

M é l a n g e

December 2025



Monthly Magazine of The Institute of Marine Engineers (India)





The Institute of Marine Engineers (India)

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1	3241	Diesel Engine Combustion Gas Simulator MEO Class I	3 Days
2	3221	Engine Room Simulator - (Management level) MEO Class II	5 Days
3	3121	Engine Room Simulator - (Operational level) MEO Class IV	3 Days
NAVIGATION SIMULATOR			
4	2121	Radar Observer Simulator - (ROSC)	10 Days
5	2122	Automatic Radar Plotting Aids - (ARPA)	5 Days
6	2123	Electronic Chart Display And Information Systems - (ECDIS)	6 Days
7	2221	Radar And Navigation Simulator (RANSCO)	6 Days
ADVANCED MODULAR COURSES			
8	5312	Advanced Training for Ships using Fuels covered within IGF code (AIGF)	5 Days
9	5112	Advanced Training for Oil Tanker Cargo Operations (TASCO)	10 Days
10	5122	Advanced Training for Gas Tanker Cargo Operations (GASCO)	10 Days
11	5113	Advanced Training for Chemical Tanker Cargo Operations (CHEMCO)	10 Days
12	1061	Vertical Integration Course For Trainers - (VICT)	10 Days
13	6421	Medical Care (MC)	10 Days
BASIC MODULAR COURSES			
14	5311	Basic Training for Ships using Fuels covered within IGF code - (BIGF)	4 Days
15	3123	High Voltage Safety And Switch Gear - (Operational Level)	1 Days
16	6101	Basic Safety Training [BST = EFA + FPPT + PST + PSSR]	12 Days
17	6621	Security Trng. for Seafarer with Designated Security Duties - (STSOSD)	3 Days
18	5121	Basic Training for Liquefied Gas Tanker Cargo Operations (BTLG)	5 Days
19	5111	Basic Training for Oil and Chemical Tanker Cargo Operations (BTOC)	7 Days
20	5211	Crowd Management, Passenger Safety & Safety Training - (PSF)	3 Days
21	6511	Ship Security Officers - (SSO)	3 Days
22	6411	Medical First Aid (MFA)	4 Days

REFRESHER COURSES			
23	1118	Revalidation / Refresher and Updating Training for Engineers and ETO (RSO)	4 Days
24	6412	Refresher Training in Medical First Aid Course (RMFA)	1 Day
25	6122	Refresher Training for Proficiency in FPPT	Half Day
26	6112	Refresher Training for Proficiency in PST	Half Day



COMPETENCY COURSES			
27	3231	MEO Class I	2 Months
28	3211	MEO Class II	4 Months
29	-	MEO Class IV (Value Added)	2 Months
30	2211	Chief Mate (FG) Phase - I	3 Months
31	2212	Chief Mate (FG) Phase - II	3 Months
32	2111	Second Mate (FG)	4 Months

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From the Editor's Desk

Dear Esteemed Readers,

As the year draws to a close, the final month invites both reflection and resolve. December carries the quiet strength of summation—of lessons learned, progress made and directions clarified. This issue of iMélange brings together voices, ideas and initiatives that reflect a maritime sector steadily preparing for the future while remaining anchored in human and institutional values.

At the professional forefront, IME(I) branches across the country remained deeply engaged in knowledge-sharing and technical advancement. IME(I) Chennai hosted a focused technical meet on Artificial Intelligence in shipbuilding, exploring how digital intelligence is reshaping design, construction and lifecycle management. The Annual Technical Paper Competition at the Kolkata Branch showcased analytical rigour and original thinking among members and students alike, reaffirming the Institute's commitment to nurturing research and technical excellence.

The IME(I) Summit at Navi Mumbai brought an important human dimension to the fore with experts addressing stroke prevention and recovery—reminding us that wellbeing remains inseparable from professional performance. This was complemented by an insightful Mumbai Branch seminar on recent IMO deliberations and the National Marine Seminar which highlighted emerging technological innovations shaping the maritime sector.

Sustainability and technological advancement found strong expression across regions. Chandigarh hosted discussions on innovations in marine technology with emphasis on practical pathways toward greener operations. Student contributions added depth to this narrative through a comprehensive case study on methanol-fuelled ships, reflecting growing awareness and engagement with alternative fuels.

Industry developments during the month underline India's accelerating maritime ambition. The inauguration of MMCT's state-of-the-art campus by the Hon'ble Minister marks a significant investment in training and capability building. India's first indigenous hydrogen fuel cell passenger vessel commencing commercial service in Varanasi and the flagging off of the nation's first all-electric tug project represent decisive steps in green maritime transition. Maharashtra's push toward developing India's largest shipyard with a 2026 completion target further strengthens the industrial ecosystem.

On the global stage, India's re-election to the IMO Council with the highest vote share reinforces its standing as a credible and influential maritime nation. Policy-focused workshops on expediting solutions to sectoral challenges and recognition of lifetime achievement within IME(I) reflect both foresight and gratitude—essential pillars of institutional growth.

As we turn the page toward a new year, may we carry forward the spirit of learning, responsibility and innovation that defines our maritime fraternity.

We look forward to your articles, insights and reflections for the upcoming issue. Kindly send your contributions to editornewsletter@imare.in or subeditor@imare.in by **7th January 2026**.

SUNIL KUMAR
Editor-in-Chief (Hon.) – iMélange



Support Transition to Zero-Emission

The shift toward a zero-emission society has accelerated in various fields, with governments making their GHG targets more ambitious and sustainable finance gaining more attention. Likewise, the time has come for the maritime industry to systematically manage the GHG emissions from shipping, as represented by the introduction of a GHG emissions evaluation framework into international shipping.

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IME(I) Chennai Hosts Technical Meet on AI in Shipbuilding



The Chennai Branch of the Institute of Marine Engineers (India) organised a landmark technical meet on 5th December 2025, drawing an unprecedented attendance of over 120 participants – a record for the branch.

The session was anchored by the Hon. Secretary of the Chennai Branch, **Mr. Ramesh Subramanian** and centred on the theme “AI-Powered Tools in Shipbuilding.” The keynote presentation was delivered by **Mr. Gautam Srinivas** of Itajai Marine Services, while the event was graced by distinguished dignitaries including the newly elected President of IME(I), **Mr. Kaushik Seal** and the Chief Guest, **Mr. P.K. Mishra**, Managing Director of the Indian Register of Shipping.

The meeting commenced with a warm welcome address by **Mr. Ramasamy Muthusamy**, Chairman of the Chennai Branch, who extended greetings to all dignitaries and expressed hopes that the deliberations would be both useful and enjoyable.

The Chief Guest, Mr. P. K. Mishra, was introduced by Hon. Secretary Mr. Subramanian. In his address, Mr. Mishra emphasised the growing relevance of AI-powered tools in the global shipbuilding industry. Drawing from his experience in classification societies, he highlighted how AI is significantly reducing shipbuilding time and costs worldwide.

He noted that the topic was particularly apt in the context of the Government of India’s *Amrit Kaal* initiative to boost domestic shipbuilding.

Mr. Mishra urged surveyors and industry professionals to stay abreast of technological developments to remain competitive globally. He expressed admiration for the strong turnout and praised the enthusiasm of Chennai’s marine engineering community.

Mr. Kaushik Seal, was introduced by Executive Committee member **Mr. Dinesh Ramasamy**. In his remarks, Mr. Seal underscored the timeliness of the chosen topic and briefed members on upcoming





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initiatives being considered by the Institute. He assured full support for proposals from the Chennai Branch that could add value to the industry.

Mr. Seal stressed the importance of **training and collaboration** in ensuring Indian mariners remain relevant amidst rapid global advancements in technology, fuel and sustainability. He emphasised that maritime training institutes must play a pivotal role and reiterated his personal commitment to supporting initiatives that strengthen industry, institute and nation alike.

The technical session was introduced by Executive Committee member **Mr. Rajesh Madusudanan**, who welcomed speaker Mr. Srinivas.

Mr. Srinivas elaborated on the AI-driven tools developed by Itajai, showcasing their ability to integrate seamlessly with classification societies such as DNV. He explained how these tools enable real-time compliance checks, drastically reducing processes that once took months to mere minutes.

He further demonstrated the 3D virtual reality capabilities of the software, allowing designers to visualise machinery layouts and experience a “real-world feel” during the design phase.

The presentation was received with rapt attention by the audience, which included senior Managers from

leading shipping companies such as Synergy, Anglo Eastern, Su-Nav, NSK Shipping, V Ships and Executive Ship Management, as well as heads of training institutes including Capt. Bharadwaj from MASSA, Mr. Sanjeev Vakil from HIMT.

L&T Shipbuilding was represented by their Head of Design Centre **Cdr Atul Balram Killedar** who found the session being very revealing and useful.



The Q&A session that followed was lively, with participants raising both technical and social concerns. The technical questions were very professionally handled by the speaker Mr. Srinivas to the satisfaction of the audience. Addressing questions about the disruptive nature of AI tools, Mr. Seal reassured attendees that while workflows would evolve, professionals would not be displaced but rather empowered – humorously clarifying that people would indeed be “at home,” meaning able to work effectively from home.

Sponsors Itajai Industries also shared insights into their broader marine services, including alteration, repair and maintenance operations, alongside their digital employment platform *WASailor*.

