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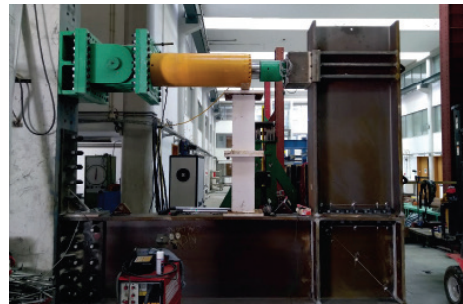
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## ISISE HIGHLIGHTS



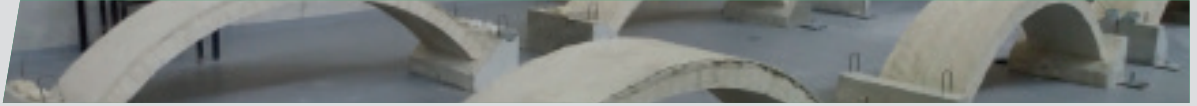
The University of Coimbra and ISISE research group were selected by CERN to conduct an experimental study on the large steel joints to be used in the new Long-Baseline Neutrino Facility, where new studies in the field of neutrino science and proton decay, in the scope of the Deep Underground Neutrino Facility, hosted at Fermilab in Batavia, (Illinois, USA), will

be undertaken. This facility will comprise the world's highest intensity neutrino beam and the necessary infrastructure to support the cryogenic far detectors, installed deep underground at the Sanford research facilities. The objective was to perform full scale tests on very large specifically tailored bolted and welded steel joints between HLM 1100 profiles fabricated with S460 high strength steel and using M48, 10.9 pretensioned bolts, validating experimentally the behaviour of the steel joints.

The European Union approved the financial support of more than 2M€ to the BIM A+ through the Erasmus+ programme. BIM A+ will have its first edition in 2019/2020 as an Erasmus Mundus Masters Course. The objective of BIM A+ is to offer an advanced education programme on BIM integrated design, construction and operation processes, with a strong focus on the collaborative practices that are the cornerstone of such integration. Applications are open and a significant number of scholarships for students of any nationality are available. For further details, please visit [www.bimaplus.org](http://www.bimaplus.org) or email us at [secretariat@bimaplus.org](mailto:secretariat@bimaplus.org).



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## ISISE HIGHLIGHTS (CONTINUED)

The New York Times, last 3<sup>rd</sup> November, 2018, reported a work carried by ISISE entitle "In a Land of Quakes, Engineering a Future for a Church Made of Mud": "In Kuño Tambo, perched at 13,000 feet in Peru's Andes Mountains, the mud-brick walls of the Church of Santiago, Apóstol, built by the Spanish in 1681, have weathered their fair share of earthquakes. (...) To come up with a strategy for strengthening Kuño Tambo's church with a mix of new reinforcements, Mr. Torrealva and a team of engineers ran over 300 small-scale physical tests of a handful of techniques used for centuries by Peruvian builders. Then, working with Paulo Lourenço, an engineer at the University of Minho in Portugal, the team built a detailed virtual model of the church. They ran simulations of the building with different arrangements of reinforcements, under multiple kinds of seismic stress. That resulted in a plan to outfit the church with 11 new tie beams that span the building's width, a new collar beam below the roof's circumference and three L-shaped braces called keys inserted into each corner to tie the walls together, all from regionally sourced eucalyptus wood." (the complete news can be seen in <https://www.nytimes.com/2018/11/03/science/adobe-peru-restoration.html>)



In the scope of the FCT R&D Units Evaluation 2014-17, last November 6<sup>th</sup>, 2018, the ISISE had the site visit of the evaluation panel composed by Lyesse Laloui (École Polytechnique Fédérale de Lausanne, Coordinator), Vladimir Nikora (University of Aberdeen), Farrokh Nadim (Norwegian Geotechnical Institute), Bernardino Chiaia (Politecnico di Torino) and Mario Di Paola (University of Palermo), and Ana Araújo from FCT. This visit included several meetings with senior and junior members, Post-Docs and PhD students of ISISE, as well as the visit to the lab facilities.





## R&D COMPLETED PROJECTS

### > SHOWTIME – Steel Hybrid Onshore Wind Towers Installed with Minimal Effort

**ISISE Principal Investigator:** Carlos Rebelo

**Budget:** Global: 1.850.329,00€/ISISE-UC: 333.250,00€

**ID:** RFSR-CT-2015-00021

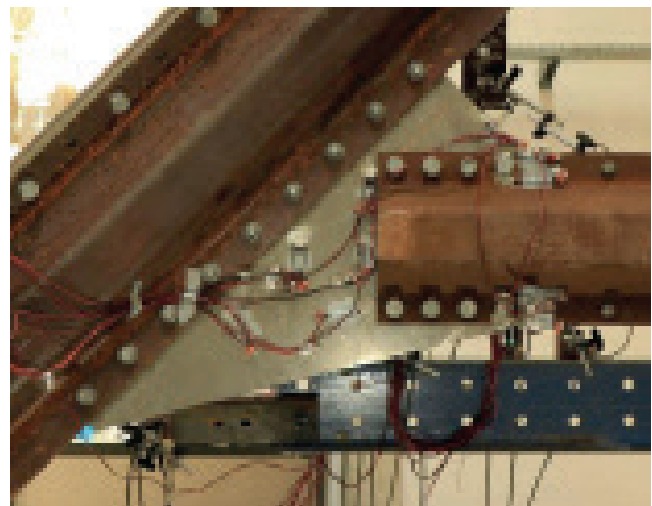
**Funding Entity:** EU – Research Fund for Coal and Steel

**Principal Contractor:** University of Coimbra

**Duration:** From 01/07/2015 to 30/06/2018

**Summary:** The aim of the project is to develop an effective high-rise hybrid lattice/tubular tower with an adequate erection process. The key objective of the project is to develop a solution that avoids this penalty by taking advantage of the well-established technology for connections between tubular segments and thereby develop a truss structure with a reduced number of joints that are also low maintenance. The project main achievements were: (i) Design and optimization of the lattice/tubular tower considering practical constraints of transportation, erection and the geometry using aeroelastic load simulations, (ii) Design and simulation of the full scale and construction of the scaled prototype of the erection process, (iii) Development of very high strength steel and low-maintenance for preloaded bolts for the new type of connections in

normal and aggressive environments, (iv) Design and experimental evaluation of a new cross-section for the lattice part with superior buckling resistance and easy connections and (v) life cycle assessment of best-performing case studies, including cost evaluation; design recommendations (for easy certification). The simulation of the erection process can be viewed in ISISE youtube channel at: [https://www.youtube.com/channel/UCQO4XgOhINzyOTx\\_He1\\_iPw/videos](https://www.youtube.com/channel/UCQO4XgOhINzyOTx_He1_iPw/videos)



