

FINAL PROGRAM

CIMAC
CONGRESS 23

BUSAN, JUNE 12-16, 2023

Meeting the Future of Combustion Engines

30th CIMAC WORLD CONGRESS

Combustion Engine Technology for Ship Propulsion | Power Generation | Rail Traction





Denise Kurtulus
Vice President Global Marine
Passionate Hiker

HOW CAN SIGNIFICANT CO₂ REDUCTION BE ACHIEVED PROFITABLY?

The sustainable solutions we develop offer a variety of successful paths to net zero emissions.

Providing ever cleaner, safer and more competitive solutions is always on our mind – even when we're not at work.



Talk to Denise about our Greenhouse Gas Roadmap on [LinkedIn](#)



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Join us in Busan!

Usually every three years, the CIMAC World Congress and the accompanying exhibition is held in one of our member countries. But due to COVID-19, the congress had to be postponed from 2022 to 2023. It will now be held from June 12 to 16 in Busan.

The Congress is a unique opportunity to keep up to date with what is happening in the internal combustion engine industry and along the value chain, to talk to other professionals from all over the world, to stay in dialogue and to discuss the topics that interest us most or that are particularly pressing on our minds and to the industry.

South Korea will host the 30th edition of the Congress since the founding of the association back in 1951. This proud tradition proves how important and how indispensable this global meeting is. South Korea is hosting the CIMAC Congress for the first time. This choice has been wisely made. The country and its important shipbuilding industry have asserted themselves on the world market and have continuously occupied a leading position for a long time. We are very pleased to be hosted in Busan with its outstanding port: Its depth and low tidal differences have helped Busan become the largest container handling port in the country and the fifth largest in the world.

The 2023 Congress is taking place under special auspices. Our industry is facing enormous, perhaps historically unique challenges, so a holistic professional exchange along the value chain about the state of the art is imperative. A central focus of this year's Congress will lie on identifying the best and realistic ways for the industry to quickly reduce emissions, on addressing greenhouse gas emission targets, on the onset of digitalization in shipping, on developing alternative fuels, and on bringing more clarity to the discussion about future fuels in the industry - all in all challenges that require collaboration within the industry and beyond more than ever before. We look forward to your contribution and to seeing you at the 2023 CIMAC Congress in Busan, where the Congress will provide a perfect opportunity to meet manufacturers, component suppliers, shipyards, research professionals, contractors, customers, and colleagues from across the industry around the world.

Presentations, flanked by the exhibition, poster sessions and the traditional technical tour, will highlight the latest product and technology developments and the value they bring to customers. Strong focus will lie on scientific research that will form the basis for the next generation of technology solutions, and the needs of markets to ensure a sustainable, environmentally friendly and economically viable future will be addressed. In addition, the Congress with its outstanding program including new formats such as pecha kucha presentations will provide a unique opportunity to do business and build lasting networks. Panel discussions and keynote presentations will challenge us to broaden our perspectives.

Once again – Welcome!



Marko Dekena
Vice-President Technical Program



Jonas Åkerman
Vice-President Technical Program

Welcome to Busan!

We are looking forward welcoming you to Busan, and we hope you will enjoy this wonderful city. Korea is an extremely modern country, but at the same time committed to its traditions. This is particularly evident in Busan, the country's second largest city.

The combination of old and new can be found here at every turn. Outstanding meeting facilities such as the BEXCO Convention Center, where the CIMAC Congress will be held, are just minutes from sandy beaches and historic mountain trails. Huge temple complexes that have endured for millennia are located amidst some of Asia's tallest residential skyscrapers. The city's natural features and rich history have enabled Busan to develop into a first-rate tourist city and established it as a hotspot for international conventions. Add to this the pleasant climate: Busan has four distinct seasons, but it is never too hot nor too cold.

We promise, there is a lot to see and do in Busan - be sure to check out the optional tours in the program and take advantage of what the city has to offer.

On behalf of the National Member Association of Korea – KOFCE (Korea Federation of Combustion Engines), we hope you enjoy your visit to Busan!

Kwang Heon An
Congress President

Ji Hyoub Cha
NMA Korea Secretary General

Welcome to the CIMAC Congress 2023 Together for a Common Future!

The International Council on Combustion Engines-CIMAC-cordially invites you to the 30th CIMAC Congress from 12 to 16 June 2023 in Busan, Korea.

The internal combustion engine has promoted industrial development and brought great convenience to people's life since its invention. Large combustion engines are essential to the global economy, particularly in maritime transportation, the energy and the rail sector. The years since the last CIMAC Congress have been very extraordinary and demanding. Our industry and our community have weathered this ordeal.

Today's CIMAC is a vigorous and attractive organization, it has become the leading global association of our industry. CIMAC provides a global platform for discussion through a range of events, while the CIMAC Congress is one of the most important international events. 72 years ago, when the first CIMAC Congress took place in Paris in 1951, industry pioneers came together with professionals from institutes and universities, to generate new ideas and discuss the future development of combustion engines. This tradition has been kept throughout the last seven decades. This year, the CIMAC Congress once again brings together the large engine industry's stakeholders. The leading experts from all over the world are actively participating in our congress and adding their new knowledge and contributions to our broad field.

Our call for papers met with a gratifyingly broad response. We received more than 500 proposals for abstracts competing for over 250 presentations at the CIMAC Congress. Social events and technical tours will further support the excellent networking possibilities in Busan. More than 800 experts from all parts of the world came to Vancouver in 2019. We are confident we will welcome a similarly high number of participants in Busan.

Today is a time of grave challenges, but also a time of great hope. I believe that the CIMAC Congress 2023 will be a grand gathering where we can see the competition of ideas, enlightenment of wisdom, building of consensus and facilitation of development, and will surely lead the development of global ICE technology and industry towards a new direction.

CIMAC sincerely invites you to the 30th CIMAC Congress and we are looking forward to meeting you in Busan.



Donghan Jin
President of CIMAC



Since 1943, NICO Precision Co., Inc. ("NIP") has been designing and manufacturing Fuel Injection Equipment ("FIE") of 4-stroke diesel engines for marine and land-based power generator, and supplying them for various major engine manufacturers in Japan and overseas.

Our continuous challenge for high-precision machining has led to our current superiority in performance, quality, and durability, which in turn has led to a high reputation among our customers.

Specializing in fuel injection system components, NIP will continue to provide products with higher precision and reliability, as well as new electronically controlled fuel injection systems and pursue services throughout their life cycle.

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For much better the world**

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CONGRESS OVERVIEW

Day	Time	Activities
Sunday June 11, 2023	14:00 – 18:00	Congress Information Desk
	14:00 – 18:00	Speakers' Preparation (Room 106)
Monday June 12, 2023	10:00 – 11:30	Opening Ceremony (Auditorium)
	10:00 – 17:40	Exhibition & Poster Sessions
	12:00 – 18:00	Speakers' Preparation (Room 106)
	12:40 – 13:40	Lunch
	13:40 – 15:00	Technical Sessions
	15:10 – 15:40	Poster presentation by the author
	15:00 – 16:00	Coffee Break
	16:00 – 17:40	Technical Sessions
	18:30	Welcome Reception at Paradise Hotel Busan
	Tuesday June 13, 2023	08:00 – 18:00
09:00 – 17:40		Exhibition & Poster Sessions
09:00 – 10:40		Technical Sessions
10:40 – 11:20		Coffee Break
11:20 – 12:40		Technical Sessions
11:20 – 12:40		Pecha Kucha Presentations
12:40 – 13:40		Lunch
13:40 – 15:00		Technical Sessions
13:40 – 15:00		PANEL Digitalization
15:10 – 15:40		Poster presentation by the author
15:00 – 16:00		Coffee Break
16:00 – 17:40		Technical Sessions
18:30		Accelleron Evening
Wednesday June 14, 2023		08:00 – 18:00
	09:00 – 17:40	Exhibition & Poster Sessions
	09:00 – 10:40	Technical Sessions
	10:40 – 11:20	Coffee Break
	11:20 – 12:40	Technical Sessions
	11:20 – 12:40	Pecha Kucha Presentations
	12:40 – 13:40	Lunch
	13:40 – 15:00	PANEL Defossilization COLLIN TRUST Keynote
	15:00 – 16:00	Coffee Break
	16:00 – 17:40	Technical Sessions
Thursday June 15, 2023	08:00 – 16:00	Speakers' Preparation (Room 106)
	09:00 – 17:40	Exhibition & Poster Sessions
	09:00 – 10:40	Technical Sessions
	10:40 – 11:20	Coffee Break
	11:20 – 12:40	Technical Sessions
	12:40 – 13:40	Lunch
	13:40 – 15:20	Technical Sessions
	15:30 – 16:00	Poster presentation by the author
	15:20 – 16:00	Coffee Break
	16:00 – 17:00	FINAL PANEL
Friday June 16, 2023	07:30 – 13:30	Technical Tours (Half day)

Optional Tours
June 12 - 15, 2023

Posters are on display all day, the author's presentation time is shown in the program.
Note: Congress Information Desk will be open from Monday to Thursday from 08:00 - 18:00.

TOPICS AND SESSIONS

- Digitalization and Connectivity**
 - Leveraging Vessel Connectivity
 - Process Optimization and Predictive Maintenance
- System Integration and Hybridization**
 - Ship Hybrid Propulsion
 - Hybrid System Engineering
- Electrification and Fuel Cells Development**
 - Marine Fuel Cell Applications
- Controls, Automation, Measurement & Monitoring**
 - Controls and Sensing
 - Monitoring and Fault Diagnostics
- Emission Reduction Technologies - Exhaust Gas Aftertreatment Solutions**
 - Scrubbers
 - Particle Filtration
 - SCR Technology
 - GHG Reduction (ammonia combustion & slip reduction)
- Emission Reduction Technologies - Engine Measures & Combustion Development**
 - GHG Reduction (H2 combustion & transition outlook)
 - PM/BC Reduction
 - Engine Measures
- Fuels - Conventional Fuels**
 - Test methodologies to predict fuel performance
 - Fuel development
- Fuels - Alternative & New Fuels**
 - Development aspects for using ammonia/methanol as a fuel
 - Future Fuel systems aspects
 - Biofuels / Future Fuels storage, supply and handling
- Lubricants**
 - Zero-carbon Fuel Lubricants
 - Gas Engine Lubricants
- New Engine Developments – Diesel**
 - 2-Stroke Engines
 - 4-Stroke Diesel Engines (1)
 - 4-Stroke Diesel Engines (2)
- New Engine Developments - Gas**
 - New Gas Engine Development
 - New Gas Engine Technology
- New Engine Developments - Dual Fuel**
 - dual fuel engines
- New Engine Developments - Alternative Fuels & other New Engine Concepts**
 - Methanol Engine Technology
 - Hydrogen and Ammonia Engine Technology
 - Alternative Fuel Concepts & Platforms
- Engine Component Developments - Fuel Injection & Gas Admission**
 - "LIQUID" or Conventional Diesel
 - "GAS" or Alternative/New Fuels
- Engine Component Developments – Components**
 - Advanced Component Integration
 - Auxiliary Equipment Systems
- Engine Component Developments - Tribology**
 - Bearings
 - Piston, Rings & Liner
- Engine Component Developments - Turbochargers & Air/Exhaust Management**
 - Next Generation Turbochargers & Intake Systems
 - Air-/Exhaust Management for Alternative Fuels
- Basic Research & Advanced Engineering - New Concepts**
 - Basic Research & Advanced Engineering - New Concepts
- Basic Research & Advanced Engineering - Simulation Technologies**
 - Engine Thermodynamics 1
 - Engine Thermodynamics 2
- Basic Research & Advanced Engineering - Mechanics, Materials Research**
 - Mechanics and Materials
- Basic Research & Advanced Engineering - Visualizations**
 - Future Fuel Spray and Combustion
 - Engine System Thermodynamics & Visualization

