

## MICRO AND NANOSCALE DESIGN OF THERMALLY ACTUATING SYSTEMS – MIDAS

### Goal of the project

A strong partnership has been organized to develop the research on shape memory alloys as materials for actuation, with well-known institutions, aiming to tackle a multitude of issues based on proven qualifications of the partners: powder metallurgy, severe plastic deformation, welding and joining, specific characterization techniques and development of applications.

### Short description of the project

The Micro and Nanoscale Design of Thermally Actuating Systems – MIDAS was successful in joining research partners from four continents in the effort to develop actuating materials belonging to the shape memory alloy group.

### Project implemented by

**Project Coordinator:** Politehnica University Timisoara, Romania (UPT)

#### EU Partners:

Universidade Nova de Lisboa, Portugal (FFCT)  
 Universitat de les Illes Balears, Spain (UIB)  
 Cranfield University, UK (CU)  
 Laboratório Nacional de Energia e Geologia, Portugal (LNEG)

#### Partners outside EU:

Universidade Federal Fluminense, Brazil (UFF)  
 University of Waterloo, Canada (WU)  
 Indian Institute of Science, India (IISc)  
 Russian Academy of Sciences (RAS)  
 University of Science and Technology Beijing, China (USTB)

### Implementation period

1.01.2014–31.12.2017

### Main activities

- WP 1 – MA Structural optimization by Mechanical Alloying
- Coordinating unit: LNEG; Partners: FFCT, UFF, UPT, USTB
- WP2 – SPD Phase control by Severe Plastic Deformation
- Coordinating unit: FFCT, IISc, UFF, RAS, USTB
- WP3 – CHR Micro and nanoscale characterization
- Coordinating unit: UIB, Partners: FFCT, UPT, LNEG, UFF, IISc, RAS, USTB
- WP4 – WJ Welding and joining techniques
- Coordinating unit: CU; Partners: WU, UPT, FFCT
- WP5 – (AD) Applicative design for smart materials integration
- Coordinating unit: UPT; Partners: RAS, LNEG, Nova.id, IME

### Results

Achievements: Materials processed via mechanical alloying technology ; Optimized technology based on experimental loops; Processed materials using SPD techniques; Microstructural maps of manufactured alloys and structures; Phase transformation parameters for the alloys and structures; Joints made out of shape memory alloys with similar and dissimilar compositions; Technological paths for different joining techniques used; joint applications for funding; prototypes; patent applications

Transfer of knowledge: Structural control by; X-Ray Diffraction; Electron microscopy (SEM, TEM) and specific sample preparation; Phase transitions (DSC, XRD, internal friction, optical microscopy); Ultrasonic, friction and electric welding; Powder metallurgy technology; Laser; Advanced design of SMA; Application development; Mechanical Testing.

Details: <http://midas.nanophys.ru/>

## Applicability and transferability of the results:

The MIDAS Project has a very high relevance for ERA because it connects through research and training important actors from Europe in the development of advanced materials at micro and nanoscale manufactured via various techniques extremely qualified partners from the world.. The partnership developed encourages collaborations in the benefit of all the partners who are themselves involved in strengthening ERA via their current activities. By the training offered in the institutions an increase of the attractiveness highly qualified people develop interesting subjects of research and could contribute to the expansion our educational interest in other countries. The MIDAS Project is in full consonance with the interest of the doctoral schools of the partners, it is expected to provide significant skills needed to develop activities in the micro and nanoengineering fields, thus increasing their chances to get a high-tech job and contribute to the development of the region.

Further opportunities to develop lasting collaboration identified during the collaboration, such as:

- Recruitment of early stage researchers for postdoctoral stages that would expand their knowledge in partners institutions.
- Identification of new patentable ideas based on the expertise of the partners.
- Stimulation of cultural interest and evaluation of opportunities to expand the institutional collaboration to other groups involved in other fields of research.

## Financed through/by

PEOPLE - MARIE CURIE ACTIONS International Research Staff Exchange Scheme  
Call: FP7-PEOPLE-2011-IRSES

## Research Centre

Department of Materials and Manufacturing Engineering

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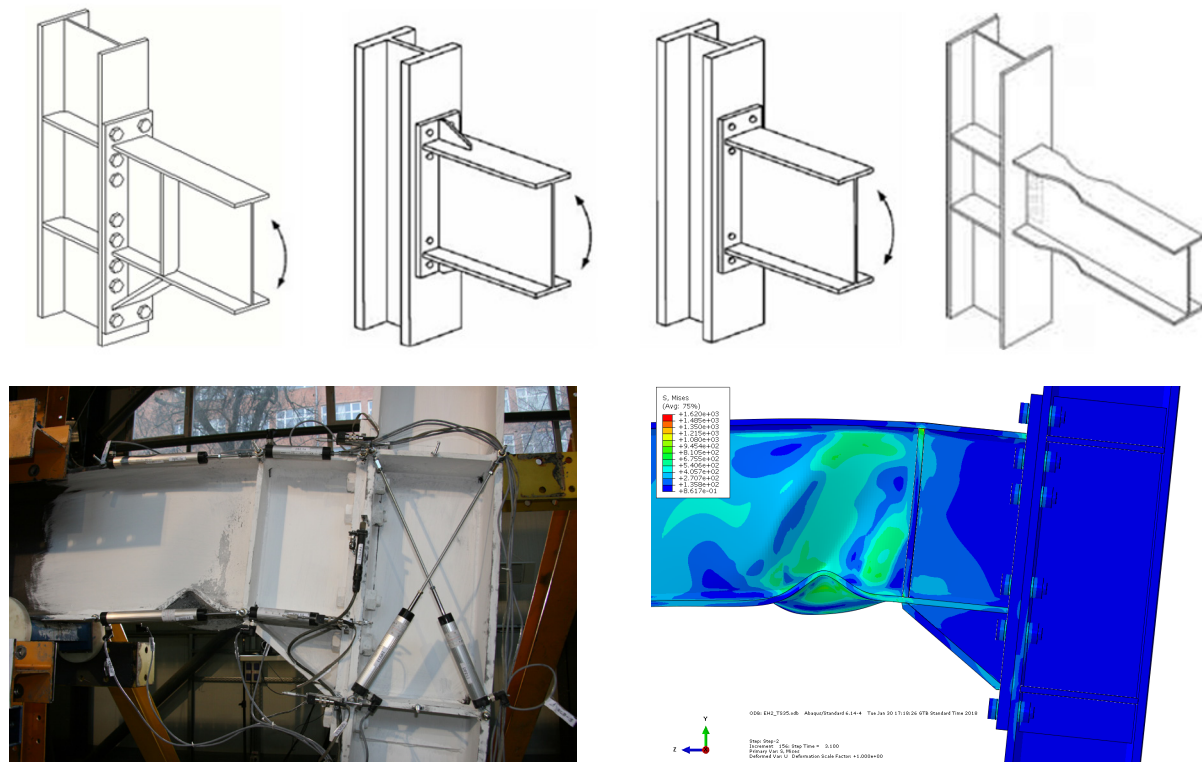
## VALORISATION OF KNOWLEDGE FOR EUROPEAN PRE-QUALIFIED STEEL JOINTS

