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## ISISE HIGHLIGHTS



SAHC

The international master in Structural Analysis of Monuments and Historical Constructions (SAHC) of the University of Minho received the most prestigious European award in the area of cultural heritage. The programme has a multidisciplinary approach comprising elements of civil engineering and conservation architecture.

“This advanced programme, which is based in the scientific principles of engineering, restoration and architecture allows for a better understanding of construction systems which in turn helps to prolong their existence”, the jury highlighted (see also ‘Awards & Prizes’ section).



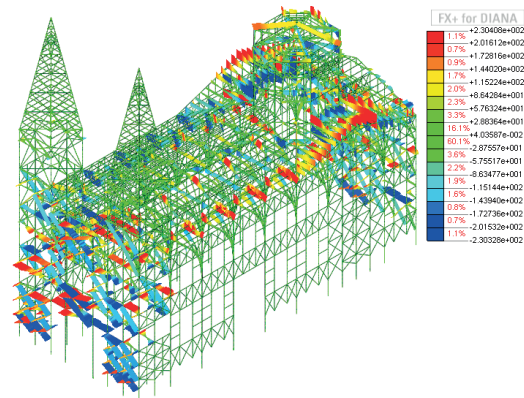
The San Sebastian Basilica in Manila, Philippines was inaugurated in 1891 and stands as the only prefabricated neo-gothic steel church in the world.

Currently, some corrosion is present and the issue of seismic safety needs to be addressed and University of Minho just completed a one-year study on the church.

Dynamic identification tests were carried out using ambient vibration, which allowed for the estimation

of six modes with frequencies ranging from 2.53 to 5.81Hz.

The results the final model, which takes into account the existing damage using a simplified approach, suggest that the safety factor of the basilica is still rather high but progress of corrosion must be stopped.



The content and opinions expressed within the Newsletter are those of the researchers involved and are not necessarily shared by the Directors of ISISE



## R&D STARTED PROJECTS

> **Development of alkali binders for geotechnical applications made exclusively from industrial waste**

**ISISE Principal Investigator:** Tiago Miranda  
**Budget:** Global: 144.887,00€/ISISE-UM: 54.216,00€  
**ID:** PTDC/ECM-GEO/0637/2014  
**Funding Entity:** FCT  
**Principal Contractor:** UTAD  
**Partners:** UMINHO  
**Duration:** From 01/02/2017 to 31/01/2020

> **SmartCore – Desenvolvimento de painéis multifuncionais de elevada performance**

**ISISE Principal Investigator:** Paulo Mendes, Luís Godinho  
**Budget:** Global: 609.732,00€/ISISE-UC: 97.743,00€  
**ID:** POCl-01-0247-FEDER-017759  
**Funding Entity:** P2020 (Co-promoção)  
**Duration:** From 01/10/16 to 31/03/19

> **OPTIMIZEDWOOD – Optimização de recursos florestais na construção**

**ISISE Principal Investigator:** Alfredo Dias  
**Budget:** Global: 465.615,00€/ISISE-UC: 198.134,00€  
**ID:** POCl-01-0247-FEDER-017867  
**Funding Entity:** P2020  
**Principal Contractor:** Pedrosa Irmãos  
**Duration:** From 01/12/2016 to 30/11/2019

> **SUSpENsE – Sustainable built environment under natural hazards and extreme events**

**ISISE Principal Investigator:** Luís Simões da Silva  
**Budget:** Global: 1 599 995,71€/ISISE-UC: 663.066,71€  
**ID:** CENTRO-01-0145-FEDER-000006  
**Funding Entity:** P2020  
**Principal Contractor:** UC  
**Duration:** From 01/01/2017 to 31/10/2020

## COMPLETED PHD THESES

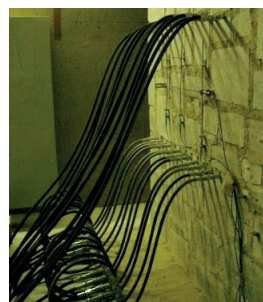
> **Enhancement of the tube-jack non-destructive test method for historical structural masonry diagnosis**

**Author:** Elizabeth Campbell Manning  
**Supervisors:** José Luis Ramos, Francisco Fernandes  
**Date:** 7<sup>th</sup> December 2016

**Summary:** Flat-jack testing is a non-destructive test method that is traditionally used to determine the state of stress in masonry and deformable characteristics of unreinforced historical structural masonry. However, difficulty in interpreting the results of flat-jack tests in irregular masonry and the necessity to cut through historical masonry units during testing in irregular masonry has led to the need for an alternative method. Tube-jack testing is as an alternative to flat-jack testing that can be performed on masonry that contains large units and irregular mortar joints. The system was tested in three masonry walls in the laboratory and in-situ on a historical masonry structure, and the results were compared with traditional flat-jack tests. The tube-jack test method is a promising enhanced non-destructive test

method that, through further research and development, will likely be able to provide an alternative to flat-jack testing for irregular and large unit masonry diagnosis.

