

International Cooperation of the Croatian Academy of Engineering

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Introduction

Croatian Academy of Engineering has been a member of the International Council of Academies of Engineering and Technological Sciences (CAETS - International Council of Academies of Engineering and Technological Sciences) based in Washington, USA since October 2000.

It has been an associate member of the European Council of Academies of Applied Sciences, Technology and Engineering (Euro-CASE) based in Paris since January 2005, and it became a permanent member of Euro-CASE in 2009.

Bilateral agreements

Representatives of the Academy signed five bilateral agreements (Agreement on cooperation in the field of engineering and technical sciences between the Croatian Academy of Engineering, Republic of Croatia and the Chinese Academy of Engineering, People's Republic of China, 2004; Agreement on mutual understanding between the Croatian Academy of Engineering and Academy of Engineering of Hungary, 2006; Agreement on cooperation between the Croatian Academy of Engineering and the Austrian Academy of Sciences (Annex I of the Agreement included), 2009; Agreement on cooperation between the Croatian Academy of Engineering and the Chinese Academy of Engineering, 2013; Agreement on cooperation between the Croatian Academy of Engineering and the Slovenian Academy of Engineering, 2017).

Also, Croatian Academy of Engineering was a supporting institution of the number of distinguished scientific conferences, such as “Conference on Sustainable Development of Energy, Water and Environment Systems – SDEWES”, in total 12 of them held in Rio de Janeiro, Novi Sad, Lisbon, Dubrovnik, Buenos Aires, Gold Coast, Sarajevo, Cologne, Vlore, Sao Paulo, Paphos, “ECCOMAS - Multibody Dynamics 2013”, (ECCOMAS - European Community on Computational Methods in Applied Sciences) which was held in Zagreb in 2013 (two years after Brussels in 2011, and two years before Barcelona 2015). It was organized under the auspices of the Croatian Academy of Sciences and Arts and sponsored by two Croatian companies (e.g. Končar and AVL), but also by the most prominent world organizations in the field of mechanical engineering, and computational and applied mechanics (ASME, IUTAM, ECCOMAS, IFToMM etc). Selected expanded papers of the Conference “ECCOMAS - Multibody Dynamics 2013” were published in a book by the international publisher Springer in the year 2014. The editor of the book is a member of the Croatian Academy of Engineering Prof. Zdravko Terze, Ph.D., and - according to the publisher’s sales statistics - the book ranked among the top 25% most successful scientific editions in the pertinent category in the years to follow.

In 2009 Prof. Vladimir Medved, Ph.D., was elected to serve as a Chair of the Committee for International Cooperation, and the members of the Committee were Prof. Stanko Tonković, Ph.D., Prof. Vladimir Koroman, Ph.D., Prof. Bernard Franković, Ph.D., Prof. Jasna Franekić, Ph.D. and Prof. Mislav Grgić, Ph.D., who occupied their posts until 2013. Prof. Zdravko Terze, Ph.D., was elected to serve as a Chair of the Committee for International Cooperation in period 2013-2017. The members of the Committee in that mandate were: Prof. Ana Marija Grancarić, Ph.D., Prof. Biljana Kovačević Zelić, Ph.D., Prof. Bojan Jerbić, Ph.D., Prof. Karolj Skala, Ph.D., Prof. Mario Kovač, Ph.D., and Prof. Neven Duić, Ph.D. The most recent mandate started in 2017, with Prof. Nikola Čavlina, Ph.D., being elected as a Chair of the Committee, while the members of the Committee are Prof. Karolj Skala, Ph.D., Prof. Vladimir Mrša, Ph.D., Prof. emer. Dubravka Bjegović, Ph.D., Prof. Bruno Zelić, Ph.D., Prof. Biljana Kovačević-Zelić, Ph.D. and Prof. emer. Ana Marija Grancarić, Ph.D.