### Goal of the project

Seismic prequalification criteria for certain steel joint typologies were developed during the previous RFCS project, EQUALJOINTS. The current project aims to valorize, disseminate and extend the prequalification criteria for practical applications to a wide audience by producing informative documents, design guidelines and organizing seminars and workshops.

### Short description of the project

The project aims the implementation of the prequalification criteria of the steel moment resisting beam-to-column joints in the future versions of design codes.



### Project implemented by

UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II (UNINA)  
- coordinator  
ARCELORMITTAL BELVAL & DIFFERDANGE SA (AMBD)  
UNIVERSITE DE LIEGE (ULG)  
UNIVERSITATEA POLITEHNICA TIMISOARA (UPT)  
UNIVERSIDADE DE COIMBRA (UC)  
EUROPEAN CONVENTION FOR CONSTRUCTIONAL STEELWORK (ECCS)  
UNIVERSITA DEGLI STUDI DI SALERNO (UNISA)  
IMPERIAL COLLEGE OF SCIENCE TECHNOLOGY AND MEDICINE (Imperial)

Centre Technique Industriel de la Construction Metallique (CTICM)  
NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA)  
CESKE VYSOKE UCENI TECHNICKE V PRAZE (CVUT)  
TECHNISCHE UNIVERSITEIT DELFT (TU Delft)  
UNIVERZA V LJUBLJANI (UL)  
UNIVERSITET PO ARCHITEKTURA STROITELSTVO I GEODEZIJA (UASG)  
UNIVERSITAT POLITECNICA DE CATALUNYA (UPC)  
RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (RWTH AACHEN)

## Implementation period

01.07.2017 – 30.06.2019

## Main activities

- Development of informative documents for the 4 beam-to-column joints qualified within the EQUALJOINTS project and translation of these documents from English to 11 additional languages
- Development of recommendations and criteria to be used in setting up limits of applicability between EN 1993:1-8 and EN 1998-1. A set of requirements within EN 1090-2 are defined. The documents are drafted as pre-normative design recommendation in English which are translated 11 additional languages
- Development of guidelines for design and analysis of seismic resistant steel structures accounting for the behaviour of beam-to-column joints. In addition, examples for different structural systems are presented which show the influence of different joint typologies.
- Enhancement of the EQUALJOINTS Matlab software for analytical prediction of the cyclic response of joints, allowing an easy application by users in practice. Moreover, an EQUALJOINTS-app for mobile phone is developed.
- Preparation of the material to be disseminated in English and translation in the mother tongue of the places where seminars/workshop will be taken.
- Organization of workshops and seminars where the pre-normative design guidelines will be disseminated. In addition, the materials will be available in printed forms and downloadable from the project website.

## Results

The prequalification criteria for the 4 typologies of steel moment resisting beam-to-column joints from the EQUALJOINTS project (3 bolted connections and 1 reduced beam section – dog-bone) are being considered for the implementation in the next version of the design codes. The dissemination materials will be available in printed form and downloadable from the project website.

## Applicability and transferability of the results

- Use of the new versions of design codes with simplified procedures for designing steel moment resisting beam-to-column joints.
- The rotational capacity and ductility demand of the joints required by the current codes are assured using the prequalification seismic design criteria.
- Increased structural safety against the seismic hazard in large parts of Europe.
- Improvement in life cycle costs and sustainability due to the reduction of losses caused by seismic hazards.

## Financed through/by

Research Fund for Coal and Steel, grant agreement RFCS 12/04/2017 – number 754048

## Research Centre

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG

## Research Team

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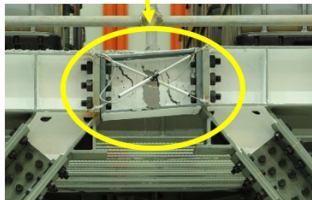
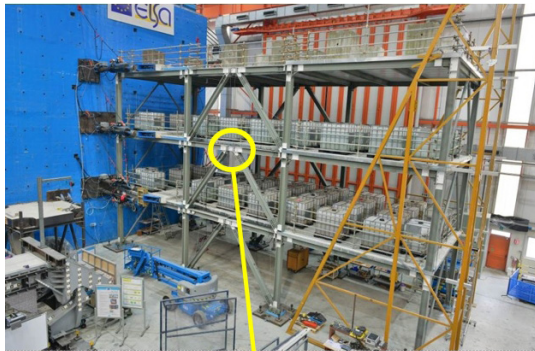
## VALORIZATION OF INNOVATIVE ANTI-SEISMIC DEVICES (INNOSEIS)

### Goal of the project

As a result of three RFCS-, one EU- and two nationally funded research projects, 12 innovative replaceable steel-based devices have been developed that improve the response of structures during earthquakes by enhancing their energy dissipation capacity. This project aims at transferring the relevant knowledge from research to practice by the production of several documents and the organization of seminars and workshops.