CV: **Elizabeth Manning** has a BA in Math and History from St. Olaf College (2007) and a BCE from the University of Minnesota (2009). In 2011 she completed the SAHCMasters at the University of Padova and the University of Minho. Elizabeth continued at the University of Minho and was awarded a PhD in Civil Engineering in 2016. She is currently an engineer-in-training at Meyer Borgman Johnson, in MN, USA.





> **Steel Towers for Wind Turbines**

**Author:** Rui Manuel Maia Pinto de Matos

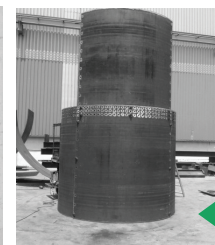
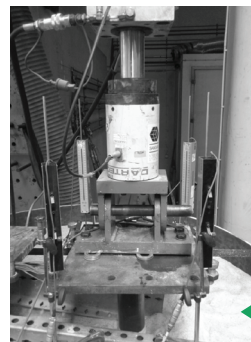
**Supervisors:** Carlos Rebelo, Paulo Pinto

**Date:** 13<sup>th</sup> January 2017

**Summary:** The increase in the exploitation of wind energy requires an improvement of the efficiency of the current solutions for the support of wind turbines. An increase in the height of the towers will allow higher production rates. This work address the behaviour of both connections and foundations of shell wind towers. It is divided in three topics: monitoring of a functional wind tower, behaviour of a friction connection to link the segments (improvement of the fatigue behaviour) as part of modular segments (transportation requirements) and behaviour of foundations including analysis of a hybrid foundation system with a shallow foundation reinforced with micropiles (LCA and LCC comparison included). The monitoring was successful and the results allowed to estimate the operating conditions of the tower, the modular construction with friction connection was

proven to be a feasible solution and the hybrid foundation solution appears as a valid solution both environmentally as in terms of costs.

**CV: Rui Matos** holds a PhD degree in Steel and Composite Structures, from the University of Coimbra (UC) in 2017 within the topic of renewable energies and behaviour of the new generation of wind towers. He holds a MSc degree in Steel and Composite Structures, from the University of Coimbra (UC) in 2008 within the topic of the behaviour of welded tubular connections.



Modular construction with friction connection

Experimental tests on micropiles

> **Behavior of RC Slabs Flexurally Strengthened with Prestressed NSM CFRP Laminates**

**Author:** Mohammadreza Mostakhdemin Hosseini

**Supervisors:** Salvador Dias, Joaquim Barros

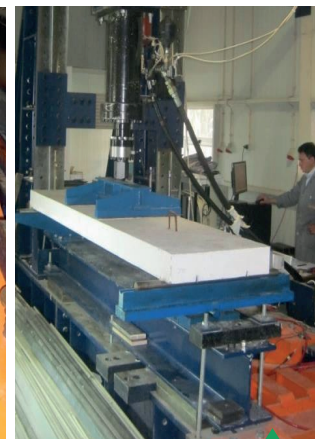
**Date:** 27<sup>th</sup> January 2017

**Summary:** The thesis aims to study the flexural strengthening of reinforced concrete (RC) slabs using prestressed Carbon Fiber Reinforced Polymer (CFRP) laminates applied according to the Near Surface Mounted (NSM) technique. For this purpose, an extensive experimental research was executed and the influence of the prestress level; percentage of existing steel flexural reinforcement; concrete quality; and level of damage in the RC slabs prior to the strengthening (pre-cracking), on the behavior of strengthened RC slabs with prestressed NSM CFRP laminates was determined. Strengthening RC slabs with the proposed method resulted in a significant increase of load carrying capacity at serviceability limit states, but had a detrimental effect on the deflection at the maximum load of the slabs. Numerical simulations of the tested RC slabs, parametric studies and development of an analytical approach were also performed in this research.