Monday - June 12, 2023

13:40 – 15:00

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>21 Basic Research & Advanced Engineering - Visualizations</p> <p>21-4 Future Fuel Spray and Combustion</p> <p>Chair: Long Liu (Harbin Engineering University)</p> <p>362 Characterization of future fuels using an optically accessible rapid compression machine Gerhard Pirker, LEC GmbH</p> <p>416 Optical experiments on ammonia combustion in spark-ignition engines with enhanced turbulence Jiaying Pan, Tianjin University</p> <p>620 Investigation of Post-injections for Emission Reduction of Diesel-piloted Ammonia Spray Combustion Valentin Scharl, Technical University of Munich, Chair of Thermodynamics</p> <p>501 Investigation of the Spray Characteristics under Conditions of Marine Diesel Engine using Image Processing Technique chen an, harbin engineering university</p>	<p>5 Emission Reduction Technologies - Exhaust Gas Aftertreatment Solutions</p> <p>5-1 Scrubbers & CCS</p> <p>Chair: Kati Lehtoranta (VTT Technical)</p> <p>463 Investigations on combined scrubbing & particle filtration technologies for maritime applications Uwe Etzien, University of Rostock - Chair of Piston Machines and Internal Combustion Engines</p> <p>182 Effects of Membrane filtration on the emission load of EGCS water from various fuels Dennis Fischer, BOLL & KIRCH Filterbau GmbH</p> <p>545 The bench test research of Hige-based Marine exhaust gas cleaning system Haoran Yang, Shanghai Marine Diesel Engine Research Institution</p> <p>379 Experimental study on the performance of an impinging scrubber Wenbo Zhang, China Shipbuilding Power Engineering Institute Co., Ltd</p>	<p>2 System Integration & Hybridization</p> <p>2-1 Ship Hybrid Propulsion</p> <p>Chair: Hinrich Mohr (GasKraft Engineering)</p> <p>651 Optimization of Complex Energy Systems as an Enabler for Sustainable Shipping Solutions Bernhard Thaler, Large Engines Competence Center Graz</p> <p>419 EEDI Amendments using Ship Operational Profile in order to avoid Too Low Engine Reserve Power Congbiao Sui, Harbin Engineering University</p> <p>090 Z-PELLER electrification and optimization for decarbonization Yota Harada, IHI POWER SYSTEMS Co., Ltd.</p> <p>328 Development of a Free-Running Model Test Methodology for Evaluation of a Full-Scale Ship Propulsion OLEKSIY BONDARENKO, National Maritime Research Institute of Japan</p>	<p>11 New Engine Developments - Gas</p> <p>11-1 New Gas Engine Development</p> <p>Chair: Stephan Laiminger (Innio Jenbacher)</p> <p>017 Further NOx-thermal efficiency trade-off improvement with lean pre-chamber Yoshinori Kaji, DAIHATSU DIESEL MFG.CO.,LTD.</p> <p>091 Development of a low-speed four-stroke gas engine Satoru Higashikawa, The Hanshin Diesel Works, Ltd.</p> <p>415 Development of the next Generation Gas Engine with Increased Efficiency and Reduced Emissions Francisco Lopez Gutierrez, Innio Jenbacher GmbH</p> <p>448 Guascor Energy's new E-Series lean-burn gas engine – First field experiences Iñaki Iruretagoyena, Guascor Energy</p>

15:00 - 16:00 Coffee Break

Monday - June 12, 2023

16:00 – 17:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>8 Fuels - Alternative & New Fuels</p> <p>8-3 Biofuels / Future Fuels storage, supply and handling</p> <p>Chair: German Weisser (Winterthur Gas & Diesel)</p> <p>562 Impact of alternative fuels on ship design - A shipbuilders perspective Erik-Jan Boonen, DAMEN</p> <p>390 Filtration Technologies for Future Fuels Joern Grotepass, Boll & Kirch Filterbau GmbH</p> <p>133 All you need to know about Biodiesel Fuel oil blends (VLSFOs) quality as a marine fuel Sara Rezaee, Viswa Group</p> <p>373 Comparison of exhaust gas emissions of a marine engine burning different blends of bio-VLSFO Barbara Heyberger, CMA Ships</p>	<p>5 Emission Reduction Technologies - Exhaust Gas Aftertreatment Solutions</p> <p>5-3 SCR Technology</p> <p>Chair: Daniel Peitz (HUG Engineering)</p> <p>243 Development and Application of an Intelligent SCR System combining Engine and SCR Control Panagiotis Kyrtatos, Vir2sense GmbH</p> <p>380 A study on deterioration mechanism of SCR catalyst during bypass operation for marine diesel engine KEN KAWABE, YANMAR HOLDINGS CO., LTD.</p> <p>430 IACCSEA – Learning lessons from IMO III Ilkka Saarinen, International Association for Catalytic Control of Ship Emissions to Air (IACCSEA)</p> <p>Impuls Discussion Learning lessons from IMO III</p>	<p>18 Basic Research & Advanced Engineering - New Concepts</p> <p>18-1 New Concepts</p> <p>Chair: Bert Buchholz (University of Rostock, LKV)</p> <p>103 Progress and prospect of combustion studies on low- and zero-carbon fuels Koji Takasaki, Kyushu University & National Maritime Research Institute, Japan</p> <p>012 Evaluation of a virtual medium-speed engine on methanol using spark-ignition Yi-Hao Pu, Ghent University</p> <p>396 Initial investigations into ammonia combustion at conditions relevant for marine engines Kai Herrmann, University of Applied Sciences and Arts Northwestern Switzerland (FHNW)</p> <p>673 Simulation of High Pressure Diesel Pilot-Initiated Ammonia Combustion in Two-Stroke Marine Engine Nathan Peters, MAHLE Powertrain</p>	<p>11 New Engine Developments - Gas</p> <p>11-2 New Gas Engine Technology</p> <p>Chair: Patrick Frigge (FPE GmbH)</p> <p>082 Influence of blend ratio on turbocharging & combustion in HS gas eng. applications with CH4/H2 blend Raphael Ryser, Accelleron, Turbo Systems Switzerland Ltd</p> <p>114 Combustion Process Optimization for Wood Gas Engine of a Biomass Power Plant Jure Galović, Institute of Powertrains and Automotive Technology, Vienna University of Technology</p> <p>573 Consideration of Combustion Improvements of Lean-burn Gas Engine with Pre-combustion Chamber Elsayed Abdelhameed, Kyushu University</p> <p>Impuls Discussion Hydrogen - the fuel for all future gas engines?</p>

18:30 Welcome Reception at Paradise Hotel Busan

Monday - June 12, 2023

15:10 – 15:40

Poster exhibition

25	Poster presentation by the author	003 Research of a China II-compliant marine diesel engine using two-stage turbocharging and EGR system Xiannan Li, Shanghai Marine Diesel Engine Reserch Institute
		011 The corrosion behavior of steels in contact with metal doped biodiesel-diesel blends Carolyn Nuortila, University of Vaasa
		026 Miller cycle combined with EGR on the transient response performance of turbocharged diesel engine Zhilong Hu, Shanghai Marine Equipment Research Institute
		150 True Worth Index represents the real price of the fuels purchased Ganesh Natarajan, The Viswa Group
		168 Study on Cavitation Characteristics of Common Rail Injector Control Valve Hanwen Zhang, Harbin Engineering University
		194 Analysis of gaseous emission and SFOC characteristic with SAC coolant temp. for two-stroke engine Sanghoon Kim, Korean Register
		197 Effects of in-cylinder flow on natural gas mixing and combustion process in a dual-fuel engine Menghao Ma, Tianjin University
		209 Modern sensor signals in networks Andreas Buchholz, Dr. E. Horn. GmbH & Co. KG
		211 Influence of resonant intake system on cylinder consistency of marine high turbocharged diesel engine yang shuqiao, 711 Research Institute of China Shipbuilding Corporation
		225 Collaborative optimization of EGR and Miller cycle of two-stage turbocharged marine diesel engine Ziqiang Chen, Shanghai Jiao Tong University
		276 The Influence of Dual Electric Turbo Compound System on the Performance of Marine Diesel Engine Rui Liu, Shanghai Jiao Tong University, Shanghai Marine Diesel Engine Research Institute
		301 High-power power electronic converter for Electrification of ship power system Xuan Yang, Shanghai Marine Diesel Engine Research Institute
		654 Development of High Performance Stationary GEO and Establishing Its Long Drain Capability YOGESH KUMAR SHARMA, Indian Oil Corporation Ltd
369 Reduction of CO2 emissions in shipping through use of drop-in fuel components from bio-based waste Fanny Langschwager, Rostock University		

Posters are on display all day, the author's presentation time is shown in the program.

Tuesday - June 13, 2023

09:00 – 10:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
13 New Engine Developments - Alternative Fuels & Other New Engine Concepts	5 Emission Reduction Technologies - Exhaust Gas Aftertreatment Solutions	1 Digitalization & Connectivity	12 New Engine Developments - Dual Fuel
13-2 New concepts hydrogen and ammonia engine technology Chair: Daniel Chatterjee (Rolls-Royce Power Systems)	5-2 Particle filtration Chair: Chair: Stefano Ghetti (FEV)	1-1 Leveraging Vessel Connectivity Chair: Eero Lehtovaara (ABB Marine and Ports)	12-1 dual fuel engines Chair: Dominik Schneider (Winterthur Gas & Diesel)
203 ABC completes the upgrade of its DZ-engines into hydrogen dual fuel and spark ignition Luc Mattheeuws, Anglo Belgian Corporation NV	549 DPF+SCR ultra low emission solution for medium speed diesel engines Daniel Peitz, HUG Engineering	548 The Path towards Autonomous Shipping from the Perspective of the Propulsion System Markus Wenig, Winterthur Gas & Diesel Ltd.	146 MAN ES 49/60DF - Maximum performance from the modular system Ingo Wilke, MAN Energy Solutions
231 Safe and efficient engine operation with Ammonia Kaj Portin, Wärtsilä	637 Simulation based layout of a highly efficient aftertreatment system for a large diesel engine Thomas Kammerdiener, AVL List GmbH	148 Implementing Fleet Digitalization: Systems, applications and lessons learned. Nikolaos Kyrtatos, Propulsion Analytics	292 Development of Marine Dual Fuel Engine (EY26DF) Nobuyuki Higa, YANMAR POWER TECHNOLOGY CO., LTD.
606 Widening the operation limits of a SI engine running on neat ammonia Mads Carsten Jespersen, Technical University of Denmark	555 Reducing particle emissions from marine engines – fuel choices and technology pathways Kati Lehtoranta, VTT Technical Research Centre of Finland	570 WiDE – an example on how digitalization creates value for ship operators René Baart, Winterthur Gas & Diesel	100 Significant performance improvements by using a low-pressure EGR system for the new X-DF2.0 Fridolin Unfug, Winterthur Gas & Diesel
667 Decarbonization of high-power systems: ammonia-hydrogen and ammonia-diesel combustion in HS engines Nicole Wermuth, LEC GmbH	577 Emissions Prediction and Control of Marine Diesel Engine Based on Real-Time Combustion Analysis Ziqiang Chen, Shanghai Jiao Tong University	647 Technological challenges and solutions for the 2030/2050 Chemical Parcel Tanker Jose Gonzalez, Stolt Tankers	187 Service experience on dual fuel MAN B&W two-stroke engines in relation to cylinder condition Jesper Mark Pedersen, MAN Energy Solutions
589 Developing the MAN B&W dual fuel ammonia engine Kar Mun Pang, MAN Energy Solutions	Impuls Discussion Black Carbon IMO Update	527 MAN-ES Automation Features on Demand Casper Olesen, MAN Energy Solutions	514 WinGD X92DF engine service experience Konrad Räss, Winterthur Gas & Diesel

10:40 - 11:20

Coffee Break

Tuesday - June 13, 2023

11:20 – 12:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>8 Fuels - Alternative & New Fuels</p> <p>8-2 Future Fuel systems aspects</p> <p>Chair: Dirk Bergmann (Accelleron, Turbo Systems Switzerland Ltd.)</p> <p>412 Power-to-X - From Decentralized e-Fuel Production to the Defossilization of High-Power Applications Daniel Chatterjee, Rolls-Royce Power Systems</p> <p>019 A comprehensive hydrogen value chain for a sustainable energy transition Florian Gruschwitz, MAN Energy Solutions</p> <p>411 The role of gas engines in a future energy market with sustainable fuels Stephan Laiminger, Innio Jenbacher</p> <p>348 Preparing for future demands - the CSSC Global 2-stroke Test Center Sebastian Hensel, Winterthur Gas & Diesel</p>	<p>6 Emission Reduction Technologies - Engine Measures & Combustion Development</p> <p>6-2 PM/BC Reduction</p> <p>Chair: Masayoshi Kawakami (JICEF)</p> <p>124 Development of Black Carbon Zero System for Marine Diesel Engines Minoru Tsuda, National Fisheries University</p> <p>002 Cooled Spray combustion for particulate matter reduction in a large-bore single-cylinder engine Adam Klingbeil, Wabtec Corporation</p> <p>310 Influence of post-injection strategy on physiochemical characteristics of diesel particulate matter Xu Lyu, Tianjin University</p> <p>073 Renewable diesel fuel effects on a Tier 3 GE ES44C4 locomotive Christopher Stoos, Southwest Research Institute</p>	<p>2 System Integration & Hybridization</p> <p>2-2 Hybrid System Engineering</p> <p>Chair: Elias Boletis (Wärtsilä)</p> <p>229 "H-Flex-E" -First industrial scale green hydrogen production, storage and energy reversion system Kenneth Widell, Wärtsilä</p> <p>308 Modeling of wind/PV hybrid generation system with LH2-superconducting magnetic energy storage Fan Zhang, Tianjin University</p> <p>413 Investigation on Matching Design and Strategy Optimization of Ship Hybrid Power System Zunhua Zhang, Wuhan University of Technology</p> <p>293 Research on energy management strategy and simulation of hybrid power system for ocean-going ships Rongpei Zhang, China Shipbuilding Power Engineering Institute Co., Ltd.</p>	<p>24 Pecha Kucha Session</p> <p>Moderator: CIMAC</p> <p>PECHA KUCHA The detailed program for the 8 pecha kucha presentations in this session can be seen on page 14.</p>

