Universitatea Politehnica Timişoara

2020

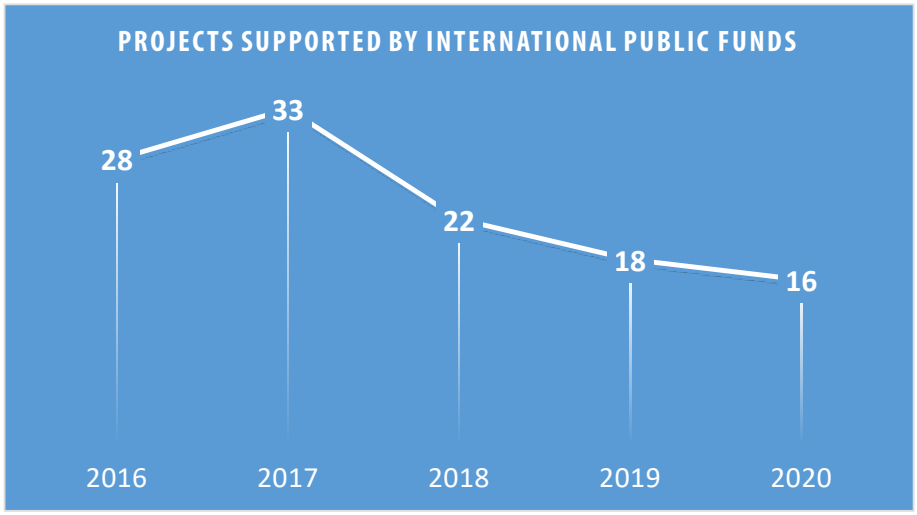
PRIMUL VEAC DE ÎNVĂȚĂMÂNT UNIVERSITAR ÎN TIMIȘOARA

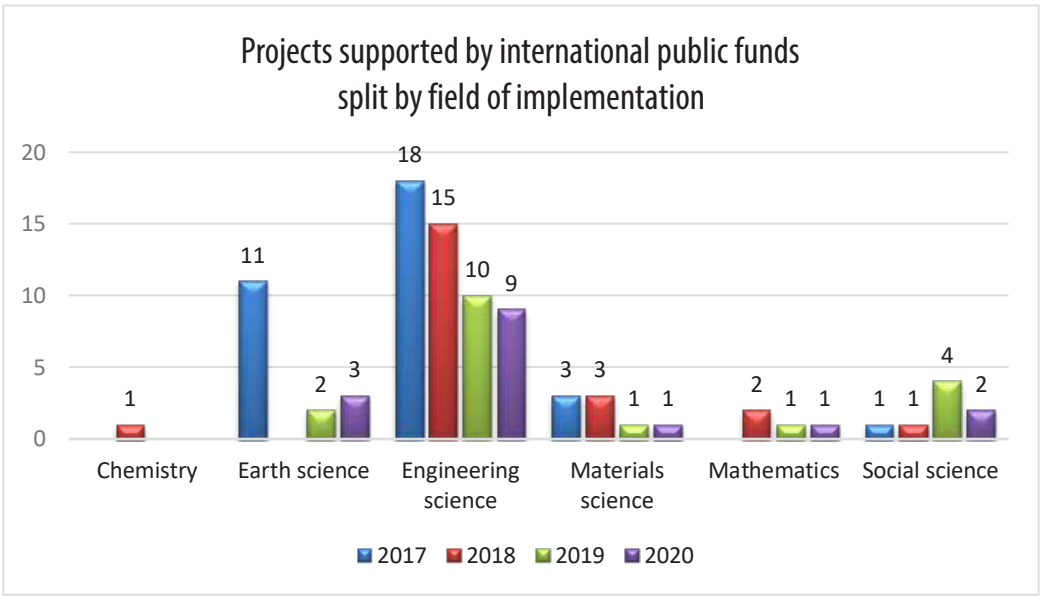
International Research Projects

PROJECTS SUPPORTED BY INTERNATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2020

Field	Total number of projects	Number of projects presented
Earth science	3	-
Engineering science	9	6
Materials science	1	1
Mathematics	1	1
Social science	2	2
Total	16	10

EVOLUTION OF PROJECTS SUPPORTED BY INTERNATIONAL PUBLIC FUNDS IMPLEMENTED BY UPT 2016 - 2020





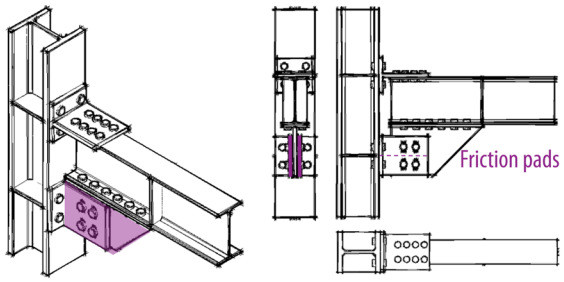
VALORISATION OF KNOWLEDGE FOR FREE FROM DAMAGE STEEL CONNECTIONS (FREEDAM-PLUS)

Goal of the project

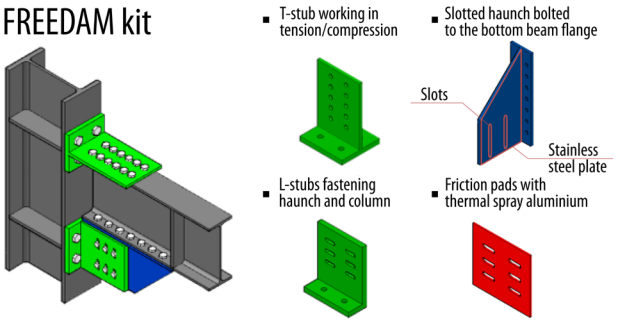
The project aimed at valorisation, dissemination and extension of the results of previous investigations regarding the design and testing of innovative connections equipped with friction dampers able to withstand without any damage severe seismic events, to a wide audience of academic institutions, engineers and architects, construction companies, and steel producers by producing informative documents, design guidelines and organizing seminars, webinars and workshops.