### > PROLIFE – Prolonging Life Time of Old Steel and Steel-concrete Bridges

**ISISE Principal Investigator:** Carlos Rebelo

**Budget:** Global: 1.690.102,00€/ISISE-UC: 221.730,00€

**ID:** RFSR-CT-2015-000

**Funding Entity:** EU – Research Fund for Coal and Steel

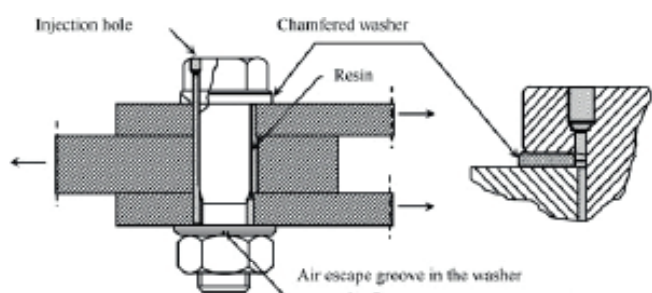
**Principal Contractor:** University of Coimbra

**Duration:** From 01/07/2015 to 30/06/2018

**Summary:** This project is based on three distinctive ideas which each has the potential to reduce investment costs as well the environmental impact and traffic disturbance:

- > Introduction of composite action or strengthening of existing shear connectors by post installed shear dowels.
- > Introduction of horizontal trusses between the lower flanges for I-girder bridges, giving the very fatigue-sensitive I-girders box-like behavior. Furthermore, a new concept for friction connections between the trusses and the bottom flanges was evaluated by tests.

> Effective methods of strengthening of old truss bridges. Four bridges have been identified and analyzed with FEM. Furthermore, methodologies for the estimation of the service life of the bridge (before and after rehabilitation) as well as for Life Cycle Cost Analysis have been developed. To support decision makers, a Multi-Criteria Decision Scheme, to evaluate various strengthening strategies, has also been generated.





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

**ISISE Principal Investigator:** *Luís Simões da Silva (ISISE-UC), Constança Rigueiro (ISISE-UC)*

**Budget:** *Global: 1.125.079,80€/ISISE-UM: 129.216,40€*

**ID:** *710068*

**Funding Entity:** *EU – Research Fund for Coal and Steel*

**Duration:** *From 07/2016 to 06/2018*

**Summary:** Within the previous RFCS research project SBRI “Sustainable Steel-Composite Bridges in Built Environment”, a holistic approach was applied to steel-composite bridges by combining analyses of environmental, economic and functional qualities along the entire life-cycle of bridges. This research aims at the valorisation, the dissemination and the extension of the developed method for advanced applications. A wide audience including bridge engineers and authorities should be reached, in order to assure the application of the project outcome. Main tasks: Explanation of methodology and background by elaboration of worked examples and improvement of the SBRI-tool and

Extension of bridge types by advanced application to innovative bridges across Europe demonstrating the flexibility and applicability of the methods developed. Two design manuals will be prepared, drafted and translated in 11 European languages and distributed within the planned dissemination activities. Design Manual I includes background information on the methodology and worked examples for easy application in daily design work with the help of the improved software tool. By analyses of built examples across Europe the SBRI method is applied to innovative bridge solutions, results and conclusions are shown in Design Manual II.



> **COST Action TU 1404 – Towards the next generation of standards for service life of cement-based materials and structures**

**ISISE Principal Investigator:** *Miguel Azenha*

**Budget:** *Global: 596 028,98€*

**ID:** *COST - CGA-TU1404*

**Funding Entity:** *European Cooperation in Science & Technology/EU*

**Principal Contractor:** *Universidade do Minho*

**Duration:** *From 01/01/2015 to 17/11/2018*

**Summary:** COST Action TU1404 has successfully reached its end in November 2018, having reached a very high degree of achievement in comparison to the initial plan, and also surpassing it. It was a truly collaborative experience that had some particularities of success in its networking aim. In brief words, there were two fundamental aspects of COST TU1404 that I would stand out, as activators of the network, and examples of good practice to be followed in all COST Actions in which these types of networking methods/instruments are applicable: (i) the Extended Round Robin Testing Programme (RRT+); (ii) the Numerical Simulation Benchmarking programme. Both these programmes were very innovative and pioneering in terms of breadth and number of involved

parties (for scientific details see [www.tu1404.eu](http://www.tu1404.eu)). On the RRT+ programme alone, more than 40 laboratories were involved since the beginning and more than 100 tons of raw material have been shipped. The effects of these networking instruments are still reverberating, and in fact they are expected to still be producing effects throughout many years. Indeed, more similar initiatives are being planned within the members of the ceasing action, most likely engaging further work in new RRT's and Benchmarks (even if smaller).





## R&D STARTED PROJECTS

### > EcOffShorBE – Eco Offshore Built Environment

**ISISE Principal Investigator:** José Sena Cruz

**Budget:** Global: 427893,42€/ISISE-UM: 214 601,76€

**ID:** NORTE-01-0247-FEDER-037417

**Funding Entity:** Norte2020/ANI

**Principal Contractor:** Civitest

**Duration:** From 23/11/2018 to 22/11/2021

**Partners:** Universidade do Minho

### > RESIST-2020 – Seismic Rehabilitation of Old Masonry-Concrete Buildings

**ISISE Principal Investigator:** Paulo Lourenço

**Budget:** Global: 239590,25€/ISISE-UM: 98267,50€

**ID:** PTDC/ECI-EGC/30567/2017

**Funding Entity:** OE/FCT

**Principal Contractor:** Associação do Instituto Superior Técnico para a Investigação e o Desenvolvimento (IST-ID)

**Duration:** From 01/10/2018 to 30/09/2021

**Partners:** Universidade do Minho, Laboratório Nacional de Engenharia Civil (LNEC)

### > SEVen – Development of Sustainable Ceramic Brick Masonry Veneer Walls for Building Envelops

**ISISE Principal Investigator:** Graça Vasconcelos

**Budget:** Global: 233902,28€/ISISE-UM: 140089,83€

**ID:** POCI-01-0145-FEDER-030876

**Funding Entity:** COMPETE2020/FCT

**Principal Contractor:** Universidade do Minho

**Duration:** From 20/10/2018 to 19/10/2021

**Partners:** Centro Tecnológico da Cerâmica e do Vidro (CTCV), Laboratório Nacional de Engenharia Civil (LNEC)

### > TimQuake- Structural performance of timber joints and structures under earthquakes

**ISISE Principal Investigator:** Jorge Branco

**Budget:** Global: 225826,45€/ISISE-UM: 163601,45€

**ID:** POCI-01-0145-FEDER-032031

**Funding Entity:** COMPETE2020/FCT

**Principal Contractor:** Universidade do Minho

**Duration:** From 20/10/2018 to 19/10/2021

**Partners:** Laboratório Nacional de Engenharia Civil (LNEC)

### > CEN-DynaGeo – Coupled Experimental and Numerical Approaches Toward Reliable Dynamic Characterization of Multi-phase Geomaterials

