA 1 & FrE 1

**Mini-Symposium on Timber Construction**

The mini-symposium will address contemporary and emerging issues related to using timber as a construction material that suits the needs of 21st century societies. Although not limited to those topics the content of sessions will emphasise the following themes: use of timber in tall buildings; cross-laminated-timber - a new design principle and modelling the performance of timber structures.

Coordinated by:

Ian Smith  
University of New Brunswick, Canada  
Gerhard Schickhofer & Thomas Bogensperger  
Graz University of Technology, Institute for Timber Engineering and Wood Technology, Austria  
Jochen Köhler  
Swiss Federal Institute of Technology ETH, Switzerland.

**PRESENTATION GUIDELINES**

The presentations should take 15 minutes plus 5 minutes for audience questions. This schedule will be strictly enforced.

Each paper session will be attended by a chairman, responsible for monitoring the time and enlightening the author, through a signal, once there are 5 minutes left to the end of the presentation.

Personal Computer (MS Windows) with Power Point will be available at each Session room.

No personal computers will be allowed to connect to the LCD projector to make presentations.

Please make sure to bring your presentation not only on USB-stick but also on CD-ROM (floppy disks cannot be used!).

Authors are requested to provide their presentation files at the Conference Desk. Please make sure no Asian fonts are used or, if those fonts are necessary, all fonts are embedded in the Power Point file.

All speakers are kindly requested to strictly observe the allocated presentation time.



## SOCIAL PROGRAM

The social program includes:

### Welcome Reception

Tuesday, July 20, 20:00 - Alberto Sampaio Museum

This museum was created in 1928 to house the collections of the Chapter House of N. S. da Oliveira and other churches and convents in the Guimarães region.

It is settled in a historical centre that is patrimony of the humanity, where, in the 10th C., the countess Mumadona ordered the building of a monastery. In the 11th C. that monastery was replaced by a college, under the invocation of St. Mary's and later under the invocation of Our Lady of the Olive Tree.

The Alberto Sampaio Museum holds collections of great interest from which the sculpture collection, represented by limestone and wooden statues from the 13th C. up to the 18th C. are part of. The goldsmithery collection composed of liturgical utensils - cups, patens, custodies, crosses and reliquaries - of varied typology and functions, which give the visitor the opportunity to keep track of evolution and likings, from the beginnings of the 12th C. to the end of the 19th C.

### Gala Dinner

Thursday, July 22, 20:00 - Municipal Stadium, Braga

The Braga Municipal Stadium is a football stadium built in 2003 as the new home for local club SC Braga, and as a 2004 UEFA European Football Championship venue. Designed by the Portuguese architect Eduardo Souto de Moura, it is often considered one of the most original and beautiful stadiums in the world. The Financial Times, states that: "There has been nothing in this country to match the architectural delight of Eduardo Souto de Moura's stadium for Braga in Portugal, a breathtaking arena carved into the side of a rock face on the site of a former quarry."

Featuring **Banda Plástica de Barcelos** - A Portuguese Folk Band created in 1976. We can find an obvious resemblance between the elements of the band and the handicraft abobe dolls from Barcelos - and **Tuna Académica do Minho** - A University Tuna is a musical group made up of university students. Tuna Académica do Minho was created in 1990. As far as the music is concerned, the main instruments used are the guitar, mandolin, the bandurria and the tambourine.

All registered participants and accompanying persons are welcome to the Welcome Reception and Gala Dinner.

Registration as 'Student' does not include the gala dinner. Additional tickets for Gala Dinner for registrants with student fee are available through the registration desk (96.00 €)

## ACCOMPANYING PERSON'S PROGRAM

### 1) Guimarães

(half day) - July 21st

Visit to one of the most beautiful and historical cities of Portugal, Guimarães - the Nation's birthplace.

Surrounded by parks and a 15th century Palace, stands the Castle of Guimarães, which will be our first stop. Simple, but yet a remarkable site, a place full of story. It was here that D. Afonso Henriques was born in the 12th century from the Count

Henrique and his wife D. Teresa. The future king was baptized in the Romanesque chapel of São Miguel outside the castle gates and close to the Ducal Palace.

Continuing with a visit to the 15th century Palace of the Dukes of Bragança, a massive and imposing building with distinctive turrets and brick chimneys. It was built in 1401 by the first Duke of Bragança and rehabilitated in the last century.

The tour proceeds for a guided visit to the historic centre of Guimarães classified as World Heritage by UNESCO, with its medieval streets layout which is lined with historic buildings everywhere you look. Stop at Largo da Oliveira one of the central points. Free time for a calm stroll.

### 2) Braga and Barcelos

(full day) - July 22nd

Departure from Guimarães for a visit to Braga, probably the main religious center in the country, Braga is known for its baroque churches, magnificent 18th century houses and elaborate gardens and squares. Known, in the Roman era as "Bracara Augusta".

This visit will provide the general idea of the most important religious and architectural monuments, such as the Sé, the most impressive church which has several styles, from Roman to Baroque. Panoramic visit passing through the City Hall, the Palace of "Raio", the Convent of "Populo", and visit to "Bom Jesus" do Monte (by funicular).

Free time at Bom Jesus do Monte and Lunch on a Restaurant with a panoramic view over Braga.

After lunch the tour proceeds to Barcelos - one of the most emblematic cities of popular Minho art. On your stroll around Barcelos you will find the 18th-century churches of Bom Jesus da Cruz and Nossa Senhora do Terço. Also opportunity for a visit to the Ceramics Museum. On the Handicraft Centre, you can get a good general view of Minho arts and crafts. The brightly-coloured Barcelos Cock is the most representative of all the pieces produced here, but one should not forget the brass bands and the figures depicting the region's customs and habits. Return to Guimarães.

### 3) Ponte de Lima and Viana do Castelo

(full day) - July 23rd

Visit to Ponte de Lima a Portuguese village with its medieval architecture and surrounded by a beautiful green area.

Ponte de Lima has a beauty and very specific and natural environment. It is situated in the middle of the Ribeira of Lima valley. In the Middle Age it was a fortified village with walls 600 meters long, 10 towers, 2 turrets and 6 entrances. In 1995 Ponte de Lima won the European Grand Prize of Tourism and Environment.

We will then proceed to the town of Viana do Castelo, a XII century town (founded 1258), where the modern town has grown near the river Lima. We can visit the Cathedral and you can't miss the neo-Byzantine Church of Santa Luzia, located on top of the Santa Luzia hill with a breathtaking view of Viana do Castelo, the river Lima estuary and the sea. The city is a living museum, but it is also the capital of the rich Minho folklore, with an important handicraft industry.

Free time for lunch on the city center. We can also visit the shipyards at Viana do Castelo in activity since 1944, being the major Portuguese Shipbuilder (to be confirmed). Return to Guimarães.