Short description of the project

The project developed design guidelines for innovative connections equipped with friction dampers.



Typical layout of a FREEDAM connection



Project implemented by

- Universita degli Studi di Salerno (UNISA)
- Universita degli Studi di Napoli Federico II (UNINA)
- Universite de Liege (ULIEGE)
- Universidade de Coimbra (UC)
- Universitatea Politehnica Timișoara (UPT)
- Convention Europeenne de la Construction Metallique ASBL (ECCS)
- National Technical University of Athens (NTUA)
- Ceske Vysoke Uceni Technicke v Praze (CVUT)
- Institut National des Sciences Appliquees de Rennes (INSA RENNES)
- Technische Universiteit Delft (TU DELFT)
- Univerza v Ljubljani (UL)
- Universitet po Architektura Stroitelstvo i Geodezija (UASG)
- Universitat Politecnica de Atalunya (UPC)
- Rheinisch-Westfaelische Technische Hochschule Aachen (RWTH AACHEN)

Implementation period

01/07/2020-30/06/2022

Main activities

- Development and translation of the informative documents concerning the connections equipped with friction dampers, from English into 12 additional languages.
- Development of pre-normative design recommendations on FREEDAM connections.
- Development of a design handbook for building structures equipped with FREEDAM connections.
- Software and mobile app development, allowing to select prequalified solutions from FREEDAM standardised connections.
- Organization of seminars, webinars and workshops for disseminating the gained knowledge in EU, EU associated and non-EU Countries.
- Development of a web site with free access to the users in order to promote the obtained results.
- Preparation of videos about the benefits of FREEDAM solutions, for an You-Tube channel.

Results

The pre-normative design recommendations for the seismic resistant steel beam-to-column joints equipped with FREEDAM devices are being considered for the implementation in the next version of the European seismic design code.
Additionally, the set of technological and constructional requirements within EN 1090-2 suitable for friction devices will be produced. Informative material concerning the connections equipped with friction dampers will be prepared in 12 languages to reach not only academic and scientific communities but mostly structural engineers and architects, construction companies, steel producers, providing them with all available tools (design and manufacture guidelines, codified design procedures, software and mobile app tools for practitioners, website, YouTube channel, etc.).

Financed through/by

Research Fund for Coal and Steel
Grant agreement RFCS-02-2019
Project number 899321

Research Centre

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

Applicability and transferability of the results

- Use of the design guidelines with simplified procedures for designing steel beam-to-column connections equipped with friction dampers, which could significantly reduce seismic damages. The produced design recommendation and criteria will be used in setting up limits of applicability between EN 1993:1-8 and EN 1998-1 concerning the design of seismic resistant steel beam-to-column joints equipped with FREEDAM device.
- 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.

Research Team

- Acad. Dan DUBINA
- Prof. Aurel STRATAN
- PhD student Anna PRODAN

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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

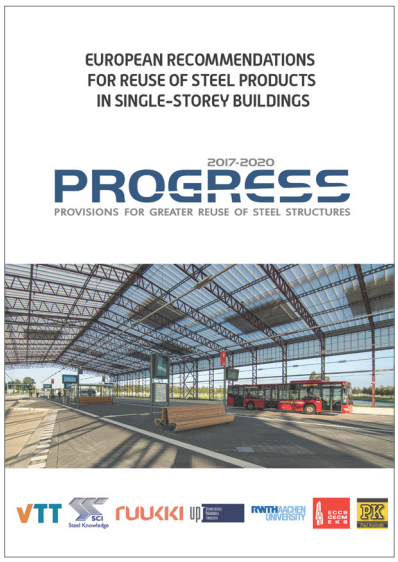
VTT Technical Research Centre of Finland Ltd., (VTT, Finland)

Implementation period

01.06.2017-30.05.2020

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;
- 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.

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 Timişoara

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).

Research team

- VTT Technical Research Centre of Finland Ltd., (VTT, Finland)
- Steel Construction Institute (SCI, UK)
- Ruukki Construction Oy (Ruukki, Finland)
- RWTH Aachen University (RWTH, Germany)
- Universitatea Politehnica Timişoara (UPT, Romania)
- European Convention for Constructional Steelwork (ECCS, Belgium)
- Paul Kamrath Ingenieurrückbau GmbH (PKIR, Germany)

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EASTERN EUROPEAN TWINNING ON STRUCTURAL INTEGRITY AND RELIABILITY OF ADVANCED MATERIALS OBTAINED THROUGH ADDITIVE MANUFACTURING (SIRAMM)

Goal of the project

The overall goal of the SIRAMM project is to significantly strengthen research in the Additive Manufacturing (AM) field at the University Politehnica Timisoara. To achieve this aim, SIRAMM will build upon the existing science and innovation base of UPT, creating a network with two internationally-leading counterparts at EU level: Norwegian University of Science and Technology (Norway) and the University of Parma (Italy).

