IRCLASS
Indian Register of Shipping

TOUCH OF CLASS

Issue 3 - Sept 2022

CONTENTS

Message from the Executive Chairman's Desk

Dear All

I am glad to note that the fleet classed with IRS has grown in tonnage, despite the headwinds in global economy. We at IRS are making all efforts not only to increase the tonnage, but also ensure quality classification and certification services. We are also providing our clients with value added services to ensure smooth compliance to the upcoming regulations, including energy efficiency and alternate fuels.

In shipping's endeavor towards decarbonisation, digitalisation plays a vital role in reducing the carbon footprint and improving operational performance. IRS is supporting the industry by actively engaging with the regulators and with the operators. Further, IRS is actively associated with the industry partners and is undertaking Joint Industry Projects.

Our efforts have received appreciation from the industry, in general and shipyards, in particular. It is heartwarming to share that our involvement with shipyards from the project initiation to completion as a "Technical stakeholder" has been receiving accolades.

Considering the rapidly changing business & technical environment, IRS has identified its next generation leadership and is actively grooming them to take the organisation forward and to bring in fresh ideas.

The global economy is going through a churn and new methodologies of business are fast evolving, which, we at IRS are optimistic, will bring in a better future.

I wish the readers a happy reading!

Managing Director's Message

Dear Reader

After braving the challenges of the pandemic, the economy and the shipping industry are in the recovery mode. Our employees at IRS have ensured that all our services are delivered effectively with the cooperation of stake holders to the satisfaction of everyone for which I am grateful to each and everyone i.e., Surveyors, stakeholders and various Administrations. As we approach the World Maritime Day, there is a strong realisation within the maritime community that shipping must rise to the global challenge of decarbonisation and the theme for this year - 'New technologies for greener shipping' is very apt. While maximum focus is currently on reducing operational emissions, it is imperative that we take a holistic view in respect of design, shipbuilding, operations and finally safe recycling for sustainable shipping.

I am pleased to note that we at IRS are undertaking multiple Joint Industry Projects in various fields including green energy, alternate fuels and new technologies. While IRS has already published Guidelines for use of Methanol, LNG & Hydrogen fuel cells; our draft guidelines for Ammonia fuel are under deliberation and will be published shortly.

Recognising the important role which digitalisation has to play, IRS has also initiated various projects in this area. With increased digitalisation & automation, the importance of cyber risk management and the need to keep information, data & devices safe cannot be overstated and accordingly being simultaneously looked into.

IRS has always accorded utmost importance to training our resources to provide quality services. The digital transition demands a fresh set of technical skills and recognising this, we have started training of our Surveyors in this direction also. Further, with the sole objective for continual improvement, there has been an increased focus on internal and external training on the latest advancements on the regulatory and technological fronts. Thus, with trained and competent resources placed at strategic locations across the globe, IRS is geared to provide quality services to our customers across the globe.

Some of the efforts and developments are showcased in this edition.

Here's wishing all a happy reading!

From the Editorial Board

Dear Reader,

Welcome to the second edition of Touch of Class in 2022. We are grateful for the immense support and appreciation received for this year's first edition. It gives us great pleasure to present this edition which includes a diverse range of technical and topical articles.

Having touched upon the technical and operational energy efficiency measures in our previous edition, we delve into the third pillar i.e. Market Based Measures, as shipping builds a future towards decarbonisation.

Digital solutions have an immense role to play in decarbonisation and are also crucial for efficient operation and streamlining existing processes. Readers will get a sneak peek into various applications developed by our Technical Software Development Group as part of a series of articles being published, since last edition.

Unexpected emergencies at sea are a major risk to life, property and the environment. A prompt support in the initial hours of an incident could prove to be the difference between survival and disaster. IRS provides Emergency Response Service (ERS) to assist crew/shipowners in mitigating these risks. Details of this service can be found in this edition.

The technical articles on Second Generation Intact Stability as well as numerical studies in the form of CFD towards EEXI calculation, will surely stimulate more research-oriented minds.

A sustainable future is only possible if it is built on inclusiveness. Recognising its importance, IRS strives to promote gender diversity and equal opportunities.

Readers will get an insight into these topics as well as some of the key events and developments at IRS in this edition.

We hope that you will find this edition interesting and would like to receive your feedback on toc@irclass.org.