**CV: Mohammadreza Mostakhdemin Hosseini** concluded his PhD in 2017 at University of Minho while he is a researcher in ISISE since 2011. He is currently assistant professor of Civil Engineering Department in Islamic Azad University Mahdishahr Branch, Iran. His research interests include strengthening of structures with FRP materials, numerical and analytical simulation.



(a) Prestressing a RC slab



(b) Testing a RC slab





## > Constitutive Models to Simulate Failure of Structures Made by Cement Based Materials

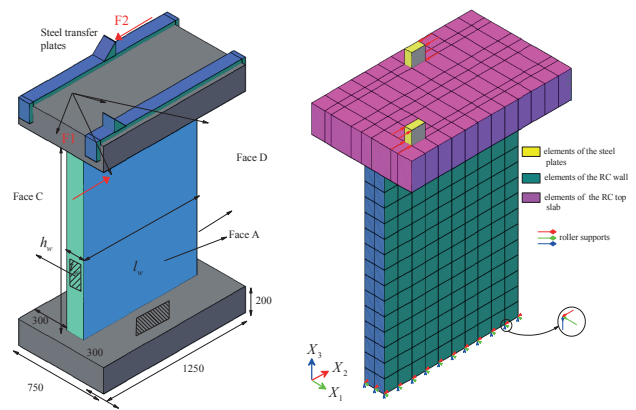
**Author:** Ali Edalat Behbahani

**Supervisors:** Joaquim Barros, António Ventura Gouveia

**Date:** 6<sup>th</sup> February 2017

**Summary:** This PhD thesis was dedicated mainly to develop a new constitutive model for cementitious based materials, allowing the possibility of simulating the complex functioning of these materials subjected to multi-axial loading configurations. The model proposes a unified approach combining a multidirectional fixed smeared crack model to simulate the crack initiation and propagation with a plastic-damage model to account for the inelastic compressive behaviour of concrete between cracks. In order to demonstrate the robustness of the developed model, experimental tests were simulated covering a wide range of specimens (more than 100 specimens) regarding type of intervening materials (e.g. normal and high strength concretes, steel fiber reinforced concretes, and strain hardening cement composites), geometry, loading configurations, and reinforcement conditions (e.g. steel and GFRP bars, CFRP laminates).

**CV:** Ali Edalat-Behbahani received his PhD from Department of Civil Engineering, School of Engineering, University of Minho, Campus de Azurém, Guimarães, Portugal. His research interests include constitutive modelling, and FEM based analysis of concrete and RC structures, and experimental research to characterize behaviour of cement based materials. He has some publications in international journals and conferences under these topics.



Shear walls subjected to torsion:

- (a) General arrangement of the wall specimen
- (b) Finite element mesh used for the simulation of the wall

## > Bond behaviour of NSM FRP systems in concrete

**Author:** Mário Rui Freitas Coelho

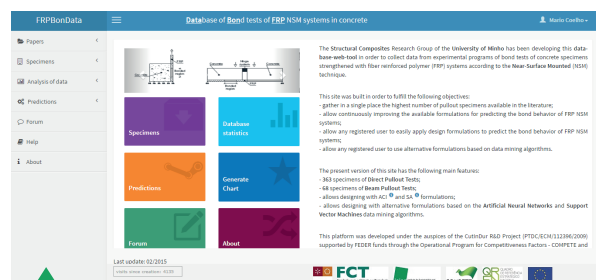
**Supervisors:** José Sena Cruz, Luís Neves

**Date:** 13<sup>th</sup> February 2017

**Summary:** In the context of strengthening concrete structures, the Near-Surface Mounted (NSM) technique using Fibre Reinforced Polymers (FRP) has been shown as a sound solution. The crucial aspect regarding this technique is related with the bond behaviour, which is studied through bond tests, analytical approaches and numerical modelling. Hence, a database with the existing works on bond tests was collected and three tasks were defined and developed: T1 – Analytical task; T2 – Experimental task; T3 – Numerical task. The T1 includes: (i) accuracy assessment of the existing bond laws, recalibration and propose of improvements; (ii) introduction of data mining algorithms as alternative bond laws; (iii) calibration of the necessary safety factors in order to allow the use of the bond laws for design. In T2 a campaign of direct pullout tests was

developed in order to contribute for the establishment of a standard direct pullout test. The T3 consisted on the development of an interface constitutive model based on the plasticity theory to allow 3D numerical simulations of NSM FRP systems.