Project objectives

- In the long term, the project aims at laying the foundations for creating a pole of excellence on AM in Eastern Europe. For this reason, other two partners from low R&I performing countries, the University of Belgrade (Serbia) and the Institute of Physics of Materials, Academy of Sciences (Czech Republic) will also take part in this Twinning project.
- To reach its goals, this 3-year project will be focused on the implementation of knowledge transfer activities such as workshops and staff exchange, training events (i.e. summer schools, seminars) for early stage researchers, and dissemination and communication actions (i.e. web site, videos, open access publications, public engagement activities) for different audiences. To keep maintaining the knowledge transfer well beyond the duration.

Implementation period

01.10.2019 – 30.09.2022
(project was suspended due to COVID between 15.04.2020 – 14.10.2020)

Results

- Increased research excellence of the coordinating institution and the other widening partners,

- Enhanced reputation, attractiveness and networking channels of the partners,

- Training and professional development of a new generation of scholars,

- Growth of industrial sector,

- Increasing awareness in the general public.

Publications

Journal Papers:

- Marsavina, L., Linul, E. (2020). Fracture toughness of rigid polymeric foams: A review. Fat. & Fract. of Eng. Mat. & Struct., 43, 2483-2514.
- Brighenti, R., Li, Y., Vernerey, F.J. (2020). Smart polymers for advanced applications: a mechanical perspective review. Frontiers in Materials, 7(196), 1-18.
- Linul, E., Marsavina, L., Stoia, D. I. (2020). Mode I and II fracture toughness investigation of Laser-Sintered Polyamide. Theoretical and Applied Fracture Mechanics, 106, 102497.
- Stoia, D. I., Marsavina, L., Linul, E. (2020). Mode I Fracture Toughness of Polyamide and Alumide Samples obtained by Selective Laser Sintering Additive Process. Polymers, 12(3), 640.

Conference Papers:

- Valean, C., Marsavina, L., Mihai, M., Luinul, E., Razavi, J., Berto, F. (2020). Effect of manufacturing parameters on tensile properties of FDM printed specimens. Structural Integrity Procedia, 26, 313-320.
- Galatanu, S-V., Scano, M., Pietras, D., Pirvulescu, L-D., Porcu, M.C., Marsavina, L., Sadowski, T. (2020). Bending behavior of AM50 Magnesium alloy under static and dynamic loading. Structural Integrity Procedia, 26, 269-276.
- Milovanović A., Sedmak A., Grbović A., Milosević M., Golubović Z. (2020) Influence of second-phase particles on fracture behaviour of pla and advanced pla-x material. In: 4th International Conference on Structural Integrity and Durability, September 15 - 18, 2020, Dubrovnik, Croatia.

- Milovanović A., Sedmak A., Grbović A., Golubović Z., Mladenović G., Čolić K., Milosević M. (2020) Comparative analysis of printing parameters effect on mechanical properties of natural PLA and advanced PLA-X material. 1st Virtual European Conference on Fracture (VECF1), Procedia Structural Integrity, 28, 1963-1968.
- Valean C. , Marsavina L., Marghitas M., Linul E., Berto F., Razavi J., Brighenti R. (2020) The effect of crack insertion in FDM printed PLA materials on Mode I and Mode II fracture toughness. 1st Virtual European Conference on Fracture (VECF1), Procedia Structural Integrity, 28,1134-1139.

Financed through/by

European Commission, H2020-WIDESPREAD-2018-03 (action: CSA) under the grant agreement No. 857124

Research centre

"St. Nadasan" Research Laboratory for Strength, Integrity and Durability of materials, structures and conductors.

Research team

1. Coordinator: University Politehnica Timisoara (UPT), Romania
2. Faculty of Mechanical Engineering, University of Belgrade (UBG), Serbia
3. Institute of Physics of Materials, Academy of Sciences of the Czech Republic (IPM), Czech Republic
4. University of Parma (UniPR), Italy
5. Norwegian Univ. of Science and Technology (NTNU), Norway

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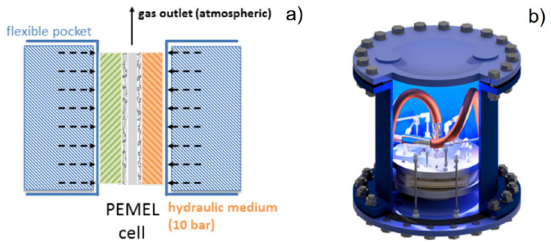
NOVEL MODULAR STACK DESIGN FOR HIGH PRESSURE PEM WATER ELECTROLYZER TECHNOLOGY WITH WIDE OPERATION RANGE AND REDUCED COST (PRETZEL)

Goal of the project

Green hydrogen produced by electrolysis might become a key energy carrier for the implementation of renewable energy as a cross-sectional connection between the energy sector, industry and mobility. Proton exchange membrane electrolyzer (PEMEL) is the preferred technology for this purpose, still costs, efficiency, lifetime and operability need to be optimized. The aim of PRETZEL project is to develop a new PEMEL that provides significant improvements in efficiency and operability to satisfy emerging market requirements.

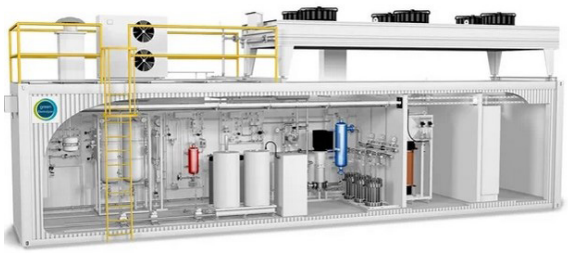
Short description of the project

The central objective of PRETZEL is to develop a new PEMEL for hydrogen production, upscaling a patented design approach based on hydraulic cell compression.