**Tuesday, July 20, 2010**

15:00 – 19:00 Registration (Lobby of the Main Auditorium)

20:00 Welcome Reception (Alberto Sampaio Museum - Guimarães)

**Wednesday Morning (WeM), July 21, 2010**

8:00- 9:00 Registration (Lobby of the Main Auditorium)

9:00- 9:30 Opening Ceremony (Main Auditorium)

9:30 – 10:30 **Keynote Lectures** (Main Auditorium) **Ian Ritchie:** Architectural values, altruism and innovation in a changing world  
**Julio Martínez Calzón:** Treatment of the form in structural engineering

Chairman: F. Branco

10:30 – 11:00 **Coffee Break** (Lobby of the Main Auditorium)

11:00 – 13:00 **Concurrent Technical Sessions:** WeM 1 to WeM 5

**WeM 1 – Main Auditorium**

Mini-symposium  
"Tectonics" in Architecture: Between Aesthetics and Ethics (1): The arena

Chairman: P. Trovalusci

**The morphogenesis of shell structures: a conceptual, computational and constructional challenge**

*M.A. Chiorino & M. Sassone*

**Topology Optimization in Architecture May It Be a Design Tool?**

*L. Frattari, R. Vadori, R. D'Aria & G.Leoni*

**On the optimal design of shape resistant structures**

*L. Consolini, G. Della Puppa & S. Lenzi*

**Structural optimization vs. shape design**

*P. Trovalusci & A. Tinelli*

**Geometrical indeterminacy as a way to structural and architectural performance**

*C. Padoa-Schioppa & S. Pollak*

**WeM 2 – Room B1.14**

Mini-symposium  
Transparent Structural Materials - Glass and Plastic (1): Glass

Chairman: J. Schneider

**Structural transparency**

*J.-D. Wörner, J. Stahl & C. Eckhardt*

**Bent architectural glasses: production, properties, structural behaviour**

*J. Schneider & S. Schula*

**Detailing with structural glass and steel**

*J. Kooymans*

**Shear behaviour of point fixed glass panels used for building stabilization**

*D. Mocibob, M. Crisinel& J.P. Lebet*

**Concept, testing and realisation of transparent and sustainable glass double layer grids**

*B. Weiler, S. Reich & J. Ebert*

**Elastic strain energy and failure behaviour of glass elements**

*F. Bos*

**Two spectacular facades with corrugated glass in Porto and Antwerp and an all glass cube in Haarlem (NL)**

*R. Nijse*

**WeM 3 – Room B1.15**

**Steel Structures (1)**

Chairman: L. Simões da Silva

**The steel construction of XIXth century: an exceptional case study**

*C. Bertolini-Cestari & S. Invernizzi*

**Steel interventions in preexistent buildings: case studies on interfaces**

*C.A. de Moraes & L.F.L. Ribeiro*

**Evolution of Spanish industrialized steel technologies for school buildings**

*O. Pons*

**Steel detailing and collaboration: a global perspective**

*K. Simonen*

**Steel tubular structures and connections in architecture of China – New application and technologies**

*W. Wang*

**WeM 4 – Room B1.16**

**Complex Forms and Form-finding (1)**

Chairman: M. Eekhout

**Process and form**

*M. Fineout, R. Stephens & M. Bacellar*

**Form and structure in engineering and visual arts**

*J.M. Songel*

**Form and structure, the teamwork between Arne Jacobsen and M. Folmer Andersen**

*Y. Ortega Sanz*

**Free-form design: from faceted to smooth double-curvature envelopes**

*N. Baldassini & J. Raynaud*

**Origami – geometry of folded plate structures**

*H. Buri & Y. Weinand*

**Engineering free form: Spanish Pavilion for the Expo 2010 in Shanghai**

*J. Martínez-Calzón & C. Castanon*

**WeM 5 – Room B1.17**

**Innovative Architectural and Structural Design (1)**

Chairman: P.H. Kirkegaard

**Engineering stadia roof forms**

*F. McCormick*

**Cable stayed cathedral ceiling**

*T. Sass*

**Designing light columns: a quantitative tool**

*T. Vilquin*

**Direct and reverse shaping structures according to the flow of forces**

*R. Tarczewski & W. Bober*

**Dual structures towards kinetic adaptability for earthquake resistance**

*T.L. Sophocleous & M.C. Phocas*

**New Museum of Contemporary Art: Challenges and design**

*D. Meštrović & T. Landeka*

## Wednesday Afternoon (WeA), July 21, 2010

13:00 – 14:30

Lunch (Restaurant of the University)

14:30 – 16:30

Concurrent Technical Sessions: WeA 1 to WeA 5

### WeA 1 – Main Auditorium

Mini-symposium  
**“Tectonics” in Architecture: Between Aesthetics and Ethics (2): The heritage of the past**

Chairman: G. Rega

The tectonic of modern materials: alternatives from Le Corbusier's work

V. Riso

The methods and spatial sensitivity of Italian architects and engineers in the fifties and sixties

A. Muntioni

The P.L. Nervi structural route: from intuition to computation through geometry

F. Romeo

Materials, forms and abstract methods in the work of Riccardo Morandi

L. Sampò

The structural control of architecture in two works of Giuseppe Damiani Almeyda

C. Tocci

### WeA 2 – Room B1.1.4

Mini-symposium  
**Transparent Structural Materials - Glass and Plastic (2): Plastic**

Chairman: J. Schneider

Transparent glass-Vierendeel roof

B. Weller, S. Reich & J. Ebert

Fly bubble, fly

B. Franken

Plastic materials in façade applications

T. Ries

Detailing of structural elements with thermoplastics

C. Eckhardt & J. Stahl

Plexiglas spatial experiment – 50 years of the Bauhaus

T. Boettger

Innovations in PMMA design

J. Stahl & C. Eckhardt

### WeA 3 – Room B1.1.5

Steel Structures (2)

Chairman: C. Bertolini Cestari

Tubular structure for the “nearly ninety” dance scenography

J. Martínez-Calzón & B.M. Encinas Maldonado

Masts and towers

U. Stottrup-Andersen & M.G. Nielsen

Transformable architectural structures

N. Afshar & M. Hosseyni-Amir

Behaviour of steel shear wall systems with cut-outs and stiffeners

A. Maleki, T. Donchev, H. Hadavinia & A. Cheah

Improved design model for thin-walled cold-formed purlins continuously connected to sandwich panel roofing

M. Georgescu & V. Ungureanu

Optimizing of human induced vibration performance of lightweight steel floors

W. Rack & J. Lange

### WeA 4 – Room B1.1.6

Complex Forms and Form-finding (2)

Chairman: F. Bos

Evolutionary form-finding – conception of effective structures by means of interactive patterns

J. Stratil

Optimization of structural form using a genetic algorithm to search associative parametric geometry

P. von Buelow, A. Falk & M. Turrin

From free-form structures to natural lighting – how engineering innovation pushes the limits of architecture

