



21st International Ship and Offshore Structures Congress

September 11–15, 2022
Pinnacle Harbourfront Hotel
Vancouver, Canada

www.issc2022.org



ISSC 2022 - Program

Welcome from the Congress Chairs

Welcome to the 21st International Ship and Offshore Structures Congress (ISSC 2022)!

It has been a very challenging 4-years in the history of the ISSC. Your dedication and contributions have made this ISSC2022 not only possible but also successful. Let's take this opportunity to share experience, exchange knowledge and reconnect during this ISSC2022!

We are pleased to host this Congress in-person, and hope you will enjoy your time in the beautiful city of Vancouver. The Pinnacle Harbourfront Hotel is an ideal location for the Congress, located mere minutes from Vancouver Harbour, Stanley Park, and numerous dining and shopping options in the downtown core.

Sunday's Welcome Reception at the top of the hotel will afford 360 degree views of the city so we hope you can join us for drinks and appetizers before finding one of the many great spots for dinner. Monday's Boat Cruise will also give you an excellent view of the city and North Shore as we cruise throughout the harbour. Tuesday's tours and Wednesday's banquet will round out the social events for the Congress.

All technical sessions will be held in the Ballroom of the Pinnacle hotel. As Congress Chairs, we would like to take this opportunity to thank the many participants who contributed to the reports which make up the proceedings. We know that many authors not in attendance this year would have chosen to come but were prevented due to health regulations within their country or other factors out of their control.

And finally a great big thank you to our generous sponsors and exhibitors. Please take a moment to visit the exhibits in the foyer during the lunches and breaks.

We look forward to welcoming each of you personally to Vancouver, Canada and ISSC 2022.



Christina Wang

Dr. Xiaozhi (Christina) Wang



Neil Pegg

Dr. Neil Pegg

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Participant Information

Exhibition & Registration

Discover new products and services from some of the industry's leading organizations. The **Registration Desk** and **Exhibition** are located in the **Foyer, Harbourfront level** during the following hours:

| | |
|--------------------------|---------------|
| Sunday, September 11: | 13:00 – 17:30 |
| Monday, September 12: | 08:00 – 17:30 |
| Tuesday, September 13: | 08:00 – 12:30 |
| Wednesday, September 14: | 08:00 – 17:30 |
| Thursday, September 15: | 08:00 – 16:00 |

Technical and Cultural Tours

The tours take place concurrently in the afternoon of **Tuesday, September 13**. You have indicated which tour you will be participating in during your registration. A list of participants for each tour is available at the Registration Desk if you wish to confirm which tour you are registered for. **Meet at the Ballroom Foyer at the times listed below for tour departure!**

- Seaspan Technical Tour (Seaspan Shipyards): **12:45**
- Cultural Tour (Capilano Suspension Bridge & Grouse Mountain): **13:00**
- UBC Technical & Museum Tour (University of British Columbia Laboratories and the Museum of Anthropology): **13:15**

Social Events

| | |
|---------------------------------------|--|
| Welcome Reception: | Sunday, September 11, 17:30 – 19:30 Location: Vistas 360 (19 th floor) at the Pinnacle Hotel Harbourfront |
| Vancouver Harbour Boat Cruise: | Monday, September 12, 17:30 – 22:00 Location: MV Britannia <i>Meet at the Ballroom Foyer at 17:30 to walk to the Coal Harbour Dock together!</i> |
| Congress Banquet: | Wednesday, September 14, 19:00 – 22:00 Location: Ballroom I & II at the Pinnacle Hotel Harbourfront |

