

# CONFERENCES ON MARINE TECHNOLOGY IN CROATIA

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## Summary

This paper presents the history of the Conference on Marine Technology held so far in the Republic of Croatia – in memory of Zlatko Winkler, Fellow of the Croatian Academy of Sciences and Arts (HAZU). The contribution of the Conference to the scientific community is pointed out along with its genesis, aims, organization, realization, and future perspectives. The historical data regarding the number of participants and presented works is summarized for the first time, and the structure of current Committees is presented.

**Keywords:** Croatian Academy of Sciences and Arts, conference; marine technology; Zlatko Winkler.

## 1. ORIGIN AND SCOPE OF THE MARINE TECHNOLOGY SECTION AS A PART OF THE SCIENTIFIC COUNCIL FOR MARITIME AFFAIRS

Writing on the activities of the Marine Technology Section as part of the Croatian Academy of Sciences and Arts is a demanding task requiring a thorough approach. Therefore, the intention of this paper is neither to outline the complete history of the Marine Technology Section nor to deal with its role and importance in the structure of the Academy. It rather presents some of the most significant milestones in the existence of the Section, which stand as an opportunity to gain some insight into its activity. A complete history of the activities of the Section can be found in the Chronicles of the Academy [1], which stand as a fundamental historical data source regularly published by the Academy [2].

Until the breakup of Yugoslavia, the Marine Technology Section was a part of the Scientific Council for Maritime Affairs of the Yugoslavian Academy of Sciences and Arts. Unfortunately, its work was interrupted in 1991 due to the Serbian attack on the territorial integrity of the Republic of Croatia. The decision regarding the work interruption

has been brought by the Presidency of the Academy on July 5, 1991, as stated by Zlatko Winkler, Fellow of the Academy, now deceased, in a document of January 17, 1994:

*By the decision of the Presidency of the Croatian Academy of Sciences and Arts on July 5, 1991, the activities of the Scientific Council for Maritime Affairs are temporarily and partially suspended until appropriate organizational, financial, and other conditions appropriate for continuous work are met.*

In these years the work continued despite demanding circumstances as testified by the same document:

*In 1992 and 1993 the Council took limited activity in preparation for the 9th regular plenum according to new concepts and activities of academic councils. According to that, a reduction of the number of members is planned, so preparations are underway for the election of members according to the new criteria.*

In addition, a reorganization was carried out within the Academy, so that the Scientific Council for Maritime Affairs continued to operate with only four sections: Section for Sea Shipping, Section for Naval Architecture, Section for Sea Ports, and Section for Marine Technology. Subsequently, in 2018, a new Section for the Croatian Maritime Heritage was established. The Rules of Procedure were adopted on April 5, 1993, as a framework for the work of the Council and its sections (Articles 7 and 8), as well as the Scientific Council for Maritime Affairs and its sections.

The research activities of marine technology involve many multidisciplinary and transdisciplinary fields, including methodologies and skills spreading across several scientific areas. An overview of these activities can be found in detail in the work plans and achievement reports of the Section for Marine Technology published regularly in the Chronicles of the Academy. However, a more in-depth report on the activities of the Section can be found in the Proceedings of the Conference on Marine Technology, in memoriam to Zlatko Winkler [3], Fellow of the Academy, which is organized by the same Section. Hence, the activities of the Section can be classified based on the Conclusions of the Scientific Conference “Croatian Maritime Economics – Today and Tomorrow”, held in November 1993, in Opatija, Croatia, stating in paragraph 6:

*Marine technology is a science that researches and studies the technological systems of the sea and the coast and their construction activity. Starting from the fact that technological systems consist of technical means, appropriate natural resources (energy, material, space), people with their creative potentials, and motivational and other relevant social content, they are interconnected into an interacting whole. Their development is possible only in the conditions of the*

*built technological infrastructure consisting of education, scientific research, information systems, technical regulations, and legislation in technological development.*

*The scientific research activity has two purposes: one, according to the construction of the techno sphere of a particular sea, the research results will be used to exploit the natural resources and properties of that sea. The second purpose is to use the research results for the development of economic activities in the production of technical means for the exploitation of the resources of the world's seas.*