V. Schmid

An interactive surface model for timber construction

G. Gouaty, J. Stotz, Y. Weinand & E. Tosan

Canadian Museum for Human Rights, Winnipeg

B. Charnish & N. Erakovic

Following natural patterns to unite architecture and structure

P. Shirazpur, G. Yunesi & S. Yaghmaeian

### WeA 5 – Room B1.1.7

Innovative Architectural and Structural Design (2)

Chairman: R. Nijse

Eladio Dieste; ‘resistance through form’

R. Pedreschi & D. Theodossopoulos

Architectural structural schemes

N. Baldassini

Heinz Isler's shells – a lasting legacy

J. Chilton

Myron Goldsmith: the development of the diagonally braced tube

M. Neveu & E.P. Salliklis

Narrative structures

E. Castro e Costa

Structural design process of the doubly curved Heyssel canopy

K. Verbeeck & L. Ney

**Wednesday Evening (WeE), July 21, 2010**

16:30 – 17:00 Coffee Break (Lobby of the Main Auditorium)

17:00 – 19:00 Concurrent Technical Sessions: WeE 1 to WeE 5

WeE 1 – Main Auditorium		WeE 2 – Room B1.14		WeE 3 – Room B1.15		WeE 4 – Room B1.16		WeE 5 – Room B1.17	
<p>Mini-symposium "Tectonics" in Architecture: Between Aesthetics and Ethics (3): Theoretical issues and ideas for future developments</p> <p>Chairman: M.A. Chiorino</p> <p>Nonlinearity in architecture versus science: borrowing the lexicon of complexity or exploiting its powerfulness? <i>G. Rega &amp; V. Settini</i></p> <p>Towards an ethic of construction: the structural conception and the influence of mathematical language in architectural design <i>P. Trovalusci &amp; R. Paneli</i></p> <p>Structural design in the architectural design process: Toyo Ito. <i>C. Gamboni</i></p> <p>Stone-masonry new constructions: science and history in the service of beauty and environment <i>G. Salerno, G. Formica, S. Gabriele &amp; V. Varano</i></p> <p>An eco-design-oriented multidisciplinary approach in industrial design <i>L. Frattari, R. Vadori &amp; R. D'Alia</i></p>	<p>Mini-symposium Transparent Structural Materials - Glass and Plastic (3): Hybrids</p> <p>Chairman: J. Schneider</p> <p>Damages in Glass/Plastic- and Hybridstructures and respective Conclusions <i>J. D. Wörner</i></p> <p>High-performance laminated glass for structural efficient glazing <i>I. Stelzer</i></p> <p>Scaling up SentryGlas-laminated reinforced glass beams <i>P.C. Louter, J. Belis &amp; F.A. Veer</i></p> <p>Hybrid structural elements made of glass and polycarbonate <i>B. Weller &amp; K. Härth</i></p> <p>Adhesively bonded hybrid steel-glass beams <i>M. Netusil &amp; M. Eliasova</i></p> <p>Development of a super slim façade system for in Holland Polytechnic, Delft <i>M. Eekhout &amp; P. van de Rofften</i></p>	<p>Steel Structures (3)</p> <p>Chairman: O. Pons</p> <p>Carrasco International Airport. Architects, engineers and steel structure <i>H.M. Ruffo &amp; J. Gomez</i></p> <p>Design of cold-formed steel curved panels <i>P. Casariego, M. Casafont, M. Ferrer &amp; F. Marimón</i></p> <p>Tubular structures for the Seville April Fair. A complex geometry exercise <i>M.T. Rodriguez-León, F. Escrig-Pallarés &amp; J. Sánchez-Sánchez</i></p> <p>Stability of single layered grid shells with various connectors <i>K.J. Hwang &amp; J. Knippers</i></p> <p>Update of steel connection data bank <i>M. Komuro, N. Kishi &amp; W.F. Chen</i></p> <p>Case Study: The supporting steel structure of the ice rink – city of Tg. Mures, Romania <i>Z. Nagy C. Câmpian, M. Cristutiu &amp; I. Benke</i></p>	<p>Interdisciplinary Work &amp; Educating Architects and Structural Engineers (1)</p> <p>Chairman: B. Sandaker</p> <p>Teaching structures to architecture students: Examples from bridge design <i>A. Berk &amp; A.I. Unay</i></p> <p>Educating structural engineers and architects together at the University of Sheffield – 10 years on <i>J.B. Davison, A. Tjyas, O. Popovic-Larsen &amp; T. Carter</i></p> <p>A case study on collaboration within multidisciplinary teamwork <i>A.S. Dederichs, J. Karishoj &amp; K.D. Hertz</i></p> <p>Let's (re)start from the beginning: Structures and architecture - Back to school <i>R. Rapaport &amp; R. Frances</i></p> <p>Breaking stuff: A no frills approach to haptic learning in structures classes <i>K. Dong &amp; T. Leslie</i></p> <p>Inter-active "self-learning" cost estimation assistant for the design of "form-active" structures <i>R. Wehdorn-Rothmayr &amp; N. Kim</i></p>	<p>Innovative Architectural and Structural Design (3)</p> <p>Chairman: D. Mocllob</p> <p>Structural design procedures to support the development of innovative architectural structures <i>S.G. Reid</i></p> <p>Structural robustness as an innovative design concept <i>M. Sykora &amp; M. Holicky</i></p> <p>On deployable reciprocal frames: from the mathematical description to the architectural applications <i>M. Sassone &amp; D. Parigi</i></p> <p>Early Christian Cemetery Complex Sopiana/Pécs Hungary <i>T. Molnár &amp; B. Bachmann</i></p> <p>Filigree constructions vs solid constructions. The relationship between structure and architecture in the contemporary age <i>R. Corrao &amp; L. Pastore</i></p> <p>Structural design of the Rogier conic shell canopy <i>K. Verbeeck &amp; L. Ney</i></p>					



## Thursday Morning (ThM), July 22, 2010

8:00- 8:30 Registration (Lobby of the Main Auditorium)

8:30 – 10:00 **Keynote Lectures** (Main Auditorium) **Björn N. Sandaker:** An ontology of structured space  
**António Reis:** The architecture of special structures  
**Yves Weinand:** Innovative timber constructions

Chairman: J. Martínez Calzón

**Coffee Break** (Lobby of the Main Auditorium)

**Concurrent Technical Sessions:** ThM 2 to ThM 5

10:30 – 13:30 **Special Seminar: ThM 1**

### ThM 1 – Main Auditorium

Special Seminar

**Megastructures: Architecture\_Play\_Structure (1)**

Chairmen: N. Grande & P. Bandeira

*The seminar will debate some megastructural proposals, designed in the 60s and 70s, in order to discuss the social and cultural context and the playful relationship between Architecture and Structure*

**Dennis Crompton**  
(Archigram)

**Gian Piero Frassinelli**  
(Superstudio)

**Fumihiko Maki**  
(Japanese Metabolist)

**Yona Friedman**  
(Ville Spatiale)

**Debate**

*After the conference a short book on Megastructures will be published, as a testimony of this memorable meeting between architects and architectural researchers*