Principle of homogeneous hydraulic cell compression (a) and stack design for hydraulic compression (b).

The system will operate with a maximum energy consumption of 25 kWh, with a production capacity of 4.5 m^3 H_2 / h at rated power, at a pressure of 100 bar and water temperature of 90°C.
All subsystems needed to properly operate a PEMEL stack will be integrated in a housing, equipped with a hydrogen detection and ventilation system.



Schematic drawing of a PEMEL system as container solution by iGas energy.

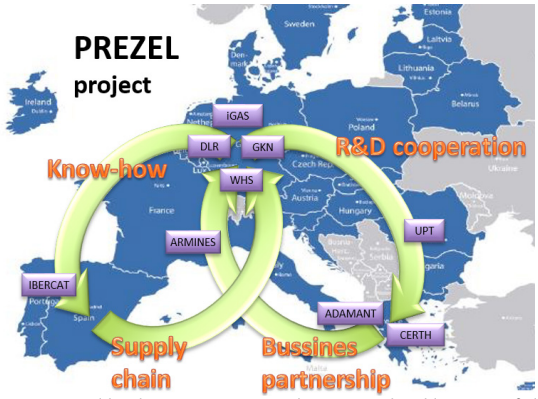
Project implemented by:

Project Coordinator:

- German Aerospace Center, Stuttgart, Germany (DLR)

EU Partners:

- Westphalian University of Applied Sciences, Germany (WHS)
- Association for Research and Development of Industrial Methods and Processes, France (ARMINES)
- Politehnica University Timișoara, Romania (UPT)
- Adamant Composites Ltd., Greece
- GKN Sinter Metals Engineering GmbH, Germany (GKN)
- Centre for Research and Technology Hellas, Greece (CERTH)
- Soluciones Catalíticas IBERCAT, Spain
- iGas energy GmbH, Germany



"PRETZEL"-like shape passing over the geographical location of all PRETZEL partners representing the long-term collaboration in know-how, supply chain, business partnership and R&D.

Implementation period

01.01.2018 – 31.12.2020

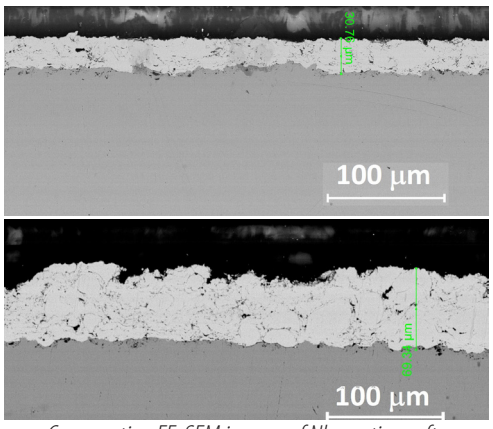
Main activities

UPT's main activities in PRETZEL are the investigation of newly developed bipolar plates (BPP), as cost-efficient alternative for the classical titanium BPP, consisting of highly corrosion resistant Nb-coatings deposited by vacuum plasma spraying (VPS) on copper pole plates in regard of:

- **Corrosion resistance** evaluation in simulated PEMEL environment, at 90°C and O_2 saturated solution, including accelerated stress tests at constant potential of 2 V applied for 6 hours
- **Interfacial contact resistance** (ICR) versus compaction force measurement
- **Structure and morphology** of BPP before and after accelerated stress tests

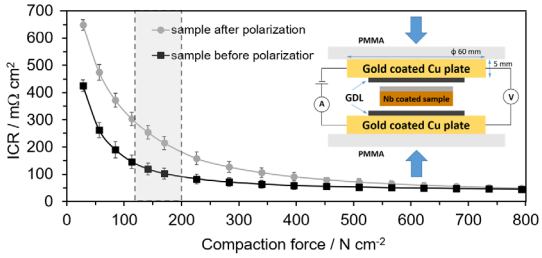
Results

- A 30 µm thick Nb coating fully protects the copper substrate against corrosion in simulated PEMEL environment, showing excellent corrosion resistance properties, with i_{corr} lower than 0.1 µA cm^{-2}.
- Cross-section images show no signs of corrosion, nor the formation of pinholes beneath the coating.



Cross section FE-SEM images of Nb-coatings after accelerated stress test.

• ICR decreases with compaction force up to 45 mΩ cm^2. In the range of 120 to 200 N cm^{-2}, which is the common pressure applied for assembling commercial PEM electrolyzer stacks, ICR decreases from 130 to 90 mΩ cm^2.



Interfacial contact resistance at different compaction forces.

Applicability and transferability of the results:

- **System:** Development and validation of a 25 kW PEM electrolyzer system with hydrogen output pressure of 100 bars or higher.
- **Cell components:** Reduction of Ir catalyst loading compared to the state-of-the-art, by the use of new aerogel supports.
- **Protocols:** development of complete protocols for BPP testing, including stress test, corrosion resistance and ICR.

Financed through/by

Fuel Cell and Hydrogen 2 Joint Undertaking under the European Union´s Horizon 2020 research and innovation programme under grant agreement No 779478.