**ISISE Principal Investigator:** António Correia

**Budget:** Global: 233723,06€/ISISE-UM: 87650€

**ID:** PTDC/EAM-GTC/29923/2017

**Funding Entity:** OE/FCT

**Principal Contractor:** Associação do Instituto Superior Técnico para a Investigação e o Desenvolvimento (IST-ID)

**Duration:** From 01/10/2018 to 30/09/2021

**Partners:** Universidade do Minho

### > SlabImp – Prefabricated lightweight and multifunctional large span slabs

**ISISE Principal Investigator:** Joaquim Barros

**Budget:** Global: 654927,64€/ISISE-UM: 262424,02€

**ID:** POCI-01-0247-FEDER-033883

**Funding Entity:** COMPETE2020/ANI

**Principal Contractor:** Pavimentos Pré-Esforçados Império Braga Lda

**Duration:** From 31/08/2018 to 30/08/2021

**Partners:** Universidade do Minho, Almeida Cunha e Chaves, Lda





› **PreSlabTec – Sistema construtivo inovador para laje aligeirada integralmente pré-fabricada de elevado desempenho comportamental**

**ISISE Principal Investigator:** Maria Isabel Valente  
**Budget:** Global: 485026,26€/ISISE-UM: 136395,08€  
**ID:** NORTE-01-0247-FEDER-033690  
**Funding Entity:** NORTE2020/ANI  
**Principal Contractor:** Civitest  
**Duration:** From 01/10/2018 to 28/03/2020  
**Partners:** Universidade do Minho, Serralharia Cunha, Lda

› **LightSlab – Development of innovative slab solutions using sandwich panels**

**ISISE Principal Investigator:** Paulo Lourenço  
**Budget:** Global: 569114,65€/ISISE-UM: 300242,33€  
**ID:** POCI-01-0247-FEDER-033865  
**Funding Entity:** COMPETE2020/ANI  
**Principal Contractor:** Ferpainel  
**Duration:** From 01/09/2018 to 31/08/2021  
**Partners:** Universidade do Minho

› **SPAFLAMIS – FRP-based innovative technique with improved fire behavior for the simultaneous flexural-shear/punching strengthening of reinforced concrete elements**

**ISISE Principal Investigator:** Salvador Dias  
**Budget:** Global: 239.923,46€: 216.173,46€/ISISE-UM; 23750€/ISISE-UC  
**ID:** POCI-01-0145-FEDER-028112  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 01/06/2018 to 27/11/2020  
**Partners:** Civitest

› **FLOATIDE – Advanced prefabricated multifunctional floating dock system for tidal energy capitation and coastal protection**

**ISISE Principal Investigator:** Fatemeh Soltanzadeh  
**Budget:** Global: 237155,58€/ISISE-UM: 197188,76€  
**ID:** POCI-01-0145-FEDER-028112  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 07/06/2018 to 05/06/2020  
**Partners:** Civitest

› **PUMA – Experimental and numerical pushover analysis of masonry buildings**

**ISISE Principal Investigator:** Paulo Lourenço  
**Budget:** Global: 239670,62€/ISISE-UM: 147558,12€  
**ID:** POCI-01-0145-FEDER-029010  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 07/06/2018 to 05/06/2020  
**Partners:** Laboratório Regional de Engenharia Civil

› **SAFEWAY – Gis-based infrastructure management system for optimized response to extreme events of terrestrial transport networks**

**ISISE Principal Investigator:** José Matos  
**Budget:** Global: 4521100€/ISISE-UM: 372 412,50€  
**ID:** SAFEWAY - 769255  
**Funding Entity:** H2020/EU  
**Principal Contractor:** Universidade de Vigo  
**Duration:** From 01/09/2018 to 22/02/2022  
**Partners:** Stiftelsen Norges Geotekniske Institutt (Norway), The chancellor masters and scholars of the university of cambridge (United Kingdom), Ingenieria Insitu SL (Spain), Demo Consultants BV (Netherlands), Universidade do Minho (Portugal), Planetek Italia SRL (Italy), Infrastructure Management Consultants GMBH (Switzerland), Ferrovial Agroman SA (Spain), Infraestruturas de Portugal SA (Portugal), Network Rail Infrastructure Limited (United Kingdom), Ruttende Leeuw Bernardus (Netherlands), Innovactory International BV (Netherlands), Transportøkonomisk Institutt (Norway)





> **STRECOLESF** – Innovative technique using effectively composite materials for the strengthening of rectangular cross section reinforced concrete columns exposed to seismic loadings and fire

**ISISE Principal Investigator:** Mohammadali Rezazadeh  
**Budget:** Global: 238048,43€/ISISE-UM: 238048,43€  
**ID:** POCI-01-0145-FEDER-029485  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 26/07/2018 to 21/01/2021

> **PUFPROTECT** – Prefabricated Urban Furniture Made by Advanced Materials for Protecting Public Built Environment

**ISISE Principal Investigator:** Honeyeh Ramezan Sefat  
**Budget:** Global: 238 985,97€/ISISE-UM: 238 985,97€  
**ID:** POCI-01-0145-FEDER-028256  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 26/07/2018 to 21/01/2021

> **ICoSyTec** – Innovative construction system for a new generation of high performance buildings