12:40 – 13:40 Lunch

Tuesday - June 13, 2023

11:20 – 12:40

Robert Bosch (R201-202)
<p>24 Pecha Kucha Session</p> <p>032 Electronic pressure regulator (EPR) for smart crankcase ventilation systems Niclas Nowak, UT99 AG</p> <p>033 Establishing a future-proof automation system architecture for modern maritime industrie Juergen Ammer, MAN Energy Solutions</p> <p>048 A new look on the maritime propulsion roadmap – Exploring co-development with the off-road sector Magnus Hellström, Åbo Akademi University</p> <p>622 Research on abnormal injection fault diagnosis technology of high-pressure common rail fuel system Yilin Liu, Harbin Engineering University</p> <p>644 The development of novel measurement techniques as enablers for cleaner and more robust engines Bernhard Rossegger, LEC GmbH</p> <p>081 Real-time gas quality analyzer for advanced gas engine control enabling performance optimization Alexander Levchenko, HEINZMANN GmbH & Co. KG</p> <p>640 Efficient vibration analysis of IC engine-based small- and medium-size marine propulsion systems Tigran Parikyan, AVL List GmbH</p> <p>679 Integration of energy saving technologies on merchant vessels Elias Boletis, Enarete Marine & Bound for Blue</p> <p>039 Investigation of bio-fuel on engine performance, emissions and durability of the HiMSEN diesel engine Jinyoung Ko, Hyundai Heavy Industries</p>

Tuesday - June 13, 2023

13:40 – 15:00

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
0 PANEL - DIGITALIZATION	9 Lubricants	7 Fuels - Conventional Fuels	
	9-2 Gas engine lubricants	7-2 fuel development	
	Chair: Marinus Hoogerbrugge (AVL List GmbH)	Chair: Kjeld Aabo (MAN Energy Solutions)	
PANEL Ship as a data eco system CIMAC Strategy Group Digitalization	094 Effects of engine operating parameters on natural gas engine oil life Fred Girshick, Infineum USA, L.P.	290 Microfine Carbon blends as fuel for Marine engines rumman ahmed, Arq ltd	
Panelists perspectives: Engine Manufacturers Suppliers Ship Owner/Operators Classification Societies Seafarers	286 Dual fuel engine oil solutions to help enable a lower carbon future john palazzotto, Chevron Oronite	635 Development of a Surrogate Fuel Model for HFO under Marine Engine-relevant Conditions Xiong Qian, Harbin Engineering University	
	497 LNG, mature solution as a Marine fuel: new generation of lubricants for current and future needs Valerie DOYEN, TotalEnergies	653 The influence of Fuel Type and Loads on Particulate Emissions from Marine Diesel Engine ang sun, Harbin Engineering University	
	668 A New Generation of High-Performing Cylinder Oils for 2-stroke Diesel and Dual Fuel Engines Luis Garcia, Shell Global Solutions (Deutschland) GmbH	CIMAC WG 7 WG7-Positioning on the alternative fuels replacing conventional fossil fuels	

15:00 - 16:00 Coffee Break

Tuesday - June 13, 2023

15:10 – 15:40

Poster exhibition	
25 Poster presentation by the author	
611	Research of a China II-compliant marine diesel engine using two-stage turbocharging and EGR system Xiannan Li, Shanghai Marine Diesel Engine Reserch Institute
645	The corrosion behavior of steels in contact with metal doped biodiesel-diesel blends Katriina Sirviö, University of Vaasa
675	Computational analysis of cylinder liner spray lubrication in large two-stroke marine diesel engines Bjørn Christian Dueholm, Aalborg University
170	True Worth Index represents the real price of the fuels purchased Ganesh Natarajan, The Viswa Group
024	Performance and energy flow of a high power density hybrid engine under different Miller timings Peng Wang, Shanghai Jiao Tong University
324	Tribology in engine parts design considering the characteristics of operating regime Hyang Lee, Hyundai Heavy Industries
355	The retrofit investigation of medium-speed marine engine using methanol as primary fue Lijun Guo, Shanghai Marine Diesel Engine Research Institute
449	Experimental observation of the combustion characteristics of methanol/air by turbulent jet ignition Lijia Zhong, Tianjin university
473	Design and Validation of Methanol fuel Injection System for the 6CS21 middle-speed Marine Engine Xiaoli Yang, CSSC(Chongqing) Southwest Equipment Research Institute Co., Ltd.
494	A study on the vibration transmission of lubricated crosshead pairs in high-duty diesel engines Shuo Liu, Shanghai Jiao Tong University
559	An Advanced Method for Estimating the Impacts of 'Scrubber' Effluent Discharge Dayang Wang, Exponent, Inc.
564	Lubricant impacts on piston deposit formation in the Enterprise marine diesel research engine Brian Kaul, Oak Ridge National Laboratory
580	Design and experimental study of intelligent cooling system of highly intensified marine diesel engine Bo Zhang, Naval University of Engineering
604	Study on NOx Prediction Model for Diesel Engine Control Based on Combustion Characteristic Parameter Jiancun Hu, Shanghai Jiao Tong University, Shanghai Marine Diesel Engine Research Institute, National Engineering Research Center of Special Equipment and Power System for Ship and Marine Engineering

Posters are on display all day, the author's presentation time is shown in the program.

Tuesday - June 13, 2023

16:00 – 17:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>13 New Engine Developments - Alternative Fuels & Other New Engine Concepts</p> <p>13-1 New concepts methanol engine technology</p> <p>Chair: Matthias Auer (MAN Energy Solutions)</p> <p>340 Experimental Study on the Conversion of Marine Diesel Engine to Methanol Engine Fuel</p> <p>Yuqi Jiang, Shanghai Marine Diesel Engine Research Institute / China Ship Research and Development Academy</p> <p>535 The development and certification of a single fuel high speed marine CI engine on methanol</p> <p>Magnus Svensson, Lund University</p> <p>438 Methanol combustion concept alternatives for new build and retrofit of 4-stroke medium speed engines</p> <p>Juho Repo, Wärtsilä</p> <p>523 MAN B&W two-stroke methanol-powered engines for small and large container vessels in the A.P Moller Maersk fleet – experience and new development</p> <p>Kjeld Aabo, MAN Energy Solutions.</p> <p>655 Development of carbon-neutral fuel engine: HiMSEN methanol engine</p> <p>YONGSEOK LEE, Hyundai Heavy Industries</p>	<p>6 Emission Reduction Technologies - Engine Measures & Combustion Development</p> <p>6-3 Engine Measures</p> <p>Chair: Chair: Dieter van der Put (FEV)</p> <p>018 Analysis and optimization of the combustion process of DF engines using highly fluctuating gas qualities</p> <p>Karsten Schlee, University of Rostock</p> <p>062 Additive technology - Enabling smooth engine operation of fuel / water mixes to reduce NOx emissions</p> <p>Marcel Harhausen, BASF SE</p> <p>433 Methane emission reduction technologies for medium-speed dual-fuel engines</p> <p>Hyunchun Park, HD Hyundai Heavy Industries</p> <p>270 Wärtsilä ultra-low emission gas engine technology</p> <p>Diego Delneri, Wärtsilä</p> <p>183 EEXI – Best practices for compliance</p> <p>Fabian Kock, DNV</p>	<p>1 Digitalization & Connectivity</p> <p>1-2 Process Optimization and Predictive Maintenance</p> <p>Chair: Eero Lehtovaara (ABB Marine and Ports)</p> <p>069 Enhancement of large engine technology through machine learning</p> <p>Constantin Kiesling, LEC GmbH</p> <p>138 Towards the digital engine: benefits and integration of the OMT Intelligent Injection System</p> <p>Marco Coppo, OMT SpA</p> <p>600 Adaptive Operating Condition Fault Diagnosis of Marine Diesel Engine based on Transfer Learning</p> <p>Jia Hu, Wuhan university of technology</p> <p>283 An analysis of Marine Cybersecurity Standards and the Secure Development Lifecycle</p> <p>Christopher Sundberg, Woodward, Inc.</p> <p>CIMAC Whitepaper On Enabling the Implementation of a Ship-wide Data Ecosystem</p>	<p>16 Engine Component Developments - Tribology</p> <p>16-2 Piston, Rings & Liner</p> <p>Chair: Alexander Leitner-Audouin (Innio Jenbacher GmbH)</p> <p>215 Novel Findings on Oil Transport Pathways Leading to the Lube Oil Ignition in Industrial Gas Engines</p> <p>Philipp Köser, Rolls-Royce Power Systems</p> <p>264 Simulation and Experimental Verification of Tribological Property Evaluation in Journal Bearing</p> <p>Sicong Sun, Wuhan University of Technology</p> <p>316 Simulation Analysis and Test Verification of Piston Ring Tension Distribution</p> <p>Xuan Ma, Harbin Engineering University</p> <p>265 Dynamic and tribological characteristics of piston assembly linked by piston secondary motion</p> <p>Yongqiang Wang, Harbin Engineering University</p> <p>185 Analytical Study on Involvement of Temperature in Friction and Scuffing of Sliding Surface in Engine</p> <p>Mitsuhiro Soejima, Kyushu Sangyo University</p>

18:30 Accelleron Evening

Wednesday - June 14, 2023

09:00 – 10:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>17 Engine Component Developments - Turbochargers & Air/ Exhaust Management</p> <p>17-1 Next generation Turbochargers & intake systems</p> <p>Chair: Dino Imhof (Accelleron, Turbo Systems Switzerland Ltd.)</p> <p>057 Next generation axial turbocharger fit for a carbon-neutral world</p> <p>Alexander Mutter, Accelleron, Turbo Systems Switzerland Ltd.</p> <p>043 Development of a high flow (TCF) and a high pressure (TCP) radial turbocharger series</p> <p>Manuel Stork, MAN Energy Solutions</p> <p>047 A new versatile TC platform for modern HS diesel engines – From product concept to validation</p> <p>Michael Gisiger, Accelleron, Turbo Systems Switzerland Ltd.</p> <p>042 High Cycle Fatigue – Advanced development and design methods for increased robustness</p> <p>Sebastian Spengler, MAN Energy Solutions</p> <p>531 Large Engine Electro-Hydraulic Lost-Motion Intake VVA System</p> <p>John Schwoerer, Cummins Engine Components - Valvetrain Technologies</p>	<p>10 New Engine Developments - Diesel</p> <p>10-3 4 Stroke diesel engines 1</p> <p>Chair: Michael Sturm (Caterpillar Motoren GmbH & Co. KG)</p> <p>038 Performance prediction and optimization methodology based on a meta-model of HiMSEN engines</p> <p>Jongwoo Park, Hyundai Heavy Industries</p> <p>145 MAN ES 175D - The most efficient and most powerful marine high-speed engine in the world</p> <p>Ingo Wilke, MAN Energy Solutions</p> <p>162 The new CSPI high speed H175 engine series for marine applications</p> <p>Teng Liu, China Shipbuilding Power Engineering Institute Co., Ltd</p> <p>060 GHG emissions reductions for North American railroads</p> <p>Steven Fritz, Southwest Research Institute</p>	<p>13 New Engine Developments - Alternative Fuels & Other New Engine Concepts</p> <p>13.3 New concepts alternative fuels and platforms</p> <p>Chair: Christoph Kendlbacher (Robert Bosch Powertrain Solutions,</p> <p>049 MAN Energy Solutions – Four-stroke engine solutions for low-carbon and carbon-free fuels</p> <p>Matthias Auer, MAN Energy Solutions</p> <p>144 Argon Power Cycle (APC) – The way to zero emission ICES</p> <p>Lukas Kniestedt, WTZ Roßlau gGmbH</p> <p>181 Defossilized Fuels for Future Non-Road Cargo Transport</p> <p>Maximilian Bierl, FEV</p> <p>080 Turbocharging of large engines in decarbonization scenarios: impact for the most likely fuels</p> <p>Raphael Ryser, Accelleron, Turbo Systems Switzerland Ltd</p> <p>105 Assessment of combustion concepts and operational limits of net-zero carbon fuels</p> <p>Harald Schlick, AVL List GmbH</p>	<p>19 Basic Research & Advanced Engineering - Simulation Technologies</p> <p>19-1 Engine Thermodynamics 1</p> <p>Chair: Ioannis Vlaskos (Winterthur Gas & Diesel)</p> <p>028 Empirical model of uniflow scavenging for a long-stroke marine low-speed diesel engine</p> <p>Junwei Li, Shanghai Jiao Tong University</p> <p>363 0D modeling of ignition and combustion processes for H2/CH4 blends in open chamber gas engines</p> <p>Thomas Oppl, LEC GmbH</p> <p>426 Numerical Study of NH3-Diesel Combustion in a Retrofit for Marine Engines using Detailed Kinetics</p> <p>Till Mante, University of Rostock (Chair of Piston Machines and Internal Combustion Engines)</p> <p>575 Simulation Analysis of Oscillation Cooling of Oil-cooled Piston in Highly Intensified Diesel Engine</p> <p>Ziying Fan, Harbin Engineering University</p>