The meeting concluded with a gracious Vote of Thanks by Executive Committee member **Mr. K.M Sundaram** (Ex. IRS), who acknowledged the contributions of all dignitaries, shipping companies and training institutes. Felicitations followed, with mementos presented to the dignitaries.





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Annual Technical Paper Competition at Kolkata Branch



The Institute of Marine Engineers (India), Kolkata Branch, organised Annual Technical Paper Competition on 22nd November 2025, for B. Tech students (3rd & 4th year) of all Indian Universities. The theme of the seminar was 'Modern Trends in Ship Propulsion & Maintenance Technology for Energy Efficient Ships'. Nine teams from Indian Maritime University (Kolkata Campus) (erstwhile DMET) and three teams from The Neotia University, Kolkata presented technical papers on various modern topics like smart engine maintenance, innovations in shipbuilding, nanotechnology in marine paints etc. The presentations were very informative.

The Chief Guest, **Capt. Himadri Roy**, Principal FOSMA Institute Kolkata, enlightened the audience on advancements of technology and the impact on seafarers' work and challenges in their life. He advised the cadets to continue learning beyond the limits of curriculum, support one another and always hold fast to the highest ethical standards of our industry and trade.

Guest of Honour, **Prof. Dr Raju Basak**, Chairman, Institution of Engineers (India), West Bengal State Centre, advised the students to conduct simulations and research on engineering problems and include primary data in their technical papers.

The Patron of the ceremony, **Rear Admiral Amit Bose (Retd) VSM**, Campus Director of Indian Maritime University, Kolkata Campus, in his address advised

the cadets about the ways to improve the quality of presentations and desired greater participation by the cadets in such seminars, for expanding the horizon of their knowledge.

Mr. Debashis Saha, Principal Surveyor, Indian Register of Shipping, Kolkata, graced the occasion as Special Guest.

Mr. Alok Kumar Mitra, Extra First-Class Marine Engineer (UK), was the Chief Judge on the occasion. **Mr. Vishvanath Ramkumar**, Ex-Principal, Hoon Maritime Institute and **Mr. S. K. Das**, Ex-DDG (Technical) cum E&SS, MMD Kolkata, were present as judges.

Twelve participants presented technical papers in the seminar. **Cdt Shreya V. Pillai & Cdt Shruti Pathak** of





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Indian Maritime University (Kolkata Campus) won the Dr D. N. Sarkar Memorial (first) Prize for their paper 'Beyond Toxic Coatings: A Super-amphiphobic Nanocomposite for Sustainable Ship's Hull'. A Team led by **Cdt Niranjana H. L.** won the Late U. N. Saha Memorial (second) Prize for their paper 'Ship Design and Structural Innovations: Emerging Technologies for a Sustainable Maritime Future'. **Mr. Arun Kumar Singh**, Hon. Treasurer, IME(I) Kolkata branch awarded 3rd & 4th Prizes to **Cdt Rajdeep Das** (3rd) and **Cdt Gautam Raj Sinha** (4th). **Cdt Rittik Singh** and **Cdt Sonali Munshi** won 5th prize. Nine participants won Motivational Awards.

The session was inaugurated by **Mr. Sadhan Kumar Sarkar**, Chairman, IME(I) Kolkata Branch. He welcomed all dignitaries and guests. He opined that the growth of India is solely depended on the growth of the young generation. He thanked all guests for their presence on the occasion.

Mr. A. K. Barai, Vice Chairman, IME(I) Kolkata Branch and **Mr. Sanjay Kr Das**, HOD, MER, The Neotia University were present in the audience.

Mr. Swapan Kumar Saha, GC Member, IME(I) Kolkata proposed a vote of thanks in conclusion.



THE INSTITUTE OF MARINE ENGINEERS (INDIA)

KOLKATA BRANCH

Annual Functions – 2026

1 ANNUAL TECHNICAL PAPER MEET

Saturday, 3 January 2026 | 9:30 AM onwards

Princeton Club, 26 Prince Anwar Shah Road, Kolkata – 700 033

Theme: *Oceans of Opportunities and Responsibilities*

2 ANNUAL CONTRIBUTORY DINNER

Saturday, 21 February 2026 | 7:30 PM onwards

Princeton Club, 26 Prince Anwar Shah Road, Kolkata – 700 033

Members are requested to kindly confirm their participation for each event in advance.

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Spotlight on Stroke Prevention and Recovery Experts Address at IME(I) HO



A Stroke Awareness Event was held on 22nd November 2025, at the IMEI House in Nerul, Navi Mumbai, in coordination with Spark Avenue Global Media as the Media Partner.

The programme was graced by **Mr. Arun Kumar Gupta**, former CMD of SCI, who honoured the occasion as the Chief Guest. In his address, he reflected on the remarkable progress of the Institute over the years and recalled the visionary efforts that shaped the IME(I) Centre in its formative days.

Mr. Gupta emphasised that informative seminars like this are crucial, given the current demands of the seafaring profession and hoped that those present might benefit by it.

The event saw participation from over a hundred delegates, with a major representation from the marine fraternity. Members of various Rotary Clubs of Navi Mumbai, as well as guests from the **business and entrepreneurial communities**, also attended, enriching the gathering with diverse perspectives.



Dr. Amit Girey, Neurologist and Founder of Om Physiotherapy Clinic—renowned for his exemplary 21-year track record in post-stroke care and rehabilitation—introduced the subject with clarity and insight. He emphasised the critical importance of the *golden period* in stroke management and outlined the immediate steps required when a stroke occurs. Dr. Girey highlighted the urgency of early diagnosis and the need to reach a stroke-ready center without delay.

Adding a scientific dimension to the discussion, **Dr. Shakti Upadhyay**, Scientist and specialist in photomedicine, cell biology and immunology, explained how advancements in medical science are enhancing rehabilitation outcomes. He also offered a glimpse into the growing role of non-invasive, light-based therapies that are increasingly being adopted across various healthcare emergencies.

The event was moderated by **Dr. Sulekha Chandra**—author, trainer, mentor and emotional intelligence expert from the Spark

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team. Her facilitation of the interactive panel discussion created an engaging environment, enabling the audience to connect personally with the subject and absorb the key messages effectively.

Mr. Tarique Mulla, Hon. Secretary, IME(I) Navi Mumbai Chapter extended a warm welcome to the Chief Guest and delegates and precisely conducted the proceedings as Master of Ceremonies. His efforts ensured that the core objective of promoting Stroke Awareness was delivered effectively and within the planned schedule.

Mr. Mulla, along with the IME(I) administration team, also undertook the recording and live online streaming of the event.

Spark Avenue Global Media, led by **Mr. Sadanand Subramanian**, along with team members **Dr. Sulekha Chandra** (Gyan Paradise) and **Ms. Sudipta Chatteraj** (Srishti Green Decor), collaborated closely with the IME(I) team headed by Chapter Chairman **Mr. Chitta Dash**, Secretary **Mr. Tarique Mulla** and EC member **Ms. Archana Saxena Sangal** throughout the planning and execution of the programme as Media Partners.



Specially crafted mementos designed by Ms. Chatteraj were presented to all the speakers in appreciation of their valuable contributions.

Ms. Sangal extended the vote of thanks.



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Jan 2026: 12 - 17



ME-GI Control System Standard Operation

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IME(I) Mumbai Branch Hosted Insightful Seminar on Recent IMO Deliberations



The Institute of Marine Engineers (India), Mumbai Branch successfully organised a high-level seminar on “Recent IMO Meetings – MEPC ES.2, ISWG-GHG 20 & PPR” on 17 December 2025 at the Indian Register of Shipping (IRS) Auditorium, Powai, Mumbai. The seminar was conducted in association with the Directorate General of Shipping (DGS) and the Indian Register of Shipping (IRS), reaffirming India’s growing engagement with global maritime regulatory developments.

The event brought together senior government officials, maritime administrators, technical experts, classification society representatives and industry professionals to deliberate upon critical outcomes of recent International Maritime Organization (IMO) meetings, particularly focusing on greenhouse gas (GHG) reduction measures, pollution prevention frameworks and future regulatory pathways.

The seminar was graced by **Shri Shyam Jagannathan, IAS**, Director General of Shipping, as the Chief Guest, whose address underscored India’s proactive role at the IMO and its commitment to sustainable maritime growth. **Shri P.K. Mishra**, Managing Director, IRS, participated as the Special Guest.

The Keynote Address was delivered by **Shri Ajit Kumar Sukumaran**, Chief Surveyor and Additional Director

General (Technical), Directorate General of Shipping, who also led the Indian delegation to the MEPC Extraordinary Session (ES.2).

The seminar was efficiently moderated by **Mrs. Sonali Banerjee**, welcomed the gathering and highlighted the importance of disseminating outcomes of IMO deliberations to the wider maritime fraternity.

Addresses by the Special Guest emphasised the evolving regulatory landscape and the vital role of Indian institutions in supporting compliance, innovation and environmental stewardship. The Chief Guest, in his address, provided strategic insights into India’s position at international forums and the nation’s preparedness for forthcoming regulatory transitions.