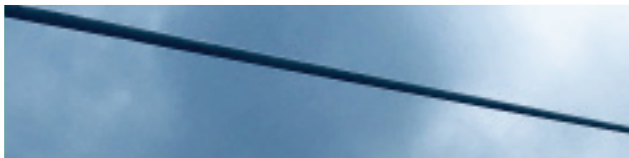
**ISISE Principal Investigator:** Joaquim Barros  
**Budget:** Global: 239923,47€/ISISE-UM: 239923,47€  
**ID:** POCI-01-0145-FEDER-027990  
**Funding Entity:** COMPETE2020/FCT  
**Principal Contractor:** Universidade do Minho  
**Duration:** From 26/07/2018 to 21/01/2021

> **WoodShape**

**ISISE Principal Investigator:** Alfredo Dias  
**Budget:** Global: 1 006 117,00€/ISISE-UM: 206 192,00€  
**ID:** POCI-01-0247-FEDER-033348  
**Funding Entity:** P2020  
**Principal Contractor:** TJ Moldes  
**Duration:** From 01/10/18 to 30/09/21

> **HLS** – Barreiras Acústicas

**ISISE Principal Investigator:** Paulo Amado Mendes  
**Budget:** Global: 451.815,00€/ISISE-UM: 209.251,00€  
**ID:** POCI-01-0247-FEDER-033691  
**Funding Entity:** P2020  
**Principal Contractor:** Pedrosa Irmãos L  
**Duration:** From 01/10/18 to 30/09/21





# COMPLETED PHD THESSES

## > Reduction of seismic vulnerability of vernacular architecture with traditional strengthening solutions

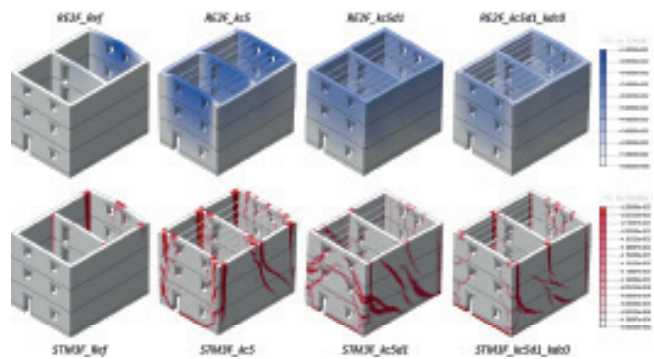
**Author:** Javier Ortega Heras

**Supervisors:** Graça Vasconcelos; Mariana Correia (Escola Superior de Gallaecia); Hugo Rodrigues (ESTG-IPL)

**Date:** 4<sup>th</sup> July, 2018

**Summary:** The valorization and preservation of vernacular architecture, as well as traditional construction techniques and materials, is a key element for cultural identity. As part of this essential objective, the thesis focused on vernacular architecture earthquake preparedness, with a particular focus on the Portuguese case. Therefore, the first part of the thesis was dedicated to the investigation of traditional strengthening construction techniques developed empirically by local communities. The second part dealt with the development of two seismic vulnerability assessment methods for vernacular architecture: (1) Seismic Vulnerability Index for Vernacular Architecture (SVIVA); and (2) Seismic Assessment of the Vulnerability of Vernacular Architecture Structures (SAVVAS). The third part addressed the numerical investigation of traditional strengthening construction solutions. Finally, the two vulnerability methods developed were applied in two real case studies.

CV: **Javier** is master in Master in Architecture at Polytechnic University of Madrid and Master in Structural Analysis of Historical Constructions at University of Minho and concluded his PhD in Civil Engineering in 2018. He has been involved in several research projects and published several papers in international conferences and international journals. Presently, he Post-doc researcher at University of Minho.



Numerical models used in parametric assessment for development of seismic vulnerability methods – assessment of the influence of horizontal diaphragms

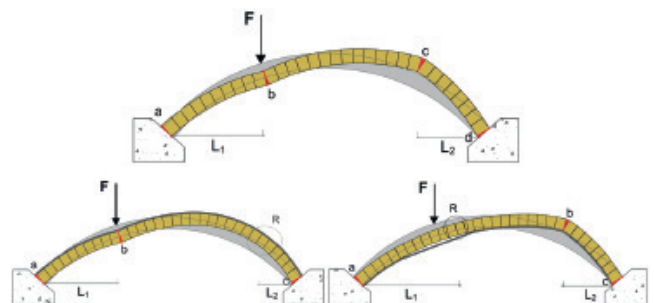
## > Conservation and Safety Assessment of Vaulted Adobe Architecture in Yazd, Iran

**Author:** Neda Haji Sadeghi

**Supervisors:** Daniel Oliveira; Mariana Correia (Escola Superior de Gallaecia)

**Date:** 26<sup>th</sup> July, 2018

**Summary:** This thesis deals with the seismic study of vernacular vaulted adobe houses in Yazd. Three main research approaches have been employed: (a) theoretical and analytical methods; (b) numerical methods; (c) experimental methods. The main research aim is to increase the life-span and safety of vernacular vaulted adobe houses in Yazd, guaranteeing human survival during an earthquake, and considering relevant principles and criteria for conservation of cultural heritage buildings.



CV: **Neda Haji Sadeghi** is currently Assistant Professor at the School of Art and Architecture, University of Yazd, Iran. Her main research interests deal with the conservation and preservation of historical adobe buildings, including the use of compatible repair techniques.





## > Seismic Behaviour of Masonry Veneer Walls

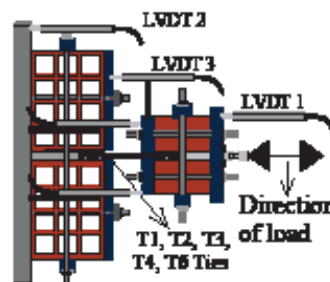
**Author:** Andreia Piedade Gomes Martins

**Supervisors:** Graça Fátima Moreira Vasconcelos; Alfredo Peres de Noronha Campos Costa (LNEC)

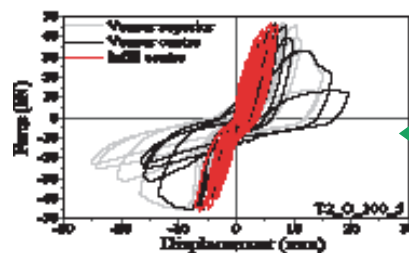
**Date:** 31<sup>st</sup> October, 2018

**Summary:** It is recognized that masonry veneer walls, commonly used in commercial, industrial and residential buildings can be vulnerable to earthquakes. This work aimed to contribute to the knowledge of seismic behaviour of masonry veneer whose backing support is composed by brick masonry infill walls enclosed in RC frames. In detail, this thesis aimed at: (1) analyse at the local level the mechanical behaviour of connections of wall ties between the brick veneer walls and masonry infill walls; (2) assess the mechanical behaviour of brick veneer walls under out-of-plane loads for different configurations of ties; (3) carry out an overview of standards and provide design and construction guidelines under seismic action for brick masonry veneer walls. It was seen that the out-of-plane behaviour of the brick veneer walls depend also on the type and number of ties, and on the air cavity width. Both parameters control the out-of-plane performance from the brick veneer walls to the backing wall.