In the period of this report, four international cooperation agreements were signed: Memorandum of Agreement on Cooperation with the Chinese Academy of Engineering (2004) (with the Chinese Academy of Engineering an additional document “CAE-HATZ Memorandum of Understanding” was signed in 2013 after the visit of the CAE delegation to the Croatian Academy of Engineering in December 2012), Memorandum of Agreement on Cooperation with the Hungarian Academy of Engineering (2006), Memorandum of Agreement on Cooperation with the Austrian Academy of Sciences (2009), and Memorandum of Agreement on Cooperation with the Slovenian Academy of Engineering (2017) (Figures 1 and 2).



Fig. 1. Signing Memorandum of Agreement on Cooperation with the Slovenian Academy of Engineering (2017), Ljubljana, 2017



Fig. 2. Signing Memorandum of Agreement on Cooperation with the Slovenian Academy of Engineering (2017), Ljubljana, 2017

Bilateral cooperation with these and other academies has been continuing to the present day and Croatian Academy of Engineering permanently supports scientific collaboration with international academic institutions. Along this line, Prof. Xilun Ding, Ph.D. (currently Dean of the School of Mechanical Engineering and Automation) and his collaborators from renown Beijing University for Aeronautics and Aerospace (BEIHANG University), China - during his visit to University of Zagreb in 2017, Faculty of Mech. Eng. & Naval Arch, Chair of Flight Vehicle Dynamics - visited Croatian Academy of Engineering as well as Croatian Academy for Sciences and Arts (Figure 3). Such international collaboration is furtherly promoted by active participation of the

Academy members in the events organised by CAETS and Euro-CASE. For example, Academy members Prof. Karolj Skala, Ph.D., and Prof. Bernard Franković, Ph.D., participated in the CAETS annual meeting and symposium “Innovative Approaches to Engineering Education”, held in Budapest in 2013. Prof. Bernard Franković, Ph.D., was present as a representative of the Croatian Academy of Engineering in CAETS Board of Directors, while at the symposium ‘Innovative Approaches to Engineering Education’ Prof. Karol Skala, Ph.D., presented FP7 project “Embedded Computer Engineering Learning Platform-E2LP”, which was developed by Institute Ruđer Bošković and Faculty of Electrical Engineering and Computing from Zagreb, in cooperation with seven other EU institutions.



Fig. 3. Prof. Xilun Ding, Ph.D., Beijing University for Aeronautics and Aerospace (BEIHANG University), China, and his collaborators during visit to University of Zagreb, Faculty of Mech. Eng. & Naval Arch, Chair of Flight Vehicle Dynamics, and Croatian Academy of Engineering (2017).

In more recent times Prof. Vladimir Andročec, Ph.D., President of the Academy, and Prof. Zdravko Terze, Ph.D., Vice-President of the Academy, participated in Euro-CASE Board Meetings in Den Haag/Delft, Netherlands (2015) (Figure 4) and in Lyngby, Denmark (2016). Also, in 2017 Prof. Vladimir Andročec, Ph.D., and Prof. Zdravko Terze, Ph.D. attended CAETS 2017 Convocation at Real Academia de Ingeniería (RAI), Madrid, Spain, and visited University of Seville, where they had official meeting on the collaboration issues with Dean of the Faculty of Engineering Prof. Jaime Domínguez, Ph.D. (Member of RAI), and Prof. Zdravko Terze, Ph.D., delivered invited lecture ‘Geometric Integration of Rotational Quaternions’ for scientists and doctoral students of the Faculty.