### Short description of the project

UPT is responsible for valorization of removable bolted links and replaceable shear panels concepts.



### Project implemented by

NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA) – coordinator  
UNIVERSITATEA POLITEHNICA TIMISOARA (UPT)  
POLITECNICO DI MILANO (POLIMI)  
UNIVERSITA DEGLI STUDI DI NAPOLI FEDERICO II. (UNINA)

UNIVERSITA DI PISA (UNIPI)  
RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN (RWTH)  
ISTITUTO SUPERIOR TECNICO (IST)  
UNIVERSITET PO ARCHITEKTURA STROITELSTVO I GEODEZIJA (UACEG)  
UNIVERSITEIT HASSELT (UHasselt)  
MAURER SOHNE ENGINEERING GmbH & CO KG (MSE)  
EUROPEAN CONVENTION FOR CONSTRUCTIONAL STEELWORK (ECCS)

### Implementation period

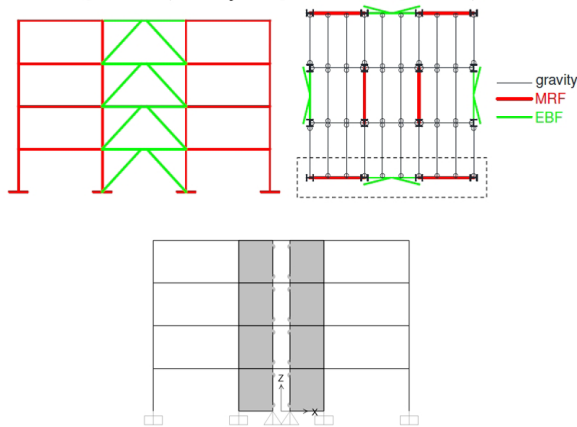
01.07.2016 – 31.12.2017

### Main activities

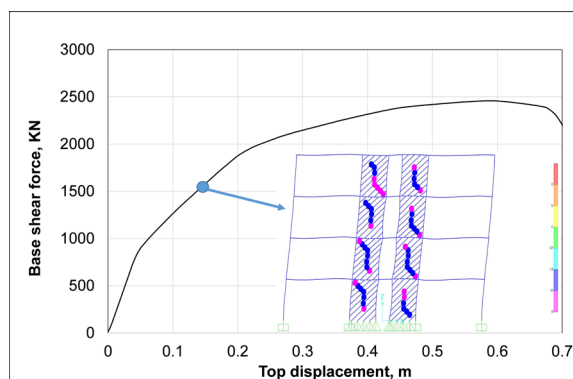
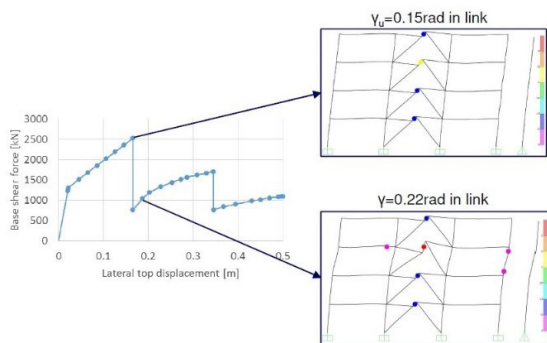
- Collection and critical review of materials available for the anticipated devices. Information brochures were produced separately for each innovative device and then put together to form a single volume.
- Production of a document that defines a methodology for reliably quantifying values of the behavior factors  $q$  for use in seismic design.
- Clarification of cases in which devices must be qualified in accordance with EN 15129 for anti-seismic devices.
- Detailed case studies of buildings in which the innovative devices are employed.
- Seminars, workshops and other dissemination actions.

### Results

Four stories buildings, in which replaceable bolted links and replaceable shear panels are employed, were designed by UPT, in two different design cases: moderate seismicity case considering Medium Ductility Class and high seismicity case considering High Ductility Class.



In order to verify the re-centering capability and to assess the seismic performance and feasibility of these structures, static nonlinear (pushover) analyses were performed.



Technical documentations that describe 12 innovative systems and design guidelines to apply them were developed within the project, emphasized by case studies. These documents were distributed during the project workshop organized within 15CONMET (Iasi, Romania) and are also available on the project website (<http://in-noseis.ntua.gr/>).



## Applicability and transferability of the results

- Promotion of innovation in the design of buildings in seismic areas
- Enhancement of structural safety against the governing natural hazard in large parts of Europe.
- Improvement in life cycle costs and sustainability due to the reduction of seismic losses.
- Contribution to the increase in market share for steel, especially in areas of moderate to high seismicity where steel is underrepresented.
- Provision of more alternatives for architectural and structural design of new and existing buildings by increasing the number of code-approved structural systems for steel and composite structures.