CV: **Andreia Martins** is master in Civil Engineering at University of Minho and concluded her PhD in Civil Engineering in 2018 with the thesis entitled Seismic Behaviour of Masonry Veneer Walls. She was involved in several research projects and published several papers in national and international conferences and 5 journals in international journals. Presently, she is coordinator of Innovation Department at DST group.



(a) Testing setup for tie-masonry connections; (b) Testing setup for Brick veneer walls under out-of-plane loading



Typical Force-displacement diagrams for brick veneer walls

## > Behaviour of Unstiffened and Stiffened Curved Steel Panels Under In-Plane and Out-of-Plane Actions

**Author:** Tiago Jorge da Cruz Manco

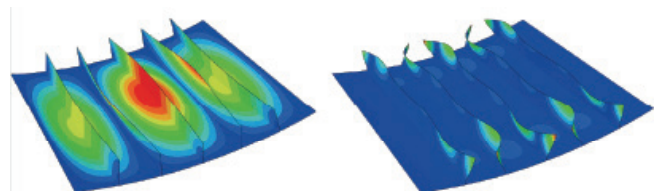
**Supervisors:** Luís Alberto Proença Simões da Silva, João Pedro Simões Cândido Martins, Maria Constança Simões Rigueiro

**Date:** 27<sup>th</sup> November, 2018

**Summary:** Despite being increasingly used in several engineering fields, design provisions to predict the strength of steel curved panels are mostly empirical and with a small range of application. Consequently, the main aim of this thesis is to predict the nonlinear behaviour and ultimate strength of stiffened and unstiffened cylindrically curved steel panels under in-plane and out-of-plane loading based on a physically robust approach, through semi-analytical methods (SAM). The main advantage of this approach, in comparison to the usual approaches, like the Finite Element Method (FEM), is allowing to identify the key parameters that influence

the behaviour of the curved panels and to develop expressions purely based on the physical background of the problem, which have a large practical interest. The SAM is then used, with a yield criterion, to predict the resistance of unstiffened curved panels under compression. Expressions are derived to calculate the ultimate load of these panels, showing good agreement with the FEM.

CV: **Tiago da Cruz Manco** has a M.Sc. in Civil Engineering from the University of Coimbra. He concluded his PhD in Steel and Composite Construction at the University of Coimbra in November 2018.





> **The use of Advanced Technologies on Life-cycle Assessment of Infrastructures**

**Author:** Bruno Samuel Ferreira Gonçalves

**Supervisors:** Paulo Lourenço; José Campos e Matos

**Date:** 28<sup>th</sup> November 2018

**Summary:** The thesis presents advancements towards an infrastructure life-cycle management integrated system. The contents were developed taking into consideration the needs of the real world players, managers and inspectors. Interviews and surveys were conducted and the needs were unveiled. A mobile inspection platform was developed that allows for better inspections by presenting a user-friendly interface, by having and collecting georeferenced data for GIS, by giving technical support to the inspectors for more objective inspections and by streamlining field inspections across organization, quality and time. For the life-cycle optimization, a multi criteria approach with a lexicographic method was adopted which is capable of obtaining the optimal solution (meeting all the constraints), is capable of drawing action plans for all

the assets over their entire life-cycle, and is capable of flexible generation of scenarios for alternative optimal solutions (multi objective optimization).

CV: Since 2009, invited professor in the DPS of the UMinho, teaching operational research and industrial simulation contents. The area of expertise is Systems Analysis and Discrete Simulation. Supervised, co-supervised and argued more than 4 master theses. Published more than 8 articles including a book chapter on Asset management. From 2015 to 2018, researcher in 2 projects (HMIEXCEL and iFactory).



> **Durability and long-term behaviour of RC slabs strengthened in flexure with prestressed CFRP laminate strips**

**Author:** Luis Luciano Gouveia Correia

**Supervisors:** José Sena Cruz; Paulo Macedo França (UMadeira)

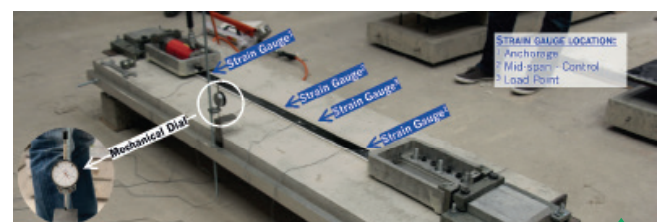
**Date:** 3<sup>rd</sup> December, 2018

**Summary:** The present PhD thesis aimed to give insights on two main literature gaps of prestressed EBR CFRP systems in RC structures, mainly: durability and long-term performance. For that purpose, an experimental program was carried out with 30 RC slabs where the main studied parameters were: the anchorage system (mechanical anchorage and gradient anchorage), level of prestress, CFRP laminate geometry and concrete surface preparation.

The durability and long-term performance were investigated by exposing 16 strengthened RC slabs to a sustained loading and to four distinct environmental conditions for approximately 8 months. After the exposure period, all slabs were monotonically tested up to failure and small losses of performance and ductility were observed.

Additionally, large scale pull-out tests were carried out to assess the bond behaviour of the mechanical anchorage system: CFRP rupture was observed in tests at room temperature, which clearly shows a better use of the strengthening materials.