Keynote and IMO Updates

In his keynote address, Shri Sukumaran, presented a detailed and insightful overview of the deliberations held during the **MEPC ES.2**. He elaborated on the intensive negotiations undertaken at the IMO concerning the formulation of mid-term measures for the reduction of greenhouse gas emissions from international shipping, including discussions on fuel standards, economic mechanisms and the global framework for achieving net-zero emissions. Shri Sukumaran highlighted India’s constructive engagement during the session, outlining

the country's balanced approach that sought to align environmental ambition with technological feasibility and equitable implementation for developing nations.

He further emphasised the evolving regulatory trajectory at the IMO and the implications of these measures for shipowners, operators, designers and regulators, underscoring the need for early preparedness and collaborative action across the maritime ecosystem.

This was followed by an update on IMO Assembly 34 and the Council elections by **Shri Anirudh Chaki, Dy. Chief Surveyor-cum-Senior Deputy Director General (Tech)**, who provided participants with a comprehensive perspective on recent institutional developments at the IMO. His presentation covered key decisions taken at the Assembly, changes in the composition of the IMO Council and their significance for future policy direction and governance. The update offered valuable insights into how these developments would influence ongoing technical deliberations and strategic decision-making at the IMO, further contextualising the outcomes of the recent committee meetings.

An introduction to the Indian delegations that participated in MEPC ES.2, ISWG-GHG 20 and PPR meetings was also presented, highlighting the breadth of India's technical and policy representation.

The seminar featured focused technical sessions that provided detailed briefings on recent IMO discussions:

- **Session 1** was led by **Shri J. Senthil Kumar**, Principal Officer, MMD Kochi, who presented the progress report from **ISWG-GHG 20**, elaborating on negotiations related to mid-term GHG reduction measures and timelines.

- **Session 2** covered the work of the **Pollution Prevention and Response (PPR) Sub-Committee**, with presentations by **Shri Satish Kamath**, Dy. Chief Surveyor-cum-Senior Deputy Director General (Tech), DG Shipping and **Shri Gopikrishna**, Engineer & Ship Surveyor-cum-Deputy DG(Tech), DG Shipping highlighting regulatory updates and technical developments in pollution prevention.
- **Session 3** outlined forthcoming agendas and timelines for upcoming **ISWG and MEPC meetings**, providing participants with clarity on future deliberation pathways.

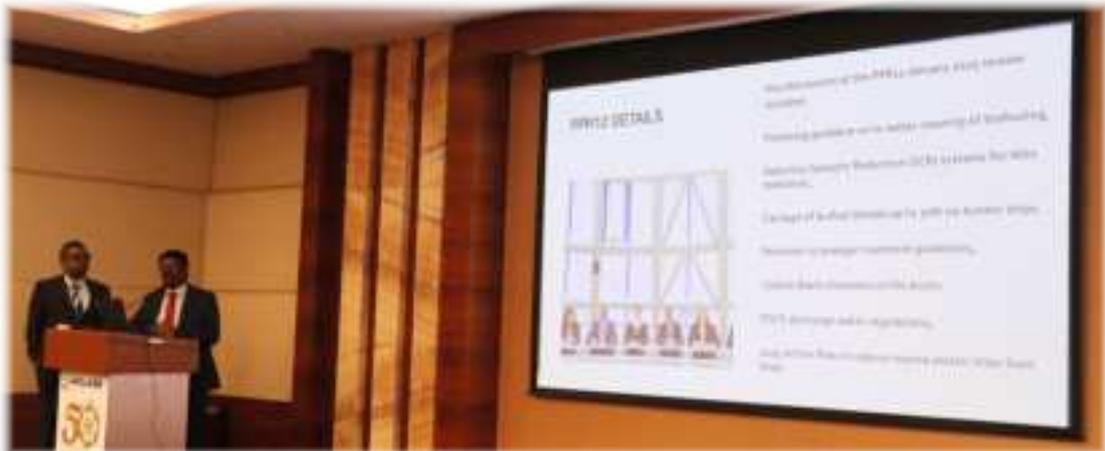
The seminar concluded with a Vote of Thanks delivered by **Mr. Sunayan Sanatani**, Secretary, IME(I) Mumbai Branch, who acknowledged the contributions of dignitaries, speakers, moderators and participants.

In addition to the seminar, the IME(I) Mumbai Branch also formally inaugurated the upcoming **INMARCO** event, scheduled to be held from **27th –29th October** at **The Westin, Powai, Mumbai**. The official inauguration was announced by **Mr. Sanjeev V. Mehra**, Chairman, IME(I) Mumbai Branch, marking the commencement of preparations for this flagship maritime event along with **Comde. Bhupesh Tater**, Convener, INMARCO.

The seminar successfully served as a knowledge-sharing platform, enhancing awareness of recent IMO outcomes and reinforcing India's commitment to global maritime governance, environmental sustainability and technical leadership. The initiative by IME(I) Mumbai Branch once again demonstrated its pivotal role in bridging international policy deliberations with domestic maritime stakeholders.

Glimpses of the Event







National Marine Seminar Highlights Emerging Technological Innovations in the Maritime Sector



The Institution of Engineers (India), Maharashtra State Centre, Mumbai, in association with The Institute of Marine Engineers (India) Mumbai branch, successfully organised the National Marine Seminar on “Technological Innovations in the Maritime Sector” on Sunday, 14th December 2025 at The Institution of Engineers (India), MSC Mumbai, Haji Ali, Mumbai. The seminar witnessed

active participation from marine engineers, technocrats, industry professionals and members of IEI and IME(I), reflecting the growing interest in technology-driven transformation of the maritime domain.

The inaugural function was graced by the Chief Guest, **Shri P. K. Mishra**, Managing Director, Indian Register of Shipping, who delivered an insightful address highlighting the role of emerging technologies, innovation-led regulation and classification societies in shaping a safer, greener and more efficient maritime industry. The Guests of Honour included **Shri Mohan Dagaonkar**, Former Additional Commissioner, Navi Mumbai and **Shri Manish Kothari**, President Elect, IEI Kolkata, who shared their perspectives on policy support, institutional collaboration and capacity building for sustainable maritime growth. The function was presided over by **Shri V. C. Kamble**, Chairman, IEI Maharashtra State Centre, Mumbai, who emphasised IEI’s commitment to fostering technical excellence and knowledge





dissemination across engineering disciplines, particularly in the marine sector.

The seminar was convened by **Shri Ganesh Barabde**, Chief Engineer, V Ships and Convener (Marine), IEI MSC Mumbai. The organising committee comprised **Shri S. P. Singh**, Chairman, IEI Navi Mumbai; **Shri Sanjeev Mehra**, Chairman, IME(I) Mumbai Branch; **Capt. Dr. Bhasker Bhandarkar**, Council Member (Marine), IEI Kolkata and **Shri Vasant Pandarkar**, Organising Secretary, IEI MSC Mumbai. The deliberations during the seminar focused on contemporary technological innovations, digitalisation, automation, green shipping solutions and future-ready maritime practices. The event concluded on a constructive note, reinforcing the importance of collaboration between professional institutions, industry and policymakers to advance innovation and sustainability in the maritime sector.

Sustainability and Innovations or Advancements in Marine Technology



The Institution of Engineers (India) (IEI) and the Institute of Marine Engineers (India) – IME(I), Chandigarh Chapter, jointly organised a one-day seminar on the topic **Sustainability and Innovations or Advancements in Marine Technology** on 13th December 2025 at IEI Bhawan, Chandigarh. The event brought together 74 maritime professionals, including senior industry leaders, practicing engineers, academics and policymakers. Designed as a forum for knowledge

exchange and strategic dialogue, the seminar focused on the evolving challenges and opportunities in the maritime sector, with particular emphasis on technological disruption, sustainability and the role of policy, innovation and education in shaping the future of maritime operations.

The seminar was coordinated and facilitated by **Mr. Ajit Singh** from IME(I), whose guidance ensured structured and meaningful discussions. Proceedings



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began with a welcome address by **Mr. Sukhbir Singh Mundi**, Past Chairman of IEI, who highlighted the relevance of such professional forums in addressing contemporary maritime challenges. This was followed by an introduction to the seminar theme by **Mr. Iqbal Singh**, Chairman of the IME(I) Chandigarh Chapter, who underlined the need for collaborative thinking across industry, academia, and regulatory bodies.

The Chief Guest, **Shri Manoj Kumar Sinha** from Indian Oil Corporation Limited (IOCL), delivered a keynote address outlining IOCL's initiatives to align with the rapidly changing requirements of the maritime industry. He discussed the corporation's preparedness for emerging fuel technologies, evolving environmental standards and operational transformations. His address emphasised the proactive role of energy providers in supporting sustainable and compliant maritime operations amid global transitions in fuel quality and emissions norms.

The Guest of Honour, **Captain (Dr.) Nitin Agarwala** of the Indian Navy, presented a comprehensive and thought-provoking paper on the "Role of Policy Framework for Disruptive Technologies in the Maritime Domain." He emphasised that regulations must function as a bridge between governance, insurance, business models, technology, processes and infrastructure. Highlighting the pace of technological change, he noted that outdated regulations often hinder innovation and economic growth. Policymakers, he argued, must balance public interest with the needs of innovators, recognizing that disruption can both reduce traditional revenues and create new economic opportunities. He stressed the urgency of removing unnecessary regulations while maintaining safety and public trust, citing estimates of

significant economic losses caused by overregulation. Importantly, he addressed workforce displacement due to disruption, calling for proactive policies focused on reskilling, retraining and equitable sharing of the costs and benefits of technological change. Timely and forward-looking policymaking, he concluded, is essential to sustain growth with minimal social unrest.