ABS

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| Day | Time | Session | Room | Session Chairman | Committee Chairman | Official Discusser |
|-------------------------|------------------|---|-----------------|-----------------------------|--------------------------|------------------------------|
| SUNDAY September 11 | 17:30 – 19:30 | Welcome Reception | | | | |
| | 19:30 – 21:30 | SC, Corr and CC meeting | Ballroom I & II | | | |
| MONDAY September 12 | 08:30 - 09:00 | Opening | Ballroom I & II | | | |
| | 09:00 - 10:30 | I.1 Environment <i>Sponsored by ClassNK</i> | Ballroom I & II | <i>Patrick Kaeding</i> | <i>Alexander Babanin</i> | <i>Sverre Haver</i> |
| | 10:30 - 11:00 | Break | | | | |
| | 11:00 - 12:30 | I.2 Loads <i>Sponsored by Bureau Veritas</i> | Ballroom I & II | <i>Carlos Guedes Soares</i> | <i>Ole Hermundstad</i> | <i>Hayden Marcollo</i> |
| | 12:30 - 12:45 | Group Photo | | | | |
| | 12:45 - 14:00 | Lunch | | | | |
| | 14:00 - 15:30 | II.1 Quasi-Static Response <i>Sponsored by BMT</i> | Ballroom I & II | <i>Alexander Babanin</i> | <i>James Underwood</i> | <i>Takao Yoshikawa</i> |
| | 15:30 - 16:00 | Break | | | | |
| | 16:00 - 17:30 | II.2 Dynamic Response <i>Sponsored by CSSRC</i> | Ballroom I & II | <i>Jean-Yves Pradillon</i> | <i>Gaute Storhaug</i> | <i>Jorgen Juncher Jensen</i> |
| | 17:30 - 22:00 | Vancouver Harbour Boat Cruise | | | | |
| TUESDAY September 13 | 08:30 - 10:00 | V.1 Accidental Limit States <i>Sponsored by CCS</i> | Ballroom I | <i>Myung-Hyun Kim</i> | <i>Bruce Quinton</i> | <i>Manolis Samuelides</i> |
| | | V.2 Experimental Methods <i>Sponsored by CCS</i> | Ballroom II | <i>Patrick Kaeding</i> | <i>Soren Ehlers</i> | <i>Giles Thomas</i> |
| | 10:00 - 10:30 | Break | | | | |
| | 10:30 - 12:00 | V.3 Materials and Fabrication Technology <i>Sponsored by CCS</i> | Ballroom I | <i>Murilo Vaz</i> | <i>Lennart Josefson</i> | <i>Myung Hyun Kim</i> |
| | | V.4 Offshore Renewable Energy <i>Sponsored by ABS</i> | Ballroom II | <i>Jean-Yves Pradillon</i> | <i>Athanasios Kolios</i> | <i>Amy Robertson</i> |
| | 12:00 – 13:00 | Lunch | | | | |
| | 13:00 - 18:00 | Technical and Cultural Tours | | | | |
| 19:00 - 21:00 | SC, Corr meeting | Ballroom I & II | | | | |

***Each session will include Committee Chair Report (30 min), Official Discusser Report (15 min), Committee Chair Response (15 min) and Q&A (30 min).*

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| Day | Time | Session | Room | Session Chairman | Committee Chairman | Official Discusser |
|--------------------------------|---------------|---|--------------------|------------------------------|--|------------------------------------|
| WEDNESDAY September 14 | 09:00 - 10:30 | III.1 Ultimate Strength <i>Sponsored by Office of Naval Research</i> | Ballroom I & II | <i>Masahiko Fujikubo</i> | <i>Paul Hess</i> | <i>Jorgen Amdahl</i> |
| | 10:30 - 11:00 | Break | | | | |
| | 11:00 - 12:30 | III.2 Fatigue and Fracture <i>Sponsored by Bureau Veritas</i> | Ballroom I & II | <i>Neil Pegg</i> | <i>Henk Den Besten for Yordan Garbatov</i> | <i>Weicheng Cui</i> |
| | 12:30 - 14:00 | Lunch | | | | |
| | 14:00 - 15:30 | IV.1 Design Principles and Criteria <i>Sponsored by CCS</i> | Ballroom I & II | <i>Stefano Ferraris</i> | <i>Matthew Collette</i> | <i>Enrico Rizzuto</i> |
| | 15:30 - 16:00 | Break | | | | |
| | 16:00 - 17:30 | IV.2 Design Methods <i>Sponsored by Fincantieri</i> | Ballroom I & II | <i>Xiaozhi Wang</i> | <i>Andrea Ivaldi</i> | <i>Mario Dogliani</i> |
| | 19:00 - 22:00 | Congress Banquet | | | | |
| THURSDAY September 15 | 09:00 - 10:30 | V.5 Special Vessels <i>Sponsored by Vard Marine</i> | Ballroom I | <i>Stefano Ferraris</i> | <i>Darren Truelock</i> | <i>Jaye Falls</i> |
| | | V.6 Ocean Space Utilization <i>Sponsored by Lloyd's Register</i> | Ballroom II | <i>Feargal Brennan</i> | <i>Sebastian Schreier</i> | <i>Hideyuki Suzuki</i> |
| | 10:30 - 11:00 | Break | | | | |
| | 11:00 - 12:30 | V.7 Structural Longevity <i>Sponsored by CCS</i> | Ballroom I | <i>Henk Den Besten</i> | <i>Iraklis Lazakis</i> | <i>Timo De beer</i> |
| | | V.8 Subsea Technology <i>Sponsored by Lloyd's Register</i> | Ballroom II | <i>Murilo Vaz</i> | <i>Agnes Marie Horn</i> | <i>Segen Farid Estefen</i> |
| | 12:30 - 14:00 | Lunch | | | | |
| | 14:00 - 14:30 | VI.1 ISSC-ITTC Cooperation <i>Sponsored by ClassNK</i> | Ballroom I & II | <i>N/A</i> | <i>Carlos Guedes Soares</i> | <i>N/A</i> |
| | 14:30 - 15:00 | ISSC 2025 Committee Member Announcement | Ballroom I & II | | | |
| | 15:00 - 15:30 | ISSC 2025 Committee Meeting | Ballroom I & II | | | |
| | 15:30 - 16:00 | Break | | | | |
| | 16:00 - 17:30 | New SC+Corr meeting | Ballroom I | | | |
| ISSC 2025 Committee Meeting | | Ballroom II | | | | |