Fig. 4. Participants of the Euro-CASE Board Meeting in Den Haag/Delft, Netherlands (2015)

In the present days, the Academy also continuously informs its members on the activities related to the application of scientific and development projects within the framework of EU research programs, such as Horizon 2020 and other programs. Furthermore, members and representatives of the Academy organize and participate regularly in the workshops, national conferences and information days in the promotion of the international activities. This practice encourages the cooperation of individual institutions in Croatia and abroad and creates a network framework for the flow of information and research ideas, especially when lecturers and participants are renown international scientists such as Prof. Aleksandar V. Efremov, PhD. (Moscow Aviation Institute), who delivered a lecture „Progress in Pilot Vehicle System Approach to Solution of Flight Safety and Manual Control Problems“ (2014)), Tin Komljenović, Ph.D. (University of California, Santa Barbara, US), who delivered a lecture “Integrated Photonics for LIDAR and Communications” (2017), organised by the Croatian Academy of Engineering, Department for Communication Systems, and Prof. Ivica Puljak, Ph.D. (The European Organization for Nuclear Research (CERN), University of Split) who delivered a lecture ‘Discovery and Measurement of Characteristics of Higgs boson’ (2018) (Figure 5), organised by the Croatian Academy of Engineering, Academy Scientific Consul.



Fig. 5. Lecture ‘Discovery and Measurement of Characteristics of Higgs boson’, Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb (2018) (organised by Croatian Academy of Engineering, Academy Scientific Consul).

In this context, the Academy also organizes workshops and symposia in order to support further development of the traditional engineering fields within newly established international collaborations, but also with the aim of promoting new technologies and industrial challenges of the future. These activities should allow for better incorporation of Croatian engineers and scientists into competitive EU research ambient of the highly-advanced engineering fields, such as nanotechnology, artificial intelligence,

and space technologies. Speaking of space, Croatian Academy of Engineering organized successful international event “Horizon 2020 Space Workshop” in Zagreb (2014), where - for the first time in Croatia - space technologies and field potential for Croatian companies have been discussed, anticipating thus signing of the agreement of cooperation between Republic of Croatia and European Space Agency in February 2018. Recently, successful roundtable ‘Cyber Physical Systems and Internet of Things’ has been organised by the Committee for Economic and Regional Cooperation, Croatian Academy of Engineering, in collaboration with Croatian Chamber of Economy and Innovation Centre Nikola Tesla, 2018 (Figures 6 and 7).



Fig. 6. Roundtable ‘Cyber Physical Systems and Internet of Things’, Croatian Chamber of Economy, 2018.



Fig. 7. Roundtable ‘Cyber Physical Systems and Internet of Things’, organised by the Committee for Economic and Regional Cooperation, Croatian Academy of Engineering, in collaboration with Croatian Chamber of Economy and Innovation Centre Nikola Tesla, 2018.

As it was in the past, representatives of the Academy participate in number of activities organized by our international partners. For example, Prof. Vladimir Andročec, Ph.D., President of the Academy, participated in the meeting of representatives of the Academies members of Euro-CASE with representative of the European Commission in Brussels within the seminar “Independent Science-and Technology-Based Policy Advice from Euro-CASE” (2013). Also, reports on the activities of the Croatian Academy of Engineering are being published regularly in Euro-CASE Annual Reports over the recent years, our publications ‘Engineering Power’ and ‘Annual Report’ are being distributed to our collaborators on the permanent basis, and Academy participates in other international activities, such as voting a member of the CAETS Board of Directors for the period 2014-2016. As a member of Euro-CASE, Croatian Academy of Engineering actively participates in the EU Horizon 2020 project SAPEA (“Science Advice for Policy by European Academies”) that has been officially launched in Brussels on December 13 2016. The overall objective of the project is to pull together timely, independent and evidence-based scientific expertise from more than 100 European academies from over 40 countries for the highest policy level in Europe and for the wider public. To this end, Croatian Academy of Engineering has nominated it’s experts for different posts within the framework of the SAPEA project activities.