Research Centre

Research Institute for Renewable Energy (ICER-TM), UPT

Research team

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- Assoc. Prof. Narcis DUTEANU, PhD
- Assist. Prof. Mircea Laurentiu DAN, PhD
- Prof. Adina NEGREA, PhD
- M.Sc.Eng. Delia DUCA,
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COMBINATORIAL DESIGN OF NOVEL BIPOLAR PLATE COATINGS FOR PROTON EXCHANGE MEMBRANE ELECTROLYZERS (CODE-PEM)

Goal of the project

The CoDe-PEM project aims to contribute towards the development of affordable PEM electrolysis systems with the development of lower cost coating materials for bipolar plates and sinters. In order to lower the costs, a reduction in use of expensive materials and the introduction of new low(er) cost materials are key elements. In addition, new materials should allow for fast and low-cost manufacturing processes, such as stamping of BPP flow structures.

Short description of the project

In order to achieve its goals, the CoDe-PEM Project will:

- Accelerate innovation research of novel coating compositions by the use of combinatorial exploration.
- Improve efficiency and reduce time of testing and characterisation of BPPs by the use of advanced electrolyser test cell
- Identify factors affecting the durability of BBP materials based on in situ experiments and post mortem failure analysis.
- Raise public awareness concerning the importance and advantages of using hydrogen based clean energy and the potential for growth in a healthy and sustainable economy.

Project implemented by:

Politehnica University Timisoara, Romania
SINTEF Industry, Norway

Implementation period

2019-2023

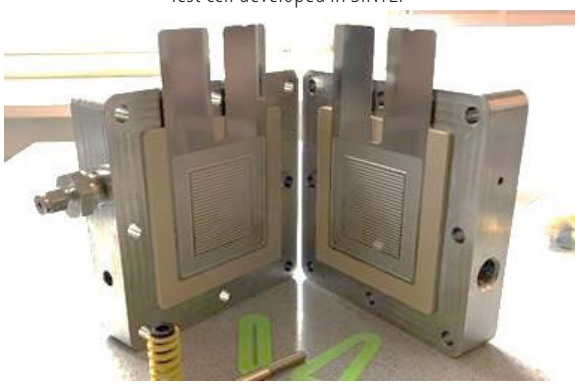
Main activities

- Coating development via combinatorial exploration
- Ex-situ characterization of coatings and coated substrates
- Bipolar plates design, testing and evaluation
- Dissemination and public awareness activities

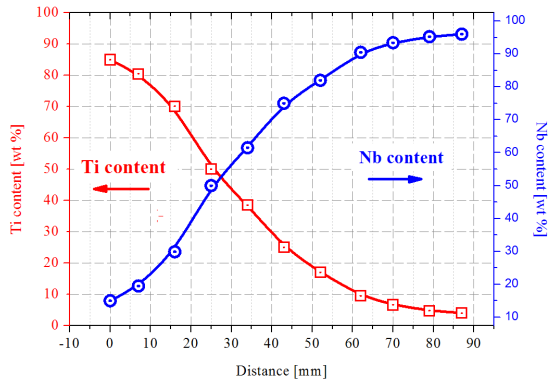
Results

System for deposition of compositional spread libraries installed in Politehnica University Timisoara

Test cell developed in SINTEF



Compositional map of a binary library manufactured in Politehnica University Timisoara



Partner's meeting in SINTEF

Applicability and transferability of the results:

. The technical solutions developed in the project have the potential to reduce the costs for hydrogen generated via proton exchange membrane electrolysis.

Financed through/by

Iceland Liechtenstein Norway grants

uefiscdi
Executive Agency for Higher Education, Research, Development and Innovation Funding

EEA Grants 2014-2021
administered by UEFISCDI.

More information about EEA Grants can be found here:
www.eeagrants.org/ and www.eeagrants.ro

Research Centre

Politehnica University Timisoara:
- Combinatorial exploration group
- Fuel cell group

SINTEF Industry:
- New energy solutions group
- Corrosion and tribology group

Research team

Politehnica University Timisoara:
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- Prof. Ion. MITELEA
- Conf. Aurel ERCUTA
- Conf. Andrea KELLENBERGER
- Lect. Mircea DAN
- Ph.D. student Delia DUCA
- Ph D. student Mihaela LABOSEL
- Ph D. student Vlad BOLOCAN
- Ph D. student Andrei NOVAC

SINTEF Industry:
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- Dr. Sigrid LÆDRE
- Dr. Alejandro OYARCE
- Eng. Ole E. KONGSTEIN
- Eng. Ann-Karin KVERNBRÅTEN

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PHOTOVOLTAIC SYSTEMS FOR IMPROVING THE ENERGY EFFICIENCY IN SOME PUBLIC BUILDINGS

Goal of the project

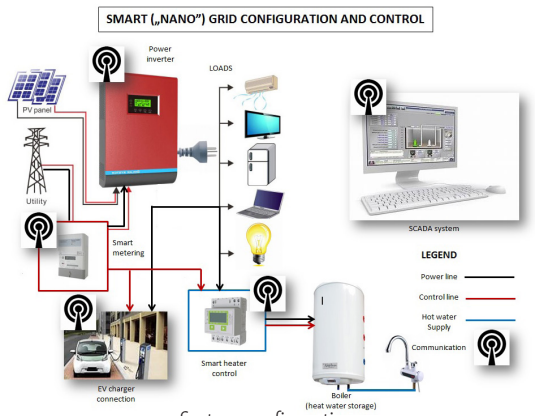
The goal of the project is the design and implementation of PV systems in public buildings in Ghiroda town, including smart power monitoring (SCADA) for energy conversion evaluating and control, using "smart grid" technologies. The systems work without injection of energy in the power grid. The additional energy will be stored in domestic hot water or will be used to charge electric vehicles.