### ThM 2 – Room B1.14

**Tall Buildings**

Chairman: A. Reis

**Structures and architecture in tall buildings**  
K.S. Moon

**Torre Reforma – an innovative tower design in Mexico City**  
D.N. Grant, R. Pittella, M. Tavolaro & I. Kourakis

**Zeroero tower for the new Telefónica headquarters in Barcelona**  
J. Martínez-Calzón & L. Ceriani

**Optimum design of steel diagrid structures for tall buildings**  
K.S. Moon

**Residential and tertiary complex “La Pallaresa” in Barcelona**  
J. Martínez-Calzón & B. Bailesteros

**The concept of continuity and the tectonics of non standard architecture**  
C. Silvestri, S. Bullo & R. Di Marco

### ThM 3 – Room B1.15

**Tectonics**

Chairman: Y. Riso

**Tectonic structures: platforms and clouds**  
J.J. Ferrer-Forés

**Performative Tectonics**  
M. K. Holst, P.H. Kirkegaard & M. Mullins

**Tectonic theory and practice: interiority in the future prefab home**  
M. Frier, A.M. Fisker & P.H. Kirkegaard

**On detailing in contemporary architecture - a discussion of architectural quality**  
C. Kristensen & P.H. Kirkegaard

**Nature and structural design in architecture**  
A. Davico & P. Mendonça

### ThM 4 – Room B1.16

**Timber Structures (1)**

Chairman: E. Karacabeyli

**Structural timber fabric: Textile principles on building scale**  
M. Hudert & Y. Weinand

**Improving the system of floor slabs of Tji beams with the incorporation of a decorative ceiling finish**  
M. C. Fernandez-Cabo

**Case study of a large lattice truss timber structure of an industrial building**  
C. Molins

**The use of structural timber in designing sustainable rainscreen façades**  
K. Vasilikou

**Structural assessment and reinforcement of ancient timber trusses**  
M. Esteban, F. Arriaga, G. Iniguez & I. Bobadilla

**Interdisciplinary form finding in the development of a sustainable emergency shelter**  
R.M. Arenas & E.P. Saliklis

### ThM 5 – Room B1.17

**Interdisciplinary Work & Educating Architects and Structural Engineers (2)**

Chairman: A Macdonald

**Collaborative teaching to create integrated building envelopes**  
K. Dong & J. Doerfler

**Get the form Right! Teaching structural design to architects**  
R. J. Dermody

**An equilibrium approach on a structural scale to structural design**  
D. Zastavni

**The interdisciplinary design studio: Understanding collaboration**  
K. Dong & J. Doerfler

**Updating the architectural and engineering curricula for the integrated age**  
P. Kassabian & A. Watson

### ThM 6 – Room B1.13

**Steel Structures (4)**

Chairman: M Crisinel

**Reliability assessment of industrial heritage structures and application to a light-weight steel roof**  
M. Sykora, M. Holicky, K. Jung, J. Markova, K. Kvaal & T.K. Thiis

**Robustness performance of seismic resistant building frames under abnormal loads**  
F. Dinu, D. Dubina & A. Ciutina

**Elasto-plastic FE analysis on hysteretic moment-rotation behavior of top- and seat-angle connections**  
N. Kishi, M. Komuro & W.F. Chen

**Mechanical behaviour of a ferritic stainless steel under simple and complex loading paths**  
B. Rossi & J.-P. Jaspart

**Analysis of some selected types of joints in lattice structures**  
V. Kvočák, P. Beke & N. Hocová

**“Affordable Houses: Architectural concepts of a modular steel residential house”**  
V. Murtinho, A. Correia, H. Ferreira, L. Simões da Silva, H. Geriáso, C. Rebelo, A. Santiago, P. Santos, D. Mateus & C. Rigueiro

**Thursday Afternoon (ThA), July 22, 2010**

12:30 – 14:00 Lunch (Restaurant of the University)  
 14:00 – 16:00 Concurrent Technical Sessions: ThA 2 to ThA 5  
 15:00 – 16:00 Special Seminar: ThA 1

ThA 1 – Main Auditorium		ThA 2 – Room B1.14		ThA 3 – Room B1.15		ThA 4 – Room B1.16		ThA 5 – Room B1.17	
Special Seminar <b>Megastructures: Architecture_Play_Structure (2)</b> Chairmen: N. Grande & P. Bandeira	<i>The seminar will debate some megastructural proposals, designed in the 60s and 70s, in order to discuss the social and cultural context and the playful relationship between Architecture and Structure</i>	<b>Bridges (1)</b> Chairman: A. Nussbaumer	<b>Designing bridges: structure, architectural concept and aesthetics</b> A. Adão da Fonseca	<b>Membranes and Tensile Structures</b> Chairman: R. Off	<b>'Membranes' in light weight and membrane structures</b> S. Patil & S. Lele	<b>Timber Structures (2)</b> Chairman: M. Piazza	<b>New joint design for the improvement of steel rods glued-in timber using an adhesive bulb</b> J. Estévez, D. Otero, E. Martín & J.A. Vázquez	<b>Affordable Houses and Sustainable Buildings</b> Chairman: K. Myhre	
<b>Dominique Rouillard</b> (Cedric Price's Fun Palace)		<b>How to win at bridge</b> C.M. Bednarski	<b>Low-span lightweight membranes in housing - environmental and structural potentialities</b> P. Mendonça	<b>Architectural and structural comparison of South American and European Timber Frame Structures</b> V. Rodríguez, D. Cizmar & V. Rajcic	<b>Architectural and structural comparison of South American and European Timber Frame Structures</b> V. Rodríguez, D. Cizmar & V. Rajcic	<b>Affordable houses (Part II): Functional, structural and technological performance</b> P. Santos, D. Mateus, L. Simões da Silva, C. Rebelo, H. Gervásio, A. Correia, H. Ferreira, A. Santiago, V. Murtinho & C. Rigueiro	<b>Design strategies for structure as in integrating framework</b> H. Giles		
<b>Marie-Thérèse Stauffer</b> (Archizoom)	<i>After the conference a short book on Megastructures will be published, as a testimony of this memorable meeting between architects and architectural researchers</i>	<b>Bridges: Architecture or just aesthetics?</b> J. Tervaoja	<b>Redefinition of architecture by means of pneumatic principles</b> M. Asefi & S. Marzban	<b>Constantino de Vasconcelos and quinchá architecture in Spanish Colonial Peru</b> H. Rodríguez-Camilloni	<b>Constantino de Vasconcelos and quinchá architecture in Spanish Colonial Peru</b> H. Rodríguez-Camilloni	<b>Innovative sustainable steel framing based affordable house solution for continental seismic areas</b> D. Dubina, V. Ungureanu, A. Ciutina, M. Mutiu & D. Grecea	<b>Design strategies for structure as in integrating framework</b> H. Giles		
		<b>To be or to do; a study of architects' and engineers' contributions to bridge design</b> B. Manum & B.N. Sandaker	<b>Matrix, barrier of silence</b> A.P.H.W. Habraken	<b>Modelling of multi layer beam with inter-layer slips</b> J. Natterer & Y. Weinand	<b>Modelling of multi layer beam with inter-layer slips</b> J. Natterer & Y. Weinand	<b>Barriers to the implementation of sustainable structural materials in green buildings</b> C. Griffin, C. Knowles, C. Theodoropoulos & J.H. Allen	<b>Design strategies for structure as in integrating framework</b> H. Giles		
		<b>Challenges of bridge design and construction in urban areas</b> V. Seilverstov & O.I. Chemerninsky	<b>'Cables' in light weight and membrane structures</b> S. Patil & S. Lele	<b>Numerical analysis of metal joints glued in timber pieces</b> E. Martín-Gutiérrez, J. Estévez, D. Otero & J.A. Vázquez	<b>Numerical analysis of metal joints glued in timber pieces</b> E. Martín-Gutiérrez, J. Estévez, D. Otero & J.A. Vázquez	<b>Low-cost sustainable construction technology for autonomous buildings</b> J. Goggins & D.Gavigan	<b>Design strategies for structure as in integrating framework</b> H. Giles		
		<b>Tensile structures: design process</b> E.F. Nunes & J.B.M. Sousa-Junior	<b>Tensile structures: design process</b> E.F. Nunes & J.B.M. Sousa-Junior	<b>Assessment of seismic behaviour of traditional timber frame Ottoman Houses: Frame tests</b> Y.D. Aktaş Erdem, U. Akyüz, B. Erdil, A. Türer & N. Şahin Güçhan	<b>Assessment of seismic behaviour of traditional timber frame Ottoman Houses: Frame tests</b> Y.D. Aktaş Erdem, U. Akyüz, B. Erdil, A. Türer & N. Şahin Güçhan	<b>Comparing the embodied energy of structural systems in buildings</b> C. Griffin, B. Reed & S. Hsu	<b>Design strategies for structure as in integrating framework</b> H. Giles		