- Editorial team

Pleasant Reading

IMO – 2nd Generation of Intact Stability

Dr. Shivaji Ganesan T,
RDAREA Division

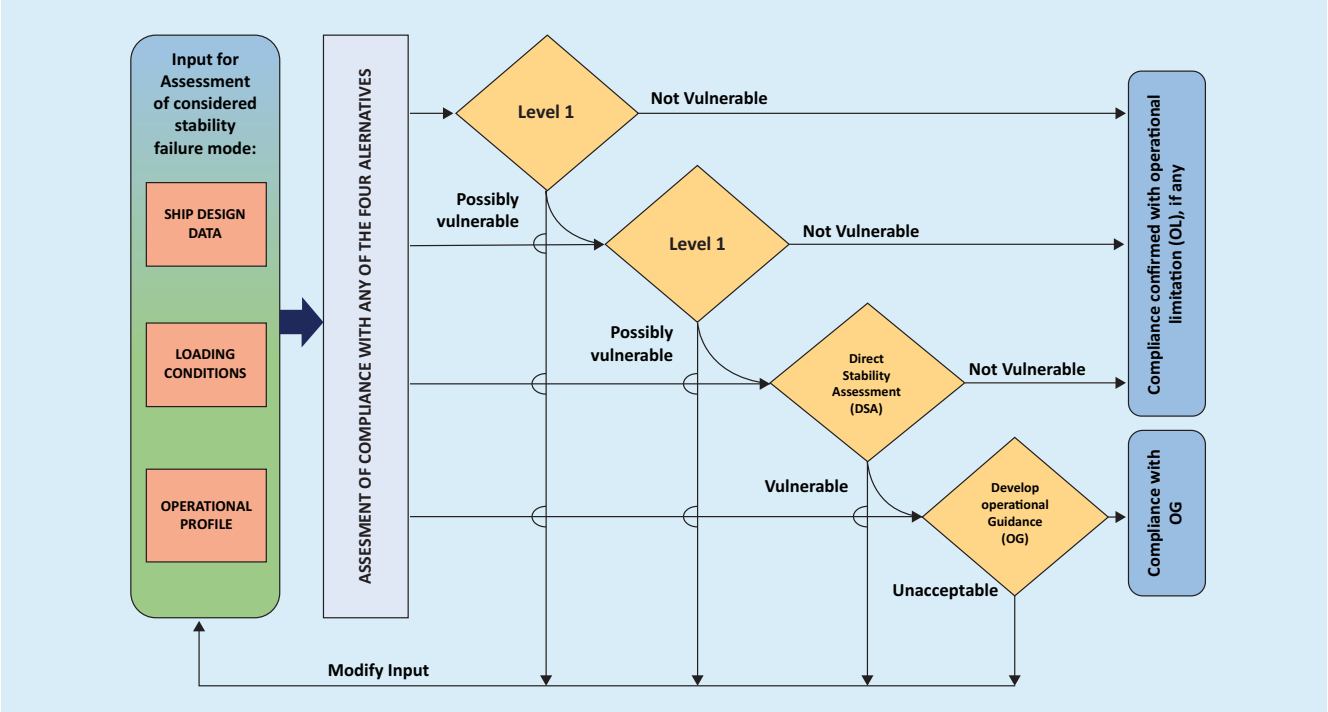
After the adoption of general intact stability criteria based on righting arm (GZ) characteristics (1968) and the weather criterion (1985), IMO released the First Generation of Intact Stability Criteria (FGISC) in 1993. These criteria were primarily based upon the metacentric height (GM) and properties of the righting lever (GZ) curve in calm water. Traditional empirical/statistical approaches were applied to the historical casualty records of ships available at that time for formulation of the criteria. With the advancements in numerical ship hydrodynamics and its implementation to understand the dynamic behaviour of ship in waves, a need for upgrading the current FGISC has been advocated which started with the revision of the code on Intact Stability in 2001 via IMO Res. A.749 (18). The revised version of the first generation intact stability was enforced in 2008 by IMO. However, this revised version of FGISC does not explicitly address the ship's dynamic stability in sea. Therefore, a preamble was provided in 2008 IS Code in support of the long-term future development of a stability code considering the ship hydrodynamic aspects and stability analysis in a seaway.

IMO released the first interim guidelines for assessment of ship dynamic stability in intact conditions under the framework of the Second Generation of Intact Stability criteria (SGISC) [IMO MSC Circ.1/1627]. Five stability failure modes were identified which are pure loss of stability, parametric roll, dead ship, excessive acceleration, and surf riding/broaching-to. These stability failure modes belong to three fundamental categories of problems as given in Figure 1: Restoring arm variation, severe weather criteria, and ship maneuvering.