## Financed through/by

Research Fund for Coal and Steel, grant agreement RFCS-02-2015 number 709434

## Research Centre

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG

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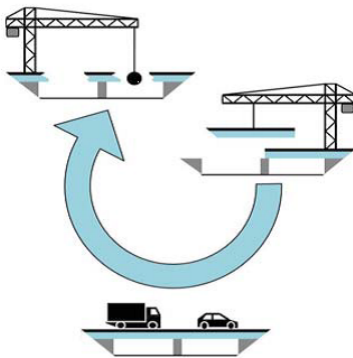
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## VALORISATION OF KNOWLEDGE FOR SUSTAINABLE STEEL-COMPOSITE BRIDGES IN BUILT ENVIRONMENT - SBRIPLUS

### Goal of the project

Within the RFCS project SBRI, a holistic approach to assess steel-composite bridges by combining Life Cycle Assessment (LCA), Life Cycle Costs (LCC) and Life Cycle Performance (LCP) was developed and applied to some representative bridges. This project aims at the valorisation, dissemination and extension of the developed method for advanced applications and further bridge types. To reach a wide audience among engineers and authorities, two Design Manuals and a software tool will be disseminated in the frame of several seminars across Europe.



Sketch of the life-cycle of a bridge

### Short description of the project

The aim of SBRIplus project is to promote the developed knowledge and design methodologies by combining the LCA, LCC and LCP analyses along the entire life-cycle of bridges.

### Project implemented by

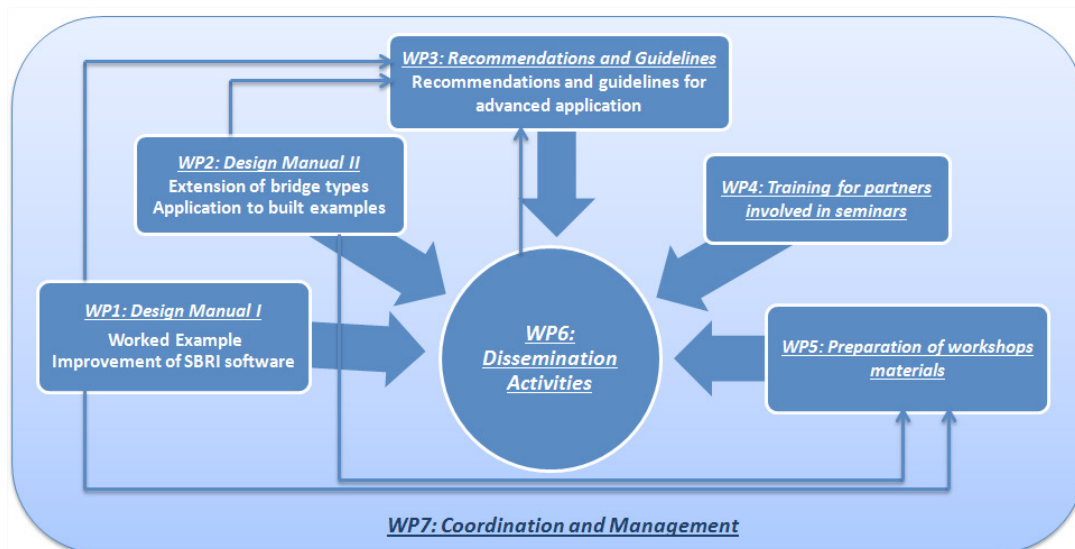
ArcelorMittal Belval & Differdange S.A., Luxembourg

### Implementation period

01.07.2016 – 31.06.2018

### Main activities

1. Explanation of methodology and background by elaboration of worked examples and improvement of the SBRI-tool;
2. Extension of bridge types by advanced application to innovative bridges across Europe demonstrating the flexibility and applicability of the methods developed;
3. Dissemination activities (11 European languages, organization of 13 workshops);
4. Providing of recommendations for advanced applications and guidelines for bridge authorities;
5. To provide recommendations summing up and concluding the analyses and being the bases for guidelines to be elaborated for bridge authorities.



The 7 Work Packages (WPs) of the SBRIplus project

## Results

Two design manuals will be prepared and translated in 11 European languages and distributed within the planned dissemination activities. The first Design Manual includes background information on the methodology and worked examples for easy application with the help of the improved software tool. By analyses of built examples, the SBRI method will be applied to innovative bridge solutions, the results and the conclusions being shown in the second Design Manual.

The seminars around Europe will offer the opportunity to present not only the results of the SBRIplus project, but also the advanced application to innovative solutions in addition to national regulations and practice.



*The location of the seminars around Europe*

## Applicability and transferability of the results

As bridges are an integral part of the European-wide traffic infrastructure, being of vital importance for society, the amount of steel used in the construction of steel and steel-composite bridges represents an important market for the steel industry. The application of a sustainable life cycle design of bridges causes an increased steel consumption. As currently the decisive criteria at tender stage are the minimum construction costs, the needed and promoted shift to a sustainable life cycle decision making, brings the steel-composite bridges forward. The advantages of low environmental inputs, low life cycle costs and low user costs for the entire life cycle are combined in sustainable steel-composite structures. The major objective of the proposal is to valorize and transfer the knowledge gained in the SBRIplus project into practice and thus to make it available to a broad audience along engineers, authorities, bridge operators and designers.

## Financed through/by

Research Fund for Coal and Steel, grant agreement No 710068.