10:40 – 11:20 Coffee Break

Wednesday - June 14, 2023

11:20 – 12:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>24 Pecha Kucha Session</p> <p>Moderator: CIMAC</p> <p>PECHA KUCHA The detailed program for the 8 pecha kucha presentations in this session can be seen on page 20.</p>	<p>10 New Engine Developments - Diesel</p> <p>10-1 4 stroke diesel engines 2</p> <p>Chair: Michael Sturm (Caterpillar Motoren GmbH & Co. KG)</p> <p>058 A new modular medium-speed engine family Koen Christianen, Anglo Belgian Corporation</p> <p>177 Performance development and experiment of a high power twostage sequential turbocharge diesel engine Zhong Jie, Shanghai Marine Diesel Engine Research Institute</p> <p>261 Performance Development of New SMDER1 CS21 4-stroke Medium Speed Diesel Engine Rui Liu, Shanghai Jiao Tong University, Shanghai Marine Diesel Engine Research Institute</p>	<p>4 Controls, Automation, Measurement & Monitoring</p> <p>4-1 Controls and Sensing</p> <p>Chair: Joonas Holmi (Wärtsilä)</p> <p>666 The benefit of fully integrated microgrid controls solutions incorporating reciprocating gas engines Herbert Kopecek, Innio Jenbacher GmbH</p> <p>004 Significant aftertreatment cost reduction with high precise AFR control for gaseous-fueled engines Dr. Yi Han, WOODWARD, INC.</p> <p>639 High-pressure common rail system injection rate observer design using DLQR control Bingxin Liu, Harbin Engineering University</p> <p>147 Combustion Control based on Low Cost Vibration Sensors for Variable Fuel Otto Engines Klaus Schmid, AVAT Automation GmbH</p>	<p>19 Basic Research & Advanced Engineering - Simulation Technologies</p> <p>19-3 Engine Thermodynamics 2</p> <p>Chair: Mingfa Yao (Tianjin University)</p> <p>106 Modelling of dual-fuel combustion in a large two-stroke engine using an advanced CFD-chemical model Kar Mun Pang, MAN Energy Solutions</p> <p>406 A New Combustion Model and its CFD Simulation in an Ammonia/Diesel Dual-Fuel Low-Speed Marine Engine Haifeng Liu, Tianjin University</p> <p>166 A mapping approach for efficient CFD simulation of dual fuel marine engine with pre-chamber Ying Ye, Tianjin University</p> <p>240 Numerical Simulation for Discrete Multi-component Lubricating Oil Spray Yuan Fang, Institute of Internal Combustion Engines, Dalian University of Technology</p>

12:40 - 13:40

Lunch

Wednesday - June 14, 2023

11:20 – 12:40

Accelleron (R205)
<p>24 Pecha Kucha Session</p> <p>677 Evolution of two-stroke marine engine lubricants Natasha Horn, Castrol</p> <p>370 Prevention of sliding bearing damages by detecting mixed friction conditions with Bearomos 2020 Horst Brünnet, Schaller Automation Industrielle Automationstechnik GmbH & Co. KG</p> <p>676 Engine Mounted Generator - The New PTO system for propulsion engine YungJoon Jo, Hyundai Heavy Industries</p> <p>638 The Impact of Future fuels on lubricating oil formulation James Dodd, Infineum UK Ltd</p> <p>559 An Advanced Method for Estimating the Impacts of 'Scrubber' Effluent Discharge Dayang Wang, Exponent, Inc.</p> <p>547 Medium speed engine oils optimized for ultra low emission profiles Daniel Peitz, HUG Engineering</p> <p>678 Methanol - A Future Proof Maritime Fuel Chris Chatterton, Methanol Institute</p> <p>040 Development of DF engine control system including virtual commissioning and adaptive AFR control Sunghoon Ko, Hyundai Heavy Industries</p>



Collin Trust sponsored Keynote Speech Perspectives on powering shipping through sustainable energy

As an expert in sustainable energy and transportation, Mr. Tunér will share his insights on how global shipping can contribute to a better world through the use of sustainable energy sources.

Global shipping plays a crucial role in energy-efficient transportation, but its current dependence on fossil fuels also contributes significantly to negative impacts on health, environment, and climate. With more than 5 billion tons of oil consumed every year, reducing the negative impact from the use of fossil fuels is an enormous task. Sustainable energy options for shipping are crucial, and Mr. Tunér will discuss how these options can be used to maximize impact with the available natural resources at the lowest cost.

During his presentation, Mr. Tunér will provide insights into the different energy sources and their potential availability, climate impact, functionality, and costs. He will also discuss why using several of these energy sources in parallel is advantageous. His speech will put the sustainable energy options in context by the scales of the challenges and the opportunities.

About Collin Trust

The Collin trust was established in the 1990's, originally in the UK, and its purpose is the handling of a financial non-profit donation made by the Swedish late Prof. Lars Th. Collin (1925 - 2013), Gothenburg. The Trust organizes and sponsors Collin Trust Lectures, to foster education of the concerned public. This lecture is to be delivered at an international reputation on contemporary environmental issues. To present his/her own view, or an organization's view on important developments in the field of energy/energy conservation and/or related matters.



Dr. Martin Tunér
Martin Tunér Ph. D.
Assistant Dean for Doctoral Education
International Advisor
Professor, Combustion Engines
Faculty of Engineering, LTH
Lund University

Dr. Martin Tunér is full Professor at the Department of Energy Sciences at Lund University and holds a position as Vice-Dean of the Faculty of Engineering at Lund University.

The keynote will be followed by the „Decarbonization Panel“. Experts from the industry will take up and discuss topics from his presentation together with Dr. Tunér.



Source: visit korea, Korea Tourism Organization

Wednesday - June 14, 2023

16:00 – 17:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>17 Engine Component Developments - Turbochargers & Air/Exhaust Management</p> <p>17-2 Air-/Exhaust Management for alternative fuels</p> <p>Chair: Silvio Risse (Kompressorenbau Bannewitz)</p> <p>068 Alternative fuels and their consequences for exhaust gas turbocharging Steffen Käseberg, Kompressorenbau Bannewitz GmbH</p> <p>096 Status of MET turbochargers for alternative fuels to reduce GHG emissions Yushi Ono, Mitsubishi Heavy Industries</p> <p>212 Switching Process Control of Two-stage Sequential Turbocharging System for Marine Diesel Engines Ling Leng, Shanghai Jiao Tong University</p> <p>213 Optimization of S-CO2 Brayton Cycle for Low-Speed Marine Diesel Engine Flue Gas Waste Heat Recovery Liangtao XIE, Wuhan University of technology</p> <p>247 Data-driven prediction of compressor aerodynamic noise in a marine diesel engine turbocharger Chen Liu, College of Power and Energy Engineering, Harbin Engineering University</p>	<p>10 New Engine Developments - Diesel</p> <p>10-2 2 stroke engines</p> <p>Chair: Mathias Moser (MAN Energy Solutions)</p> <p>099 The latest technological development of the J-ENG UE engine for zero emission and digital transformation Katsumi IMANAKA, JAPAN ENGINE CORPORATION</p> <p>149 MAN B&W Two-Stroke Engine Design Update incl. the Newly Developed High-Efficient 10.6 Engine Series Lars Ascanius, MAN Energy Solutions</p> <p>464 New compact engines from WinGD tailored to the changing needs of modern vessels Marc Spahni, Winterthur Gas & Diesel</p> <p>046 LP EGR system for a two-stroke engine Hoick Lee, Hyundai Heavy Industries</p> <p>079 Operation of two-stroke main engines with reduced viscosity cylinder oil to improve fuel consumption Mark Embleton, Maersk Oil Trading</p>	<p>6 Emission Reduction Technologies - Engine Measures & Combustion Development</p> <p>6-1 Greenhouse Gas reduction (H2 Combustion and Challenge)</p> <p>Chair: Dieter van der Put (FEV)</p> <p>084 Combustion characteristics of low-flashpoint fuels and ammonia in the internal combustion engine Youngmin Woo, Korea Institute of Energy Research</p> <p>072 Greenhouse gas reduction through hydrogen fumigation on a 1-MW Tier 2 Caterpillar 3512 diesel engine Christopher Stoos, Southwest Research Institute</p> <p>291 Prechamber Combustion: Enabling the Competitive Carbon-Neutral ICE Emmanuella Sotiropoulou, Prometheus Applied Technologies</p> <p>192 Preliminary study on China's ship power to meet the challenge of carbon emission reduction Dongming Zhang, Tianjin University, Shanghai marine diesel engine research institute</p> <p>652 Greenhouse Gas Emissions Reduction on High-Speed Large Engines Gareth Estebanez, AVL List GmbH</p>	<p>16 Engine Component Developments - Tribology</p> <p>16-1 bearings</p> <p>Chair: Franz Koch (N/A)</p> <p>009 DPLE – Digital product lifecycle engineering for hydrodynamic bearings Falk Nickel, Miba Bearing</p> <p>025 Bearing testing and validation to optimize bearing design for different engine applications ZHIFENG ZHANG, Miba Precision Components (China) Co., Ltd.</p> <p>075 Diagnosis of abnormal lubrication conditions to prevent seizure of crosshead bearings Tatsumi Kitahara, Kyushu University</p> <p>234 Research on the effect of the preload of the main bearing bolts on the performance of the diesel engine main bearings Chen Guangku, Harbin Engineering University</p> <p>295 A new real-time condition monitoring method for engine bearings Motohiko Koshima, Daido Metal Co., Ltd</p>

Thursday - June 15, 2023

09:00 – 10:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>5 Emission Reduction Technologies - Exhaust Gas Aftertreatment Solutions</p> <p>5-4 GHG Reduction - Ammonia combustion & slip reduction</p> <p>Chair: Stefano Ghetti (FEV)</p> <p>141 MAN Energy Solutions – Technologies to reduce methane slip of dual fuel engines Mathias Moser, MAN Energy Solutions</p> <p>440 Ammonia as a fuel – a role for catalytic components. Joseph McCarney, Johnson Matthey</p> <p>101 Fundamental study of the effect of stratified NH3 injection system for nitrogen compounds reduction Hiromichi Oba, Japan Engine Corporation</p> <p>274 From LNG to CCUS, how the methane pathway can be a shortcut to the decarbonization of large containers Philippe RENAUD, CMA Ships</p> <p>629 Methane slip emissions from LNG vessels - review Niina Kuittinen, VTT Technical Research Centre of Finland</p>	<p>8 Fuels - Alternative & New Fuels</p> <p>8-2 Development aspects for using ammonia/methanol as a fuel</p> <p>Chair: German Weisser (Winterthur Gas & Diesel)</p> <p>236 The effect of injection strategy on combustion and emissions of ammonia Marine engine Yue Wu, Harbin Engineering University</p> <p>113 Development of premixed ammonia combustion strategy with minimum emissions for marine diesel engines Yoichi Niki, National Institute of Maritime, Port and Aviation Technology</p> <p>420 Effects of Fuel Ratio and Injection Strategy on Ammonia -Diesel Engine Zunhua Zhang, Wuhan University of Technology</p> <p>624 Research on combustion and emission characteristics of marine ammonia engine Song Zhou, Harbin Engineering University</p> <p>521 Methanol as an energy carrier – latest technological advances Martti Larmi, Aalto University</p>	<p>21 Basic Research & Advanced Engineering - Visualizations</p> <p>21-2 Engine System Thermodynamics & Visualization</p> <p>Chair: Gerhard Pirker (LEC GmbH)</p> <p>313 Experimental visualization of gas-liquid two-phase flow in a real-size piston model BING LIANG, Harbin Engineering University</p> <p>095 Visualization of cavitation behavior in a fuel injection valve Ryosuke Fukuda, Mitsui E&S</p> <p>511 Use and benefits of advanced simulation tools for the development of exhaust aftertreatment systems Christian Lieber, Hug Engineering</p> <p>221 Effect of SO2 on absorbents for Onboard Carbon Dioxide Capture Jianjun Ren, Harbin Engineering University</p>	<p>15 Engine Component Developments - Components</p> <p>15-2 Auxiliary Equipment Systems</p> <p>Chair: Keitaro Hironaka (IHI Power Systems)</p> <p>016 Smarter sealing for a safer tomorrow – obtaining information of a gasket with novel technology Jaakko Niukkala, TT Gaskets</p> <p>064 Development of a valve train system with a hydraulic lash adjuster (HLA) for large engines Hiroyuki Katayama, DAIHATSU DIESEL MFG.CO.,LTD.</p> <p>208 The effect of increasing Peak Firing Pressure on the reliability of cylinder head of diesel engine ZOU HAO, Dalian CRRD Diesel Engine Co.,Ltd</p> <p>279 Innovative lube oil filtration concept for combustion engines Andreas Nußbaum, Boll & Kirch Filterbau GmbH</p> <p>489 The reliability design of tribological system meeting for the future clean engine Yihu Tang, 1. Shanghai Jiaotong University 2. SMDERI</p>