## Thursday Evening (ThE), July 22, 2010

16:00 – 16:30

Coffee Break (Lobby of the Main Auditorium)

16:30 – 18:30

Concurrent Technical Sessions: ThE.1 to ThE.5

16:30 – 18:30

Special Seminar: ThE.1

### ThE 1 – Main Auditorium

Special Seminar  
**Megastructures: Architecture\_Play\_Structure (3)**

Chairmen: N. Grande & P. Bandeira

*The seminar will debate some megastructural proposals, designed in the 60s and 70s, in order to discuss the social and cultural context and the playful relationship between Architecture and Structure*

**Paul E. Kassabian**  
*(Buckminster Fuller's Geodesic Structures)*

**Simon Sadler**  
*(Constant's New Babylon)*

Debate

*After the conference a short book on Megastructures will be published, as a testimony of this memorable meeting between architects and architectural researchers*

### ThE 2 – Room B1.14

**Bridges (2)**

Chairman: A. Adão da Fonseca

**Design evolution of footbridges and access bridge on the jetties of a LNG Terminal**  
*J.D. Gómez, N. Pastor & A. Arnedo*

**The relation between architectural elements and structural system in the rehabilitation of the old bridges in Timisoara**  
*L. Rosiu & S.M. Bica*

**Aerodynamic stability of large suspension bridge using cable frames**  
*T. Yoshimura & M. Kawahara*

**Asymmetric network arch bridges**  
*B. Zwingmann, S. Marx & F. Schanack*

**The "diagrid system": A new aesthetic and structural concept for an outstanding bridge on the access to the new T4 terminal at Barajas Airport (Madrid)**  
*F. Millanes, D. Martínez, P. Solera, F. Domouso, L. Fernández-Ordoñez & E. Rodríguez*

**Oscar Niemeyer's Bridge in Brasília**  
*R. P. da Fonseca & J.M. Morales Sanchez*

**Gala Dinner (Municipal Stadium - Braga)**

20:00

### ThE 3 – Room B1.15

**Hybrid and Composite Structures**

Chairman: I. Valente

**Tall hybrid RC framed buildings with massive timber floor plates**  
*A. Asiz & J. Smith*

**Architecturally exposed hybrid wood-steel and wood-concrete structures**  
*P. Fast & J. Stahl*

**The behaviour of steel and steel concrete composite joints**  
*D. Dan, V. Stoian, T. Nagy-György, A. Fabian, C. Daescu, C. Florut & I. Demeter*

**Convergent design methodology for bio-science labs: architectonic and performative structural considerations using the Geilinger composite column solution**  
*M. Echarid & D. Tonis*

**Proposals for determination of the effective moment of inertia of composite slabs**  
*R.S. Costa, F.C. Rodrigues & A.C.C. Laval*

### ThE 4 – Room B1.16

**Timber and Masonry Structures**

Chairman: C. Molins

**Simple efficient architecture**  
*J.M. Cabrero, E. Bayo & P. Haller*

**Towards a new generation of software: a case study for timber building structures**  
*J.L. Fernández-Cabo, J. Ávila-Nieto & V. Kudlac*

**Tabique construction in Alto Tâmega**  
*A. Cepeda, A. Murta, J. Lousada, J. Vieira, J. Pinto, L. Fernandes, H. Varum, P. Tavares & P. Silva*

**Structure and architectural project: two examples with masonry walls**  
*M. Freire, J.M. Rosales & G. Crecente*

**Retrofit of the masonry minaret of historical mosque with FRP: A case study**  
*A.M. Turk & C. Cosgun*

**Restoration of the refectory vault. Monasterio de Monfêro. A Coruña, Spain**  
*P. Sabiñ-Díaz, E.M. Blanco-Lorenzo, J.B. Pérez-Valcárcel & M. Muñoz-Vidal*

### ThE 5 – Room B1.17

**Emerging Technologies**

Chairman: P. C. Louter

**Translucent buildings' silhouettes made of wire cloth -development of an adjusted dynamic wind load concept**  
*F. Kemper, M. Feldmann & J. Kuck*

**Principles of conceptual design for new seismic protection systems**  
*M. Mezzi*

**The emergence of kinetic intelligent architecture in 21st century**  
*H. Ghamari & M. Asefi*

**Aseismic dissipating devices and unconventional shapes in seismic areas**  
*M. Mezzi & A. Dusi*

**Sustainable and earthquake resistant structural systems**  
*E. Coskun, G. Kymaz & E. Seckin*

**Friday Morning (FrM), July 23, 2010**

8:00- 8:30 Registration (Lobby of the Main Auditorium)  
 8:30 – 10:00 **Keynote Lectures** (Main Auditorium) **Angus MacDonald:** The changing relationship between architects and structural engineers  
**André Tavares:** Concrete immaterial structures  
**Robert Off:** New trends on membrane and shell structures – Examples of bat-sail and cushion-belt technologies  
 Chairman: K. Myhre  
 10:00 – 10:30 **Coffee Break** (Lobby of the Main Auditorium)  
 10:30 – 13:00 **Concurrent Technical Sessions:** FrM 1 to FrM 5