Ms. Manpreet Kaur, Head of the Mechanical Engineering Department at BBSBEC, Fatehgarh Sahib, delivered an in-depth lecture on marine corrosion, describing it as an aggressive and economically damaging challenge driven by chlorides and biofouling. She explained how poor corrosion management can result in serious safety risks, structural degradation and financial losses. Advocating surface engineering as a long-term solution, she highlighted the importance of protective coatings, cathodic protection and intelligent material selection. Special attention was given to advanced thermal spray technologies such as High Velocity Oxy-Fuel (HVOF) and Cold Spray coatings, which significantly extend service life. She also introduced emerging solutions including additive manufacturing and self-healing polymers, emphasising the need for predictive maintenance and "Cradle-to-Cradle" lifecycle thinking to achieve sustainable marine asset management.

Prof. Jasjeet Suri, Vice-Principal at Chitkara University's School of Maritime Studies, addressed sustainability in the maritime domain using the Triple Bottom Line framework of Planet, People, and Profit, aligned with the UN Sustainable Development Goals. He emphasised the importance of measurable sustainability indicators, such as the Carbon Intensity Indicator (CII),





and clarified that innovation should be viewed as a continuous process rather than isolated invention. Prof. Suri called for a shift from a solely safety-oriented mindset toward one that integrates sustainability and long-term ocean health. He discussed advancements in anti-fouling coatings and clean energy propulsion systems, concluding that true sustainability requires both technological progress and a fundamental change in organisational mindset.

Mr. Arjun G. Singh Tuteja, Tech Service Manager at IOCL, focused on innovations in marine lubricant technology in the post-2020 regulatory environment.

He explained the implications of reduced Sulphur limits in bunker fuels and the maritime sector's pathway toward Net Zero by 2050. He emphasised that regulatory compliance now requires a holistic approach encompassing fuel choice, emissions intensity and operational practices. The development of fuel-specific lubricants, combined with AI-enabled sensor technologies, allows real-time optimisation and predictive maintenance. He stressed the integration of regulatory ratings and costs, such as EEXI, CII, EU ETS, and FuelEU, into daily operations, asserting that sustainability has become a core engineering discipline.

Capt. Prabhat Nigam, Pro Vice Chancellor of Chitkara University of Maritime Studies, discussed the transformation of maritime education and training (MET) in India. He outlined reforms led by the Directorate General of Shipping under the Maritime India Vision 2030 and Maritime Amrit Kaal 2047, aimed at positioning India as a global maritime skill hub. These reforms include stricter regulatory oversight, alignment with IMO–STCW standards, modernisation through simulators and digital learning platforms, expanded institutional capacity and curricula focused on green shipping, cybersecurity and human–machine interaction. Despite challenges in uniform quality and infrastructure scaling, he emphasised that these reforms are creating a future-ready maritime workforce.

In the final invited lecture, **Mr. Munish Sharma**, Technical Director at Royal Marine Ship Management Services, highlighted how regulatory and economic pressures are driving advancements in marine technology. Drawing on extensive industry experience, he discussed innovations in electronic engines, featuring smart emissions control and digital integration. He spoke about hybrid power generation for zero-emission operations in port. Ballast-free ship designs and operational optimisation through AI, IoT, and data analytics. While acknowledging increasing automation, he stressed the continued importance of human oversight in maritime operations.

The seminar concluded with a vote of thanks by **Ms. Manpreet Kaur**, Honorary Joint Secretary of IEI, who expressed appreciation to the speakers, organisers, volunteers and technical staff. The event ended with the National Anthem.



Maritime Excellence Recognised with Lifetime Achievement Award



Shri **S. M. Rai**, Senior Fellow Member of The Institute of Marine Engineers (India), was conferred with the prestigious Lifetime Achievement Award at the International *Samudra Manthan Awards*, organised in association with the Directorate General of Shipping under the Ministry of Ports, Shipping and Waterways. The award was presented by the Chief Guest, the Hon'ble Governor of Mizoram and former Chief of the Armed Forces, **General Dr. V. K. Singh, PVSM, AVSM**, in the presence of eminent national and international

dignitaries. The ceremony was held at a grand function at the Jio Convention Centre, Mumbai, on 19th November 2025.

Shri Rai was honoured in recognition of his outstanding contributions to ship engineering, advancement of maritime standards and exemplary leadership within the marine and shipping fraternity. His lifelong dedication to professional excellence and capacity building in the maritime sector has earned him wide respect across the industry.





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Workshop on Policy Interventions for Speedy Resolution of Key Challenges in the Indian Maritime Sector



A focused workshop on “Policy Interventions Required for Speedy Resolution of Current Issues in the Indian Maritime Sector” was jointly organised by the Indian Private Ports and Terminals Association (IPPTA) and the Indian Maritime Centre (IMC) on 24th November 2025 at Andheri, Mumbai. The workshop brought together key stakeholders from the maritime ecosystem to deliberate on regulatory, operational and policy challenges impacting the sector’s growth.

The event provided a high-level platform for private port operators, terminal developers, maritime service providers, policymakers and industry experts to engage in constructive dialogue on issues requiring immediate policy attention. Discussions centred on improving ease of doing business, streamlining approval mechanisms, enhancing private sector participation and accelerating dispute resolution processes in the maritime domain.

The dignitaries present at the event included **Shri Sushil Mansing Khopde, IPS**, Additional Director General of Shipping, Directorate General of Shipping; **Shri P. K. Misra**, Joint Managing Director, Indian Register of Shipping; and **Shri Rajiv Jalota, IAS**, along with several other senior leaders and key representatives from the shipping and maritime industry.

Participants highlighted the need for clearer regulatory frameworks, faster decision-making at multiple levels of governance and better coordination among central and state authorities. Emphasis was laid on addressing procedural delays related to land acquisition, environmental clearances, tariff structures, concession agreements and contract enforcement, which continue to affect project timelines and investor confidence.





connectivity, digitalisation, customs processes and port-led industrialisation to unlock the full potential of India's maritime sector.

The role of institutions such as IPPTA and IMC in facilitating structured industry-government engagement was widely acknowledged. The workshop concluded with consensus on the need to compile actionable recommendations for submission to relevant authorities, aimed at enabling faster resolution of bottlenecks and supporting India's broader maritime vision under initiatives such as *Maritime India Vision 2030* and *Maritime Amrit Kaal Vision 2047*.

The workshop also underscored the importance of harmonised policies for ports and terminals, particularly in the context of increasing private investment and the evolving role of major and non-major ports. Stakeholders called for uniformity in concession frameworks, rationalisation of compliance requirements and predictable policy regimes to support long-term infrastructure development.

Another key area of discussion was the integration of ports with logistics and hinterland connectivity. Speakers stressed that policy interventions must go beyond port boundaries and address multimodal





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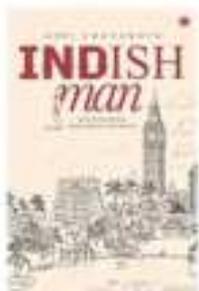
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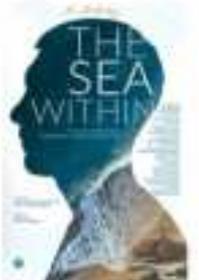
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AUTHORS & BOOKS AT THE EVENT



Hon'ble Minister Inaugurates MMCT's State-of-the-Art Campus



Hon'ble Minister, Port, Shipping and Waterways, Shri Sarbananda Sonowal, inaugurated the newly renovated campus of Mangalore Marine College & Technology (MMCT) on 13th November 2025. The event marked a significant milestone in MMCT's journey toward maritime education and excellence.

The MMCT 2.0 campus is a symbol of the institution's commitment to continuous growth and technological advancement. Spread over 1,50,000+ sq. ft., the MMCT campus integrates world-class training infrastructure, including fully functional Ship-in-Campus training, world-class simulators, advanced marine workshops and laboratories, smart classrooms, computer labs, digital library and fully renovated hostel accommodations.

MMCT offers a range of Directorate General of Shipping (DGS)-approved programmes that prepare students for rewarding maritime careers: Graduate Marine Engineering (GME), Electro Technical Officer (ETO), Diploma in Nautical Science (DNS) and General Purpose (GP) Rating Course.

The inauguration ceremony was attended by distinguished dignitaries, including **Capt. Brijesh Chowta**, **Dr. Bharat Shetty**, **Shri Shyam Jagannathan (IAS)**, **Shri Sushil Mansingh Khopde (IPS)**, **Dr. Venkata Ramana Akkaraju** and **Capt. M.P. Bhasin**.

Shri S.I. Nathan, Founder and Chairman, CMC Group of Institutions, stated, "The launch of MMCT 2.0 marks a new chapter in our journey to elevate maritime education in India. With modern facilities and global training standards, we aim to create future-ready seafarers who uphold India's maritime legacy with pride and professionalism."

Hon'ble Minister Shri Sarbananda Sonowal said, "India is aiming to become the third largest economy in the world by 2029 under the leadership of Prime Minister Shri Narendra Modi." "The government has given two visions: India Maritime Vision 2030 and India Amrit Kaal Vision 2047." "We will invest at least 80 lakh crore rupees in the maritime sector for modernization, mechanisation and digitisation." "India has the solution to every problem of the world, and we need to harness our maritime power."