Short description of the project

The project aims is to increase the capacity to deliver renewable energy, by integration of the PV systems, in order to reduce the power consumption from fossil fuels.

Project implemented by:

The project Promoter is Ghiroda City Hall, having as partners: POLITEHNICA University of Timisoara, Romania, and Western Norway Research Institute.



System configurations.

Implementation period

2019-2023

Main activities

1. Power consumption measurements in each location for identifying the necessary electrical energy;
2. Dimensioning the installed power (peak power) of each PV system, according to the energy demands;
3. Dimensioning the storage (the installations for heat water production) for each location;
4. Integrating (design) "smart grid" technologies in order to maximize the efficiency, avoid the injection of electrical energy in the grid;
5. Integrating (design) smart power monitoring (SCADA) systems for evaluating and control the energy conversion, with a central unit and distributed automation;
6. Acquisition and installation of the PV system, including the automation and supervising elements;
7. Testing and monitoring the installations in order to obtain maximum efficiency and reliability;
8. Disseminating the results in workshops, with potential other beneficiaries, and in international conferences with compatible subjects.

Results

- 8 PV systems with an installed PV capacity of 49 kWp, design and implementation;
- 60 MWh/year estimated PV electrical energy production;
- Annual CO2 emission reduction estimated at 19.8 tons per year;
- Smart power monitoring and control of entire system using "smart grid" technologies;
- Life cycle assessment for all proposed solar energy harvesting installations.

Applicability and transferability of the results:

The project has an applicative purpose, through the integration of PV electrical energy production systems in some public buildings, in an "intelligent way", using "smart grid" technologies.
The project can be an example of the transformation of a commune into a green energy pole as a compulsory and necessary measure for a consolidated economic development, minimizing the impact on the environment and implicitly increasing the quality of life of the inhabitants.

Financed through/by

EEA and Norway Grants

Research Centre

"Intelligent Control of Energy Conversion and Storage", part of the "Research Institute for Renewable Energies".

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DANUBE URBAN BRAND + BUILDING REGIONAL AND LOCAL RESILIENCE THROUGH THE VALORIZATION OF DANUBE'S CULTURAL HERITAGE (DANURB+)

Goal of the project

To stop socio-economic shrinkage DANURB+ creates a dense network of stakeholders and projects along the Danube implementing EUSDR actions in the peripheral and border regions along the river. The main objective is the capacity building for local stakeholders to enable them to cooperate locally and interregionally for the valorization of their Danube related heritage with local actions under a unified brand strong enough to increase local prosperity and international tourist attractiveness.

Short description of the project

DANUrB+ aims to reactivate underused cultural heritage and resources in shrinking settlements along the Danube.

Project implemented by:

The partnership consists of 19 partners and 23 associated strategic partners from 6 countries: Hungary, Slovakia, Croatia, Bulgaria, Romania, and Serbia.

Implementation period

01-07-2020 - 31-12-2022

Main activities

As shrinking urban situations often entail the decay of the built environment, creating an economical vicious circle, the ambition of the project is to initiate 6 local physical interventions (building, public space) selected according to their potential positive effect on the whole urban development and in close collaboration with the local communities. The objective is to provide planning, technical measurement, and documentation, so that those pilot sites are ready for funding application. The project aims at the creation of a Quality Label, an enlarged Danube Cultural Promenade, an Atlas, audio guided tours, a documentary movie, and guidelines for educational programs to raise awareness of the local values.

Results

A significant aspect is the creation of a database reflected in an Atlas of the Danube regions, focusing on settlements, culture and local values and conducting an analysis of local heritage with the potential to facilitate the development of the region. Also, together with partners, UPT will be the developer of a regional development strategy, complemented by local plans and technical documentation for a local objective, to access external financing.

Applicability and transferability of the results:

As DANUrB+ aims to reactivate underused cultural heritage to increase local prosperity and international tourist attractiveness in shrinking settlements its stakeholder network building framework and methodology are easily transferable to other cities in a similar situation.

Financed through/by

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

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ENGAGED AND ENTREPRENEURIAL EUROPEAN UNIVERSITY AS DRIVER FOR EUROPEAN SMART AND SUSTAINABLE REGIONS (E³UDRES²)

Goal of the project

E³UDRES² is a European Universities Consortium focusing on

- Co-Innovate Smart and Sustainable European Regions
- Co-Ideate a Future University for future-skilled learners
- Co-Create a European Multi-University Campus

E³UDRES² co-creates outstanding ideas and concepts for future universities for future-skilled learners, integrates challenge- based education, mission-oriented research, human-centred innovation as well as open and engaged knowledge exchange as interrelated core areas and establishes an exemplary multi-university campus across Europe.

E³UDRES²

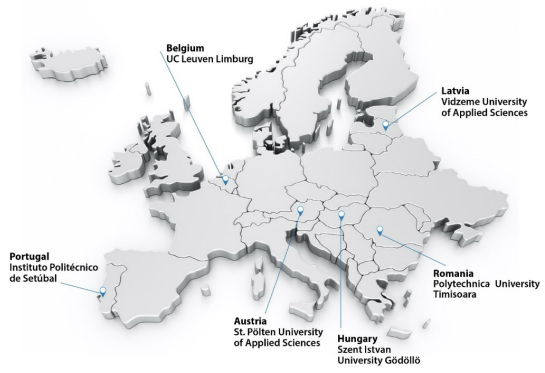
Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions

Short description of the project

The project is one of the 41 consortiums selected for funding as part of the European Commission Initiative towards creating a number of European Universities.