10:40 – 11:20

Coffee Break

Thursday - June 15, 2023

11:20 – 12:40

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>3 Electrification and Fuel Cells Development</p> <p>3-1 Marine Fuel Cell Applications</p> <p>Chair: Marco Thömmes (Rolls-Royce Power Systems)</p> <p>454 Road to zero global warming from high powered merchant marine propulsion systems Dominik Schneider, Winterthur Gas & Diesel</p> <p>366 TCO comparison between fuel cells and Diesel engines - example of PEMFC APU for large vessel Jeremy Dalton, Ricardo</p> <p>085 Fuel cells for future marine propulsion systems Clemens Mair, AVL List GmbH</p> <p>118 Simulation-Driven Development of PEM Fuel Cell Systems for Maritime Applications Victoria Damerow, Freudenberg Fuel Cell e-Power Systems GmbH</p>	<p>7 Fuels - Conventional Fuels</p> <p>7-1 Test methodologies to predict fuel performance</p> <p>Chair: Charlotte Rojgaard (Bureau Veritas VeriFuel)</p> <p>008 Demonstrating significant fuel consumption and emissions savings with combustion improver additives Adrian Bourdeaux, Infineum UK Ltd</p> <p>014 The fuel oil spin test: a method to help fuel users predict sludge issues at the fuel oil separator Dewi Ballard, Infineum UK Ltd</p> <p>131 Long term storage stability issues of very low sulfur fuels, a major problem for shipowner Sara Rezaee, Viswa Group</p> <p>669 Presence of Organic Chlorides in Bunker Fuel Sara Rezaee, Viswa Group</p>	<p>4 Controls, Automation, Measurement & Monitoring</p> <p>4-2 Monitoring and Fault Diagnostics</p> <p>Chair: Sai Venkataraman (Woodward)</p> <p>102 New generation oil mist detection system for prevention of crankcase explosions in large ICE Alexander Levchenko, HEINZMANN GmbH & Co. KG</p> <p>244 Selective hydrogen and methane online monitoring in the crankcase of large 4-stroke engines Horst Brünnet, Schaller Automation Industrielle Automationstechnik GmbH & Co. KG</p> <p>116 Accident-based FMECA study of Cruise ship Lubrication system using Type-2 Fuzzy expert System SHOAIB AHMED, Shanghai Jiaotong University, China</p> <p>627 Condition Based Monitoring for Large Bore Medium Speed Engines using a Digital Twin, ML and Big Data Rik De Graeve, ABC</p>	<p>14 Engine Component Developments - Fuel Injection & Gas Admission</p> <p>14-2 "GAS" or alternative/new fuels</p> <p>Chair: Rune Nordrik (Bergen Engines AS)</p> <p>088 Low-pressure (SOGAV) gas admission of H2 and NH3 Rick Boom, Woodward</p> <p>055 Fuel injection and admission systems for liquid and gaseous bio- and e-based fuels for large engines Jens Olaf Stein, Robert Bosch AG</p> <p>104 Methanol port fuel injection for medium speed application: injector development and engine design Arianna Sorrentino, Heinzmann GmbH & Co. KG</p> <p>128 Development & Simulation of "HP Gas-and/or hydrogen-DI-Injectors" for combustion engines Erich Vogt, DUAP AG</p>
<p>12:40 - 13:40 Lunch</p>			

Thursday - June 15, 2023

13:40 – 15:20

Accelleron (R205)	INNIO (R104-110)	OMT (R101-103)	Robert Bosch (R201-202)
<p>9 Lubricants</p> <p>9-1 Zero carbon fuel lubricants</p> <p>Chair: Christer Wik (Wärtsilä)</p> <p>066 Lubricants enabling shipping's alternate fuels and journey to decarbonisation Lawrie Peck, Lubrizol</p> <p>467 The Role of Marine Lubricants in Lowering the Carbon Intensity of Maritime Transport Marcel Verlinde, Chevron Oronite</p> <p>126 Ammonia as an alternative Marine fuel-Assessing the impact on lubricants and lubrication reliability Nicolas Obrecht, TotalEnergies One Tech</p> <p>386 Development of lubricants for hydrogen-fueled large engine power plants Dr. Winfried Koch, ESSO Deutschland GmbH</p> <p>423 Marine engines lubrication within a broad fuel landscape & impact on exhaust aftertreatment systems Luc Verbeeke, Chevron</p>	<p>14 Engine Component Developments - Fuel Injection & Gas Admission</p> <p>14-1 "LIQUID" or conventional diesel</p> <p>Chair: Rick Boom (Woodward)</p> <p>063 Injection rate control strategy with Bosch Smart CR Injector for optimized injection performance Thibault Henrion, Robert Bosch, Powertrain Solutions, Large Engines</p> <p>120 PtX fuels for combustion engines: flexible injection concepts for all applications Michael Willmann, Woodward L'Orange</p> <p>139 Powering a greener future: the OMT injector enables high-pressure injection of ammonia and methanol Marco Coppo, OMT SpA</p> <p>439 Steps towards online detection and optimization of e-fuel engine operation Erwin Swiderski, University Rostock</p> <p>574 Development of a retrofit fuel flexible platform for future fuels Andreas Carelli, Wärtsilä</p>	<p>15 Engine Component Developments - Components</p> <p>15-3 Advanced component integration</p> <p>Chair: Falk Nickel (Miba Gleitlager Austria GmbH)</p> <p>023 Joint development of the bearing system for AVL's new high-speed engine platform Gunther Hager, Miba Gleitlager Austria GmbH</p> <p>245 Powertrain innovation – Development Speed vs. Reliability? Andreas Thalhammer, Geislinger GmbH</p> <p>378 Improvement technologies for efficiency and development for decarbonized society in Mitsubishi gas engines KAZUHIRO KAWAI, MITSUBISHI HEAVY INDUSTRIES ENGINE & TURBOCHARGER</p> <p>560 Experimental Study on Multi-objective Optimization of a Marine Diesel Engine Cooling System Bo Zhang, Naval University of Engineering</p> <p>616 CIMAC WG4 - Crankshaft Rules - Multiaxial Fatigue Assessment of Crankshafts John Dowell, Wabtec Corporation</p>	<p>20 Basic Research & Advanced Engineering - Mechanics, Materials Research</p> <p>20-1 mechanics and materials</p> <p>Chair: Feng Wang (SMDERI)</p> <p>352 Study on The Wear Map of Cylinder Liner Based on Various Operating Parameters Baofeng Zhang, Harbin Engineering University</p> <p>436 Impact of hydrogen on iron- and nickel-based valve spindle materials Oliver Lehmann, Märkisches Werk</p> <p>311 Numerical and Experimental Research on Thermal Insulation Performance of Marine Diesel Engine Piston zihao shu, Wuhan University of Technology</p> <p>414 Predicting vibrations of the base engine using flexible Multi Body Dynamics simulation Pranay Sharma, Cummins Inc.</p>
<p>15:20 – 16:00 Coffee Break</p>			
<p>16:00 – 17:00 Final Panel</p>			
<p>18:30 Gala Dinner at Busan Hilton Hotel</p>			

Thursday - June 15, 2023

15:30 – 16:00

Poster exhibition

25 Poster presentation by the author

- 097** Development of the 25AHX diesel engine
Hiromitsu Fujita, IHI Power Systems

- 132** Relationship between the chemical composition of the fuels and cold flow properties
Sara Rezaee, Viswa Group

- 200** Development and validation of a virtual NOx sensor for closed-loop control of marine diesel engines
Sheng Lin Du, Wuhan University of Technology

- 224** Wear mechanism of exhaust valve recession induced by running low sulfur diesel
Feng Zhu, Shanghai Marine Diesel Engine Research Institute

- 297** Pore-Scale Investigation of Solving Active Overpotential in the Catalyst Layer of PEM Fuel Cell
Li Xing, Tianjin University

- 357** The transient performance optimization of an emergency diesel engine
Li Huang, Shanghai Jiao Tong University, Shanghai Marine Diesel Engine Research Institute

- 360** Research on the performance of alcoholic diesel blended fuels on diesel engines with nano-TBCs
Yuxvan Du, Wuhan University of Technology

- 399** Influence of coupling characteristics of control parameters and operating frequency on stability
Yunpeng Wei, Harbin engineering university

- 445** Experimental study on efficiency improvement based on a high performance single cylinder engine
liang zheng, Shanghai Jiao Tong University/ Shanghai Marine Diesel Engine Research Institute/ National Engineering Laboratory of Ship and marine engineering power system

- 544** Ignition and combustion characteristics of fast pyrolysis bio-oil for engine application
Yu Wang, Eindhoven University of Technology

- 398** The Petrobras experience on formulating the "IMO 2020" bunker fuels
Antonio Prada Jr, Petrobras

- 117** Formulation of TPEO Lubricants For Low Sulphur Residual Fuels Post 2020
Jonathan Hughes, Infineum

- 453** Research on Unregulated Emissions of Commercial Pure Methanol Engines
yajie zhang, Xi'an Jiaotong University

- 433** Filtration as lube oil maintenance strategy
Jens Fich, C.C.Jensen A/S



Reimagining Motion

For a greener, safer, better world of mobility.

We are driven by a passion to examine the science, mechanics and philosophy of movement. By using all our imagination, creativity and pioneering spirit, we create a world that is climate neutral and one that makes safe, comfortable, green mobility a reality for everyone.

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We call it **Reimagining Motion**.



Posters are on display all day, the author's presentation time is shown in the program.

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OPTIONAL TOURS JUNE 12 - 15, 2023

WEDNESDAY 14 JUNE 2023

GYEONGJU SHILLA DYNASTY (Full Day / Activity Level: Moderate)

Price: \$ 130 per person

Description

Excursion out of Busan to visit Gyeongju, the ancient capital of Shilla now known as the “open-air museum” for being home of several Unesco Heritage sites of Korea.

The royal tombs at the Tumuli Park date back to the Shilla Dynasty (600-900 AD). Artifacts found in the graves show a remarkable technological and cultural achievements. The Cheomseongdae is the oldest existing astronomical observatory in Asia. The 362 stones used to build the Cheomseongdae represent the 362 days in the lunar calendar. The Anapji Pond is an artificial pond constructed for the royal family for leisure and study.

Inclusive: Private bus / English Guide / Admission fees / Lunch

Program

- 09:00 Departure BEXCO
- 10:30 Tumuli Park & Grave of General Kim Yusin
Walk to Cheomseongdae Astronomical Observatory & Anapji Royal Pond
- 12:00 Gyeongju National Museum
- 13:00 Lunch & Free time in Hwangnamdong District / Hwangnidan-Gil
Traditional village tour with rooftop cafés, restaurants, and tiny shops
- 15:00 Woljeong Bridge
- 17:00 Arrive at BEXCO, end of tour.



OPTIONAL TOURS JUNE 12 - 15, 2023

THURSDAY 15 JUNE 2023

Option 1: BUSAN ANCIENT WALL HIKING TRAIL (Full Day / Activity Level: Active)

Price: \$ 80 per person

Description

The century old Geumjeongsan Defense Wall stretches over several mountain ridges along the city of Busan. From the natural spring of Heoshimjeong one can take a cable car to the Defense Wall and make a wonderful hike for several hours along this wall. On the way stops can be made at the South-, East- and North Gate. The city view is spectacular. The hike ends at the Beomeosa Temple.

Preparation: Good physical condition required, good quality hiking shoes (highest point approximately 800 meters), sporty clothing, sun cream, 3-4 bottles of water and energy snacks. Lunch boxes are prepared by the guide. In case of rain or other adverse weather conditions, the tour will be cancelled or postponed.