A formal ceremony was held to launch the 'Sagar Mein Yog' Wellness Programme, graced by Minister of Ports, Shipping and Waterways, Shri Sonowal.

On this occasion, the Minister felicitated 13 dedicated staff members of CMC & MMCT, recognising their tireless service and commitment to the organisation.

Capt. Chowta, Member of Parliament, said, "Mangalore is a hub for education, and this institution will contribute to the region's growth. We want to make Mangalore a hub for maritime education and technology. I thank the Hon'ble Minister for blessing this occasion and starting a new chapter in Mangalore's journey of education and growth."

Dr. Shetty, Member of Legislative Assembly, said, "Mangalore has more than 10 medical colleges, 30

Shri Khopde, Additional Director General of Shipping, said, "Yoga is essential for mental wellbeing and we have launched a course on Yoga for seafarers. The course will help seafarers develop intuition, intellect and consciousness. I hope the cadets will take advantage of this course and progress in their future life."

Dr. Akkaraju, Chairperson, New Mangalore Port Authority, said, "The Hon'ble Prime Minister has given a clear vision to increase maritime ratings and seafarers to 20% by 2047. We need to encourage female power in the maritime sector and create research and skilling opportunities. I wish the institution all the best and the young boys and girls a bright future.

Capt. M.P. Bhasin, Managing Director, MSC Crewing Services Pvt. Ltd., said, "MSC has a vision



engineering colleges and 8-9 dental colleges, making it an education hub. The newly renovated campus will contribute to the educational hub and produce quality students. I wish the institution all the best and hope it will make Mangalore proud."

Shri Jagannathan, Director General of Shipping, said, "India is emerging as a leading maritime nation and we are working towards achieving the milestones of Maritime India Vision 2030 and Vision Amrit Kaal 2047. We aim to increase India's share in global shipbuilding and become a global leader in sustainable, safe and smart shipping. The Mangaluru Port Authority is playing a significant role in the economy and export-import growth story of the region."

to develop professionals who can navigate seas and lead the global maritime economy. We aim to create skilled seafarers who understand sustainability and technology. MSC has a huge workforce from India, and we are proud to employ Indian seafarers on our vessels."

The ceremony concluded with a Vote of Thanks by **Mrs. Clarissa I.**, Managing Director, CMC Group of Institutions and a token of appreciation presented to the Hon'ble Minister and other dignitaries.

The Evening event was part of a heartwarming get-together at The Ocean Pearl Hotel, bringing together staff, faculty, family members and management staff.

India's First Indigenous Hydrogen Fuel Cell Passenger Vessel Begins Commercial Service in Varanasi



India has taken a significant step toward green and sustainable inland water transport with the commencement of commercial operations of the country's first fully indigenous hydrogen fuel cell passenger vessel on the river Ganga. Union Minister for Ports, Shipping and Waterways (MoPSW), **Shri Sarbananda Sonowal**, flagged off the maiden commercial run of the vessel at Namoo Ghat, Varanasi, signalling a new era of zero-emission maritime mobility.

The hydrogen-powered passenger vessel is the first in India to demonstrate hydrogen fuel cell propulsion in a maritime environment using entirely indigenous technology. Powered by a Low Temperature Proton Exchange Membrane (PEM) fuel cell system, the vessel converts stored hydrogen into electrical energy, with water being the only by-product, ensuring completely emission-free operations.

Addressing the gathering, Shri Sonowal said that under the visionary leadership of Prime Minister **Shri Narendra Modi**, India is witnessing a transformative shift towards clean, sustainable and self-reliant transportation. He noted that the launch of the hydrogen fuel cell vessel reflects the Government's strong commitment to *Make in India*,

green mobility and the ecological rejuvenation of the sacred river Ganga, while ensuring that development progresses in harmony with environmental responsibility.

The vessel is owned by the Inland Waterways Authority of India (IWAI) and has been built by Cochin Shipyard Limited (CSL). Its entry into commercial service follows the successful completion of extensive trials and aligns with India's national commitment to achieve net-zero emissions by 2070. The project also supports the Ministry's broader efforts to promote clean and alternative fuels across India's inland waterways network.

Designed as a 24-metre catamaran for urban and pilgrimage transit, the fully air-conditioned vessel has a seating capacity of 50 passengers and operates at a service speed of approximately 6.5 knots. Its hybrid energy architecture integrates hydrogen fuel cells, battery storage and solar power, enabling up to eight hours of continuous operation on a single hydrogen fill. The vessel is classed and certified by the Indian Register of Shipping, ensuring compliance with safety and performance standards.



To operationalise the pilot project, IWAI, Cochin Shipyard Limited and Inland and Coastal Shipping Limited have entered into a tripartite agreement covering technical support, operational management, safety protocols, monitoring mechanisms and periodic inspections during the pilot phase. The structured framework ensures safe, reliable and efficient deployment of this pioneering technology.

The hydrogen fuel cell vessel offers multiple advantages for urban water transport, including noise-free travel, zero smoke and pollution, reduced road congestion and enhanced commuter experience. It is also expected to boost tourism

and local employment while positioning Varanasi among the first cities globally to adopt hydrogen-powered passenger transport on inland waterways.

The maiden commercial voyage covered a five-kilometre stretch from Namoo Ghat to Lalita Ghat on National Waterway-1, carrying ministers, senior officials and other dignitaries, formally marking the start of commercial hydrogen-powered passenger services on the Ganga.

The flag-off ceremony was attended by Minister of State (Independent Charge) Shri Ravindra Jaiswal, Uttar Pradesh Transport Minister Shri Dayashankar Singh, Minister of State (Independent Charge) Dr. Daya Shankar Mishra 'Dayalu', several Members of the Legislative Assembly, the Mayor of Varanasi Municipal Corporation and senior officials from the Ministry of Ports, Shipping and Waterways, IWAI and the Government of Uttar Pradesh.



Following the introduction of hybrid electric catamarans, the deployment of the hydrogen fuel cell vessel further reinforces IWAI's long-term strategy to modernise, decarbonise and future-proof India's inland water transport system in line with *Maritime India Vision 2030* and *Maritime Amrit Kaal Vision 2047*.

India Re-elected to IMO Council with Highest Vote Share, Reinforcing Global Maritime Leadership



India has been re-elected to the Council of the International Maritime Organization (IMO) in Category B, securing the highest number of votes for the second consecutive term. The election took place on 28th November during the 34th IMO Assembly in London, where India received 154 out of 169 valid ballots, marking a strong acknowledgment of the nation's robust maritime interests and growing influence in international seaborne trade.

Union Minister of Ports, Shipping and Waterways Shri Sarbananda Sonowal expressed that this remarkable outcome reflects the world's confidence in India's role as a major maritime power. He stated that India's success at the IMO is a testament to Prime Minister Shri Narendra Modi's progressive maritime vision and his commitment to building a safer, greener and more efficient global maritime ecosystem. He described the re-election as a proud moment for the entire maritime sector and a



major endorsement of India's constructive engagement in shaping the future of international shipping.

The achievement comes soon after India successfully hosted the India Maritime Week 2025, inaugurated by Prime Minister Shri Narendra Modi, which saw participation from representatives of more than 100 countries. The event showcased India's expanding maritime capabilities and served as a major platform



for policy collaboration, technology advancement, port-led development initiatives and maritime security discussions. This continued recognition also demonstrates India's proactive role in sustainability, maritime safety, digitalisation and seafarer welfare areas that have strengthened trust within the global maritime community.

India's leadership has been aligned with the long-term roadmap of the Amrit Kaal Maritime Vision 2047,



which aims to transform the country into a globally competitive maritime hub. The initiative is guided by Hon'ble Prime Minister and driven by Shri Sonowal, along with Minister of State for Ports, Shipping and Waterways Shri Shantanu Thakur, focusing on port modernisation, smart logistics and innovation-led maritime growth. Officials noted that India securing the highest votes again highlights the nation's strong position among the ten major maritime nations elected in Category B, including Germany, France, Canada, UAE, Australia, Spain, Sweden, Netherlands and Brazil.

During the Assembly, India's delegation also held bilateral and multilateral discussions with other maritime nations and global organisations to deepen cooperation in green shipping, maritime safety frameworks, port digitalisation and the development of resilient supply chains. Industry observers believe that India will continue to play a crucial role in maritime policy-making at a time when the global shipping industry is rapidly transitioning through sustainability measures and technological advancements. The Government has reiterated its commitment to collaborative maritime governance and its continued contribution to ensuring secure and stable global trade.

**Book
Launch**

Comprehensive Guide on Port Operations



The book *Port Operation and Management Handbook* by **Shri Amit Bhatnagar**, Fellow, IME(I) (F 5874) marking a significant contribution to contemporary maritime literature. The handbook has been conceived

as a comprehensive and up-to-date reference work on port operations and management, integrating technical, economic and regulatory aspects into a single, accessible volume. It effectively distils complex operational frameworks, administrative procedures and emerging technological trends into clear and practical guidance for readers.