**CV:** Mário Coelho was born in Portugal and graduated in Civil Engineering by the University of Minho. His doctoral thesis, as well as his research, is focused on the use of fibre reinforced polymers to strengthen concrete structures.



Database of experimental results





> **Reliability analysis of FRP strengthened prestressed concrete girders**

**Author:** Sara Gomes

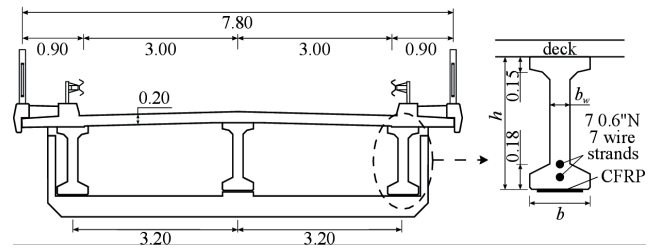
**Supervisors:** Daniel Dias-da-Costa and Luis Neves

**Date:** 24<sup>th</sup> March 2017

**Summary:** This thesis had as main objective the development of a framework to assess the reliability of FRP strengthened PC girders adopted for bridges, including: i) the statistical characterisation of mechanical properties of CFRP (Young's modulus, tensile strength and ultimate strain), ii) the calibration of partial safety factors for CFRP considering reliability analysis and adopting a hybrid approach combining numerical models, using a strong discontinuities to model concrete in fracture and to better simulate the influence of concrete cracks in FRP, with analytical models to save computational time; and iii) the time-dependent reliability analysis of PC girders strengthened with CFRP, considering time-dependent models for pre-

stressed strands corrosion and CFRP degradation, and spatial corrosion randomly generated over the girder length.

CV: **Sara Gomes** holds a Ph.D. in Civil Engineering, Structural Mechanics, from the University of Coimbra. Her main research interests incorporate both numerical and reliability topics of structural engineering and material mechanics. She has been working with the development of numerical models for several structural applications, within structural rehabilitation of reinforced concrete structures.



> **Development of prefabricated modular houses in pure composite sandwich panels**

**Author:** Hassan Abdolpour

**Supervisors:** Joaquim Barros, José Sena Cruz

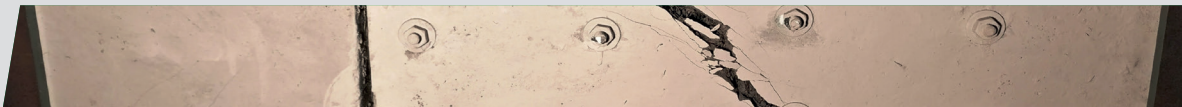
**Date:** 18<sup>th</sup> April 2017

**Summary:** In the scope of the ClickHouse R&D Project, a residential modular temporary building was proposed and developed to accommodate, in urgent situations, dislocated families due to e.g. the occurrence of natural disasters. Proposed building is composed of a frame structure, panels and a tailored connection system. The frame structure and connection are composed of glass fibre reinforced polymer (GFRP) pultruded tubular profiles. While for the panels, composite sandwich panels made of polyurethane foam (PU) core and GFRP skins, are utilized. A new connection system is defined for connecting adjacent members. In the ambit of the present thesis, the following research programs, which contributed for the ClickHouse outcomes, were developed: (i) material testing program; (ii) development/ characterization of a connection system for jointing composite panels, (iii) evaluation of the mechanical performance of single panel, two jointed panels and three jointed panels under flexural loading; (iv) assessment of single and two jointed wall

panel's behaviour under axial loading; (v) performance/ characterization of two floor modular prototypes.

CV: **Hassan Abdolpour** is B.Sc. and M.Sc. in Structural Engineering from the School of Civil Engineering, Tabriz University, Tabriz, in Iran. He concluded his PhD in April 2017 in Civil Engineering at University of Minho. His research interests cover topics in the field of use of FRP as structural materials, concrete technology, fracture mechanism and composite materials. He has some publications in international journals and conferences under these topics.