*Encouraging the development of maritime technology in our country as a scientific discipline and as a set of economic activities is part of the development of the maritime economy in our country and points to intensive international scientific and technological cooperation and exchange of scientific and technological information. The development of all technological systems of marine technology is preceded by research into the sea as a natural system and the human environment.*

The Section is, therefore, presently active in all of these areas, with different intensities according to the Rulebook and guidelines that were empowered in the coming period. Intensity and focus follow the development of science and technology in the field, and the inclusion of other scientific fields is encouraged. All activities are carried out by individual members of the Section, or through their joint action. The achieved results are regularly published in scientific journals of different fields, as well as in the proceedings of relevant conferences. As the economy of the city of Rijeka and its surroundings, as well as the orientation of the Department of Naval Architecture and Ocean Engineering, Faculty of Engineering, University of Rijeka, are strongly related to marine technology, the Section traditionally encompasses activities of experts and scientists originating mostly from the same geographical area.

Such an orientation was strongly encouraged by Zlatko Winkler, Fellow of the Academy, especially as his work merged marine technology and naval architecture at academic education level in the city of Rijeka. Besides formal education, he actively gathered all those who, with their knowledge, abilities and desire, could give a specific contribution to the study of naval architecture at the Faculty of Engineering. Likewise, as the President of the Scientific Council for Maritime Affairs of the Academy, he gathered within the Marine Technology Section all specialists who stood out in this field as those who would contribute to the goals of the Section. Thus, the employees of the Faculty of Engineering as experts in Marine Technology were regularly recruited to the Section in the first place.

## 2. CONFERENCES ON MARINE TECHNOLOGY

These efforts yielded the idea of organizing a conference on Marine Technology in memoriam to Zlatko Winkler, Fellow of the Academy, aiming to promote, research, and further develop this challenging field. Thus, on January 11, 2005, at the meeting of the Section for Marine Technology of the Scientific Council for Maritime Affairs of the Croatian Academy of Sciences and Arts, a decision was made to organize a Conference on Marine Technology:

*It was decided to organize a scientific conference under the working title: Scientific Conference on Marine Technology, with the Organizing Committee to consider the subsequent inclusion in the final name of Zlatko Winkler, a fellow of the Academy. The conference organizers are the Marine Technology Section of the Scientific Council for Maritime Affairs of the Croatian Academy of Sciences and Arts and the Faculty of Engineering of the University of Rijeka. The patronage of the Croatian Academy of Sciences and Arts will be requested. The Conference will be held at the Faculty of Engineering in Rijeka in October 2005. Financial support will be requested from the Ministry of Science, Education and Sports, the University of Rijeka Foundation, the Croatian Academy of Sciences and Arts Foundation, the Chamber of Commerce, and different business entities.*

The Organizing Committee, summoned by Igor Rožanić, a deceased Secretary of the Section, at its meetings on January 17 and February 24, 2005, accepted the conference title as “Conference on Marine Technology – in memoriam to Zlatko Winkler, a fellow of the Academy”. The first four meetings were organized by the Scientific Council for Maritime Affairs of the Croatian Academy of Sciences and Arts and the Faculty of Engineering, University of Rijeka. Besides the Faculty of Engineering, other institutions such as the Faculty of Maritime Studies, the University of Rijeka, and the Association for Research and Development of Maritime Industries, Rijeka, were also involved in the conference organization.

The aims and scopes of the conference were determined in its early days providing selection criteria for the contributions of authors. Thus, the list of aims and scopes includes:

- to give an overview of scientific research, the results and applications thereof in the field of marine technology, and the importance thereof for the economy, and to stimulate the development of this activity in Croatia;
- to inform the general, scientific and expert public about the importance of the economic activity of marine technology;

- to provide information on the marine industry's business activities that need to be taken into account at a time when the main directions of our technological development are determined;
- to encourage the establishment of a high degree of coordination and cooperation in economic activities related to the sea and marine technology, in particular from the aspect of the necessary export expansion;
- to give elements to participate in international technology transfer based on technological knowledge.