The publication has been well received by port administrators, operators and members of academia for its relevance and clarity. It is particularly useful for students pursuing studies in shipping, port management, maritime logistics and supply chain management, while also serving as a valuable reference for industry professionals, policymakers and regulators. The book provides extensive coverage of international maritime conventions, including SOLAS, MARPOL and the ISPS Code, along with frameworks for safety, security, cargo handling and environmental sustainability. With its blend of theory, case studies and practical insights, the handbook is expected to support academic learning, professional development and informed decision-making across the maritime and port management sector.

India Takes Major Green-Tech Leap as Nation's First All-Electric Tug Project Flagged Off



India's maritime sector has taken a significant step toward sustainable growth as Union Minister for Ports, Shipping and Waterways, **Shri Sarbananda Sonowal**, virtually flagged off the steel-cutting ceremony for the country's first all-electric green tug. Designed for Deendayal Port Authority (DPA) in Kandla, the tug is being built under the Ministry's flagship Green Tug Transition Programme (GTTP), marking a major advancement in India's decarbonisation and clean-energy integration efforts.

The ceremony was attended by Minister of State for Ports, Shipping and Waterways **Shri Shantanu Thakur**; MoPSW Secretary **Shri Vijay Kumar, IAS**; DPA Chairman **Shri Sushil Kumar Singh, IRSME**; senior officials of DPA Kandla as well as representatives from Netincon, Ripley, technical experts from Kongsberg and engineers from Atreya Shipyard, which is carrying out the vessel's construction. The initiative reflects the Government's strong focus on energy efficiency, innovation and green growth within port operations.

Speaking on the occasion, Shri Sonowal said that this historic milestone is a direct result of the visionary guidance of Prime Minister Shri Narendra Modi, who has placed the maritime sector at the centre of India's sustainability and economic transformation agenda. He emphasised that the steel-cutting of the first all-electric tug demonstrates the Modi Government's dedication to future-ready infrastructure, environmental stewardship





and technological leadership on the global stage. He noted that a modern and clean maritime ecosystem is vital for India to achieve its aspiration of becoming a global maritime power.

The Minister added that the “Viksit Bharat” vision puts ports and maritime logistics at the forefront of national progress, and the launch of this tug shows how innovation can accelerate India’s transformation into a greener and stronger maritime nation. The tug being developed for DPA will have a 60-ton bollard pull capacity and will operate with zero emissions, silent propulsion, lower maintenance requirements and enhanced manoeuvring efficiency, thereby setting a benchmark for next-generation tug operations in Indian ports.

Under the GTTP, India aims to induct 50 green tugs by 2030, with 16 of them set to be deployed in the first phase between 2024 and 2027. Two green tugs each will be stationed at DPA, Paradip Port Authority, Jawaharlal Nehru Port Authority and V.O. Chidambaram Port Authority, while the remaining major ports will receive one tug each. Four major ports – DPA, VPA, JNPA and VoCPA – have already

awarded work orders, with DPA being the first to formally commence construction, further strengthening the port’s leadership in clean-energy transition.

Officials said the tug will support harbour manoeuvring, escort operations and emergency response activities and will help gather operational data for advancing India’s future electric fleet. The initiative also boosts domestic shipbuilding capabilities, aligning with the Government’s “Make in India” and “Make for the World” manufacturing vision. Shri Sonowal stated that the maiden construction of this electric tug at Atreya Shipyard showcases India’s growing expertise in maritime engineering and will demonstrate to the world India’s ability to build advanced, environmentally responsible fleet assets.

The Green Tug Transition Programme forms a core part of the Ministry’s sustainability roadmap and aligns with India’s international climate commitments, as well as the Maritime India Vision 2030 and the long-



term mission of the Amrit Kaal Maritime Vision. The Minister concluded by stating that India’s advances in green maritime technology represent a collective effort propelled by the Prime Minister’s leadership and that this project marks the beginning of a new era where Indian ports will lead global innovation in green shipping.



Maharashtra Accelerates Plans for India's Largest Shipyard, Targets 2026 Completion



Maharashtra is set to take a decisive leap in India's maritime landscape with the State Government fast-tracking the development of what is envisaged to be the country's largest shipyard. Chief Minister **Shri Devendra Fadnavis** has directed senior officials to expedite planning and execution, positioning the project as a strategic pillar of India's shipbuilding ambitions.

Leveraging Maharashtra's long coastline and the upcoming deep-draft Vadhavan Port, the proposed shipyard is being developed as a critical maritime asset with national significance. At a high-level review meeting of the Ports Development Department held at Vidhan Bhavan, Nagpur, the Chief Minister stressed the need to accelerate work on the Detailed Project Report (DPR), enhance coastal connectivity and adhere strictly to the targeted 2026 completion timeline.

The meeting was attended by Ports and Fisheries Minister **Shri Nitesh Rane**, Chief Secretary **Shri Rajesh Aggarwal**, Additional Chief Secretary (Transport & Ports) **Shri Sanjay Sethi**, along with senior officials of the Maharashtra Maritime Board. Discussions focused on aligning infrastructure development with future shipbuilding requirements, including large-vessel construction and repair capabilities.

Parallel to the shipyard initiative, the Chief Minister also reviewed progress on the proposed Mumbai Water Metro project – a modern, water-based urban transport system envisioned to transform mobility across Mumbai's waterways. Shri Fadnavis emphasised that the project should exceed existing benchmarks, including those set by the Kochi Water Metro, through larger scale operations, advanced vessel technologies and enhanced passenger amenities.

He directed officials to adopt a phased implementation strategy, beginning with hybrid vessels and gradually transitioning to a fully electric fleet. The upgraded water taxi and metro services are expected to significantly ease urban congestion while contributing to reduced emissions and improved environmental outcomes.

Together, the accelerated shipyard development and the Mumbai Water Metro underscore Maharashtra's integrated maritime vision – combining world-class shipbuilding infrastructure with sustainable, future-ready urban transport solutions. The initiatives reinforce the State's ambition to emerge as a national leader in maritime innovation, industrial growth and green mobility.



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About Cochin – The Marine and Commercial Capital of Kerala

Cochin, known as the Queen of the Arabian Sea, is a vibrant city located on the south west coast of India, star of God's Own Country, Kerala. From time immemorial, Arabs, British, Chinese, Dutch, and Portuguese traders have left an indelible mark on the history and development of this beautiful coastal town.

Cochin has preserved many of its historic landmarks and monuments, which continue to add to its charm and glory. The city is the Maritime and Commercial capital of Kerala, boasting of major infrastructure such as seaports, container terminals, modern shipyard, maritime educational and training centres, airport, an efficient Metro and Water Metro network.

Cochin enjoys excellent connectivity to Kerala's major tourist destinations through rail, road, and inland waterways. A wide range of hotels and restaurants offering delicious cuisine at affordable prices make it a destination for both business and leisure travellers.

The Institute of Marine Engineers (India)

The Institute of Marine Engineers (India) is a premier professional body representing marine engineering professionals across the country. With a membership strength of over 13,000, the Institute members include professionals serving both in India and abroad in key positions across the maritime industry.

Headquartered in Mumbai, the Institute operates eight regional branches located in different parts of the country. It actively provides various facilities to enhance the knowledge and professional competence of its members, while extending a wide range of services aimed at their professional growth and welfare.

The primary objectives of the Institute are to promote the scientific and technological advancement of marine engineering, facilitate the exchange of ideas and information among marine engineers, uphold the professional status of its members, foster cooperation with other professional institutions, classification societies, and the maritime industry, and contribute to the advancement of engineering education in the country.

About the event, COMARSEM 2026

COMARSEM (Cochin Marine Seminar) is a flagship event periodically organised by the Cochin Branch of The Institute of Marine Engineers (India). The upcoming COMARSEM 2026, scheduled for January 2026, will be an international seminar bringing together eminent stakeholders from across the global maritime industry under one roof.

COMARSEM 2026 organized by IMEI Kochi branch in association with DG Shipping

Themed "**Maritime India – Innovations and Collaborations**," this mega event will feature panel discussions, technical presentations, and interactive sessions that deliberate on the progress of India's maritime sector and explore strategies to realise the nation's vision of becoming a maritime superpower.

The event will host focused panel discussions and paper presentation on key topics such as:

- ◆ Policy framework and new legislations to accelerate Indian Shipping and Inland Waterways.
- ◆ Infrastructure growth for enhancing shipping, shipbuilding & repair and ship recycling.
- ◆ Accelerating the adoption of greener technologies to meet decarbonisation goals
- ◆ Innovate training methodologies for skill development focused on alternate fuel, digital, autonomous, AI technology etc.
- ◆ Developing maritime clusters to address emerging challenges indigenously
- ◆ Improvements in logistics and supply chain systems for sustained growth.

These discussions aim to foster cross-industry collaboration, drawing valuable insights from both Indian and international participants, while exploring the financial and technological pathways essential for achieving these ambitious goals.

This event will feature:

TECHNICAL PRESENTATIONS, PANEL DISCUSSIONS & NETWORKING

- ◆ Inauguration Session attended by Industry Leaders.
- ◆ Four (4) Sessions of Paper presentation of 4 papers each
- ◆ Four (4) sessions of Panel discussions
- ◆ Industry Exhibits
- ◆ Kochi back water networking cruise.
- ◆ Valedictory function.