Inclusive: Private bus / English Guide / Admission fees / Lunch package

Program

- 09:00 Departure BEXCO
- 10:00 Cable Car at the Geumjeong Park
- 10:30 Hiking via East Gate to the North Gate (highest point 800 meter)
Descending to the Beomeosa Temple
- 14:30 Arrival at the Beomeosa Temple
Free time at Beomeosa Temple
- 16:00 Arrive at BEXCO, end of tour

Option 2 BUSAN SEASHORE TEMPLE TOUR (Half Day Morning Tour / Activity Level: Easy)

Price: \$ 80 per person

Description

The Haedong Yonggungsa Temple dates back to 1376 during the Goryo Dynasty. While most temples are tucked away high in the mountains, this temple was built along the shoreline. An enormous Buddha Statue on top of the temple complex is overlooking the amazing coastline. A special site at the temple are the 108 stairs and stone lanterns lining the rocky landscape. After going down the 108 steps one can enjoy the calming sounds of waves, and view the majestic sunrise.

Inclusive: Private bus / English Guide / Admission fees

Program

- 09:00 Departure BEXCO
- 09:30 Dalmaji-gil Road
- 11:00 Haedong Yonggungsa Temple
- 14:00 Arrive at BEXCO, end of tour

FRIDAY JUNE 16, 2023

Technical Tour 1: Hyundai Heavy Industries, Ulsan

Price: \$ 120 per person

Description

Since its foundation in 1972, Hyundai Heavy Industries turned a small fishing village into the busiest place in Korea. Hyundai Heavy Industries is leading the global shipbuilding industry with a wide range of product lineup that offers any type of ship desired by customers.

Program

- 07:30 Departure from Busan, start of tour
- 09:00 Course A - Culture Center: History & Introduction
- 09:45 Course B - Culture Center 1F: Visit Exhibition Hall
- 10:20 Course C - Yard Tour (move from Cultural center to Engine factory)
- 11:20 Course D - Engine Factory Tour + Yard Tour (move from Engine factory to Cultural Center)
- 11:30 Pickup Lunch & Gift
- 13:30 Busan arrival and end of tour

FRIDAY JUNE 16, 2023

Technical Tour 2: Korea Maritime and Ocean University

Price: \$ 120 per person

Description

Based on the Jinhae Marine Officer School established in 1919, the Korea Maritime and Ocean University (KMOU) was opened in 1945 to pursue the goal of strengthening the country through the ocean. Since then, it has been producing experts in the maritime field, including the shipping industry, based on the noble educational philosophy of truth-finding, cultural creation, and character development, through which it has contributed to the development of the nation and society.

While its past history focused on the development of KMOU as Korea's only specialized maritime university, its future is to lead the world's oceans with the vision of becoming the world's best global maritime university.

Program

- 08:30 Departure from Busan „BEXCO“ Start of tour
- 09:20 Course A – Training Ship (“HANBADA” or “HANNARA)
- 11:00 Course B – Greenship Technology Research & Test Center, Marine Simulation Center
- 12:30 Pickup Lunch & Gift
- 13:30 BEXCO arrival End of tour

FRIDAY JUNE 16, 2023

Technical Tour 3: Korea Marine Equipment Research Institute

Price: \$ 120 per person

Description

KOMERI is a specialised production technology research institute established in 2001 by the Industrial Technology Innovation Promotion Act under the Ministry of Trade, Industry and Energy with its aim to contribute to marine and offshore industries through comprehensive support including technical development and test certification of marine equipment.

KOMERI contributes to improving national competitiveness in shipbuilding and marine industry through preemptive technical development and constructing the foundation of test certification as well as international standardisation activities in new leading business such as environmental friendly ship, Maritime Autonomous Surface Ship(MASS), hydrogen fueled ship and new renewable energy. Also, in response to diversification of foreign markets, KOMERI is also making efforts in technical cooperation projects with global regions.

Program

- 09:00 Departure from Busan „BEXCO“ Start of tour
- 10:00 Course A – Advanced-Green Technology Center
- 11:00 Course B – Fuel Gas Technology Center
- 12:00 Pickup Lunch & Gift
- 13:20 Busan arrival End of tour

None of the tours are adventurous or dangerous, and should be fully covered by your travel insurance. No special preparations needed for Easy and Moderate tours. For Active tours adequate preparation necessary.

Easy: These tours are at a leisurely pace which involves minimal physical activity. Standing and walking for short periods of time, mainly when visiting a Buddhist temple, museum or market.

Moderate: Long touring day with moderate physical activity. Standing and walking for extended periods of time, mainly at Buddhist temple and natural sightseeing spots.

Active: Tour with main active element, such as hiking or biking. Walking over uneven and mountainous terrain, biking with moderate elevations. The participant should be physically fit and comfortable to walk 5-10 km. Adequate preparation according to specified instruction per tour required: suitable shoes, clothing, sunscreen, snacks and drinks.



MAIN SPONSORS

Platinum Sponsor

We thank our Platinum Sponsor of the 30th CIMAC World Congress for the extraordinary support!



Accelleron

Turbo Systems Switzerland Ltd
5401 Baden, Switzerland

Accelleron is a global leader in turbocharging technologies and optimization solutions for 0.5 to 80+ MW engines, helping to provide sustainable, efficient and reliable power to the marine, energy, rail, and off-highway sectors. Through its innovative product offerings and research leadership, the company accelerates the decarbonization of the industries it operates in. Accelleron has an installed base of approximately 180,000 turbochargers and a network of more than 100 service stations across 50 countries worldwide.

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We thank all the Gold Sponsors of the 30th CIMAC World Congress for their extraordinary support!



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92029 Nanterre, France

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24159 Kiel,
Germany



Wärtsilä
65101 Vaasa,
Finland



Daihatsu Diesel
524-0035 Moriyama city
Shiga Pref., Japan



Winterthur Gas & Diesel
8401 Winterthur,
Switzerland



Geislinger
5300 Hallwang,
Austria



Woodward
70435 Stuttgart,
Germany



IHI Power Systems
101-0021 Tokyo,
Japan



Yanmar
660-8585 Amagasaki,
Japan

MEDIA PARTNERS

We thank all Media Partners for helping us making CIMAC 2023 once more a successful event.



EXIBITORS

Exhibitors	Booth Number
Accelleron	70
AVAT Automation GmbH	6
AVL List GmbH	58
BOLL & KIRCH Filterbau GmbH	47
C.C.JENSEN A/S	39
Chevron Oronite Company LLC	30
Cummins Engine Components - Valvetrain Technologies	11
Dr. E. Horn GmbH & Co. KG	5
DUAP AG	6
Federal-Mogul Burscheid GmbH	25
FEV	2
Ganser CRS AG	16
Geislinger GmbH	75
Heinzmann GmbH & Co. KG	17
Hug Engineering AG	55
HYDAC International GmbH	51
IB MATERIALS	63
IMES GmbH	14
Infineum UK Ltd.	12
Kistler Instrumente AG	36
KS Large Bore Pistons Germany GmbH	60
LEC GmbH Large Engines Competence Center	64
Lubrizol Ltd.	46
Märkisches Werk GmbH	10
Miba Bearing Group - Miba Gleitlager Austria GmbH	34
Mitsubishi Heavy Industries Marine Machinery & Equipment Co. Ltd.	44
Nova Werke AG	1
OMT Officine Meccaniche Torino Spa	40
PETER FUCHS TECHNOLOGY GROUP AG	35
Purso-Tools Oy	42
Robert Bosch GmbH	56
Sauer Compressors c/o J.P. Sauer & Sohn Maschinenbau GmbH	54
Schaller Automation GmbH & Co. KG	32
Trafag AG	22
TT Gaskets Tampereen Tiivisteteollisuus Oy	50
UT99 AG	74
Viswa Group	4
Woodward L'Orange GmbH	52

Exhibitor Badges

The exhibitor badges are for use of the stand staff only and do not entitle to take part in the conference

HALL LAYOUT

CONGRESS VENUE

Convention Hall 3F - Grand Ballroom - General Hall Layout

More information on: <https://www.bexco.co.kr/eng/Main.do>

You can find the latest floor plan at: <https://www.hamburg-messe.de/aussteller>



bexco

Busan the city of international conventions - the perfect place for any event!

Korea is one of the most advanced nations in the world, yet it is also a country steeped in historically rich tradition. In Busan, this combination of the old and the new abounds at every turn. Firstclass convention facilities sit minutes from sandy beaches and historic mountain trails. Serene, thousand-year old temple sites are nestled among some of the tallest residential skyscrapers in Asia.

BEXCO - Busan Exhibition Convention Centre

Convention Hall
55 APEC-ro
U-dong
Haeundae-gu
Busan
South Korea

www.bexco.co.kr





Busan

Busan is Korea's representative tourist city with over 3 million foreign visitors a year. From the Haeundae Beach to the beautiful natural environment, visitors can enjoy all four seasons. It provides a variety of marine tour programs, shopping experiences and other cultural activities. These have all combined to make Busan a world class tourist city for lodging and relaxation.

Population: 3.429 million

Languages Spoken: Korean is the national and official language in Busan. The language is drastically different from western languages. In addition to the native language, most people below 40 years of age speak English frequently. One of the most prominent minority languages in South Korea is Chinese, which is spoken by over 1.2 million residents.

Climate: Busan is characterized by the oceanic climate with warm summers and mild winters. In winter temperatures can drop below the freezing point at night. Rainy season is from April until September. Busan has a cooler version of a humid subtropical climate. Extremely high or low temperatures are rare. Busan and the nearby area have the least amount of snow compared to other regions of Korea due to its location.

Time Zone: Busan is in the Korean Standard Time Zone.

Money: The Korean currency is Korean Won (KRW). \$ 1 = KRW 1350. Upon your arrival at the airport in Korea you can exchange cash money to Korean won at any bank at Incheon Airport – or debit card out of the ATM. You can use your debit card if it shows the Cirrus- or Maestro-logo. Credit cards (VISA or MasterCard) are widely used.

Electricity: Korea has an electric voltage capacity of 220 volts. Adapters are necessary in case of variation to the European standard 2-pin plugs.

Phone & Internet: Wifi is widely available. If you want to have continuous access without using roaming, you can either rent a phone, sim card or Pocket Wifi. These items are for rental and can be picked up upon arrival at the Incheon Airport & Gimpo Airport.

For more information about Busan please visit:

[Busan Tourism](https://www.bto.or.kr/)



Traveling to Busan

Travel preparation

Please be aware that you have to register online for K-ETA (Korea Travel Authorization) <https://www.k-eta.go.kr/portal/apply/index.do> before travelling to Korea! You must complete your K-ETA application at least 24 hours prior to boarding your flight.

Accessibility

South Korea is extremely well-connected by land, air and sea, with a high density of airports, train/subway stations and bus terminals all over the country. Almost all stations are meticulously clean and safe, the schedules frequent and punctual, and rates reasonable. For subway, bus and taxi, the most convenient is to purchase a T-Money Card at one of the numerous convenient stores.

Domestic transportation

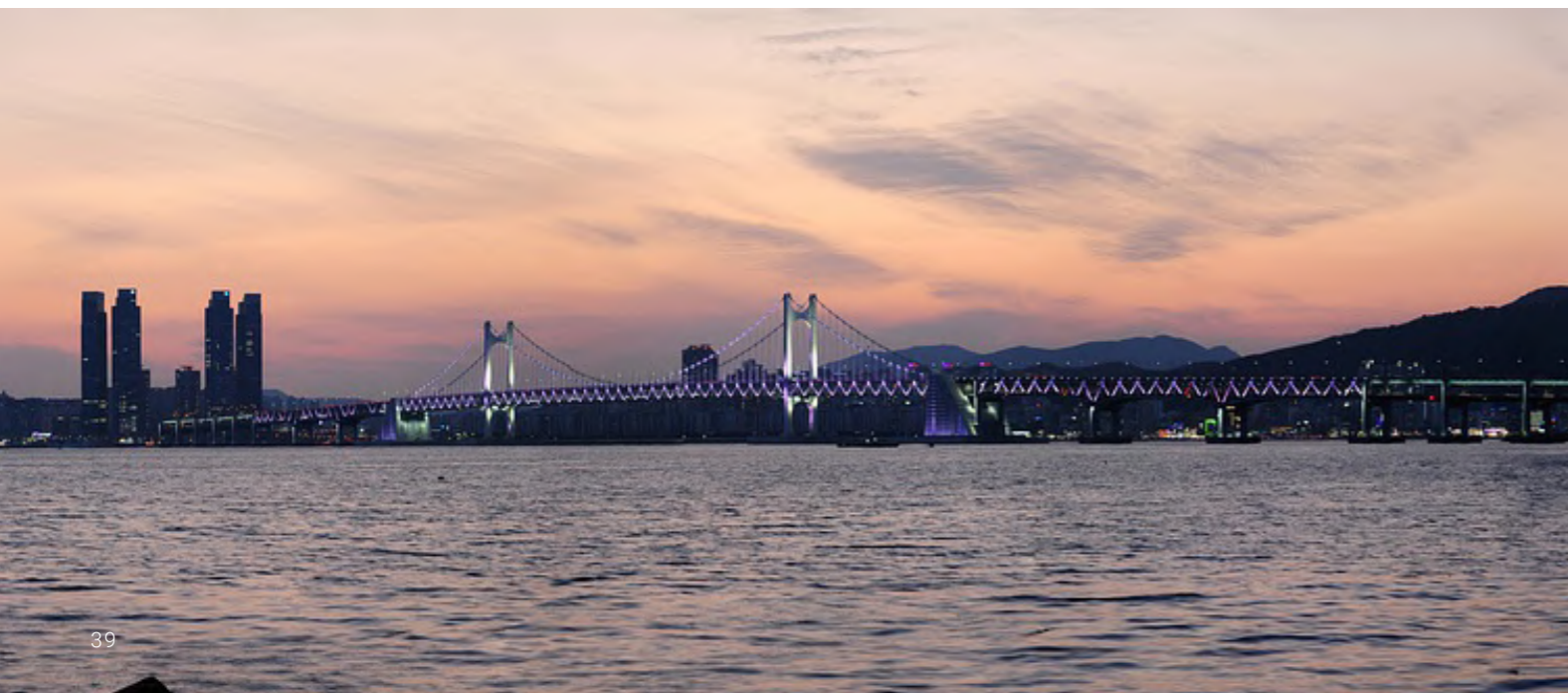
■ **Domestic flights:** South-Korea has a convenient network of domestic airport that cover the entire country. The main domestic destinations are Seoul, Busan, Daegu, Gwangju and Jeju Island.