It is important to point out that the Croatian Academy of Sciences and Arts as the leading umbrella scientific institution in the Republic of Croatia was patron of all the conferences. For each one, the Academy appointed its representative, and recently, a representative from the Department of Technical Sciences, Ivo Senjanović, Fellow of the Academy. The conferences are organized biennially to alternate with the traditional Conference SORTA held in memory of Leopold Sorta, former Croatian professor in naval architecture. Thus, since 2005, nine Conferences have been organized: 2005 (W1), 2007 (W2), 2009 (W3), 2011 (W4), 2013 (W5), 2015 (W6), 2017 (W7), 2019 (W8), and 2021 (W9), Table 1.

An important event in the development of the Conference is the conclusion of the meeting of the Organising Committee in March 2017. Then, as suggested by Zoran Vukić from the Faculty of Electrical Engineering and Computing, University of Zagreb, and Bernard Franković from the Faculty of Engineering, University of Rijeka, an agreement of all the members of the Committee on the improvement of the conference to an international character has been achieved. That was to be achieved by:

- the inclusion of international scientists/experts in the field of marine technology in the International Scientific Committee;
- involving an additional international scientific institution as co-organizer;
- encouraging the participation of international authors;
- preparing presentations in English;
- double reviews for conferences and later for the publication of selected papers in the *Journal of Maritime & Transportation Sciences*, which would increase the interest of scientists and researchers;
- a reasonably increased volume of plenary lectures.

This was implemented for the next, 8<sup>th</sup> International Conference, when the thematic areas covered by the Conference were slightly redefined:

- Marine environmental protection;
- Intelligent Underwater Systems and Technologies;

- Autonomous Vessels;
- Biotechnology, Fisheries, and Aquaculture;
- Maritime Transport, Economy;
- Shipbuilding Technology and Shipyards;
- Marine Structures;
- Small and Pleasure Crafts;
- Construction and Design in Shipbuilding and Mechanical Engineering;
- Mining, Oil, and Geological research;
- Marine Biology;
- Material and Chemical Engineering;
- Marine Engineering;
- Marine Automation and Control;
- Marine Electronics;
- Renewable energy sources in the field of marine technology;
- Desalination of sea water in conjunction with renewable energy sources;
- Legislation, rules, standardization;
- Computer applications in the design, manufacture, and operation of marine technology facilities.

In this way, thanks to the Dean of the Faculty in Portorož, Elen Twrdy, an international academic education institution – Faculty of Maritime Studies and Transport of the University of Ljubljana – participated in the organization in addition to the Faculty of Engineering of the University of Rijeka and co-organizers, the Faculty of Maritime Studies of the University of Rijeka and the Association for Research and Development of Maritime Industries. With an enhanced international scientific committee and with a considerable number of papers by foreign authors, the 8<sup>th</sup> Conference commenced with an international character. Its sponsor was, traditionally, the Croatian Academy of Sciences and Arts – Department of Technical Sciences. Out of 43 submitted abstracts, 35 complete papers by 95 authors and co-authors were submitted. In addition, three plenary lectures were given on Regulations for the design, construction, and use of marine technology facilities, Luxury yachts, and Air pollution from ships. Thirty-five contributions were submitted through 6 sections in the field of technical sciences from different branches:

- Maritime transport, construction, and design in shipbuilding (5);
- Environmental protection (6);
- Legislation, rules, standardization (3);
- Maritime Structures and Engineering (8);
- Materials and Chemical Engineering (4);

- Autonomous Vessels and Underwater Intelligent Systems (3);
- Aquaculture and Marine Biology (2);
- Marine Engineering (4).

Plenary lectures, announcements, and discussions were held in English, while the opening ceremony was held parallel in Croatian and English. The Conference was attended by more than 150 participants, authors, co-authors, organizers, co-organizers, sponsors, professors, students, business people, and guests.

The majority of the members of the Organizing Committee of the Conference are, and have been for the past years, members of the Department of Naval Architecture and Ocean Engineering of the Faculty of Engineering, University of Rijeka. Table 2 shows the members of the Organising and Executive Committee of the last two Conferences held in 2019 and 2021, while the composition of the Organising and Executive Committee of the previous Conferences can be found in [5].