> **Cement based materials reinforced with recycled steel fibres: mechanical, durability and structural performance**

**Author:** Ziaaddin Zamanzadeh

**Supervisors:** Joaquim Barros, Lúcio Lourenço

**Date:** 28<sup>th</sup> April 2017

**Summary:** To assess the potentiality of Recycled Steel Fibre Reinforced Concrete (RSFRC) to constitute a sustainable material for structural applications, experimental and numerical research was carried out on the use of RSFRC in elements failing in bending and in shear. Design and advanced modeling of RSFRC elements failing in shear and bending were performed. Furthermore, the use of thin cement based (mortar) panels reinforced with relatively high content of recycled steel fibres for structural reinforcement was explored. The panels were produced by using a mixing technique similar to the one is used in the Slurry Infiltrated Fibre Concrete (SIFCon) technology. Then, their potentialities as a shear strengthening solution for RC beams were investigated. Advanced numerical

simulations and an analytical study were carried out to contribute for a better understanding of the effectiveness of the shear strengthening technique with these panels.

CV: **Ziaaddin Zamanzadeh** concluded his PhD in April 2017 at University of Minho. Since 2009, he is academic board member in Islamic Azad University, Iran. His research interests are: Fiber reinforced concrete, structural strengthening, numerical analysis and durability of cement-based material. Currently, He is teaching at Islamic Azad University, East Azarbaijan, Iran.



> **Characterization of the Behaviour of Partial-Strength Joints Under Cyclic and Seismic Loading Conditions**

**Author:** Hugo Renato Gonçalves da Silva Augusto

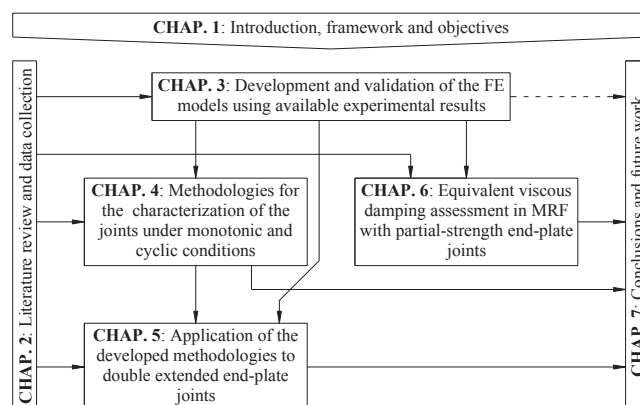
**Supervisors:** Carlos Rebelo (UC) and José Miguel Castro (UP)

**Date:** 28<sup>th</sup> April 2017

**Summary:** This thesis deals with the numerical and analytical modelling of beam-to-column end-plate bolted steel joints, when subjected to monotonic, cyclic or dynamic loading, addressing both the global response of the joint and the behaviour of the critical components. The main outputs of the research are: i) the detailed FE model that is capable of simulating the behaviour of joints and its components; ii) the several detailed procedures proposed to isolate some of the most relevant and dissipative components of the joints; iii) the identification of the components' force-displacement relationships by analysing the stress and deformation fields in the FEM, which can be used directly in a component based mechanical model of the joint; iv) improved ductility-equivalent viscous damping relationship, for steel MRF structures with dissipative beam-to-column partial-strength joints, which can be

used directly in procedures like the Direct Displacement-Based Seismic Design (Priestley et al., 2007).

CV: **Hugo Augusto** Academic degrees: PhD in Steel and Composite Construction (SCC) (Univ. of Coimbra), 2017; MSc in SCC (Univ. of Coimbra), 2011; Graduation in Civil Engineering (Univ. Aveiro), 2003. Professional activities: Researcher (FCT/ISISE/Univ. Coimbra), 2017; Structures designer (Martifer Constructions), 2011. Scientific work: 2 research projects; 4 journal papers; 20 conference papers; 2 book chapters.



# AWARDS & PRIZES

> Europa Nostra 2017 Award Granted to the Advanced Master in Structural Analysis of Monuments and Historical Constructions, Turku, Finland, June 2017.



The master is a one-year Master programme jointly organised by partner universities from four countries: University of Minho (Portugal), Czech Technical University in Prague (Czech Republic), UPC / Barcelona Tech (Spain) and University of Padua (Italy). The programme also involves the Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences as an associated partner. This initiative offers an advanced education programme on the conservation of cultural heritage

structures, focusing on the application of scientific principles and methodologies in analysis, innovation and practice. The master's programme – which has around 400 applications for an average of 35 students – is coordinated by Paulo B. Lourenço. The award was received on 15<sup>th</sup> May 2017, in Turku, Finland, at a ceremony attended by the President of Europa Nostra, Maestro Plácido Domingo and the European Commissioner for Education, Culture, Youth and Sport, Tibor Navracsics.