■ **Train:** South Korea is conveniently connected by high speed train between all major cities on the mainland: Seoul, Daejeon, Daegu, Gwangju, Yeosu, Busan. Commuter trains ('Mugunghwa) still run and stop at smaller towns and villages. Payment by purchase of separate tickets.

■ **Subway:** One of the best in the world and by far the most convenient way to transfer within the city. Seoul, Busan, Daegu and Gwangju offers state-of-the-art modern subway, with clear signage in Chinese, English and Japanese. The subway lines cross city borders and connect suburbs and nearby towns. Payment by T-Money card or purchase of separate tickets.

■ **Taxi:** Uber is not the common taxi service, instead the Koreans use Kakao Taxi. The app is easy to download and convenient to use. Alternatively, the hotel staff can help you reserve a taxi, or you can stop a taxi on the road. Payment by T-Money card, credit card or cash.

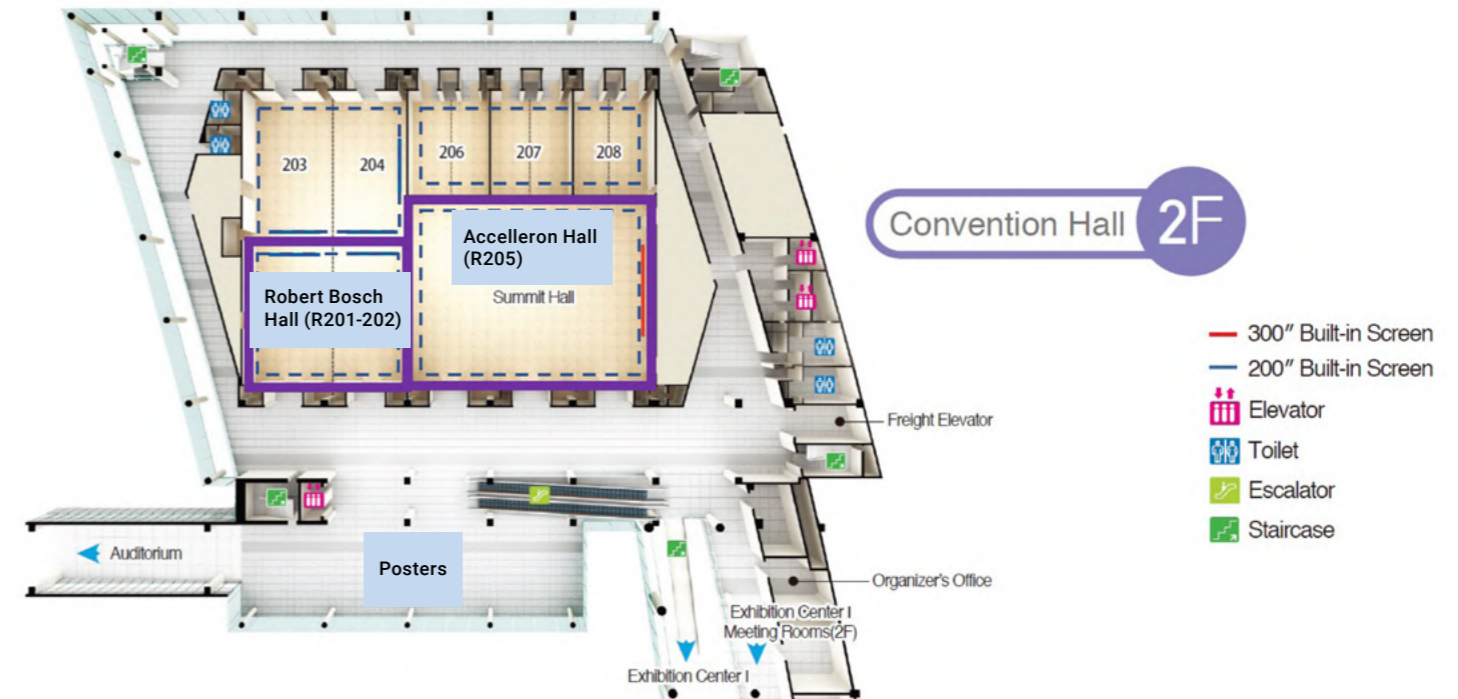
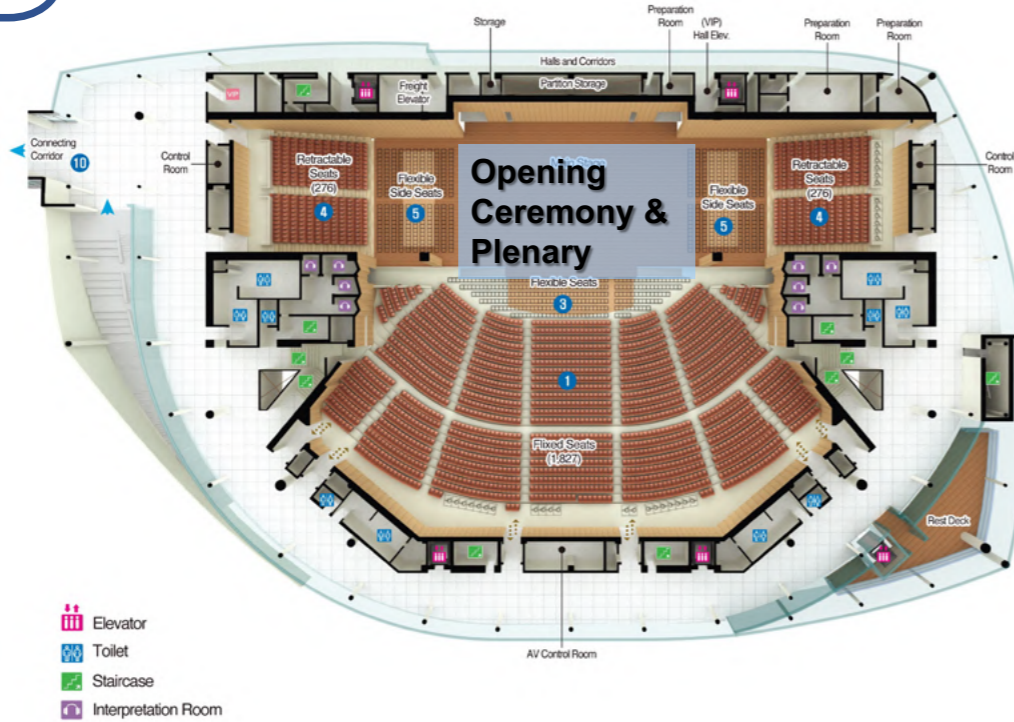
■ **Car rental:** Koreans drive on the right side. Driving in the big cities of Seoul and Busan is comparable with driving in Rome or Paris, so caution is advised. Car-rentals can be arranged in South Korea.



FLOOR PLANS

FLOOR PLANS

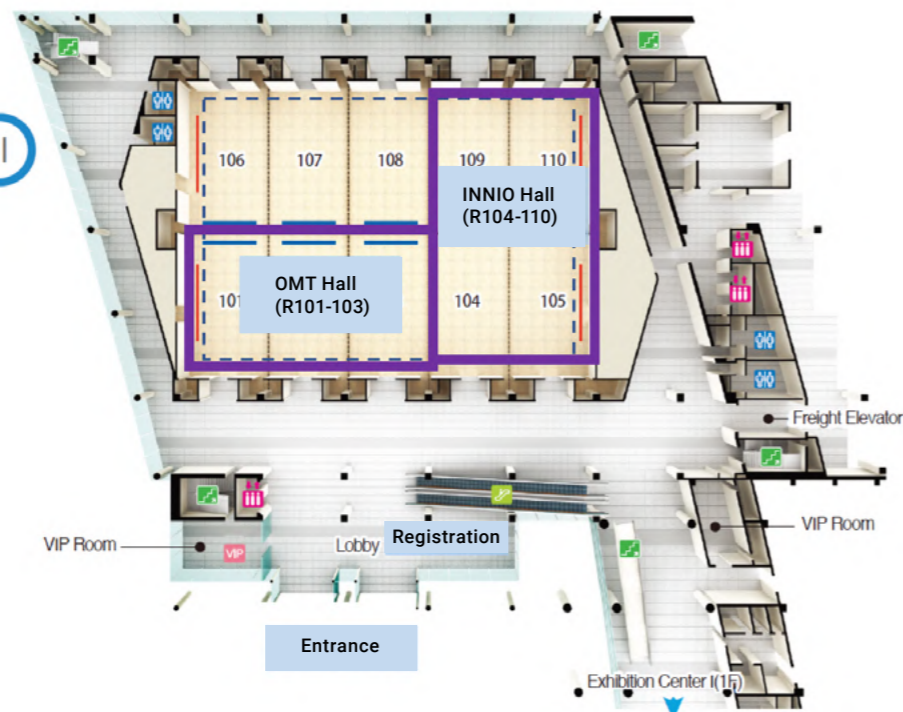
Auditorium



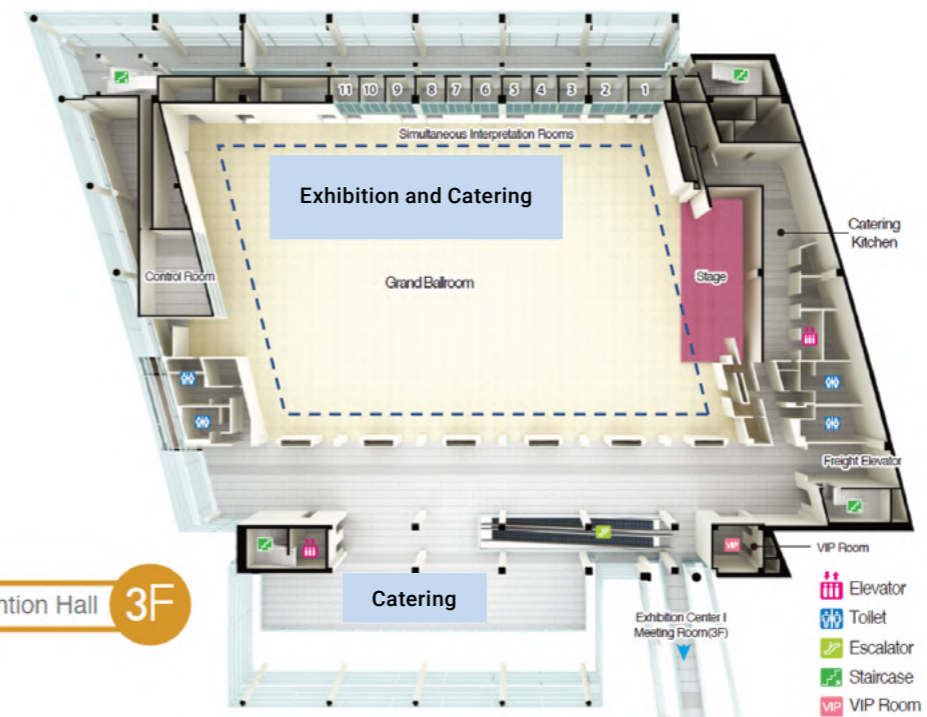
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1F Convention Hall



Convention Hall 3F



ACCOMMODATION

Selected hotels for CIMAC participants

Hotel offers:

- **Special rates** for CIMAC participants on the following website: [hotel bookings](#)
- **Close vicinity to BEXCO**, 1 to 10 min away by car.
- **Special Cancellation Policy:** in case the CIMAC Congress is cancelled your room reservation is 100% refundable.
- All rates inclusive of all taxes & breakfast
- Additional week-end charges may apply
- Rates in USD are subject to currency fluctuations and may be adjusted over time.
- Payment via international bank transfer.
- Cancellation policy according to [General Terms & Conditions KR H&E for CIMAC Congress 2022](#).