Restoring arm variation problems	Severe weather criteria	Maneuvering
• Pure loss of stability • Parametric rolling	• Dead ship • Excessive acceleration	• Broaching-to • Surf riding

Fig.1: Dynamic phenomena

A multi-tier approach was recommended in the interim guidelines for each of the five stability failure assessments as presented in Figure 2.



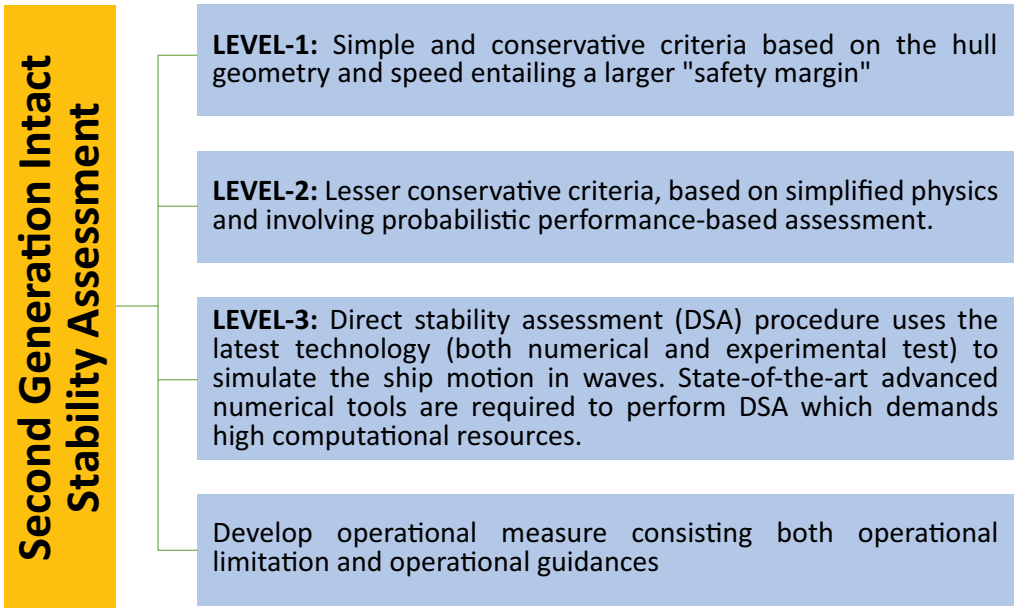


Figure 2: Framework of SGIS

For a given ship's loading condition, the vulnerability assessment can either follow a sequential logic or commence each level directly. Briefly, the sequential logic is explained here. For a given loading condition, Level 1 is an initial check, if the ship is assessed as not vulnerable to the tested failure mode, the assessment for that failure mode can be concluded; otherwise, the design check would progress to Level 2. If the ship is assessed as not vulnerable to the tested failure mode in Level 2, then the assessment would conclude; otherwise, the design check would progress to the application of Direct Stability Assessment (DSA), or preparation of Operational Measures (OM).

A set of in-house programs based on the formulation and methodology described by IMO interim guidelines have been developed by the Indian Register of Shipping (IRS) for dynamic stability assessments covering all five failure modes of Level-1 and Level-2, which have been extensively validated and tested for various ship forms, loading conditions, and operational profiles.

Level-1 and Level-2 Vulnerability Assessment

Figure 3 displays the righting arm variation of the C11 post Panamax container hull in a regular wave of length equal to ship's length with wave crest varying from A.P to F.P. Figures 4 & 5 show the sample output for the pure loss of stability Level-1 and Level-2 assessment for 25 loading conditions. The abscissa represents the loading condition index and the 'y' ordinate represents the calculated minimum metacentric height (GMmin) for Level-1 and the required index for Level-2 criteria. It can be observed from Level-1 assessment for loading conditions 1-10, that the ship was found not vulnerable to pure loss of stability whereas in the case of level-2 assessment for loading conditions 1-9 the ship satisfies the vulnerability criteria. The rest of the loading conditions i.e. 15 loading conditions for Level-1 and 16 loading conditions for Level-2 were found vulnerable to pure loss of stability failure mode. Inconsistency can be observed between Level-1 and Level-2 of pure loss of stability failure mode as loading condition 10 was found not vulnerable using Level-1assessment although Level-2 assessment concludes the opposite. This inconsistency may arise for a few loading conditions, as the recommended guidelines are under trial. However, in the present case, the designer may opt to choose the Level-1 assessment considering the flexibility provided. For the loading conditions that were found vulnerable to the failure criteria, either DSA or OM can be undertaken.