Project implemented by:

- University of Applied Sciences St. Polten, Austria
- Politehnica University of Timisoara, Romania
- Polytechnic Institute of Setubal, Portugal
- Szent Istvan University Godollo Hungary
- University College Limburg, Belgium
- Vidzemes University, Latvia



Implementation period

2020 - 2023

Main activities

The E³UDRES² learning trajectory creates entrepreneurial and engaged professionals committed to designing and implementing the future roads of their regions. To be able to achieve this, E³UDRES² organises six I-Living Labs for educators and 30 I-Living Labs for learners of all ages and levels of prior knowledge. These I-Living Labs are divided into three categories addressing either the challenges linked to well-being & ageing, circular economy, or the role of the human being in an AI society.

E³UDRES²sees research and innovation as the most efficient educational tools to ensure that learners will be equipped with the future-proof hard, soft and innovation skills to fully participate and take responsibility in the "novel worlds" that our regions and Europe will become during the next decades: novel technologies, novel stakeholders, novel challenges, and novel societies will definitely emerge.

WP1: Management

WP2: Future Universities

WP3: Learners

WP4: Researchers

WP5: Innovators and Entrepreneurs

WP6: Sustainability and Dissemination

Results

- Scenarios for a future university, as vision for 2030
- E³UDRES² 2030 Blueprint (Vision for the University of the Future)
- I-Living Labs: Educators for the future (development of 36 transnational I-Living Labs)
- Creation of 3 Research & Development Innovative (R&Di) networks: circular economy, well being & active ageing, human contributions to AI
- Knowledge Exchange Strategy on Innovation for Smart and Sustainable Regions
- Empower Regional Innovation Ecosystems
- Science Engagement
- Open Access
- Annual E3UDRES2 conferences and workshops
- Long-term strategy for sustainability of the alliance

Applicability and transferability of the results:

E³UDRES² promotes the development of small and medium-sized cities and their rural environments into smart and sustainable regions and shapes a prosperous future with the best possible quality of life for a self-determined people in a progressive European society. The project aims to develop further co-operation applications under Horizon Europe, Erasmus+ KA2, Marie Curie doctoral consortiums and other international funded calls.

Financed through/by

European Commission, EPP-EUR-UNIV-2020

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MITIGATION OF THE RISK OF PROGRESSIVE COLLAPSE IN STEEL AND COMPOSITE BUILDING FRAMES UNDER EXCEPTIONAL EVENTS (FAILNOMORE)

Goal of the project

Recent events such as natural catastrophes or terrorism attacks have highlighted the necessity to ensure the structural integrity of buildings under exceptional events so as to mitigate the risk of progressive collapse; the main objective being to save lives (occupants and members of emergency services) and to reduce collateral effects.

The overall objective of the project is the preparation of scientific background material, derivation of design guidelines, preparation of study cases and production of dissemination materials (design manual, PowerPoint presentations). The manual can be considered as a reference document for the practical design of structures for which the structural integrity has to be ensured under exceptional events.

Project implemented by

The project is implemented by a partnership of 14 European Universities and Industrial partners:

- Universite de Liege (coordinator);
- Universidade De Coimbra;
- Imperial College of Science Technology and Medicine;
- Universitaet Stuttgart;
- Universita Degli Studi Di Trento;
- Politehnica University Timisoara;
- Ceske Vysoke Uceni Technicke V Praze;
- Politechnika Rzeszowska Im Ignacego Lukasiewicza Prz;
- Technische Universiteit Delft;
- Universitat Politecnica De Catalunya;
- Institut National Des Sciences Appliquees De Rennes;
- Convention Europeenne De La Construction Metallique Asbl;
- Feldmann + Weynand Gmbh;
- Arcelormittal Belval & Differdange Sa.

Implementation period

2020 – 2022

Short description of the project

The proposed project, which involves European centers of expertise in the area of robustness, brings together extensive knowledge acquired on various related aspects, i.e. risk analysis, loading scenarios, mechanical responses of structures, and components subject to extreme loading conditions such as impact, earthquake and explosions.

Main activities

WP1: Development of a consistent design approach for robustness

- Collection of all relevant information documents available worldwide on all the relevant "robustness" and accidental loading events issues (Fig. 1, Fig. 2);

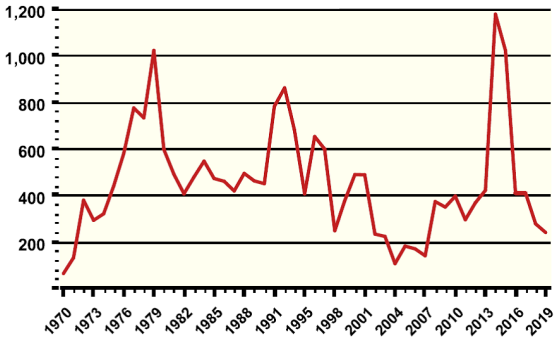


Fig. 1 Occurrence of explosions associated with terrorist attacks between 1970 and 2019 in Europe (GTD, 2019)

Fig. 2 Accidental explosion produced by improper storage of large quantities of ammonium nitrate, Beirut, August 2020

- Integration of the knowledge based on different research works into a full-consistent design approach for robustness.

WP2: Derivation of design guidelines, application to study cases and preparation of the dissemination material (English version)

- Drafting of a fully-consistent set of up-to-date and practice-orientated design recommendations;
- The applicability will be demonstrated through the preparation of four worked examples.