## Research Centre

Research Center for Mechanics of Materials and Structural Safety (CEMSIG), Politehnica University of Timișoara  
Research Institute for Renewable Energy (ICER-TM), Politehnica University of Timișoara

## Research Team

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RAMBOLL Sverige AB (Sweden);  
BRISA Engenharia e Gestao SA (Portugal);  
FOSTA -Forschungsvereinigung Stahlanwendung e.V. (Germany);  
Politehnica University of Timisoara (Romania);  
Ceske Vysoke Uceni Technike V Praze (Czech Republic);  
Fundacion Tecnalia Research & Innovation (Spain);  
University of Naples Federico II (Italy);  
ATKINS Consultants Limited (UK);  
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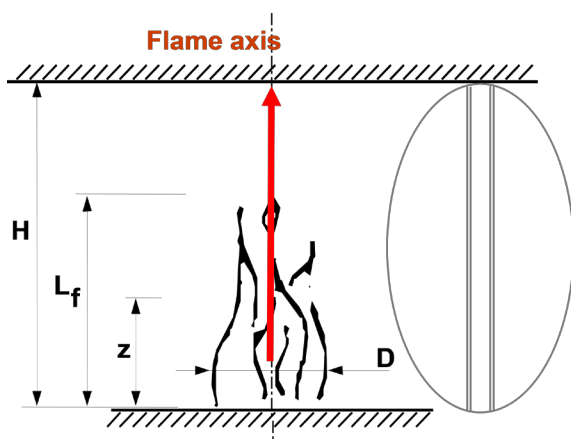
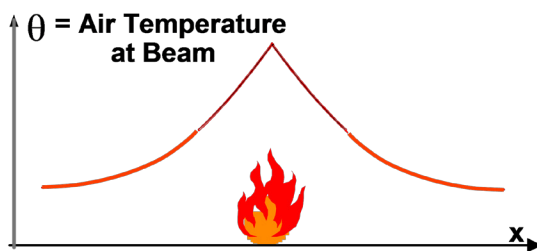
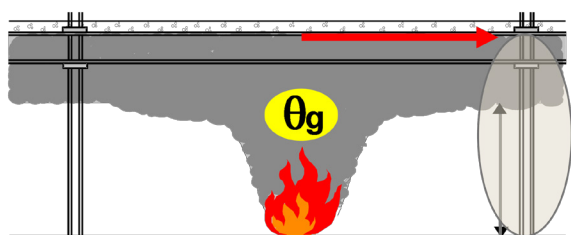
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## TEMPERATURE ASSESSMENT OF A VERTICAL MEMBER SUBJECTED TO LOCALISED FIRE - DISSEMINATION

### Goal of the project

LOCAFI+ represents the valorisation project of the RFCS project LOCAFI the main objective of which was to provide designers with scientific evidence that will allow them designing steel columns subjected to localised fires.



### Short description of the project

The project aims to disseminate the methodology for the fire design of columns under localised fire in several European countries, by means of national seminars.

### Project implemented by

ArcelorMittal Luxembourg (coordinator)

### Implementation period

1.07.2017-31.12.2018

### Main activities

- Development of nomograms for a wide range of different localised fires
- Development of the design guide for practitioners
- Preparation of the PowerPoint presentations for the workshops
- Adaptation of OZone software
- Translation activities and preparation of document with legal context and adapted design examples
- Preparation/ organization of the seminars
- Design of the Internet website with documents available online

### Results

An important number of seminars will be organised across Europe to present the simplified method developed within LocaFi project which will be implemented in the latest version of the European standard EN1991-1-2, its background (experimental tests, numerical investigations), user-friendly software and case studies.

### Applicability and transferability of the results

The analytical models developed within the LocaFi project were introduced in a user friendly software and in an advanced calculation model for fire design, in order to offer a large utilization of the procedure for the construction market.

## Financed through/by

EUROPEAN COMMISSION  
DIRECTORATE-GENERAL FOR RESEARCH AND INNOVATION  
Research Fund for Coal and Steel - RFCS

## Research Centre

The Research Center for Mechanics of Materials and Structural Safety  
- CEMSIG,  
Research Centre of Excellence of the Politehnic University of Timisoara

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## PROVISIONS FOR GREATER REUSE OF STEEL STRUCTURES - PROGRESS

### Goal of the project

The PROGRESS project will provide methodologies, tools and recommendations on reusing steel-based components from existing and planned buildings. The project particularly targets the design for deconstruction and reuse of envelopes, load-bearing frames, trusses and secondary elements of single-storey buildings framed in steel. This building type has broad applicability as industrial, commercial, sports, exhibition, warehouse facilities, and shows most potential in suitability for reuse and viability for circular economy business models. The whole life benefits of reusable single-storey steel buildings will be quantified from environmental and economic viewpoints. The outcomes will be extensively disseminated in particular among manufacturers, designers, contractors and researchers.



### Short description of the project

The main objective of the proposal is to develop products, systems, methods and protocols that facilitate reuse of various components of steel-framed single-storey buildings. The proposed project addresses both deconstruction and reuse of existing buildings and how new buildings can be designed, constructed and documented to facilitate future reuse. Its scope includes: (a) primary structures (frames), (b) secondary structures, (c) envelope components and hybrid multi-material systems.

### Project implemented by

VTT Technical Research Centre of Finland Ltd., (VTT, Finland)

### Implementation period

01.07.2017-30.06.2020

### Main activities

- review of the experiences from the successful reuse and deconstruction projects collected by the project partners and from the practitioners in the building industry;

**Table 1. Reuse scenarios**

	In-situ	Same site		Different site	
		Same configuration	Different configuration	Same configuration	Different configuration
Entire primary structure	A	B	C	D	E
Elements of the primary structure	N/A	N/A	F	N/A	G
Individual elements	N/A	N/A	H	N/A	I

- propose methods for the assessment of suitability of materials and elements for the reuse, including recommendations for their modification/adaptation to fit in the new design;
- propose technical recommendations for the increase of reusability of the components to be provided on component and building design levels.
- propose novel hybrid solutions for envelopes of single-storey buildings, either new buildings or renovation projects, that improves the thermal performance of the entire building, service life of envelopes and reusability of solutions themselves;
- propose a methodology to quantify and declare the environmental benefits of reused elements, resulting in recommendations on the circularity and LCA methodology;
- provide benchmark for demolition, classification and testing/verification protocols developed on a real deconstructed building including the laboratory tests to identify mechanical and chemical properties of the materials;
- design case studies to cover the most common reuse situations.