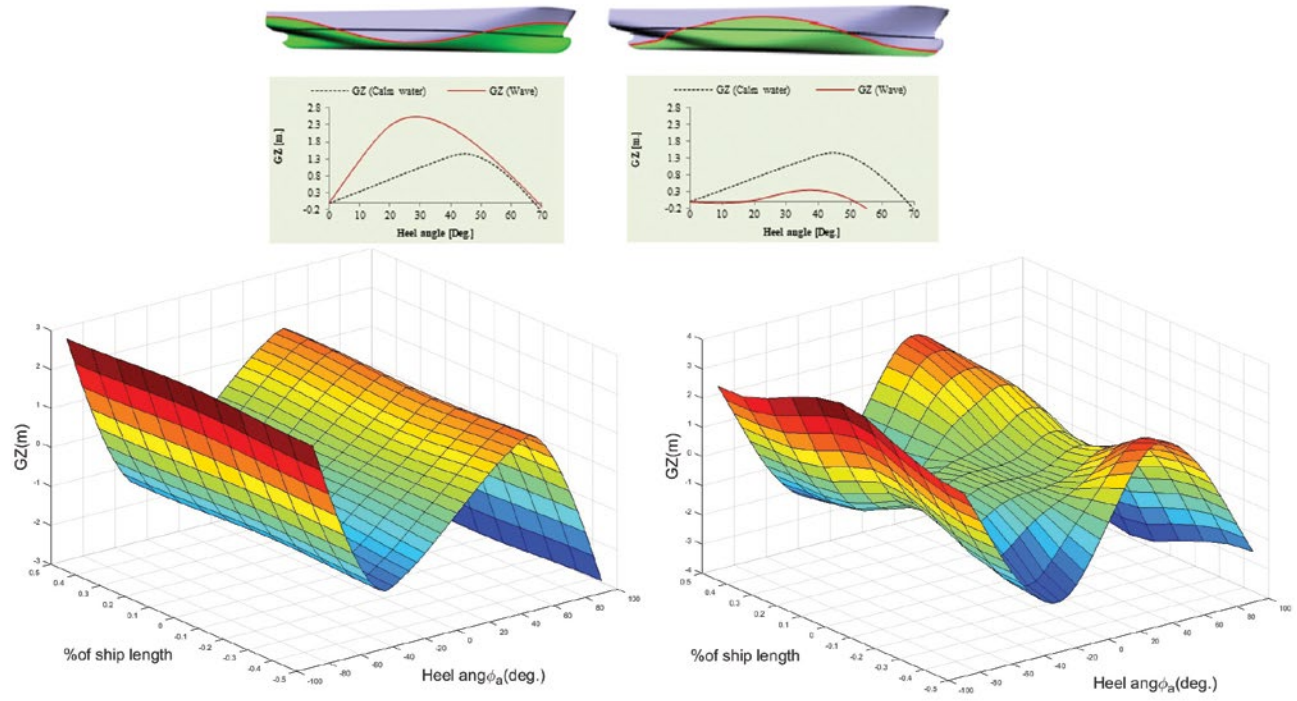


Fig.3 Restoring arm variations in waves with wave crest located along the ship length.