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Methanol Fueled Ships: A Comprehensive Case Study



Abstract: This paper provides an overview of the systems currently being used by methanol fueled ships and gives an insight on future engine modification options for the same. The specifics have been taken from case studies of some vessels currently in operation to elaborate on the type of engine, fuel injection parameters, overall efficiency and power output. The methods of power generation using methanol have been further analyzed and comparative data has been obtained to delve into possibilities regarding power generation and propulsion. The fuel cell system has been given weightage in this regard, particularly the High temperature polymer exchange membrane cell, due to its efficiency, cost and reduction in emissions; option of dual fuel engine has also been discussed. This is done keeping in mind the current regulations regarding emissions and call for change in the industry to reduce environmental impact.

Keywords: Methanol; Fuel cell; Engine performance; Emissions

INTRODUCTION

As the world comes into unison to counter the drastic effects of climate change and as global leaders in the maritime industry employ stricter rules to reduce emissions and pollution, there is an immediate need for a solution to keep up with the newer standards without

entirely reforming the industry. Due to the recent move towards a greener environment, many companies have been making efforts to explore various technologies to reduce air pollution. A volatile global market and rising bunker prices have led to a search for alternate fuels as a veritable solution.

Methanol is increasingly being used as a shipping fuel, primarily due to new regulations from the IMO and in Europe. It provides a feasible path to adherence, keeping pace with progressively stringent regulations through retrofit and replacement options and by permitting the blending of grey and lower-emission methanol to achieve compliance.

METHANOL AS A FUEL

Methanol can be derived from fossil fuels or can be bio based or synthetic, produced from carbon dioxide and hydrogen, both of the later making it renewable. Though methanol is colourless, it can be broadly classified into different colours based on its origin.

- **Green Methanol:** Green hydrogen and biomass, or collected CO₂, are used to make green methanol.
- **Blue Methanol:** Carbon capture approach in conjunction with blue hydrogen is used to make blue methanol.

- **Grey Methanol:** Grey methanol is derived from natural gas.
- **Brown Methanol:** Brown methanol is methanol produced from coal.

COMPARATIVE ANALYSIS OF DIFFERENT TYPES OF METHANOL

Green methanol is the most sustainable. When compared to fossil fuels like diesel, blue methanol nevertheless considerably lowers CO₂ emissions from well to tank. The majority of methanol in use today is either brown or grey, which presents one of the largest obstacles to maritime decarbonization. Compared to diesel, all forms of methanol have the potential to reduce CO₂ emissions from tanks to wakes by roughly 7%. But when looking at things from the well-to-wake perspective (production to consumption), the carbon footprint of diesel is less than that of grey and brown methanol. Because of this, the only viable options for reducing greenhouse gas emissions from well to tank are green and blue methanol. Blue methanol occupies a middle ground between green and grey methanol.

FUEL CELL TECHNOLOGY

A methanol reformer system with high temperature polymer electrolyte membrane fuel cell combined with CO₂ capture and liquefaction system can be used to generate power as it has the following advantages:

- Has high efficiency and lifetime as compared to direct methanol fuel cell and can use low purity fuels which makes it cheaper.
- Since it operates at high temperatures, catalyst affinity for CO is reduced which removes many stages of fuel processing.
- It has good performance because of high oxygen reduction rate. Reactant and product gases have high diffusion rates, thus promoting more reaction to occur.
- Heat transfer rate between fuel cell and environment is increased and water transport in membrane, electrodes and diffusion layer is simplified.

WORKING OF FUEL CELL

As in a report published on energy conversion and management, a methanol-based fuel cell and carbon capture system was used which included a methanol steam reformer to produce reformat gas, a combustor for providing heat to the reformer, HT-PEMFC stack for power generation, a CO₂ capture unit and a liquefaction system. Steam reforming is preferable because: molar flow rate of H₂ is higher, reactions in the reformer can take place at a lower temperature and a low CO ratio can be obtained.

The methanol water mixture is pre-heated by steam generated at HT-PEMFC and vaporized by the reformat gas stream from the reformer, mainly giving H₂. Reformat gas is then used for power generation in

HT-PEMFC, and off-gas from the fuel cell is fed to the combustor to produce heat. Captured CO₂ is compressed and liquefied by the compressor.

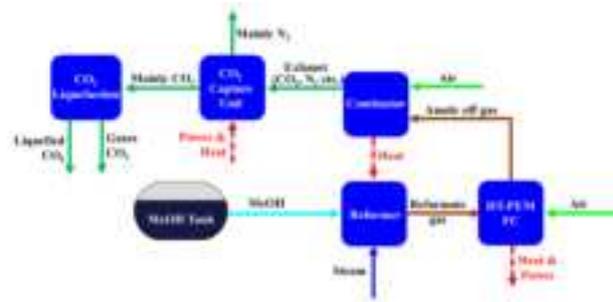


Fig 1: Working of methanol fuel cell[8]

Safety practices while using steam reformers include:

- Provisions for basic combustion hazards such as flame instability, flame lift off, back burning, after burning, fuel accumulation and exposure to hot gases should be made.
- Personnel should be equipped with PPE in reformer area as a safeguard against toxic release, flammable gas release, anoxia, burn exposure and noise.
- Combustion control system shall be designed to maintain overfiring protection, firing controls, flue gas oxygen control, draft control, and flue gas pressure.
- Instrumentation considerations include combustion air flow, flue gas oxygen, draft measurement, combustion air temperature, flue gas pressure, process outlet temperature, auxiliary fuel flow and heating valve.

FUEL INJECTION

Details of injection parameters are available in [8], where a Volvo Penta engine was used for the experiments and separate sensors, fuel supply system, and engine control unit were incorporated for methanol. Injectors were placed after the turbocharger and before the intake manifold for single-point injection (SPI), in which case the intercooler was removed to prevent condensation as methanol takes up the latent heat of vaporization. For Multiple Point Injection (MPI), injectors were placed in the intake manifold, directed to the intake valves.

Methodology: For calculating the amount of each fuel used, Methanol Energy Fraction, Diesel Substitution Ratio, Methanol Mass Fraction and Replacement Ratio were used. The in-cylinder pressure and temperature were measured at different speeds and loads to calculate performance parameters such as maximum allowable MEF, NO_x emissions, and efficiency for both injection modes. At each load point, the engine was first operated in diesel only mode, then the methanol fraction was increased in steps, while maintaining the same speed and load until the maximum MEF was reached. The boundary conditions specified were: partial burn, misfire, roar combustion and knock.

Results

- Intake temperatures: The intake temperature in MPI mode was lower as compared to SPI due to presence of intercooler before injection point.
- Methanol energy fraction: Considering the diesel substitution limiting events (boundary conditions), it was found that average MEF was higher in MPI mode than SPI mode further, pre-ignition and high exhaust temperatures were noted in SPI mode due to absence of intercooler.
- Effect of intercooler on pre-ignition: There was a general trend of increasing charge air temperature with increase in MEF in MPI mode without intercooler thus leading to pre-ignition and same was observed with SPI mode leading to an increase in NO_x emissions.
- Efficiency: Brake thermal efficiency compared to diesel only operation decreased at low loads due to delayed ignition and lower velocity of burning, both due to presence of leaner and colder mixture, although at higher MEF, BTE was higher for SPI mode.
- NO_x emissions: Although NO emissions exhibited a parabolic profile with increase in MEF, about 20%-80% decrease was observed compared to traditional fuels and tier II regulation limits were met. It was found that emissions in MPI mode were lower than SPI due to lower temperatures encountered during combustion.

Conclusion:

It was therefore suggested that both modes had their own pros and cons such as SPI might be preferred for maximizing efficiency whereas MPI might be suited for decreasing emissions and increasing substitution.

CASE STUDIES

One of the pioneers in methanol fueled shipping, namely AP Moller Maersk had launched two of its container vessels i.e. Ane Maersk and Laura Maersk which have a dual fuel engine that can run on either methanol or conventional marine fuel.

The details on engine specifications are available at MAN B&W site. CEAS tool was used to get exhaust gas data for low flashpoint fuel(methanol) and SFOC. Few additional parameters are worth noting which might differ from that actually used onboard, nevertheless the engine model was same.