## Results

The outcomes of the project will include recommendations to:

- Reduce the technical barriers to reuse through establishing the quality verification procedures for the structural elements and envelopes of deconstructed low-rise buildings to be reused;
- Simplify the implementation of reusable components through recommendations for design for deconstruction and reuse, and for design using reclaimed elements as well as for safe and efficient deconstruction activities;
- Support the product manufacturers', facility owners' and designers' decision making by recommended methodology to calculate the environmental impact and cost of steel components reusing;
- Develop an online reused steel trading portal to co-ordinate the supply and demand for reused steel-based components;
- Develop novel types of hybrid solutions for envelopes in order to improve the thermal performance of a building, extend the service life of an envelope and maximize the reuse potential of components.

## Applicability and transferability of the results

The majority of existing steel low-rise buildings can be deconstructed into elements such as cold-formed or hot-rolled sections, sheets, panels, frames or truss girders. These components have very high reuse potential, but require verification of the material quality, dimensions and tolerances in order to be included in new building projects. The future reuse of modern buildings, however, may be different, because those structures are increasingly designed as systems and their design information can be easily maintained for instance as a building information model (BIM).

## Financed through/by

Research Fund for Coal and Steel, EU, grant agreement No 747847.

## Research Centre

Research Center for Mechanics of Materials and Structural Safety (CEMSIG), Politehnica University of Timișoara

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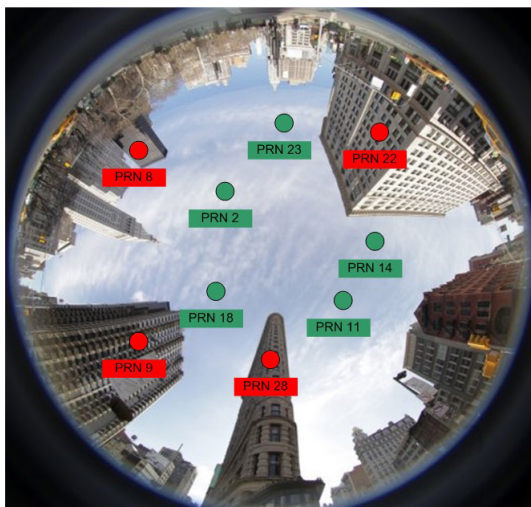
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## IMAGE FUSING TECHNIQUES (IMFUSING)

### Goal of the project

The Line of Sight (LoS) of a satellite could be disrupted by obstacles, reducing the accuracy of the information provided to a Global Navigation Satellite System (GNSS) receiver. The first objective of the project is to eliminate or weight the signals coming from these satellites. To simplify the identification of satellites having a direct LoS with the GNSS receiver, this project proposes, as a supplementary sensor, to use a fish eye camera.



Original image.  
The satellites were marked at Thales-Alenia.



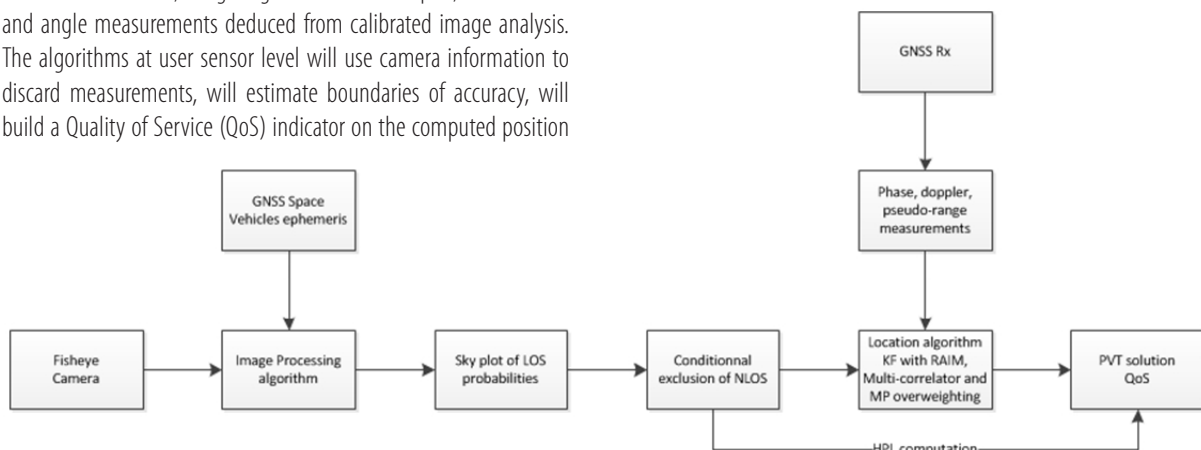
Segmentation result (the non sky region is colored in black) obtained applying an original segmentation method developed in our research team.

The segmentation of the image provided by the fish eye camera permits to identify the satellites that are not on the LoS of the GNSS receiver

### Short description of the project

To provide sufficient information to the GNSS receiver, at the image processing level, the algorithms conceived will include the calibration of the camera sensor, image segmentation techniques, and distance and angle measurements deduced from calibrated image analysis. The algorithms at user sensor level will use camera information to discard measurements, will estimate boundaries of accuracy, will build a Quality of Service (QoS) indicator on the computed position

and will authenticate the position. The algorithms at tracking loop level will use camera information to adjust the GNSS receiver correlator.