Organization/Coorganization of Conferences

- Croatian Engineer’s Day, Zagreb, Faculty of Chemical Engineering, Zagreb, February 22, 2019
- International Scientific Conference “Printing&Design”, Školska knjiga Zagreb, March 14, 2019
- Workshop of the Economic Council of the Croatian Academy of Engineering ”Needs of Croatian Economy for Lifelong Learning with Emphasis on Secondary Vocational Education” , Croatian Academy of Engineering, Zagreb, March 29, 2019
- Workshop “Patents and Patent Application”, Zagreb, April 3, 2019
- SED 2019/Energy Democracy Summit, Pula, April 20-12, 2019
- Croatian Engineer’s Day, Zagreb, Faculty of Chemical Engineering, Zagreb, February 22, 2019
- International Scientific Conference “Printing&Design”, Školska knjiga Zagreb, March 14, 2019
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- Workshop “Patents and Patent Application”, Zagreb, April 3, 2019
- SED 2019/Energy Democracy Summit, Pula, April 20-12, 2019
- FSB, AMZH, HATZ, Lecture “Comanipulation for assistance to gesture with therapeutic applications”, Croatian Medical Association, Zagreb, December 5 2019
- HGK, ICENT, HATZ, Round table discussion “Digital innovative solution in food and agriculture sector”, FER, Zagreb, December 6, 2019
- Croatian Engineer’s Day, March 2, 2020, Zagreb
- Conference „Croatian Engineer’s Day - Engineers as Future Builders, HIS and HATZ, AGG faculties of the University of Zagreb, March 02, 2021, live with partially filled hall
- Webinar „Hydrogen in Energy Transition“, March 04, 2021, Department of Energy Systems of the Croatian Academy of Engineering, conferencing using Zoom platform
- International Scientific-Professional Conference, „Printing & Design 2021“, May, 2021
- International scientific conference „Printing & Design 2022“, University of Zagreb Faculty of Graphic Arts), Zagreb University of Applied Sciences, (North University, Varaždin – Koprivnica, Croatian Academy of Engineering, May 12, 2022, Zagreb;
- 7th Croatian Congress of Microbiology with International Participation, Croatian Microbiology Society and Croatian Academy of Engineering, May 24 to 27, 2022, Sv. Martin na Muri;
- Several International scientific conferences: „Conference on Sustainable Development of Energy, Water and Environment Systems – SDEWES“:
 - 1st Latin American SDEWES Rio de Janeiro, Brazil , 28-31 January, 2018
 - 3rd South East Europe SDEWES, Novi Sad, Serbia June 30 – July 4, 2018
 - 13th SDEWES Palermo, Italy, September 30 - October 4, 2018
 - 14th SDEWES Dubrovnik, 1 – 6 October, 2019
 - 2nd Latin American SDEWES, Buenos Aires, Argentina, 9 – 12 February 2020
 - 1st Asia Pacific SDEWES, Gold Coast, Australia, 6 – 9 April 2020
 - 4th South East Europe SDEWES, Sarajevo, Bosnia and Herzegovina, 28 June – 2 July 2020
 - 15th SDEWES Cologne, Germany, 1-5 September 2020
 - 16th SDEWES Dubrovnik, 10 – 15 October, 2021
 - 5th South East Europe SDEWES Vlorë, Albania, 22-26 May 2022
 - 3rd Latin American SDEWES Sao Paulo, Brazil, July 24-28, 2022
 - 17th SDEWES, Paphos, Cyprus, 06 - 10 November 2022

- Conference „10th International Congress of Food Technologists, Biotechnologists and Nutritionists“, Faculty of Food Technology and Biotechnology, Croatian Academy of Engineering, November 30 to December 2, 2022, Zagreb;

Euro-CASE 2020

Croatian Academy of Engineering organized Euro-CASE 2020 Annual Conference on “Dealing with Challenges of the European Energy Transition” (Figure 8).



Fig. 8. Euro-CASE 2020

Euro-CASE (European Council of Academies of Applied Sciences, Technology, and Engineering) is a non-profit association of national academies of engineering, applied sciences, and technology from 23 European countries. Founded in 1992 and based in Paris, Euro-CASE has access to over six thousand experienced professional engineers, offering independent advice with a clear European dimension. The mission of Euro-CASE is to pursue, encourage, and sustain excellence in engineering, applied sciences, and technology for the benefit of European citizens.