This is a one-of-a-kind training programme in the world, when compared to countless general training courses in heritage conservation, because it combines different competences of European Universities of reference in the field of structural analysis and conservation of built cultural heritage, with students coming from 62 countries and with an average applicant age of 27 years-old, ranging from fresh bachelor students to experienced professionals. The international diversity of the students ensures that the knowledge gained has a far-reaching effect with the awareness of culture and the expertise required to protect it spreading far beyond the environs of these four universities. This was noted by the jury who stated: "This project has great international value and its global outreach is a noteworthy model for other similar initiatives. The programme allows for students to view structural systems in different cultural contexts, encouraging the students to create and to develop their expertise with an increasingly valuable international perspective".

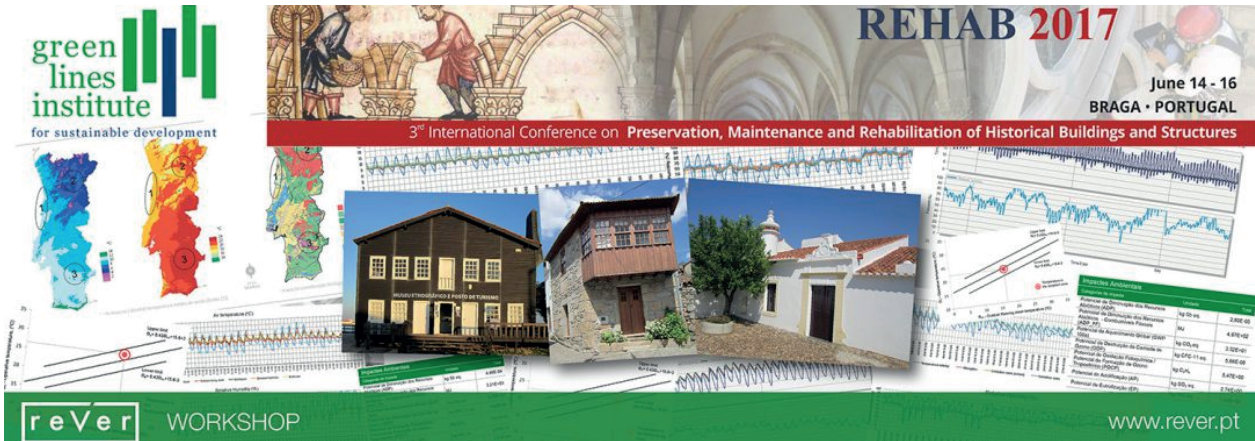
The master programme is the only international programme which specifically addresses the conservation of historical structures. It effectively creates those professionals who have the ability to protect our shared heritage from the various threats it currently faces, such as natural decay, human interventions, climatic changes and natural hazards. The jury noted this aspect, elaborating that "the multidisciplinary aspect of this project is responding to the present economic and societal needs of heritage. The master programme creates the specialised expertise necessary to advance the protection of our built cultural heritage, a niche area which is becoming progressively more important".

SAHC's presentation video is available at [www.youtube.com/watch?v=G3JHrgX7a4c&t=3s](http://www.youtube.com/watch?v=G3JHrgX7a4c&t=3s)





> **Best Paper Award REHAB 2017** in Topic 8 “Sustainability principles and practices in the rehabilitation of historic buildings and structures” for the paper entitled “Single and Double Step Joints Design: Overview of European standard approaches compared to experimentation.” by M. Verbist, J. Branco, E. Poletti, T. Descamps, P.B. Lourenço, at the 3<sup>rd</sup> International Conference on Preservation, Maintenance and Rehabilitation of Historical Buildings and Structures, Braga, Portugal.



## EVENTS

### > Offshore Course

**Venue:** Civil Engineering Department, University of Coimbra

**Date:** 8-11 November, 2016

**Website:** [www.cmm.pt](http://www.cmm.pt)

**Summary:** The course “Advanced Topics on the Analysis of Offshore Structure” promoted by the University of Coimbra and CMM, intends to add additional knowledge and skills on the design of offshore structures provided by the Training Course Offshore Structures. Several topics are present to cover themes which include: Fatigue analysis; Offshore foundations and Geotechnical issues and Accidental actions: Impact and fire.