IMFUSING algorithm architecture final solution



## Project implemented by

UPT as contractor and Thales-Alenia Space France as subcontractor

## Implementation period

October 1 2014 – January 15 2018

## Main activities

Phase I 01/10/2014–31/08/2015: State of the art analysis (already validated),

Phase II September 1 2015 – January 15 2018

01/09/2015–30/06/2016: Core technical development (already validated)

01/12/2015–15/03/2017: Test campaign (validated)

15/12/2016–31/07/2017: Performance analysis (validated)

01/06/2017–15/01/2018: Dissemination and exploitation (validated)

01/02/2018–31/07/2018: 6 month support period.

## Results

Satellite localization often suffers in terms of accuracy due to various reasons. One possible source of errors is represented by the lack of means to eliminate NLoS satellite related data. IMFUSING proposes a method for fusing existing GNSS data with new information, extracted by using roof mounted cameras and adequate image processing algorithms. The roof mounted camera is used to robustly segment the sky regions. The localization approach can benefit from this new information as it offers a way of excluding the NLoS satellites. The output of the camera module is a probability map. One can easily decide which satellites should not be used for localization, by manipulating this probability map. Our approach is validated by extensive tests, which demonstrate the improvement of the localization itself (HPE) and a moderate degradation of protection levels involved in the localization (HPL).

Deliverables: Report on the State of the art in Image-GNSS fusion, Preliminary Design Review Report, Critical Design Review Report, Test Review Board Report, Executive Summary Report, MATLAB codes for developed algorithms.

Dissemination: Scientific paper in a scientific journal, Technical Note on synthesis of the study.

A first dissemination result:

Naforniță C., David C., Isar A., Preliminary results on sky segmentation, Proceedings of 2015 International Symposium Signals Circuits and Systems, 9-10 July 2015, Iasi, Romania, pp. 1-4, 10.1109/ISSCS.2015.7203933, Print ISBN: 978-1-4673-7487-3

Scientific paper at an international conference:

C. David, V. Gui, G. Carrié and others, "IMFUSING – GNSS Localization in Constraint Environment by Image Fusing Techniques". Proc. 6th CEAS Conference, October 2017, Bucharest, Romania

## Applicability and transferability of the results

The subject was evaluated at the start at technology maturity level 1 (Scientific Research), and it is aimed to conclude the project at technology readiness level (TRL) 3 (Laboratory Experiments).

## Financed through/by

European Space Agency (ESA), contract number 10031/02.08.2014 – UPT: 128.234 EURO, Thales Alenia: 70.000 EURO.

## Research centre

Intelligent Signal Processing Research Centre

## Research team

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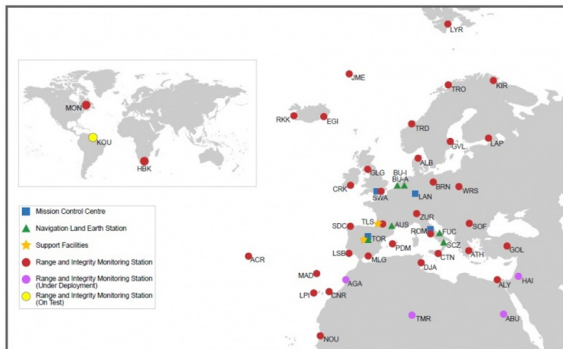
## STUDY FOR A MONITORING STATION FOR EGNOS TO SUPPORT SERVICES IN EASTERN EUROPE

### Goal of the project

The objective of the study is the automatic reporting of EGNOS performance over Romania as well as the assessment of corrections transmitted by other SBAS.

### Short description of the project

Due to its geographical location, Romania is an ideal candidate for system performance monitoring at the border of EGNOS service area. Receivers placed in most parts of Romania will be able to track, in addition to EGNOS, also the Russian Federation's System for Differential Corrections and Monitoring (SDCM) and India's GPS Aided GEO Augmented Navigation system (GAGAN). UPT implemented within ESA regulatory framework and based on ECSS standards, all activities related to: an automatic reporting of EGNOS performance over Romania and assessment of other SBAS visible from Romania.



EGNOS Ranging and Integrity Monitoring Stations (RIMS) Sites

### Project implemented by

UPT as contractor and Thales-Alenia Space France, Pildo Labs Spain as subcontractors

### Implementation period

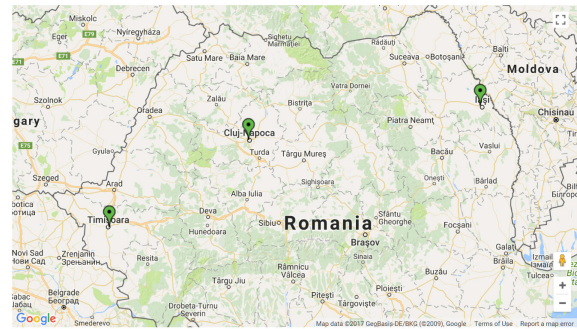
Sep 19 2016 – Mar 19 2018; 1 year of warranty after end of contract

### Main activities

- Management;
- Site Ranking;
- Site Selection;
- Deployment;
- Automatic Reporting & Performance Comparison;
- Communication

### Results

UPT deployed a monitoring site network, in Timisoara, Cluj-Napoca and Iasi, for the EGNOS service and all GNSS systems within Romania and archived the data for remote access by the Agency.