Following are the specifications for the vessels:

Laura Maersk

- Length: 172 meters, breadth (molded): 32.2 meters, speed: 17.4 knots
- Main engine: HYUNDAI – MAN B&W 6G50ME-C9.6-LGIM-HPSCR, 10,320 kW
- Auxiliary engines: 2x HiMSSEN H32DF-LM, 3000 kW w/ 2820 kW Electrical Generator; 1x HiMSSEN 6H21M, 1320 kW w/ 1240 kW Electrical Generator

- Methanol fuel capacity: 1400 m³
- The vessel can sail up to 6,000 nautical miles
- Container capacity 2136 TEU

Table I: Laura Maersk fuel consumption and gas figures

SFOC	Tier II		Tier III	
	SMCR g/kWh	NCR g/kWh	SMCR g/kWh	NCR g/kWh
ISO	170.5	170.5	171.0	171.0
Tropical	172.3	172.3	172.8	172.8
Specified	188.5	188.5	189.0	189.0

SFOC: Specific Fuel Oil Consumption (LCV: 42,708 kJ/kg)

SFOC/SOC (Heat rate)	Tier II		Tier III	
	SMCR g/kWh (kJ/kWh)	NCR g/kWh (kJ/kWh)	SMCR g/kWh (kJ/kWh)	NCR g/kWh (kJ/kWh)
ISO	8.40343.5 (7.195)	8.40343.5 (7.195)	8.40344.6 (7.216)	8.40344.6 (7.216)
Tropical	8.40347.4 (7.271)	8.40347.4 (7.271)	8.40348.8 (7.293)	8.40348.8 (7.293)
Specified	8.40339.2 (7.109)	8.40339.2 (7.109)	8.40340.3 (7.130)	8.40340.3 (7.130)

SFOC: Specific Fuel Oil Consumption (LCV: 42,708 kJ/kg)
SOC: Specific Gas Consumption (LCV: 14,863 kJ/kg)

Table II: Specified main engine parameters

Specified parameters	
Type of propeller	Controllable pitch propeller
Cooling system	Central water cooling system
Hydraulic control oil system	Common (system oil)
Hydraulic power supply	Mechanical
Cylinder of lubricator type	Alpha lubricator
Fuel sulphur content for engine design	Low sulphur
Sulphur in fuel (Tier II)	max 0.5% sulphur
Sulphur in fuel (Tier III)	max 0.1% sulphur
NO _x emission compliance	Tier II / Tier III
Heat of energy fraction	Normal 0.0%
Turbocharger specifications	
Turbocharger efficiency	High efficiency
Exhaust gas bypass	With EGR
Number of turbochargers and make/type	1 x MAN TCTBOM
Turbocharger lubricating	Common (system oil)
Exhaust gas scrubber for high sulphur	Not retained
Exhaust back pressure (Tier II)	30 mbar
Exhaust back pressure (Tier III)	30 mbar

* The engine can be supplied with Economiser Energy Control (EEC) for lowering exhaust gas temperatures.

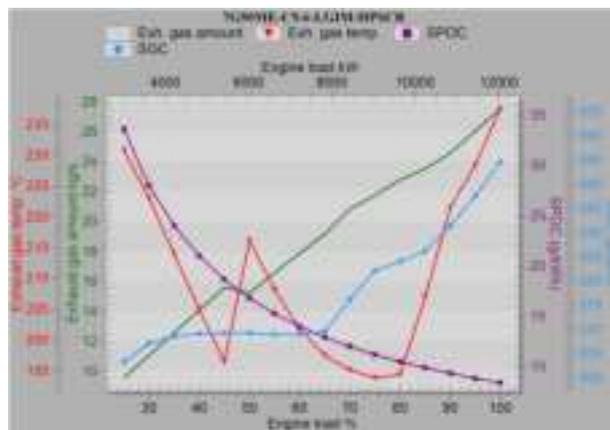


Fig 2: Fuel consumption and exhaust gas data low flashpoint fuel, Tier-III mode

Ane Maersk

- Length: 350 meters, breadth: 53.5 meters, speed: 21 knots
- Container capacity: 16,592 TEU (twenty-foot-equivalent units of containers)
- Main engine: HYUNDAI-MAN B&W 8G95ME-C10.5-LGIM-EGRTC, 8 cylinders, 44,187 kW
- Auxiliary engines: 4 x HiMSSEN H32DF-LM (3 x 9 cylinders each 4320 kW + 1 x 6 cylinders 2880 kW)

- Shaft generator: Wartsila shaft generator of 4.0 MW.
- Methanol fuel capacity: 16,000 m³
- The vessel can sail up to 23,000 nautical miles on methanol when fully bunkered.

Table III: Ane Maersk fuel consumption and gas figures

	Tier II		Tier III	
	SMCR g/kWh	NCR g/kWh	SMCR g/kWh	NCR g/kWh
BFOC	163.0	163.0	163.0	163.0
ISO	163.0	163.0	163.0	163.0
Typical	164.7	164.7	166.7	166.7
Specified	161.0	161.0	163.0	163.0

SFOC Specific Fuel Oil Consumption (LCV: 42.705 kJ/kg)

	Tier II		Tier III	
	SMCR g/kWh (kJ/kWh)	NCR g/kWh (kJ/kWh)	SMCR g/kWh (kJ/kWh)	NCR g/kWh (kJ/kWh)
SFOC/SC (Heat rate)	8.09228.2 (6.875)	8.09228.2 (6.875)	8.09228.2 (6.960)	8.09228.2 (6.960)
ISO	8.09228.2 (6.875)	8.09228.2 (6.875)	8.09228.2 (7.036)	8.09228.2 (7.036)
Typical	8.09228.2 (6.875)	8.09228.2 (6.875)	8.09228.2 (7.036)	8.09228.2 (7.036)
Specified	8.09228.2 (6.792)	8.09228.2 (6.792)	8.09228.2 (6.877)	8.09228.2 (6.877)

SFOC Specific Fuel Oil Consumption (LCV: 42.705 kJ/kg)
SFC Specific Gas Consumption (LCV: 19.900 kJ/kg)

Table IV: Specified main engine parameters

Specified parameters	
Type of propeller	Fixed pitch propeller
Cooling system	Central water cooling system
Hydraulic control of system	Common (system oil)
Hydraulic power supply	Methanol
Control of lubricator type	Alpha lubricator
Fuel sulphur content for engine design	Low sulphur
Sulphur in fuel (Tier II)	max 0.5% sulphur
Sulphur in fuel (Tier III)	max 0.1% sulphur
NOx emission compliance	Tier II / Tier III
Max oil energy fraction	Maximal 0.5%

Turbocharger specifications	
Turbocharger efficiency	High efficiency
Exhaust gas bypass	Wheeled BGR
Number of turbochargers and intertype (Main string)	2 x Accelleron A180L
Number of turbochargers and intertype (CO-ful string)	1 x Accelleron A275-L
Turbocharger lubricating	Common (system oil)
Exhaust gas available for high sulphur	Not available
Exhaust back pressure (Tier II)	30 mbar
Exhaust back pressure (Tier III)	30 mbar

*) This engine can be equipped with Emission Energy Control (EEC) for lowering exhaust gas temperatures. This requires cooling or EBC valve, because it is not standard on this engine.

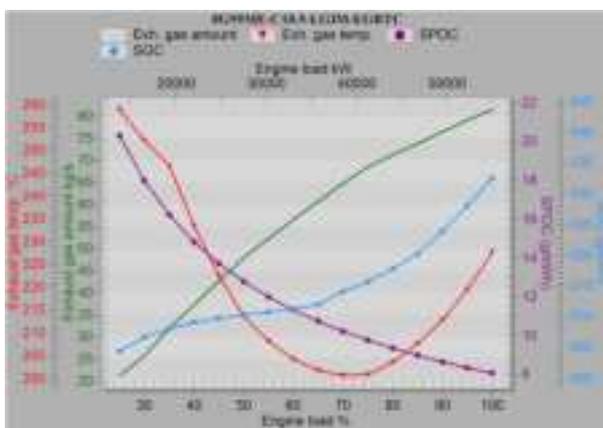


Fig 3: Fuel consumption and exhaust gas data low flashpoint fuel, Tier-III mode

Discussion

The aforementioned data were collected with the first engine powering a Controllable Pitch Propeller (CPP) while the second one running a Fixed Pitch Propeller (FPP) to demonstrate the flexibility in propulsion. As it is evident, the Lower Calorific Value (LCV) of methanol is much lower compared to fuel oil, resulting in higher consumption. However, the exhaust emission is much reduced making it Tier III compliant, Selective Catalytic Reduction (SCR) was additionally used to reduce the NO_x levels. Low sulphur content of the fuel made

scrubber installation unnecessary. Overall, a relatively lower emission level coupled with constant and reliable power output was observed in both the engines making it suitable for future use in accordance with IMO regulations.

CONCLUSION

Methanol can be considered as a very promising fuel because of its pre existing infrastructure. Its natural liquid state allows for easier storage. Nox emissions were cut down to almost half of what is observed in mgo when using methanol.

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धावक की पत्नी



आज तुम्हारे बीच दोस्तों
एक दुखद गीत मैं गाता हूँ
एक शूरवीर धावक की
पत्नी की व्यथा सुनाता हूँ

दोस्त यार सब छूट गए
जो पहले थे मिलते जुलते
अब जिससे जब भी जहाँ मिलो
सब जूते के फीते कसते

छुट्टियों में लंदन पेरिस
आराम से घूमने जाते थे
अब धीमी सी मैराथन दौड़ के
स्पीड से वापस आते है

रेस के पहले होटल का कमरा
रेस के बाद महाशय थके हुए
सारा जोश और गर्मी बस
बस मैराथन पर ही निकले

शॉपिंग शूपिंग के लिए पहले ये
मॉल वगैरा जाते थे
अब नीले पीले जूते जुराब धुलते
REI में इनको पाते हैं

वर्क, स्कूल, बर्थडे, एनिवर्सरी
चार कैलेंडर से जीवन चलता था
अब रेस कैलेंडर का घुटना
ज़िंदगी पर आ टिका

इतना सब भी सह लें लेकिन
कोई एक रेस भी जीतो तो
बच्चों जैसा फिनिशर मेडल
के आगे का भी तो कुछ सोचो

कठिन परीक्षा लेते हो तुम
support तुम्हें हम करते हैं
पर जान पर अब बन आई है
मन हैं के एक थप्पड़ जड़ दें

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