> 1º congresso português de building information modelling

**Venue:** Universidade do Minho, Azurém

**Date:** 24-25 November, 2016

**Website:** <http://www.ptbim.org/>

**Summary:** The first Portuguese Congress on Building Information Modelling took place at the School of Engineering of the University of Minho in 24-25 November 2016. The conference was chaired by

ISISE member Miguel Azenha and had more than 200 participants. Fifty two papers were published in the conference proceedings that are available online for download in <http://www.ptbim.org/primeiraedicao.html>. Meanwhile the 2<sup>nd</sup> edition of PTBIM is already planned and announced for May 2018 in [www.ptbim.org](http://www.ptbim.org). It will take place in Lisbon.



> 8<sup>th</sup> International Conference on Steel and Aluminium Structures (ICSAS 2016)

**Venue:** Cordis, Hong Kong China

**Date:** 7-9 December, 2016

**Website:** <http://www.civil.hku.hk/ICSAS2016/>

**Summary:** The 8<sup>th</sup> ICSAS took place in Hong Kong. The conference aims at bringing international experts and leaders together to disseminate recent research findings in the fields of steel and aluminium structures and to provide a forum for the discussion of the developments in design and construction. ISISE was represented by João Pedro Martins and Trayana Tankova who presented their recent research.



> Joint workshop of COST Action TU 1402, COST Action TU 1406 and IABSE Working Commission WC1

**Venue:** Faculty of Civil Engineering, Zagreb, Croatia

**Date:** 2-3 March, 2017

**Website:** <http://www.tu1406.eu/meetings/zagreb>

**Summary:** The workshop objective was to contribute to improve bridge management leading to satisfied users and bridge operators, and sustainable development of European road network. A more specific objective is to reveal the value of sophisticated methods to collect, update and process data and the inclusion in probabilistic reliability analysis. The event gathered 120 participants from 40 countries.







> **COST TU 1406 Work Group Meeting**

**Venue:** Champs sur Marne in Marne la Vallée, France

**Date:** 12<sup>th</sup> May, 2017

**Website:** <http://www.tu1406.eu/meetings/paris>

**Summary:** The workgroup meeting took place at IFSTTAR and focused on the works of WG2, WG3, WG4 and WG5 of COST Action TU1406. The outcomes from workgroups WG1, WG2, WG3 and WG4 will be compiled by WG5 in order to establish a guideline for the implementation of QC plans for roadway bridges that could be adopted by agencies and engineers responsible for managing bridges.



> **Course on Risk and Asset Management in Buildings and Infrastructures – 1<sup>st</sup> Edition**

**Venue:** Academia da Infraestruturas de Portugal and University of Minho

**Date:** 13-17 March (Risk management) and 27-31 March (Asset Management)

**Summary:** The main objectives of the course were: (i) Quantify fixed asset management costs; (ii) Quantify

effects of interventions; (iii) Acquire knowledge on simple predictive models; (iv) Calculate optimal maintenance plans; (v) Identify risks associated with assets (risk screening); (vi) Incorporate the concept of risk in cost quantification. The course had 21 participants from several entities.

> **Transportation Geotechnics and Geoecology**

**Venue:** Emperor Alexander I Petersburg State Transport University

**Date:** 17-19 May, 2017

**Website:** <http://conf-geotech.wixsite.com/tgg-2017>

**Summary:** Organized by Emperor Alexander I Petersburg State Transport University under auspices of the ISSMGE and IGS and supported by TCs 202 and 215, this Conference aims to give an up-to-date of the design, construction and exploitation of transport facilities, sharing research findings and application from different players. The Conference was devoted to 150<sup>th</sup> anniversary of Professor Alexander Liverovsky.







> **Design of reinforced RC elements under the combined effect of applied loads and restrained shrinkage**

**Venue:** Ordem dos Engenheiros, Porto, Portugal

**Date:** 19<sup>th</sup> May, 2017

**Website:** <http://civil.uminho.pt/integracrete/seminar>

**Summary:** The Seminar "Design of reinforced RC elements under the combined effect of applied loads and restrained shrinkage" took place at 'Ordem dos Engenheiros' in Porto (Portugal). It was a free seminar, open to the practising community (design and construction), as well as students and academics. It intended to present the most recent scientific advances in the subject, and specifically address interactive discussions among designers. This initiative was held in the scope of the FCT Project "Integracrete", under the combined initiative of the School of Engineering of the University of Minho and the Faculty of Engineering of the University of Porto. The e-book of presentations was made freely available at the website of the event.