Contact



KR Hospitality & Events (KR H&E) is the official travel agent for CIMAC Congress 2023 in Busan

Mr. Don Roelofs

Info & Bookings via don@krhospitality.co

ACCOMMODATION

1 CENTUM PREMIER HOTEL 4 *



The finest business hotel within walking distance from BEXCO, and only 10 minutes drive to the famous Haeundae Beach. Located in a quiet area in the evening, and with an excellent restaurant inside the hotel. The hotel provides clean and cozy guest rooms and various facilities to ensure the best service and satisfaction for all guests.

This hotel is fully booked

3 THE WESTIN JOSUN Busan 5 *



The Westin Josun Busan offers luxury along the famous Haeundae Beach with true 5-star service. It definitely has one of the best city- and sea views of Busan. It is 15 minutes drive to BEXCO Convention Center.

Info & booking: <https://zurl.co/9wJJ>

2 RAMADA ENCORE BY WYNDHAM Busan Haeundae 4 *



RAMADA ENCORE BY WYNDHAM Haeundae has been opened in 2017 and is 500 meters away from the famous Haeundae Beach. In the direct vicinity of the hotel, you will find a large variety of restaurants, bars and shops, while still enjoying the tranquility inside the hotel. It only takes 10 minutes by subway to reach BEXCO.

Info & bookings: <https://zurl.co/sr6Y>

4 SHILLA STAY HOTEL Haeundae 4 *



Shilla Stay Hotel Haeundae is a modern and stylish hotel located in the bustling Haeundae district of Busan, South Korea. With its prime location just a few steps away from the Haeundae Beach and other popular attractions, the hotel offers guests comfortable accommodation, excellent dining options, and convenient access to the city's highlights. *The Standard room types are City View only.

Info & booking: <https://zurl.co/BLxo>

REGISTRATION

Opening Hours Information Desk

Sunday June 11	14:00 – 18:00
Monday June 12	08:00 – 18:00
Tuesday June 13	08:00 – 18:00
Wednesday June 14	08:00 – 18:00
Thursday June 15	08:00 – 18:00

Ticket shop

You can register for the 30th CIMAC World Congress online by using the ticket shop. Please follow the link: [Ticket shop](#)

Registration Fees*

	Euro / €	USD / \$	Korean WON / ₩
CIMAC Members	1,950	2,010	2,788,500
Non-Members	2,300	2,370	3,289,000
Speakers	1,750	1,805	2,502,500
Students	On invitation only		
Accompanying Persons	350	365	500,500
One-Day Ticket	950	980	1,358,500
Exhibition Ticket per Day	50	55	72,000
Gala Dinner only	250	260	357,500

*Not subject to Korean VAT.

The prices in Euro are binding. Dollar and Korean won prices may vary and are for orientation only.

The Congress fee for **CIMAC members, non-members** and **speakers** includes participation in the technical program, admission to the exhibition, the Opening Ceremony, the Welcome Reception, the Accelleron Evening, and the Gala Dinner. Additional Congress components, such as the accompanying program (optional tours, technical tours) must be booked and paid separately. The Congress documents (program, Congress bag, participant badge) as well as catering during breaks are included in the Congress fees.

Invited Students (free of charge) have the above-mentioned services also included - except the participation in the Gala Dinner.

The participation fee for **accompanying persons** includes admission to the exhibition, coffee breaks and lunch, Opening Ceremony, Welcome Reception, the Accelleron Evening and Gala Dinner, but this ticket does NOT include the technical program.

The participant fee for **One Day tickets** includes: participation in the scientific program, admission to the exhibition. The Congress documents (program, Congress bag, participant badge) as well as catering during breaks are included in the Congress fee, this ticket does NOT include any social program.

The participation fee for **exhibitors** and **exhibition day-tickets only** include only the admission to the exhibition and does NOT include the scientific program and does NOT include any social program.



QUICK FACTS

Accommodation

Informations about selected Hotels in [Busan](#) please see page 37.

CIMAC

CIMAC is the non-commercial sponsor of the 30th CIMAC World Congress in Busan. For further informations on CIMAC please visit the website at <http://www.cimac.com/>

Cancellation of Congress Participation

In case of cancellation, provided that VDMA Services has received written notice about it 40 days before the congress, the participation fee will be refunded less a handling fee of € 180. In case of cancellation after this date, no refund will be made.

CIMAC Membership

If you are uncertain about your membership status or want to apply for a membership, please contact the CIMAC Central Secretariat – info@cimac.com

Congress Catering

Catering stations will be integrated in the exhibition area. During the coffee breaks and lunch break participants will be provided with food and drinks. Enjoy regional and international cuisine!

Congress Documents

Please bring your mobile ticket ready on your mobile phone or tablet with you or print out your e-ticket legibly on a sheet of paper. Your personal badge is your entrance ticket to all sessions, the exhibition and the social events. Please, remember to wear your badge at the congress and the social events at every time. Congress bags will be provided in the registration area in the Convention Centre.

Contact for Questions

For questions regarding the technical Program, please contact CIMAC Central Secretariat. For questions regarding the congress, sponsoring and exhibition, please contact the Main and the Co-Organizer of the congress. Contact details see page 43.

COVID-19

Current COVID-19 regulations will be announced on our website <https://www.cimaccongress.com/> in time before the Congress.

Cloakroom

Participants may leave their belongings in the designated area.

Language

The official language of the Congress is English. No translation will be provided.

Newsletter

For the subscription of the CIMAC Newsletter please fill out the form on CIMAC website: <http://www.cimac.com/publication-press/newsletter-subscription/index.html>

QUICK FACTS

Mobile App

A mobile app will be available for downloading in [Google Play](#) and [Apple App Store](#) around mid april. Visit www.cimaccongress.com to find the download links once it is available.

Optional Tours

For participating in the optional tours, please visit our hospitality room at the congress. Please see pages 19.

Social Media

Fans and followers will find the CIMAC Congress on [LinkedIn](#) and [Twitter](#).

Speakers' Preparation Room

All presentations can be checked and delivered to the speaker's preparation room 206 at least 2 hours prior to speaker's session. Presentations being held during a morning session should be checked at the end of the day before. Speakers are kindly requested to follow the instructions of the chairperson and strictly keep to the time of their presentation.

Technical Program

Admission to all sessions of the technical Program is only possible with a valid congress ticket. The congress ticket for **CIMAC members, non members, speakers and students** includes: congress badge, congress bag, admission to all sessions and the exhibition, coffee breaks and lunches, Opening Ceremony, Welcome Reception, Accelleron Evening, Gala Dinner (except students).

The registration for **accompanying persons** includes: admission to the exhibition, coffee breaks and lunch, Opening Ceremony, Welcome Reception, Accelleron Evening, Gala Dinner.

Technical Tours

Separate registration is required for participation in the technical tours. Registration is available via the congress website.

Ticketshop

Tickets are only sold online via our Ticketshop and only payable via credit card. Print your ticket or bring it along on your mobile device.

WIFI

Free WIFI is available at Busan Convention Center BEXCO. Login and password will be announced on-site.

Main Organizer Congress:

VDMA Services GmbH

a VDMA group company

Lyoner Straße 18
60528 Frankfurt am Main
Germany

Contact: Hatice Altintas
Email: Hatice.Altintas@vdma.org

Phone: +49 69 6603-1143
Fax: +49 69 6603-2843
Email: Hatice.Altintas@vdma.org
Web: www.cimaccongress.com
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Lyoner Strasse 18
60528 Frankfurt am Main
Germany

Contact: Marc Schinke

Phone: +49 69 6603 1149
Fax: +49 69 6603-2149
Email: info@cimac.com
Web: www.cimac.com



Co-Organizer Congress:

CIMAC National Member Association

Korea Federation of Combustion Engines (KOFCE)
C1-463, Marine Department,
Korea Maritime and Ocean Univ. 727,
Taejong-ro, Yeongdo-gu, Busan, Republic of Korea.

Contact: Ph.D. Ji Hyoub, Cha, Secretary General

Phone: +82-51-917-1767
Fax: +82-51-917-1766
Web: www.kofce.or.kr

Co-Organizer Exhibition:

Hamburg Messe und Congress GmbH

Messeplatz 1
20357 Hamburg
Germany

Contact: Sybille Lang

Phone: +49 40 3569-2293
Fax: +49 40 3569-692293
Email: cimac@hamburg-messe.de
Web: www.hamburg-messe.de/aussteller/auslandsveranstaltungen/auslandstermine-details/veranstaltung/cimac-congress-2022-0013



ABOUT CIMAC

Originally founded in Paris in 1951, CIMAC has become the **leading global association of the large internal combustion machinery industry**. It is a non-profit association bringing together and representing the large engine industry to regulators and standardizing bodies. In addition to promoting the work of National Member Associations, CIMAC supports information exchange and understanding across the large engine industry including:

- Builders of large diesel, gas and dual-fuel engines
- Users of large engines such as owners and operators of ships, power plants, locomotives etc.
- Systems and component suppliers
- Fuel and lubricant suppliers, including oil companies
- Classification societies and other regulatory bodies
- Academic institutions, consultant engineers, scientists
- System Integrators, shipyards and other service providers

CIMAC's Vision:

To promote large engine technology power solutions that are efficient, reliable, safe and sustainable and of benefit to society, in pursuit of the transition to a low-carbon future.

CIMAC's Mission:

To add value to our members' businesses and to society by:

- › Enabling exchange on technological trends and developments among our members, with their users, associated industries along the value chain.
- › Developing and promoting globally harmonized standards and regulations that foster a competitive, safe and sustainable industry.
- › Striving for zero environmental impact of power solutions utilizing large engine technology.
- › Facilitating safe and efficient operation, leveraging digitalization, automation and system integration.
- › Promoting open markets to foster the spread and scalability of innovative large engine technology solutions.

CIMAC Membership

CIMAC members currently come from **24 countries** across America, Asia and Europe. Membership can take three forms:

- Membership of the official CIMAC National Member Association (NMA) in your country
- Membership in the respective National Member Associations (NMA)
- Corporate Membership for individual companies (in countries where there is no NMA)

Please see page [43](#) for CIMAC contact details.

ABOUT CIMAC

CIMAC Strategy Groups & Working Groups: The Consensus Seekers

CIMAC Strategy & Working Groups are the heart of CIMAC. Led by **international specialists** from CIMAC member organisations, they seek solutions to industry-wide technical issues and develop strategies to deal with pressing topics of the industry.

They interface with legislators, standards organisations, and regulators such as the classification societies to develop united CIMAC guidelines, recommendations, or positions, representing the industry on a pre-competitive, pre-legislative basis. They have a distinguished record of issuing guidance and publications on a wide range of crucial subjects relating to the operation of large engines in the maritime industry. Consequently, CIMAC Strategy & Working Group activities encompass the environmental compatibility, efficiency and safety of large engines and their applications.

The two recently established CIMAC Strategy Groups are:

- Greenhouse Gas Strategy Group
- Digitalization Strategy Group

CIMAC Working Groups currently cover these vital areas of engine technology and operation:

- | | |
|-----------------------------|----------------------------------|
| ▪ Classification | ▪ Electronics & Software Systems |
| ▪ Crankshaft Rules | ▪ Gas Engines |
| ▪ Exhaust Emissions Control | ▪ Inland Waterway Vessels |
| ▪ Fuels | ▪ System Integration |
| ▪ Marine Lubricants | ▪ Propulsion |
| ▪ Users | |

CIMAC Events

The CIMAC Congress represents the culmination of all CIMAC activities, being held every three years, each time in a different member country. The Congress is **a unique gathering of key industry decision makers**, including manufacturers of engines, components and sub-systems, engine owners and operators, classification societies, researchers and developers, and representatives from regulatory bodies.

The Congress program centres on the **presentation of technical papers** on engine research & development, application engineering on the original equipment side, and engine operation and maintenance on the end-user side. This is complemented by social programs which promotes friendship and networking within the community.

CIMAC Circles are panel discussions involving CIMAC members debating topical issues. They are hosted at key industry events around the world at least once a year. CIMAC CASCADES promote the advancement of young engineers and their careers. The events enable them to meet with leading industry experts to exchange information, network and present their projects.

CIMAC Tech-Talks and Webinars are new online events with technical presentations & live discussion sessions, chaired by distinguished experts from the industry, offering fresh insights into new and important topics pertaining to the industry today.

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Person	Company	Place
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Finland	Technology Industries of Finland
France	CIMAC France
Germany	AG Großmotoren - CIMAC Deutschland
India	CIMAC India
Japan	JICEF (Japan Internal Combustion Engine Federation)
Republic of Korea	KOFCE (Korea Federation of Combustion Engines)
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