***Each session will include Committee Chair Report (30 min), Official Discusser Report (15 min), Committee Chair Response (15 min) and Q&A (30 min).*

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THANK YOU TO OUR EXHIBITORS AND SESSION SPONSORS

EXHIBITORS



CSSRC is one of the world's major ship research & design centers established in 1951. Today CSSRC have more than 1,800 employees including a team of high-level talents in scientific research. CSSRC has more than 30 large and medium-sized test facilities, mainly engaged in the fundamental research for application of hydrodynamics, structural mechanics, vibration, noise, and other relevant technical field of ship and marine engineering, as well as research, design and development of high-performance ships and underwater vehicles. CSSRC has also developed a series of ship industrial CAE software. CSSRC provide services for the customers all over the world.



DNV is the independent expert in risk management and assurance, operating in more than 100 countries. Through its broad experience and deep expertise DNV advances safety and sustainable performance, sets industry benchmarks, and inspires and invents solutions. Whether assessing a new ship design, optimizing the performance of a wind farm, analyzing sensor data from a gas pipeline or certifying a food company's supply chain, DNV enables its customers and their stakeholders to make critical decisions with confidence. Driven by its purpose, to safeguard life, property, and the environment, DNV helps tackle the challenges and global transformations facing its customers and the world today and is a trusted voice for many of the world's most successful and forward-thinking companies.



ROBERT ALLAN

Robert Allan Ltd.'s business is centred on the design of commercial working marine vessels of all types, with a particular focus on the international tugboat market. In addition, we design fireboats, research vessels, crewboats, barges, Government service vessels (such as icebreakers and nav-aids tenders), shallow-draft vessels of all types for inland transportation, and a diverse range of specialized craft for almost any purpose. The company also provides expertise in analyzing technical and financial aspects of a broad range of marine operations and marine systems design.

Robert Allan Ltd. is committed to providing the highest possible standards of independent professional marine design and engineering services to our valued clients, thereby creating innovative working vessels that embody efficiency, durability, and performance. We are devoted to making the vessels built to our designs as safe and efficient as possible for the crews that work on them, and for the people who own them.



Seaspan Shipyards is a leader in Canada's shipbuilding and ship repair industry. With one of the most modern shipyards in North America and a dedicated workforce of 2,800 in North Vancouver and Victoria, Seaspan is a proven and trusted partner for both government and the private sector.

Seaspan Shipyards is proud to be Canada's chosen non-combat shipbuilder under the National Shipbuilding Strategy. In this capacity, the company is building state-of-the-art ships in Canada for the Canadian Coast Guard and Royal Canadian Navy. Through its NSS-related work, Seaspan Shipyards is creating jobs, generating economic benefits, and rebuilding Canada's shipbuilding industry.

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SESSION SPONSORS

Session: V.4 Offshore Renewable Energy



ABS, a leading global provider of classification and technical advisory services to the marine and offshore industries, is committed to setting standards for safety and excellence in design, construction and operation. Focused on the safe and practical application of advanced technologies and digital solutions, ABS works with industry and clients to provide solutions that drive sustainability, optimize performance and increase operational efficiency for marine and offshore assets. From its world headquarters in Houston, ABS delivers survey, engineering and advisory services and solutions to clients through a network of local representatives.

Session: II.1 Quasi-Static Response



BMT provides independent technical expertise and consultancy. We offer design solutions, asset management, programme delivery and technology services to customers in the defence, security, transport, energy, and infrastructure markets. Our team tackle the most complex engineering and programme challenges, blending capabilities from the entire spectrum of engineering disciplines to deliver enduring and value-adding benefits. We can adopt agile practices to rapidly tailor solutions to meet customers' needs. With over thirty years of industry experience, and a long-term commitment to research and innovation, we solve the problems of today and shape the ideas of tomorrow.