**Table 1.** Overview of the Conferences held [4-14]

**Tablica 1.** Pregled održanih savjetovanja [4-14]

Conf. No.	Conference Venue / Dates	Number of participants	Number of authors and co-authors	Number of submitted abstracts / presentations held	Number of submitted complete papers	Book of Abstracts / Conference Proceedings / Journal ISBN / ISSN
W1	Rijeka, Croatia November 28-29, 2005	47	32	N/A / 21	21	Conference Proceedings 963-6326-47-7
W2	Rijeka, Croatia November 16-17, 2007	71	58	N/A / 26	26	Conference Proceedings 978-953-6326-40-2
W3	Rijeka, Croatia November 30, 2009	82	81	N/A / 32	32	Conference Proceedings 978-953-6326-17-4

W4	Rijeka, Croatia November 25-26, 2011	55	72	N/A / 32	32	Conference Proceedings ISSN 1848-3976
W5	Rijeka, Croatia November 22-23, 2013	62	50	N/A / 23	23	Conference Proceedings ISSN 1848-3976
W6	Rijeka, Croatia November 20, 2015	61	51	N/A / 21	21	<i>Journal of Maritime &amp; Transportation Sciences</i> , ISSN 0554-6397, Spec. Vol. 2016
W7	Rijeka, Croatia November 17, 2017	52	37	20 / 18	13	<i>Journal of Maritime &amp; Transportation Sciences</i> , ISSN 0554-6397, Spec. Vol. 2018
W8	Rijeka, Croatia November 15-16, 2019	110	95	43 / 35	30	<i>Journal of Maritime &amp; Transportation Sciences</i> , ISSN 0554-6397, Spec. Vol. 2020
W9	Rijeka, Croatia November 11-12, 2021	100	85	35 / 33	28	Book of Abstracts ISBN 978-953- 8246-23-4, 2022. <i>Journal of Maritime &amp; Transportation Sciences</i> , ISSN 0554-6397, Spec. Vol. 2022



Additionally, for the 9<sup>th</sup> International Conference, contribution through the poster section was also possible. The last, 9<sup>th</sup> edition of the Conference, was quite a challenge due to pandemic surroundings. The decision of the Organizing Committee in March 2021 to switch to the online edition of the 9<sup>th</sup> Conference proved to be thoughtful, given the likelihood of an autumn wave of epidemics, which, unfortunately, can now be said to have so far been the most difficult. The Conference Organizing Committee, Table 2, was composed of Albert Zamarin, Chair, Tomislav Mrakovčić, Vice- Chair, Marko Hadjina, Secretary, Julijan Dobrinić, Zoran Vukić (Faculty of Electrical Engineering and Computing, University of Zagreb), Jakov Dulčić (Institute of Oceanography and Fisheries, Split), Tin Matulja, Lidia Runko Luttenberger (Polytechnics University of Rijeka), Siniša Vilke (Faculty of Maritime Studies, University of Rijeka), Goran Vukelić (Faculty of Maritime Studies, University of Rijeka), Elen Twrdy (Faculty of Maritime Studies and Transport, University of Ljubljana), Špiro Ivošević (Maritime Faculty, Kotor, Montenegro), Merica Slišković (Faculty of Maritime Studies, University of Split), and Marko Perčić.