CV: **Luis Correia** graduated in MSc Civil Engineering in 2012 from the University of Madeira, where he was awarded twice with the merit scholarship. In 2018, he finished his PhD degree in Civil Engineering from the University of Minho. While his PhD work was being developed, he published 21 papers (journal and conference papers) in the field of RC structures strengthened with prestressed CFRP laminate strips



Instrumentation used during the strengthening (pre-stress application) of RC slabs with the mechanical anchorage system

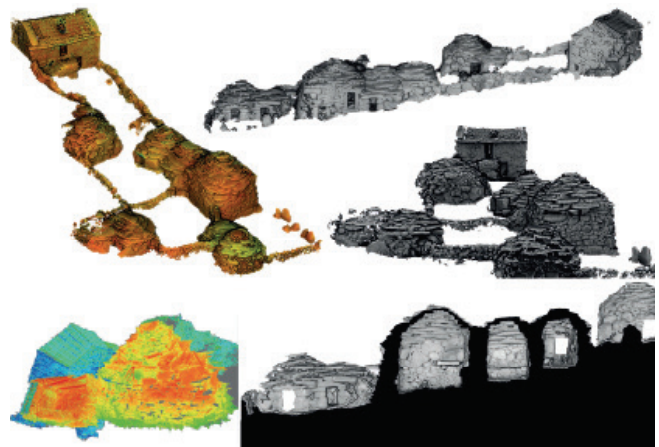


> **The rural vernacular construction of the Entre-Douro-e-Minho**

**Author:** Carlos Eduardo Santos Barroso  
**Supervisors:** Daniel Oliveira; José Luís Ramos  
**Date:** 18<sup>th</sup> December, 2018

**Summary:** This thesis deals with the technical study of the rural vernacular construction of the Entre-Douro-e-Minho region aiming at its conservation. The four main objectives of this work are as follows: (a) contribution to the protection of vernacular knowledge by promoting its safeguarding and sharing; (b) contribution to the knowledge field's enlargement by adding a technical perspective; (c) overview regarding vernacular buildings state of preservation; (d) application of a vernacular heritage preservation methodology to two case studies.

CV: **Carlos Barroso** started his career as Architect in 2008, working in Portugal and Spain. He holds a Master Degree in Sustainable Construction and Rehabilitation, obtained in 2012. He concluded his PhD in Civil Engineering in 2018, at University of Minho, on the topic "The vernacular construction from the Entre-Douro-e-Minho". He is author of several publications on the field of vernacular heritage preservation.



> **Study of Structural and Thermal Performance of Lightweight Steel Framing (LSF) Modular Construction**

**Author:** Nuno Cláudio Ferreira Rosa  
**Supervisors:** Paulo Santos, Helena Gervásio, José Costa  
**Date:** 21<sup>st</sup> December, 2018

**Summary:** Lightweight Steel Framing (LSF) construction is recognized as a sustainable construction system, not only because steel is one of the most recyclable materials in the world but also due to the advantages of this type of construction. In LSF construction screws are often used to perform the connections between structural and non-structural elements due to its efficiency. However, it is exceedingly difficult to quantify their stiffness and strength contributions to the structural system due to their complex behaviour. Due to the low thermal inertia of LSF constructions, two systems (Earth-to-Air Heat Exchangers and Trombe wall) able to improve thermal inertia of buildings are investigate. In this context, the main outcomes of the thesis are: (1) to analyse and give better understanding of screw connection in LSF

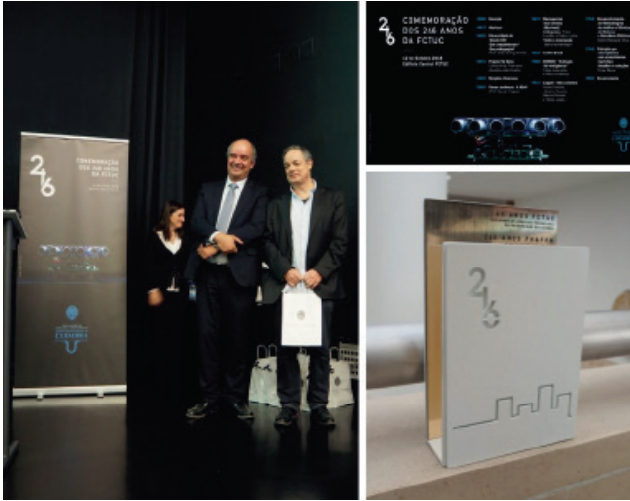
panels and to analyse the contribution of OSB boards to the lateral stiffness of the steel frame; (2) to provide design guidelines for suitable design, and operation control, of an efficient EAHE; (3) to develop a new Trombe Wall system that can be easily assembled in a LSF construction.

CV: **Nuno Rosa** has a M.Sc. in Mechanical Engineering (Energy and Environment) from the University of Coimbra. He concluded his PhD in Steel and Composite Construction in December 2018 at University of Coimbra while he is a researcher in ISISE since 2013. He is currently a researcher at the Mechanical Engineering Department of the University of Coimbra.





## AWARDS & PRIZES



In the context of the 246-year celebrations of University of Coimbra, Professor Luís Simões da Silva received, for the third time, the “Honorable Mention in Research: Projects and Activities”. The distinction was presented by Professor Luís Filipe Menezes, Vice-Rector of the University of Coimbra, on October 12.

Dafne C. Martin-Alarcon received the “2017 Outstanding Student Thesis Award” for the master’s thesis conducted under the supervision of Professor Paulo Lourenço, entitled "Optical Monitoring & Modeling of Masonry Behavior under Shear Load" during the TMS 2018 Annual Meeting held October 3-6, Cleveland. The Masonry Society (TMS) Student Thesis Awards are awarded annually by the TMS Scientific Committee for the best doctoral thesis and master dissertation on Masonry topics.



Angelo Gaetani, Giorgio Monti, Paulo Lourenco and Giancarlo Marcari just won the David Fischetti Award from the Association for Preservation Technology International, for an outstanding article that advances the field of conservation engineering: “Design and Analysis of Cross Vaults along History”.





## EVENTS

### > Course on Risk Analysis and Asset Management in Buildings and Infrastructures (3<sup>rd</sup> edition)

**Venue:** Porto, Portugal

**Date:** March 19-23 and April 16-20, 2018

**Website:** [www.ordemengenheiros.pt/pt/agenda/curso-de-risco-e-gestao-de-ativos-nas-edificacoes-e-infraestruturas/](http://www.ordemengenheiros.pt/pt/agenda/curso-de-risco-e-gestao-de-ativos-nas-edificacoes-e-infraestruturas/)

**Summary:** The Course on Risk Analysis and Asset Management in Buildings and Infrastructures is

a joint organization of University of Minho and Infraestruturas de Portugal, with the support of the Portuguese Association of Engineers. This course has a duration of 80 hours and is mainly aimed to technicians, with responsibilities in risk analysis and asset management, whom need to acquire and/or update fundamental knowledge and skills in this area.