**FrM 1 – Main Auditorium**

Mini-symposium  
**Timber Construction (1): Tall Timber Buildings**

Chairman: I. Smith

**Better than steel? The use of timber for large and tall buildings from ancient times until the present**  
*R. Langenbach*

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**FrM 2 – Room B1.14**

**Special Structures**

Chairman: N. Baldassini

**Investigation the optimum location of cable-supports for communication towers**  
*O. Salem*

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**FrM 3 – Room B1.15**

**Concrete Structures (1)**

Chairman: A. Camões

**Historical use of concrete and innovation in architecture**  
*M. Bostenaru-Dan*

*M. Bostenaru-Dan*

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**FrM 4 – Room B1.16**

**Computer and Digital Design Tools (1)**

Chairman: R. Póvoas

**Computational design tools for integrated design**  
*M.K. Holst & P.H. Kirkegaard*

*M.K. Holst & P.H. Kirkegaard*

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**FrM 5 – Room B1.17**

**Masonry Structures**

Chairman: C. Molins

**Fracture test of a Gothic ribbed vault**  
*J.C. Palacios, R. Martín, J.I. Hernando, D. Sanz, M.A. Alonso, & A. Aznar*

*J.C. Palacios, R. Martín, J.I. Hernando, D. Sanz, M.A. Alonso, & A. Aznar*

*J.C. Palacios, R. Martín, J.I. Hernando, D. Sanz, M.A. Alonso, & A. Aznar*

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## Friday Afternoon (FrA), July 23, 2010

Lunch (Restaurant of the University)

13:00 – 14:00

Concurrent Technical Sessions: FrA 1 to FrA 5

14:00 – 16:00

### FrA 1 – Main Auditorium

Mini-symposium  
**Timber Construction (2): Cross Laminated Timber-A New Design Principle**

Chairmen: T. Bogensperger

**Vertical relative displacements in a medium-rise CLT-building**

*E. Serrano, B. Enquist & J. Vessby*

**A study of cross-lamination of a multi-component liquid-retaining timber structure**

*N.J. Savage, A. Kermani & H. Zhang*

**Verification processes for cross laminated timber in the frame of EN 1995**

*R.A. Joebstl*

**On the architectural qualities of cross laminated timber**

*A.K. Bejder, P.H. Kirkegaard & A.M. Fisker*

**Vibration properties of cross laminated timber floors**

*N. Labonnote & K.A. Malo*

### FrA 2 – Room B1.14

**The Borderline Between Architecture and Structural Engineering (1)**

Chairman: A. L. Rodrigues

**Architect and structural engineer communicating in multi-disciplinary creativity**

*L. Luyten*

**Architectural anatomy**

*J. Pérez-Herreras*

**Four study cases on skins and structures**

*H. Fallon*

**Groundwork, structure, design: the integrated education of architects and engineers**

*M. Dunn*

**Load path method in the interpretation of dome behaviour**

*F. Palmisano & A. Totaro*

**Tensile structures - interdisciplinary teamwork as a win-win situation**

*E. Amity & I. González-Quelle*

### FrA 3 – Room B1.15

**Concrete Structures (2)**

Chairman: S. Jalali

**New solutions for constructing double-curved concrete shell structures**

*M. Johnson, P. Kassabian, C. Genter, M. Love, T. Love & J. Lamere*

**Technological evolution of concrete: from ancient times to ultra high performance concrete**

*A. Camões & R.M. Ferreira*

**Lightweight ferro cement open web joists as low cost roofing element**

*S. F. Ahmad*

**Conservation of suburban concrete buildings**

*J. Lahdensivu, S. Varjonen & J. Mattila*

**Poor quality concrete: a major challenge in the building construction industry in Nigeria**

*R.O. Oduola*

**Hybrid composite rods for concrete reinforcement**

*C. Gonilho-Pereira, R. Figueiro, S. Jalali, M. Araújo & P. Pina-Marques*

### FrA 4 – Room B1.16

**Computer and Digital Design Tools (2)**

Chairman: P. Mendonça

**A computational framework for synthesising optimum complex structural patterns**

*D.J. Gunaratnam & M. Rosenman*

**Building on the information model: Enhancing architectural structures education with BIM**

*D.J. Oakley*

**Optimization as a design tool for shell structures**

*S. Arnout, G. Lombaert & G. de Roeck*

**Representation + fabrication: Connecting descriptions and artifacts in the digital age**

*T. Al-Haddad, A. Cavieres, R. Gentry, M. Carpo, J. Cho, L. Wagner & A. Zaitsev*

**Checking building structures**

*J. Valcárcel & M. Muñoz Vidal*

### FrA 5 – Room B1.17

**New Materials**

Chairman: J. M. Cabredo

**FRP light poles: A Combination of structural integrity and architectural elegance**

*S. Salib*

**Sintered glass with increased contents of secondary raw materials**

*T. Melichar & J. Bydžovský*

**FRP composites for seismic retrofitting of RC wall panels with cut-out openings**

*I. Demeter, T. Nagy-Gyorgy, V. Stoian, C. Daescu & D. Dan*

**Self-diagnosing braided composite rod**

*E. Zdraveva, C. Gonilho-Pereira, R. Figueiro, A. Ferreira & S. Lanceros-Mendez*

**FRP: Towards harmony between structural and architectural requirements for rehabilitation systems**

*S. Salib*

**Bond improvement in cement mortars reinforced with carbon-fibre composite strands**

*A. Ivanic, S. Lubej & E. Radosavljevic*

**Friday Evening (FrE), July 23, 2010**

16:00 – 16:30 Coffee Break (Lobby of the Main Auditorium)

16:30 – 18:30 Concurrent Technical Sessions: FrE 1 to FrE 5

**FrE 1 – Main Auditorium**

Mini-symposium  
**Timber Construction (3): Modelling of the load bearing performance of timber structures**

Chairman: K. Jochen

**Failure studies carried out in Europe and a proposal for a standardized failure template**  
*T. Toratti*

**Moisture-induced stresses in timber-concrete composite structures**

*M. Fragiaco & J. Schänzlin*

**Stress analysis of timber structures under variable humidity conditions by using a multi-Fickian moisture transfer model**