WP3: Translation and editing of the dissemination material

- Translation of deliverables in 9 other European languages.

WP4: Dissemination activities

- Organization of training workshop
- Organization of post-project dissemination

Results

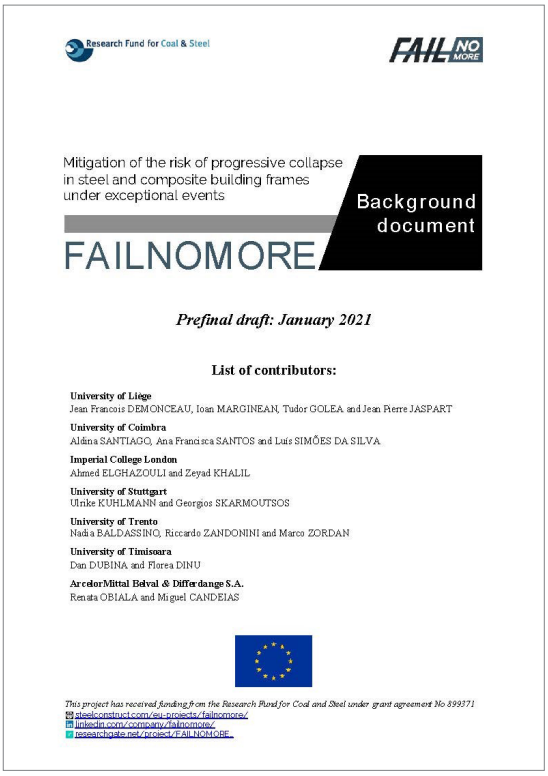
Comprehensive overview of the project and preparation of the technical background material

- Collection of worldwide reports of ongoing and recently-finalized research projects related to structural robustness;
- Codes and recommendations related to risk analysis, definition of scenarios, design guidelines, local response of structural elements under impact and blast, global response of buildings following a local damage, possibly including dynamic effects.

Development of a consistent design approach for robustness of steel and composite buildings

A fully consistent and scientifically founded design approach including the general philosophy and the design models was developed.

A complete scientific background document was drafted. The document will be used as a reference for the preparation of the design guidelines.


Research Fund for Coal & Steel

FAIL NO MORE

Mitigation of the risk of progressive collapse in steel and composite building frames under exceptional events

Background document

FAILNOMORE

Prefinal draft: January 2021

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steelconstruct.com/eu-projects/failnomore/
linkedin.com/company/failnomore/
researchgate.net/project/FAILNOMORE_

Applicability and transferability of the results

The derivation of a full consistent set of practice orientated design guidelines and relevant worked examples are useful tools for construction professionals including designers, fabricators and control officers, within a clear and easy-to-apply format. .

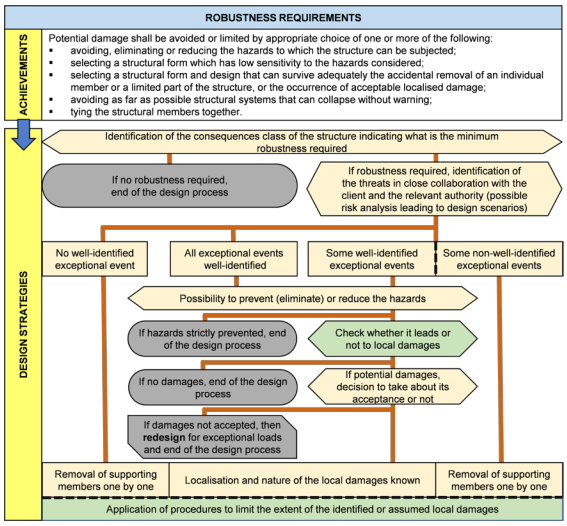

Fig. 3 General flowchart of the design process

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Research Centre

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CONTRIBUTIONS TO CODIMENSION K BIFURCATIONS IN DYNAMICAL SYSTEMS THEORY

Goal of the project

The overall project objectives are to produce new knowledge in the area of codim k bifurcations for continuous and discrete (smooth and non-smooth) dynamical systems and provide training in this area of research to early stage researchers.

Short description of the project

The project objectives are planned to be achieved during secondments.

Project implemented by

1. Politehnica University of Timisoara (Coordinator)
2. Autonoma University of Barcelona
3. Obuda University
4. West University of Timisoara
5. University of Craiova
6. Acmit Gmbh, Austria
7. University North Caroline, USA
8. Shanghai Jiao Tong University, China
9. University of Sao Paulo, Brazil
10. Queen's University, Canada
11. University of Bio-Bio, Chile

Implementation period

1 April 2018 - 31 March 2022

Main activities

1. Study degenerate Bautin bifurcations;
2. Study degenerate Hopf-Hopf bifurcations;
3. Study other codimension k bifurcations in continuous (smooth) systems;
4. Study other codimension k bifurcations in discrete (smooth) systems;
5. Study codim k bifurcations in non-smooth systems;
6. Study bifurcations in non-smooth systems with impacts.

Results

Published articles:

1. G. Tigan et al., Bifurcation diagrams in a class of Kolmogorov systems, Nonlinear Analysis: Real World Applications 56, 103154, 1-14, 2020.
2. J. Ginoux, J. Llibre, C. Valls, Dynamics and Darboux integrability of the D_2 polynomial vector fields of degree 2 in R^3, Mathematical Physics, Analysis and Geometry 24, 2021.

Financed through/by

Horizon2020-2017-RISE-777911, "Dynamics"

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