### > TIASD 2018: 3<sup>rd</sup> International Workshop on Traditional and Innovative Approaches in Seismic Design

**Venue:** Guimarães, Portugal

**Date:** April 26-28, 2018

**Website:** [www.tiasd.eu](http://www.tiasd.eu)

**Summary:** The 3<sup>rd</sup> International Workshop on Traditional and Innovative Approaches in Seismic Design (TIASD 2018) was held at the University of Minho, Guimarães, on April 26-28, 2018. This Workshop, financed by the German Academic Exchange Service, involved the participation of 18 lecturers from Portugal, Italy and Germany, experts in seismic engineering, and was addressed to selected MSc and PhD students.



### > LEST Party

**Venue:** Arouca

**Date:** July 20<sup>th</sup>, 2018

**Website:** [lest.uminho.pt](http://lest.uminho.pt)

**Summary:** LEST organised its summer party, a tradition to bring the group together and encourage friendship and cooperation among all users. This year it was held at the mountain with an adventure through the Paiva walkways that tested the endurance and resilience of all participants. All passed the test with flying colors, which proved the strength of the team and the cooperation spirit of all members. After, the event closed with a hearty picnic near the Douro river, and some very happy participants.





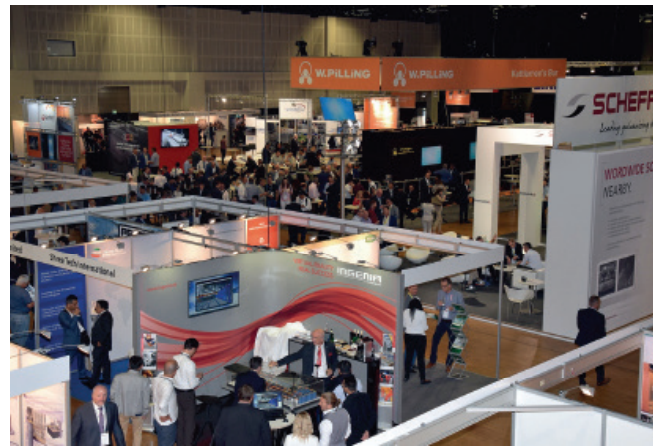
> **INTERGALVA 2018**

**Venue:** Berlin, Germany

**Date:** June 17-22, 2018

**Website:** <https://www.intergalva.com/past-events/intergalva-2018/>

**Summary:** Prof. Carlos Rebelo was a keynote speaker during the Conference and Exhibition INTERGALVA 2018 Intergalva 2018 organised by European General Galvanizers Association (EGGA). In his lecture he presented the advances on steel wind towers research, with special focus on the use of cold formed members in lattice towers.



> **Research Dissemination Seminar on the joint European Project 'SHOWTIME'**

**Venue:** Broadway House, London

**Date:** June 28<sup>th</sup>, 2018

**Summary:** This full-day event presented the remain results of the research project that investigated an economical solution for tall onshore wind towers based on a hybrid design comprising a steel lattice lower part and a steel tubular upper part. Innovative aspects of the project include the optimisation of the tower erection process, the transition component between the tubular and lattice parts of the tower, and the minimisation of in-situ work using newly developed bolted connections. Besides the partners of the project, delegates from several companies (Hebetec Engineering, Salzgitter Mannesmann, Suzlon Energy, Tata Steel and others) and from universities were present in a total of 28 attendees.



> **ISISE Summer Party with DJ Steel**

**Venue:** Coimbra

**Date:** July 21<sup>st</sup>, 2018

**Summary:** Before the summer holidays, ISISE SMCT+FP had a wonderful summer party. There were games, food and drinks in a warm July evening accompanied with nice music chosen by DJ Steel. João Vidal from ISISE Lab won the darts tournament!





### > COST TU1406 Summer School – University College Dublin

**Venue:** Dynamical Systems and Risk Laboratory, School of Mechanical and Materials Engineering, University College Dublin, Ireland

**Date:** July 24, 2018

**Website:** <https://www.tu1406.eu/training/dublin>

**Summary:** COST TU1406 Summer School participants

were introduced to a range of bridge management, inspection, performance indicators and assessment approaches along with a clear idea around the different aspects of risk. The summer school provided targeted training for doctoral researchers in these topics, including hands-on problem-solving sessions.

### > 8<sup>th</sup> Workgroup Workshop of COST Action TU1406

**Venue:** Technical University of Catalonia, Barcelona, Spain

**Date:** September 27<sup>th</sup>, 2018

**Website:** <https://www.tu1406.eu/meetings/barcelona>

**Summary:** The eighth workshop of COST Action TU1406 was dedicated to: (i) methods and

experiences of bridge Life-cycle Assessment; (ii) establishment of Quality control plans; (iii) quality control measurements, techniques and methods; (iv) applications to Case Studies; guidelines for implementation of Quality Control Plans; (v) quality control and standardization; (vi) bridge management systems.

### > COST TU1406 Training School – Thessaloniki

**Venue:** Department of Civil Engineering, School of Engineering, Aristotle University of Thessaloniki

**Date:** October 1-4, 2018

**Website:** <https://www.tu1406.eu/training/thessaloniki>

**Summary:** The COST TU1406 Training School – Thessaloniki aimed at teaching the most recent

knowledge on performance bridge assessment procedures with the adoption of specific goals. The objectives were listed as: (i) to validate the proposed framework with a set of inspectors with experience from bridge assessment in practice and (ii) to develop some exchange of knowledge between participants.

### > Seminar on Rehabilitation and Maintenance of Buildings (Seminário de Reabilitação e Manutenção de Edifícios)

**Venue:** Coimbra

**Date:** October 12-13, 2018

**Summary:** On the 12<sup>th</sup> and 13<sup>th</sup> of October, was held at the Department of Civil Engineering of the University of Coimbra a Seminar on Rehabilitation and Maintenance of Buildings. Here several presentations of Prof. Vitor Murtinho from the University of Coimbra, Eng. Baldomiro Xavier and Eng. Laura Santos from Teixeira Duarte, Eng. Carlos Mesquita from Oz\_ Diagnóstico, Levantamento e Controlo de Qualidade em Estruturas e Fundações, Lda., Eng. Ricardo Braz from Rothoblaas, Eng. Joselito Pereira from TecoFix and Eng. Tiago Ribeiro from Tal Project.





> **Advanced Topics on the Analysis of Offshore Structures**

**Venue:** Coimbra

**Date:** October 16-19, 2018

**Summary:** The course "Advanced Topics on the Analysis of Offshore Structures" promoted by 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. For that several topics are presented to cover themes which include: Environmental impacts; Fatigue analysis; Offshore foundations and Geotechnical issues and Accidental actions: Impact, fire and explosions. This course aims at students of civil engineering, civil engineers, mechanical engineers and technicians connected to the area of steel construction.