*S. Fortino, T. Toratti & A.L. Mendicino*

**Robustness evaluation of timber structures – Results from EU COST Action E55:WG3**

*P.H. Kirkegaard, J.D. Sørensen, D. Cizmar & P. Dietsch*

**Robustness analysis of big span glulam truss structure**

*V. Rajcic, D. Cizmar, P.H. Kirkegaard & J.D. Sørensen*

18:30 – 19:00

**FrE 2 – Room B1.14**

**The Borderline Between Architecture and Structural Engineering (2)**

Chairman: Y. Weinand

**The structure as an identity**  
*R. Baretkowski*

**Project management: integrating architecture and structural engineering design processes**

*N. Resende-Andrade, A.L. Aquere & R.M. Lima*

**The work of Eduardo Torroja: Research for improving the quality of construction technology**

*J. Artuñua*

**Structural skins in contemporary architecture**

*A. Bernabeu-Larena & J. Bernabeu-Larena*

**Qualitative structural model for pre-evaluation of structures behavior**

*M. Oliveira & A.M.S. Freitas*

**Beware, she's here!**

*T. Andrade-Santos*

**Closing Ceremony (Main Auditorium)**

**FrE 3 – Room B1.15**

**Concrete Structures (3)**

Chairman: M. Bostenaru Dan

**Accounting for the construction phase in the coordination between architectural and structural design**  
*M. Branco, M.R. Arruda & L. Murteira*

**Structural design of the concrete shell for 'Facelift Umicore'**

*J. Vander-Beken, F. Ghysaert & L. Ney*

**Reducing the embodied energy and embodied carbon of reinforced concrete structures in Ireland**

*J. Goggins*

**Directionally oriented fibrous structures for lightweight concrete elements reinforcement**

*P. Pina-Marques, R. Fangueiro & C. Gonilho-Pereira*

**Utilization of triaxial stress fields in plastic shear solutions for confined RC members**

*L.C. Hoang & U.G. Jensen*

**Strengthening of pre-stressed concrete main girder bridge by means of FRP plates**

*A.Q. Melhem*

**FrE 4 – Room B1.16**

**The History of the Relationship Between Architects and Structural Engineers**

Chairman: A. Tavares

**The history of the relationship between architects and structural engineers**  
*M.R. Taghavi*

**Collaboration and rivalry at Expo 58. Authorship in the building industries' landmarks**

*R. Devos & S. Van de Voorde*

**Félix Candela (1910-1997): Architect and structural**

*P.Cassinello*

**The changing concept of truss design caused by the influence of science**

*M. Rinke & T. Kotnik*

**Past and present characteristics of Vierendeel's poutre à arcades**

*K. Verswijver & R. de Meyer*

**FrE 5 – Room B1.17**

**Experimental and Numerical Analysis**

Chairman: J. Pinto

**Prediction of debris hazardous zone for different architectural and structural forms**  
*S.C. Fan & Q.J. Yu*

**Experimental results on composite steel-concrete structural shear walls with steel encased profiles**

*D. Dan, V. Stoian & A. Fabian*

**Experimental investigation of panel zone in steel beam-to-column joint at elevated temperature**

*M. Strejcek & F. Wald*

**Experimental analysis on T-shaped metallic profile for timber connection**

*A. Polastri, M. Moretton, R. Tomasi, M. Piazza & A. Angeli*

**AVI as a mechanical tool for studying dynamic and static beam structures**

*F. Demoures, T.S. Ratiu, Y. Weinand & J. Nembrini*

**Management of bridges with historical value**

*H. Isohata*

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 Pérez, J.L. FrM 4  
 Pérez-Herreras, J. FrA 2  
 Pérez-Valcárcel, J.B. ThE 4, FrA 4  
 Phocas, M.C. WeM 5  
 Piazza, M. FrE 5  
 Pimenta, P. FrM 2  
 Pina-Marques, P. FrA 3, FrE 3  
 Pineda, P. FrM 5  
 Pinto, J. ThE 4, FrM 5  
 Pittella, R. ThM 2  
 Polastrí, A. FrE 5  
 Pollak, S. WeM 1  
 Pons, O. WeM 3  
 Popovic-Larsen, O. WeE 4  
 Popovski, M. FrM 1  
 Potac, J. FrM 4

Rabuñal, J.R. FrM 4  
 Rack, W. WeA 3  
 Radić, J. FrM 2  
 Radosavljevic, M. FrM 3, FrA 5  
 Rajcic, V. ThA 4, FrE 1  
 Rapaport, R. WeE 4  
 Ratiu, T.S. FrE 5  
 Raynaud, J. WeM 4  
 Rebelo, C. ThA 5, ThM 6  
 Reed, B. ThA 5



Rega, G. WeE 1  
 Reich, S. WeM 2, WeA 2  
 Reid, S.G. WeE 5  
 Reis, A. KN-ThM  
 Resende-Andrade, N. FrE 2  
 Ribeiro, L.F.L. WeM 3  
 Ries, T. WeA 2  
 Rigueiro, C. ThA 5, ThM 6  
 Rinke, M. FrE 4  
 Riso, V. WeA 1  
 Ritchie, I. KN-WeM  
 Rivest, S. FrM 1  
 Rodrigues, F.C. ThE 3  
 Rodriguez, E., ThE 2  
 Rodríguez, V. ThA 4  
 Rodríguez-Camilloni, H. ThA 4  
 Rodríguez-León, M.T. WeE 3  
 Romeo, F. WeA 1  
 Rosales, J.M. ThE 4  
 Rosenman, M. FrA 4  
 Rosiu, L. ThE 2  
 Rossi, B. ThM 6  
 Rouillard, D. ThE 1  
 Ruffo, H.M. WeE 3

**S**

Sabín-Díaz, P. ThE 4  
 Sadler, S. ThE 1  
 Sáez, A. FrM 5  
 Sahin Guchan, N. ThA 4  
 Salem, O. FrM 2  
 Salerno, G. WeE 1  
 Salib, S. FrA 5  
 Saliklis, E.P. WeA 5, ThM 4  
 Sampò, L. WeA 1  
 Sánchez-Sánchez, J. WeE 3  
 Sandaker, B.N. KN-ThM, ThA 2  
 Santiago, A. ThA 5, ThM 6  
 Santos, P. ThA 5, ThM 6  
 Sanz, D. FrM 5  
 Sass, T. WeM 5  
 Sassone, M. WeM 1, WeE 5  
 Savage, N.J. FrA 1  
 Schanack, F. ThE 2  
 Schänzlin, J. FrE 1  
 Schmid, V. WeA 4  
 Schneider, J. WeM 2  
 Schula, S. WeM 2  
 Seckin, E. ThE 5  
 Seliverstov, V. ThA 2  
 Serrano, E. FrA 1  
 Settimi, V. WeE 1  
 Shirazpur, P. WeA 4  
 Silva, P. ThE 4  
 Silvestri, C. ThM 3  
 Simões da Silva, L. ThA 5, ThM 6  
 Simonen, K. WeM 3  
 Smith, I. ThE 3  
 Solera, P., ThE 2  
 Songel, J.M. WeM 4  
 Sophocleous, T.L. WeM 5  
 Sørensen, J.D. FrE 1  
 Sousa-Junior, J.B.M. ThA 3  
 Stahl, J. WeM 2, WeA 2, ThE 3  
 Stelzer, I. WeE 2  
 Stephens, R. WeM 4