**Table 2.** Members of the Organising and Executive Committee for the last two Conference held in 2019 and 2021

**Tablica 2.** Članovi Organizacijskog i Izvršnog odbora zadnja dva Savjetovanja 2019. i 2021. godine

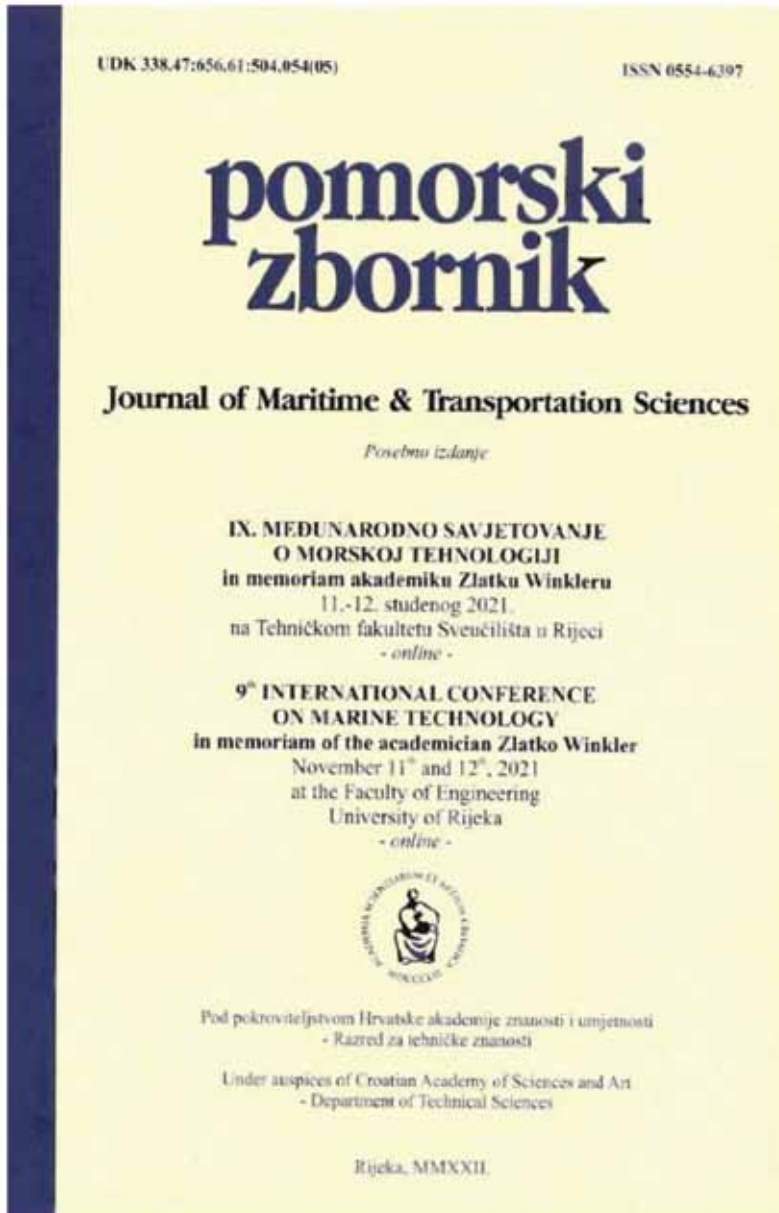
	Organising Committee	Executive Committee
W8	Prof. D.Sc. Albert Zamarin, Chair	Prof. D.Sc. Albert Zamarin, Chair
W9	Prof. D.Sc. Tomislav Mrakovčić, Vice-Chair	Prof. D.Sc. Julijan Dobrinić
	Prof. Dr.Sc. Marko Hadjina, Secretary	Prof. D.Sc. Tomislav Mrakovčić
	Prof. Emeritus Julijan Dobrinić	Prof. D.Sc. Marko Hadjina
	Prof. D.Sc. Zoran Vukić	Prof. D.Sc. Tin Matulja
	Prof. D.Sc. Jakov Dulčić	Assist. Prof. D.Sc. Dunja Legović
	Prof. D.Sc. Elen Twrdy	D.Sc. Marko Perčić
	Prof. D.Sc. Tin Matulja	
	Assoc. Prof. D.Sc. Lidija Runko Luttenberger	
	Assoc. Prof. D.Sc. Goran Vukelić	
	Assoc. Prof. D.Sc. Siniša Vilke	
	Assoc. Prof. D.Sc. Špiro Ivošević	
	Prof. D.Sc. Merica Slišković	
	D.Sc. Marko Perčić	

Out of 30 abstracts, 28 complete papers were submitted, including 85 authors and co-authors. Additionally, five plenary lectures were given by representatives of international companies and institutions in attractive fields: GREEN TRANSITION AND DIGITAL TRANSFORMATION OF THE MARITIME SECTOR (Lürsen Design Center Kvarner & Maritime Centre of Excellence), UTILITY VESSEL CONCEPT FOR THE CROATIAN ADRIATIC and AUTOMATION OF BUCKLING CHECK OF STIFFENED PANELS BY USING COMMERCIAL FINITE ELEMENT ANALYSIS SOFTWARE (IHC Engineering Croatia), Maritime Environment-friendly TRAnsport systems - METRO Project review and presentation of the capacity of CENTER FOR MARINE TECHNOLOGY– CMT Rijeka from the Faculty of Maritime Studies, University of Rijeka.