Sessions: I.2 Loads and III.2 Fatigue and Fracture



Bureau Veritas is a world leader in laboratory testing, inspection, and certification services. Created in 1828, the Group has 75,000 employees located in more than 1,600 offices and laboratories around the globe. Bureau Veritas helps its clients improve their performance by offering services and innovative solutions in order to ensure that their assets, products, infrastructure and processes meet standards and regulations in terms of quality, health and safety, environmental protection and social responsibility.

Bureau Veritas Marine & Offshore is a world-leading classification society with more than 190 years of expertise. We provide support and in-depth knowledge to protect people, ships and offshore structures, going beyond the scope of individual projects to find new ways to anticipate and manage risk across the industry, promoting safety and health, and protecting the marine environment. We work with the industry to support innovation via new rules and tools.

Sessions: IV.1 - Design Principles and Criteria, V.1 - Accidental Limit States, V.2 - Experimental Methods, V.3 - Materials and Fabrication Technology, and V.7 - Structural Longevity



Founded in 1956, China Classification Society (CCS) is headquartered in Beijing and is a full member of the International Association of Classification Society (IACS). By committing to the mission of "safety, environmental protection and creating value for clients and society", CCS provides classification services to ships, offshore installations and related industrial products by furnishing world-leading technical rules and standards. CCS also provides statutory surveys, impartial and integral classification, verification, certification and accreditation and other services in accordance with international conventions, regulations and the related rules and regulations of the authorizing flag states or regions.

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Sessions: I.1 -Environment and VI.1 ISSC-ITTC Cooperation



Established in 1899, ClassNK(Nippon Kaiji Kyokai) is a classification society dedicated to safety and environmental protection through third-party certification with 1,700 staff and 130 offices. ClassNK has conducted diverse technical services including surveys and classifications of ships and marine structures based on its own rules, statutory certifications on behalf of more than 100 flag states, management system certifications in line with ISO and other industry standards. ClassNK has committed to provide the industry with its full support to pave the way for digitalization and decarbonization challenges through the expanding certification service and R&D with industry partners.

Session: II.2 - Dynamic Response



CSSRC is one of the world's major ship research & design centers established in 1951. today CSSRC have more than 1,800 employees including a team of high-level talents in scientific research. CSSRC has more than 30 large and medium-sized test facilities, mainly engaged in the fundamental research for application of hydrodynamics, structural mechanics, vibration, noise, and other relevant technical field of ship and marine engineering, as well as research, design and development of high-performance ships and underwater vehicles. CSSRC has also developed a series of ship industrial CAE software. CSSRC provide services for the customers all over the world.

Session: IV.2 - Design Methods



Fincantieri is one of the world's largest shipbuilding groups and number one for diversification and innovation. It is leader in cruise ship design and construction and a reference player in all high-tech shipbuilding industry sectors, from naval to offshore vessels, from high-complexity special vessels and ferries to mega yachts, as well as in ship repairs and conversions, production of systems and mechanical and electrical component equipment, cruise ship interiors solutions, electronic systems and software, infrastructures, and maritime constructions as well as after-sales services. With a supplier network that employs nearly 50,000 people in Italy alone, Fincantieri is the leading Western shipbuilder.

Sessions: V.6 Ocean Space Utilization and V.8 Subsea Technology



Lloyds Register was established more than 260 years ago as the world's first marine classification society to improve the safety of ships. Today we operate globally providing compliance, assurance and performance solutions to help keep the world moving safely, efficiently, and sustainably. We are wholly owned by the Lloyd's Register Foundation (LR Foundation), an independent global charity that supports research, innovation, and education to make the world a safer place.

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Session: III.1 - Ultimate Strength

The Department of the Navy's Office of Naval Research provides the science and technology necessary to maintain the Navy and Marine Corps' technological advantage. ONR, through its NRE commands, includes ONR Global and the Naval Research Laboratory sponsors work in 50 states, 55 countries, 634 universities/nonprofits, and 960 companies.



Session: V.5 - Special Vessels

Vard Marine is a consulting naval architecture and marine engineering company that has operating in North America for 39 years, with Canadian operations located in Vancouver and Ottawa, and American operations located in Houston, Texas. The company offers professional ship design, engineering, and shipbuilding technology services, and our vessel portfolio ranges from LNG fueled and bunkering vessels, renewable support, and offshore construction to patrol ships, icebreakers and ferries. More information on Vard Marine can be found at <https://vardmarine.com>.