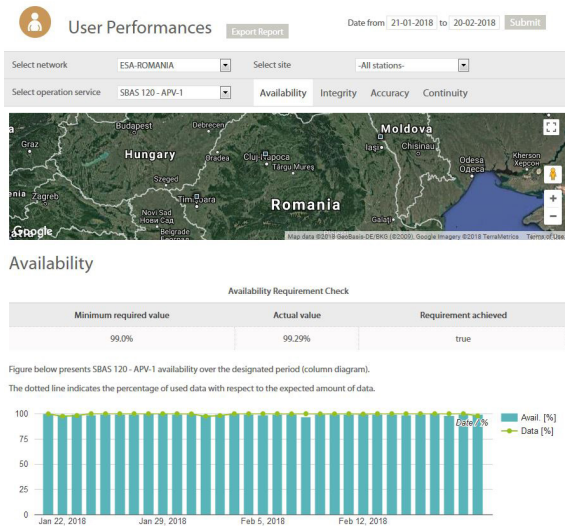


The three stations deployed at UPT-Timisoara, UTCN-Cluj and TUIASI-Iasi.

The respective locations were chosen at technical universities (UTCN and TUIASI), with whom UPT has signed hosting agreements. The user performances are monitored using the owl, a cloud service offered by Pildo Labs. The data is collected by PildoBoxes.

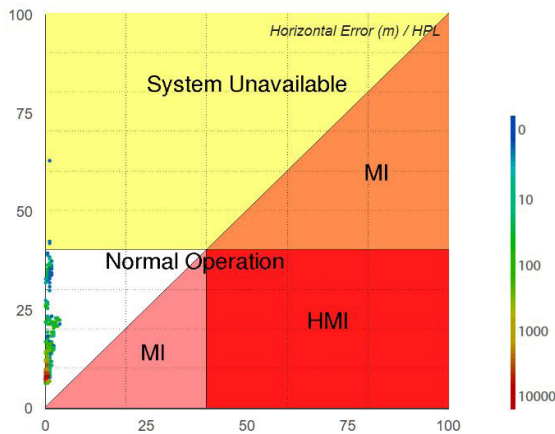


The antenna deployed at UPT.



User Performances monitored using the owl cloud service: availability (SBAS 120- APV 1). This is the probability of the system being available for any given user at any given time.

### Stanford Plot Horizontal



Integrity Stanford plot for UPT station (SBAS 120 – APV 1). Integrity is the system's ability to provide warnings to the user when the system is not available for a specific operation.

Deliverables: Site Selection Justification Document, Volume Simulation Plan, Service Volume Simulation Report, Hardware Deployment Plan, Hardware Deployment Report, Project Management Plan, Executive Summary Report, Financial Report, Final Report, Contract Closure Summary.

### Applicability and transferability of the results

The subject was evaluated at the start at technology maturity level 1 (Scientific Research) and is aimed to conclude the project at technology readiness level (TRL) 6: Model demonstrating the critical functions of the element in a relevant environment.

### Financed through/by

European Space Agency (ESA), contract number No. 4000 117 527 / 16/NL/CBi – UPT: 115000 EURO, Thales Alenia: 15000 EURO, Pildo Labs: 20000 EURO

### Research centre

Intelligent Signal Processing Research Centre (ISPRC)

### Research team

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 Prof. Andrei Câmpeanu (Contracts Officer);  
 Prof. Ioan Naforniță;  
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## LINKING TRANSNATIONAL, MULTIMODAL TRAVELLER INFORMATION AND JOURNEY PLANNERS FOR ENVIRONMENTALLY-FRIENDLY MOBILITY IN THE DANUBE REGION

### Goal of the project

There is a huge cross-border travel demand within the EU leading to hundred millions of cross-border trips every year by EU residents and further several hundred million trips by international tourists. More than 100 providers of traveller information services exist in Europe covering different levels, from local to regional, national and pan-European. The goal is to work on the inter-linking of existing services in order to enable transnational journey planning that goes beyond the territory covered by the single systems and offers travellers one seamless journey planning result.

### Short description of the project

The objective is to develop a decentralised system architecture that enables distributed journey planning.

### Project implemented by

An international consortium of journey planner- and transport operators in the frame of the INTERREG project "LinkingDanube" from Austria, Czech Republic, Hungary, Slovakia, Slovenia and Romania (with two partners, UPT and Electronic Solutions Ltd.)

### Implementation period

01.01.2017 – 30.06.2019

### Main activities

In particular the main objective is to develop a decentralised system architecture that enables distributed journey planning. By developing and establishing a common interface at each of the involved systems, the exchange of requests and results (not data) will be facilitated. The multiple responses of the involved systems have to be merged by means of an intelligent journey planner algorithm. The involved systems will engineer an application programming interface (open API) that allows bi-directional communication of the enquirer system (the system requesting information from other systems) and the responding systems. A common exchange specification will be developed that all participating systems will implement. Besides the method of implementing common gazetteers and exchange points within the distributed system will be one of the crucial points.

### Results

The actual development work of LinkingDanube will be done both on national level in a decentralised adaption of the national journey planners as well as on central level in setting up a central entity. In the end this means that national services will be able to "plug into" a common interface and provide seamless information from multiple

systems to cross-border travellers. After implementation and testing, the technical feasibility will be demonstrated for the respective regions in relevant use cases.

The pilot action will demonstrate, test and validate the developed concept and demonstrate how integrated journey planning helps to connect citizens and commuters across borders and rural regions to major hubs. In this way the demonstrations will be the basis for further large-scale implementation.

### Applicability and transferability of the results:

A central focus of LinkingDanube is the development of a concept for transnational multimodal journey planners in order to integrate the advantages of hub-to-hub-routing with local routing for cross-border regions and the elaboration of technical specifications for interface and data exchange. This concept shall build on existing structures in the partner countries, enhancing existing journey planners instead of creating a completely new structure and is completely transferable.

### Financed through/by

Co-funded by the European Union through the Joint Secretariat of the Danube Transnational Programme

### Research Centre

Dept. of Mechanical Machines, Equipment and Transportation

### Research team

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