Lecturers: Aldina Santiago (UC) • Hélder Craveiro (UC) • Paulo Pinto (UC) • Constança Rigueiro (UC) • Rick Perkins (Sherwin-Williams) • Hans Jørgen Pederstad

(NGI) • Luís Borges (Structurame) • Tiago Ribeiro (TalProjecto) • Luis Godinho (UC) • Paulo Amado (UC) • Vitor Espinosa (UV) • Mark Lefranc (Force)



> **SynerCrete'18 – Interdisciplinary Approaches for Cement-based Materials and Structural Concrete: Synergising Expertise and Bridging Scales of Space and Time**

**Venue:** Funchal, Portugal

**Date:** October 24-26, 2018

**Website:** [www.synercrete.com](http://www.synercrete.com)

**Summary:** ISISE has organized and hosted the final event of COST Action TU1404 with the conference SynerCrete'18 - Interdisciplinary Approaches for Cement-based Materials and Structural Concrete: Synergising Expertise and Bridging Scales of Space and Time. The conference has consisted of 8 key-note speakers and 180 regular papers presented over 3

days. It was supported by RILEM, fib, JCI and ACI.



> **Course Building Information Modelling (8th edition)**

**Venue:** Porto, Portugal

**Date:** October 2018 to February 2019

**Website:** [www.cursobim.com](http://www.cursobim.com)

**Summary:** Following the strong demand for BIM training in the professional community, the 8th Edition of the National Course on Building Information Modelling, was recently started in October 2018 in Porto and Lisbon. The course is coordinated by ISISE members Miguel Azenha and José Carlos Lino, in a joint organization of the Universities of Minho, Porto and Lisbon.







> **Workshop “Risco de incêndio alimentado pelas alterações climáticas e pela urbanização”**

**Venue:** Coimbra; Viseu

**Date:** October 28<sup>th</sup> to December 7<sup>th</sup>, 2018

**Summary:** No âmbito do projeto CentroAdapt, estão a decorrer na região centro workshops dedicados às adaptações às alterações climáticas. O workshop “Risco de incêndio alimentado pelas alterações climáticas e pela urbanização” foi apresentado no dia 28 de outubro em Coimbra e no dia 7 de dezembro em Viseu, pelos professores Aldina Santiago e Helder Craveiro, ambos do ISISE-UC. O CentroAdapt é um projeto de transferências de conhecimento científico e tecnológico no âmbito das adaptações às alterações climáticas, entre investigadores da Universidade de Coimbra e o tecido empresarial da região centro. Tem como parceiros: ISISE-Institute for Sustainability and Innovation in Structural Engineering; – Universidade

de Coimbra; Centre for Informatics and Systems of the University of Coimbra; MARE – Centro de Ciências do Mar e do Ambiente; ADAI – Associação para o Desenvolvimento da Aerodinâmica Industrial.



> **COST TU1406 Owners Meeting**

**Venue:** BAST – Federal Highway Research Institute, Bergisch Gladbach, Germany

**Date:** November 22<sup>nd</sup>, 2018

**Website:** <https://www.tu1406.eu/meetings/cologne>

**Summary:** The success of COST Action TU1406 can be measured by the impact it has on the civil engineering community composed by, among others, infrastructure owners and operators. These target groups are the end users who will be able to exploit the outcome of COST TU1406 by applying the developed methodology to their assets. Therefore an Owners Meeting was held in order to reinforce this cooperation.



> **9<sup>th</sup> International Conference on Advances in Steel Structures**

**Venue:** Hong Kong, China

**Date:** December 5-7, 2018

**Website:** <http://www.icass2018.com>

**Summary:** Prof. Luís Simões da Silva was a keynote speaker during the 9<sup>th</sup> International Conference on Advances in Steel Structures. In his lecture he shared his thoughts about designing steel structures using 3D connections.





## UPCOMING EVENTS

### > COST TU1406 Final Conference

**Venue:** University of Minho, Guimarães, Portugal

**Date:** March 25-26, 2019

**Website:** <https://www.tu1406.eu/meetings/guimaraes>

### > Conference IABSE 2019

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

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

**Website:** [www.iabse.org/guimaraes2019](http://www.iabse.org/guimaraes2019)

### > Research Dissemination Seminar on the joint European Project 'EQUALJOINTS plus'

**Venue:** London, Imperial College

**Date:** March 29<sup>th</sup>, 2019

### > COST TU1406 Standardization Workshop

**Venue:** Reykjavik, Iceland

**Date:** April 11-12, 2019

**Website:** <https://www.tu1406.eu/meetings/reykjavik>

### > SÍSMICA 2019 – 11º Congresso de Sismologia e Engenharia Sísmica

**Venue:** Lisboa, Portugal

**Date:** April 29-30, 2019

**Website:** <https://sismica2019.org/>

### > Research Dissemination Seminar on the joint European Project 'EQUALJOINTS plus'

**Venue:** Lisbon, TEKTONICA, Centro de Congressos

**Date:** May 10<sup>th</sup>, 2019

### > EQUALJOINTS plus: COMPDYN 2019 – 7<sup>th</sup> Internacional Conference on Computational Methods in Structural Dynamics and Earthquake Engineering

**Venue:** Crete, Greece

**Date:** June 24-26, 2019

**Website:** <https://2019.compdyn.org/>

### > CMN2019

**Venue:** Guimarães, Portugal

**Date:** July 1-3, 2019

**Website:** <http://cmn2019.pt/>

### > SHATiS'2019 – International Conference on Structural Health Assessment of Timber Structures

**Venue:** Guimarães, Portugal

**Date:** September 25-27, 2019

**Website:** [www.shatis19.pt](http://www.shatis19.pt)

### > 3<sup>rd</sup> International Conference on Information Technology in Geo-Engineering (3<sup>rd</sup> ICITG 2019)

**Venue:** Guimarães, Portugal

**Date:** September 29 to October 2, 2019

**Website:** [www.3rd-icitg2019.civil.uminho.pt](http://www.3rd-icitg2019.civil.uminho.pt)

### > CSSg – 9<sup>th</sup> ECCS-AISC International Workshop on Connections

**Venue:** Coimbra

**Date:** June 2-4, 2020

### > Conference IPW 2020

**Venue:** Guimarães, Portugal

**Date:** September 23-25, 2020

**Website:** [www.ipw2020.com](http://www.ipw2020.com)