The annual Euro-CASE conference serves as the most important professional and political forum organized by the member academies. It brings together leading European scientists and experts to discuss the engineering aspects of issues of vital importance. Through these conferences, Euro-CASE aims to maintain a leading role in promoting excellence in applied sciences, engineering, and related critical issues in Europe. Moreover, Euro-CASE emphasizes the need to consider the social impact of technological change and to address environmental and sustainability aspects adequately.

Since its inception in 2008 with the first conference held in London, Euro-CASE conferences have been held annually. The selected topics cover areas of the greatest engineering interest, including innovation, energy, and engineering education. The annual conference plays a significant role in shaping Euro-CASE's positions and recommendations.

The topic of energy for the 2020 conference, held online on November 20th, 2020, was proposed by Prof. Vladimir Androćec, Ph.D. and Prof. Nikola Čavlina, Ph.D. during the Euro-CASE Steering Committee meeting in Paris in June 2019. The topic, along with HATZ as the conference organizer, was accepted. Originally scheduled for the first half of 2020, coinciding with the Croatian presidency of the Council of the European Union, the conference had to be rescheduled to the fall of 2020 due to the pandemic. Finally, on November 20th, 2020, the conference took place online due to the ongoing pandemic situation (Figure 9).



Fig. 9. Euro-CASE 2020 conference

To accommodate the circumstances, HATZ condensed the usual one-day Euro-CASE conference into a 3-hour session without breaks. The conference program comprised four invited lectures in the first section titled “Energy Policies - Challenges and Opportunities for Transformation” and presentations from five invited speakers in the second section titled “Implementation, Economic Impact, and Challenges.” The conference concluded with a question-and-answer session.

Euro-CASE 2020 Annual Conference had 170 participants registered for the conference, what was above expectations. Among the 23 national academies that make up Euro-CASE, 21 presidents or vice-presidents of academies were present.

The positive feedback received after the conference, indicates that the conference was well-organized. The conference program and all presentations and videos can be accessed on the website: www.euro-case.org/all_annual-conference/annual-conference-2020/.

CAETS 2023

Croatian Academy of Engineering is currently preparing **CAETS 2023 Annual Meetings and Technical Symposium “e²–mobility: Solutions and Opportunities”** (<https://caets2023.org/>) (Figure 10).



Fig. 10. CAETS 2023 Annual Meetings and Technical Symposium “e²–mobility: Solutions and Opportunities”

Croatian Academy of Engineering is presiding over International Council of Academies of Engineering and Technical Sciences (CAETS), world alliance of 31 academies, during year 2023, and its presidency will culminate in organisation of CAETS 2023 conference, to be held in Zagreb, on October 9-11, 2023.

Decarbonisation of transport will bring significant changes to the way humanity moves people and goods around. While electrification may help with both greenhouse and local emissions, it will also convey huge change to car production and servicing chains. Electrification of transport makes car more of IT product, having battery management software at the core

While the decarbonisation of transport is very wide now, and it is also changing quickly. Main topic will be covered by sessions, introduced by invited speaker, and then discussed by 4-5 panellists on electrification of transport and integration with energy systems, batteries – the core technology, hydrogen, fuel cells and electrofuels, autonomous driving and modal shift.

The organising committee is chaired by Prof. Neven Duić, Ph.D. and members are Prof. Vedran Mornar, Ph.D., Prof. Nikola Čavlina, Ph.D., Prof. Vladimir Mrša, Ph.D., Prof. Hrvoje Gold, Ph.D., Prof. Igor Kuzle, Ph.D., Prof. Bruno Zelić, Ph.D., Prof. Željko Tomšić, Ph.D. and Prof. Vladimir Andročec, Ph.D.

The conference will try to draw attention to Croatian potential role in transport electrification transition, as a site of significant R&D and super car development, but also as a country in which high peaks for charging electric vehicles during summer tourist season will soon be testing the infrastructure. Will Croatia electrify its roads, or perennially miss the markets of electrified higher middle class European tourists?