Stoian, V. ThE 3, FrA 5, FrE 5  
 Stottrup-Andersen, U. WeA 3  
 Stotz, I. WeA 4  
 Stratil, J. WeA 4  
 Strejcek, M. FrE 5  
 Sykora, M. WeE 5, ThM 6, FrM4

**T**

Taghavi, M.R. FrE 4  
 Tarczewski, R. WeM 5  
 Tavares, A. KN-FrM  
 Tavares, P. ThE 4  
 Tavolaro, M. ThM 2  
 Teixeira, C. FrM 5  
 Tervaoja, J. ThA 2  
 Theodoropoulos, C. ThA 5  
 Theodossopoulos, D. WeA 5  
 Thiis, T.K. ThM 6, FrM 4  
 Tinelli, A., WeM 1  
 Tocci, C. WeA 1  
 Tomasi, R. FrE 5  
 Tonis, D. ThE 3  
 Toratti, T. FrE 1  
 Tosan, E. WeA 4  
 Totaro, A. FrA 2  
 Trovalusci, P., WeM 1, WeE 1  
 Turer, A. ThA 4, FrM 5  
 Turk, A.M. ThE 4  
 Turrin, M. WeA 4  
 Tyas, A. WeE 4

**U**

Unay, A.I. WeE 4  
 Ungureanu, V. WeA 3, ThA 5

**V**

Vadori, R. WeM 1, WeE 1  
 Valença, J. FrM 3  
 Van De Rotten, P. WeE 2  
 Van de Voorde, S. FrE 4  
 Vander-Beken, J. FrE 3  
 Varano, V. WeE 1  
 Varjonen, S. FrA 3  
 Varum, H. ThE 4, FrM 5  
 Vasilikou, K. ThM 4  
 Vázquez, J.A. ThA 4  
 Veer, F.A. WeE 2  
 Verbeeck, K. WeA 5, WeE 5  
 Verswijver, K. FrE 4  
 Vessby, J. FrA 1  
 Vieira, J. ThE 4  
 Vilquin, T. WeM 5  
 Von Buelow, P. WeA 4

**W**

Wagner, L. FrA 4  
 Wald, F. FrE 5  
 Wang, J.-I. FrM 2  
 Wang, W. WeM 3  
 Watson, A. ThM 5  
 Wedhorn-Roithmayr, R. WeE 4  
 Weinand, Y. KN-ThM, WeM 4, WeA 4,  
 ThM4, ThA 4, FrE 5  
 Weller, B. WeM 2, WeA 2, WeE2  
 Wörner, J.D. WeM 2, WeE 2

**Y**

Yaghmaeian, S. WeA 4  
 Yoshimura, T. ThE 2  
 Yunesi, G. WeA 4  
 Yu, Q.J. FrE 5

**Z**

Zaitsev, A. FrA 4  
 Zastavni, D. ThM 5  
 Zdraveva, E. FrA 5  
 Zhang, H. FrA 1  
 Zwiggmann, B. ThE 2

**Tuesday, July 20, 2010**

15:00 – 19:00 **Registration** (Lobby of the Main Auditorium)

20:00 **Welcome Reception** (Alberto Sampaio Museum - Guimarães)

**Wednesday, July 21, 2010**

9:00- 9:30 **Opening Ceremony** (Main Auditorium)

9:30 – 10:30 **Keynote Lectures** (Main Auditorium)

11:00 – 13:00 **WeM 1Mini-symposium**

“Tectonics” in Architecture: Between Aesthetics and Ethics (1): The arena

14:30 – 16:30 **WeA 1 Mini-symposium**

“Tectonics” in Architecture: Between Aesthetics and Ethics (2): The heritage of the past

17:00 – 19:00 **WeE 1 Mini-symposium**

“Tectonics” in Architecture: Between Aesthetics and Ethics (3): Theoretical issues and ideas for future developments

**WeM 2 Mini-symposium**

Transparent Structural Materials - Glass and Plastic (1): Glass

**WeA 2 Mini-symposium**

Transparent Structural Materials - Glass and Plastic (2): Plastic

**WeE 2 Mini-symposium**

Transparent Structural Materials - Glass and Plastic (3): Hybrids

**WeM 3**

Steel Structures (1)

**WeA 3**

Steel Structures (2)

**WeE 3**

Steel Structures (3)

**WeM 4**

Complex Forms and Form-finding (1)

**WeA 4**

Complex Forms and Form-finding (2)

**WeE 4**

Interdisciplinary Work & Educating Architects and Structural Engineers (1)

**WeM 5**

Innovative Architectural and Structural Design (1)

**WeA 5**

Innovative Architectural and Structural Design (2)

**WeE 5**

Innovative Architectural and Structural Design (3)

**Thursday, July 22, 2010**

8:30 – 10:00 **Keynote Lectures** (Main Auditorium)

10:30 – 12:30

**ThM 2**

Tall Buildings

**ThM 3**

Tectonics

**ThM 4**

Timber Structures (1)

**ThA 2**

Bridges (1)

**ThA 3**

Membranes and Tensile Structures

**ThE 2**

Bridges (2)

**ThE 3**

Hybrid and Composite Structures

**ThM 5**

Interdisciplinary Work & Educating Architects and Structural Engineers (2)

**ThA 4**

Timber Structures (2)

**ThE 4**

Timber and Masonry Structures

**ThM 6**

Steel Structures (4)

**ThA 5**

Affordable Houses and Sustainable Buildings

**ThE 5**

Emerging Technologies

20:00 **Gala Dinner** (Municipal Stadium - Braga)

**Friday, July 23, 2010**

10:30 – 13:00 **FrM 1 Mini-symposium**

Timber Construction (1): Tall Timber Buildings

14:00 – 16:00 **FrA 1 Mini-symposium**

Timber Construction (2): Cross Laminated Timber-A New Design Principle

16:30 – 18:30 **FrE 1 Mini-symposium**

Timber Construction (3): Modelling of the load bearing performance of timber structures

**FrM 2**

Special Structures

**FrA 2**

The Borderline Between Architecture and Structural Engineering (1)

**FrE 2**

The Borderline Between Architecture and Structural Engineering (2)

**FrM 3**

Concrete Structures (1)

**FrA 3**

Concrete Structures (2)

**FrE 3**

Concrete Structures (3)

**FrM 4**

Computer and Digital Design Tools (1)

**FrA 4**

Computer and Digital Design Tools (2)

**FrE 4**

The History of the Relationship Between Architects and Structural Engineers

**FrM 5**

Masonry Structures (1)

**FrA 5**

New Materials

**FrE 5**

Experimental and Numerical Analysis



Welcome reception at Alberto Sampaio Museum