The papers were presented in 6 sections in the field of technical sciences, including:

- Marine Environmental Protection (5);
- Marine Biology, Biotechnology, Fisheries and Aquaculture (4);
- Construction and Design in Shipbuilding, Small Craft (6);
- Maritime Transport, Shipbuilding Technology and Shipyards (5);
- Computer Applications in the design, manufacture and operation of marine technology facilities (5);
- Marine Engineering, Automation and Control (3).

Plenary lectures, announcements, and discussions were held in English, while the opening ceremony was held parallel in Croatian and English. The Conference was attended by more than 100 participants, authors, co-authors, organizers, co-organizers, sponsors, professors, students, business people, and guests. Reviewed abstracts are available on the Conference website and in the form of a Book of Abstracts. All the papers are published in the conference proceedings as a special issue of the Journal of Maritime and Transportation Science, Figure 1.



**Figure 1.** Proceedings of the 9<sup>th</sup> International Conference on Marine Technology  
*Slika 1.* Zbornik radova 9. Međunarodnog savjetovanja o morskoj tehnologiji

### 3. CONCLUSION

In conclusion, the importance of these Conferences has been recognized in academia and the media. Significantly, there is an inelible response in secondary scientific publications. The words by Ivo Senjanović, Fellow of the Academy, President of the Scientific Council for Maritime Affairs of the Croatian Academy of Sciences and Arts, at the opening of the 7<sup>th</sup> Conference, point out the same:

*... As you know, this traditional gathering dedicated to Zlatko Winkler, a fellow of the Academy, is organized by the Faculty of Engineering of the University of Rijeka and under the auspices of the Croatian Academy of Sciences and Arts. As an envoy of the Academy, I cordially greet you on its behalf, on behalf of its President, Zvonko Kusić a fellow of the Academy, and on behalf of the Department of Technical Sciences and its Secretary, Stjepan Jecić, a fellow of the Academy.*

*The Academy accepted the patronage of this gathering in gratitude to its former full member Zlatko Winkler, who was President of the then Maritime Science Council from 1994 to 1996. It was Winkler, a fellow of the Academy, who as a visionary in that Council, founded the Section for Marine Technology, and at his suggestion, marine technology was introduced as a new scientific discipline in the curriculum of this Faculty.*

*Marine technology covers a wide range of human activities at sea, under the sea, on the seabed, and inland. The construction of special facilities for research and use of natural resources from the seabed, wind energy, waves and sea currents, fish farming, etc., certainly stands out. Today, when shipbuilding in Croatia is declining, it is important to welcome the breakthrough of marine technology and the construction of sophisticated high value-added facilities...*

Maintaining the international level of the Conference is a considerable effort and demands continuous work from all the members of the organizing Committee and others interested in creating and maintaining international contacts, as well as those who seek specific financial resources. This being a common problem, the activity has been reduced to a combination of actions that members of the Organisation Committee perform within the existing scientific and other ongoing projects as much as they can. Given the possibilities and perspectives of the field of marine technology, we believe that this will not be a problem in the future.

The Croatian Academy of Sciences and Arts continuously supports the development of Marine Technology in Croatia in different ways and with different opportunities as can be seen in [16-19]. In addition, one of the well-known International Conferences on Marine Technology was organized by the Academy members in Split in 2015 [20].

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## SAVJETOVANJA O MORSKOJ TEHNOLOGIJI U REPUBLICI HRVATSKOJ

### Sažetak

U radu su sažeta sva dosadašnja Savjetovanja o morskoj tehnologiji održana u Republici Hrvatskoj – u spomen na akademika Zlatka Winklera. Opisuje se cjelokupna geneza Savjetovanja, od same početne ideje i svrhe pa do pripreme i realizacije svakog od devet održanih savjetovanja, kao i značajni momenti i odluke u razvoju Savjetovanja. Brojčani podaci karakteristični za svako pojedino Savjetovanje su prikazani tablično, kao i struktura posljednja dva Organizacijska i Izvršna odbora. Obzirom na prikazane podatke i širinu tematskih cjelina vezanih za morsku tehnologiju, za očekivati je daljnji razvoj Savjetovanja u budućnosti.

**Ključne riječi:** Hrvatska akademija znanosti i umjetnosti; savjetovanje; morska tehnologija; Zlatko Winkler

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*Tisak*

Stega tisak

Zagreb, ožujak 2023.