## UPCOMING EVENTS

> *Building Information Modeling (BIM)*

**Venue:** Ordem dos Engenheiros

**Date:** Funchal: April to June 2017 (5<sup>th</sup> edition) Porto, Lisboa, Braga and Coimbra: September to November, 2017

**Website:** <http://www.cursobim.com/>

> *Second International RILEM/COST Conference on Early Age Cracking and Serviceability in Cement-based Materials and Structures*

**Venue:** Univ. Libre de Bruxelles ULB, Campus of Solbosch

**Date:** 12-14 September, 2017

**Website:** [www.eac2.be](http://www.eac2.be)

> *Curso de Análise do Risco e Gestão de Ativos nas Edificações e Infraestruturas – 2<sup>nd</sup> Edition*

**Venue:** Academia - Infraestruturas de Portugal, Lisbon

**Date:** 6 - 10 November 2017 (Risk Management) and 11 - 15 December 2017 (Asset Management)

> *XI Congresso de Construção Metálica e Mista*

**Venue:** iParque, Coimbra

**Date:** 23 - 24 November, 2017

**Website:** [www.cmm.pt](http://www.cmm.pt)

> *WORKSHOP PUREST - Promotion of new Eurocode rules for structural stainless steels*

**Venue:** iParque, Coimbra

**Date:** 23-24 November, 2017

**Website:** [www.cmm.pt](http://www.cmm.pt)

> *WORKSHOP SBRI+ - Valorisation of Knowledge for Sustainable Steel-Composite Bridges in Built Environment*

**Venue:** iParque, Coimbra

**Date:** 23 - 24 November, 2017

**Website:** [www.cmm.pt](http://www.cmm.pt)

> WORKSHOP CENTRO ADAPT

**Venue:** iParque, Coimbra

**Date:** 23-24 November, 2017

**Website:** [www.cmm.pt](http://www.cmm.pt)

> Conference IABSE 2019

**Venue:** Centro Cultural Vila Flor, Guimarães, Portugal

**Date:** 27-29 March, 2019

**Website:** [http://www.iabse.org/guimaraes\\_2019](http://www.iabse.org/guimaraes_2019)

> cmn2019 - Congress on Numerical Methods in Engineering

**Venue:** University of Minho, Guimarães

**Date:** 1-3 July 2019

**Website:** <http://www.civil.uminho.pt/cmn2019>

## MASTER COURSES

> **Master Course on Acoustic and Energy Efficiency for a Sustainable Construction**

**Website:** <http://www.dec.uc.pt>

**Application dates:**

- > 2<sup>nd</sup> call: 01<sup>st</sup> April until 15<sup>th</sup> July;
- > 3<sup>rd</sup> call: 24<sup>th</sup> August until 5<sup>th</sup> September

> **Master Course in Building Reabilitação**

**Website:** <http://www.dec.uc.pt>

**Application dates:**

- > 2<sup>nd</sup> call: 01<sup>st</sup> April until 15<sup>th</sup> July;
- > 3<sup>rd</sup> call: 24<sup>th</sup> August until 5<sup>th</sup> September

> **Master Course in Steel and Composite Construction**

**Website:** <http://www.dec.uc.pt>

**Application dates:**

- > 2<sup>nd</sup> call: 01<sup>st</sup> April until 15<sup>th</sup> July;
- > 3<sup>rd</sup> call: 24<sup>th</sup> August until 5<sup>th</sup> September

> **Advanced Masters in Structural Analysis of Monuments and Historical Constructions**

**Venue:** Department of Civil Engineering, University of Minho

**Website:** <http://www.msc-sahc.org>

**Application dates:**

- > 3<sup>rd</sup> call: 15<sup>th</sup> June



## PHD COURSES

> **Doctoral Program Steel and Composite Construction**

**Website:** <http://www.dec.uc.pt>

**Application dates:**

- > 2<sup>nd</sup> call: 01<sup>st</sup> April until 15<sup>th</sup> July;
- > 3<sup>rd</sup> call: 24<sup>th</sup> August until 5<sup>th</sup> September

> **Doctoral Program in Civil Engineering**

**Website:** <http://www.pdec.civil.uminho.pt>

**Application dates:**

- > 2<sup>nd</sup> call: August, 28<sup>th</sup> until September, 3<sup>rd</sup> 2017