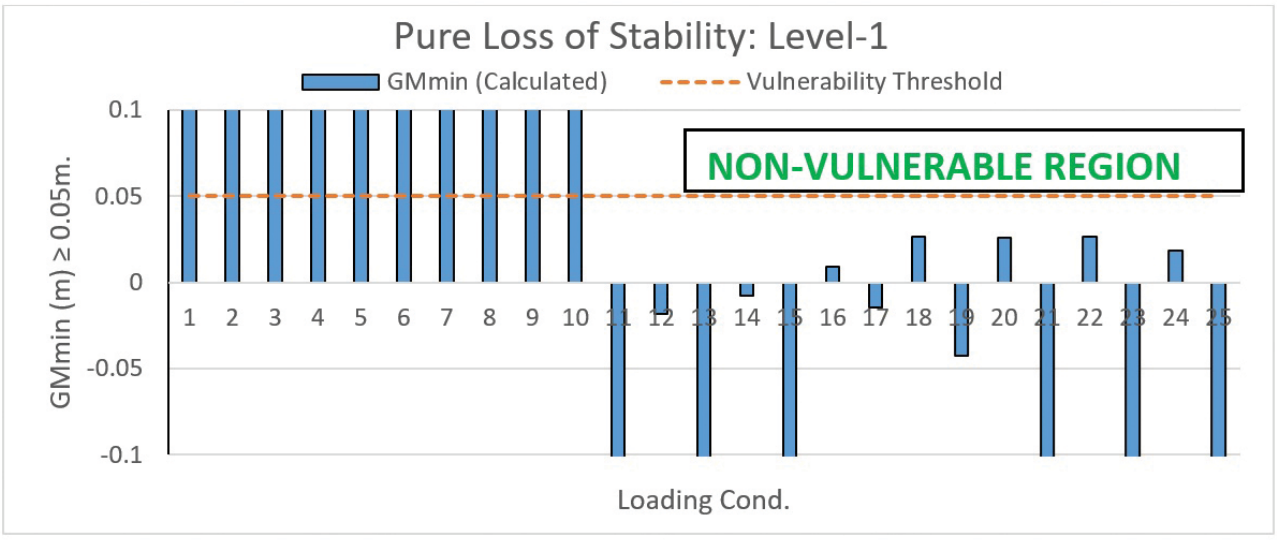


Fig.4 Sample output for pure loss of stability Level-1 assessment

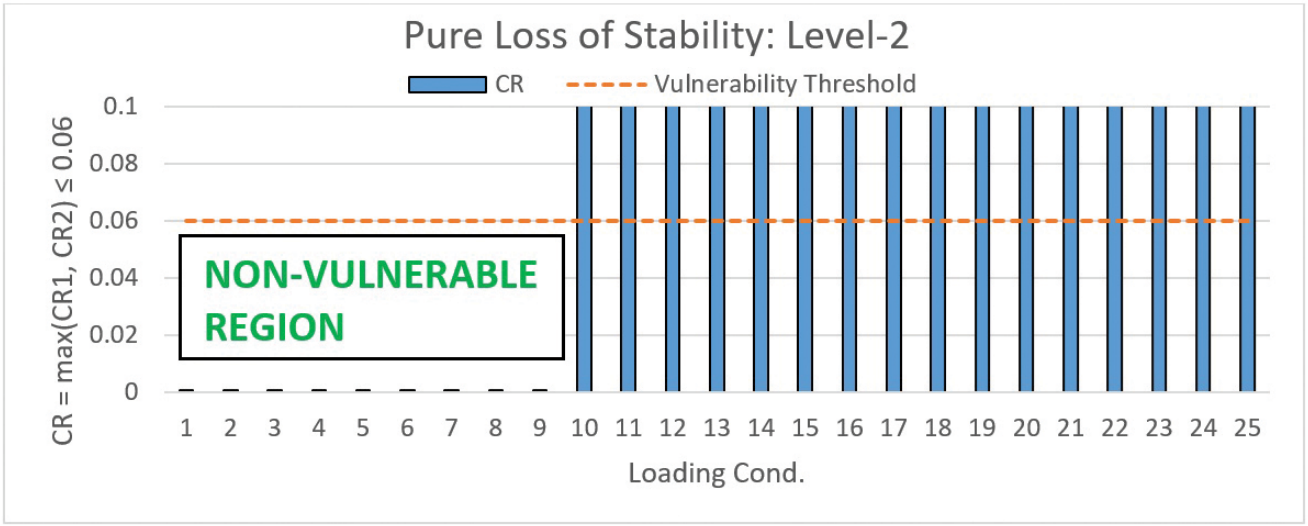


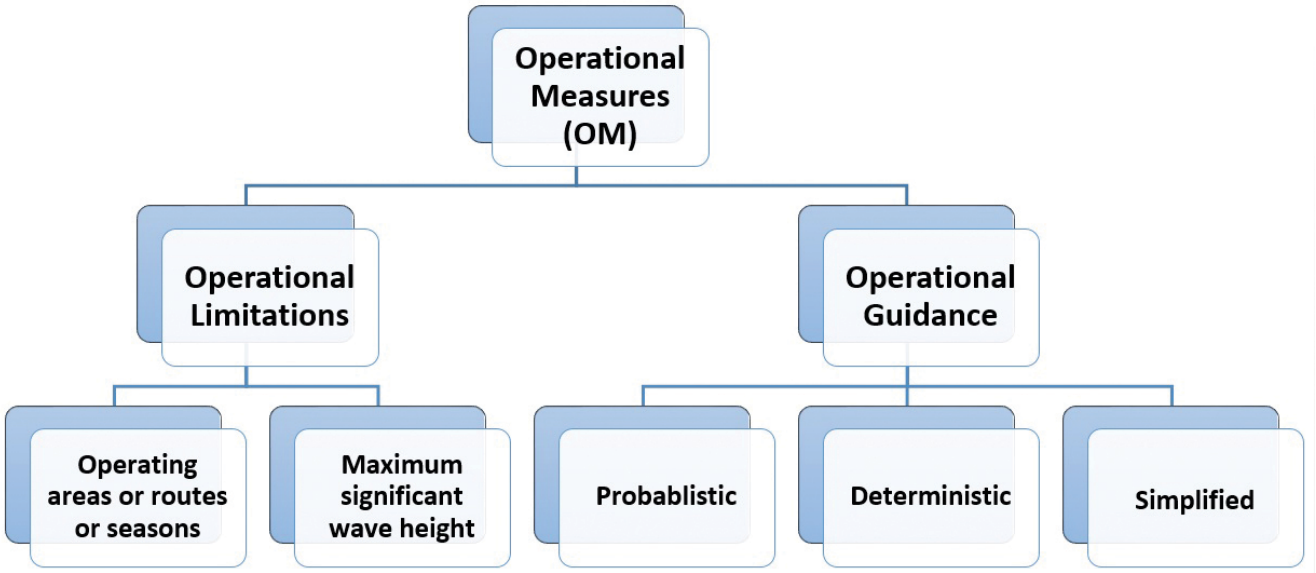
Fig.5 Sample output for pure loss of stability Level-2 assessment

Direct Stability Assessment (DSA)

This assessment procedure employs the latest technology with advanced sophisticated numerical tools while being sufficiently practical to be uniformly accepted and applied using the currently available infrastructure. Adhering to the DSA procedure in the IMO guidelines will ensure a safety level corresponding to the average stability failure rate not exceeding $2.6x10^{-3}$ per ship per year. The overall procedure for DSA consists of two major components: i) a method(numerical or model test) that adequately replicates ship motions in waves, ii) a prescribed systematic procedure that identifies the process by which input values are obtained for the assessment, how the output values are processed, and how the results are evaluated.

Operational Measures (OM)

If ship design changes are not feasible, Operational Measures (OM) can be developed and provided to avoid dangerous situations and reduce the likelihood of stability failures. The OM is further categorized into Operational Limitations (OL) which is related to area or routes and Operational Guidance (OG) which defines the combinations of ship speed and heading relative to mean wave direction. OG development is based upon Level-1 and Level-2 assessments known as the simplified method. However, DSA is required to develop OM based on the probabilistic and deterministic operational guidelines.



Summary:

In-house numerical tools have been developed to perform SGIS assessment for all five stability failure modes with Level-1and Level-2 criteria and for DSA assessment in design situations using deterministic criteria for parametric roll, excessive acceleration, and dead ship condition. The tools have been verified and validated using available literature with results showing satisfactory agreement. All these developed tools can be used routinely for assessing the ship's dynamic stability in a realistic seaway. Further developmental work is in progress for DSA which requires a nonlinear time domain forward speed program and towards procedures for preparing operational measures based on level-1, Level-2, and DSA criteria.

An overview of potential Market Based Measures to reduce GHG Emissions from Shipping

Mr. Kunal Sharma,
Ships & Technical Services Division

Today the maritime sector is engaged in an unprecedented effort to accelerate the transition to greener shipping in response to the climate challenge.Environmental performance of shipping continues to be the hottest topic of discussion, which has driven governments, ports and shipping operators to focus on ways of improving the sustainability of the shipping. In 2018, IMO adopted an initial strategy on the reduction of GHG emissions from ships (adopted vide MEPC 304(72)), setting out a vision which confirms IMO's commitment to reducing GHG emissions from international shipping and to phasing them out as soon as possible.

The technical measures in the form of EEDI & EEXI as well as operational measures in the form of SEEMP & CII have already been put in place. These measures have set the ball rolling and require mandatory regulatory compliance for ships to maintain a certain level of energy efficiency. Many experts believe that if shipping is to achieve the ambitious decarbonization targets, then these technical and operational meausres also need to be supported by a third pillar i.e. Market Based Measures (MBMs).

This was also envisaged while preparing Initial IMO Strategy on Reduction of GHG Emissions from ships. One of the candidate mid-term measures identified in the strategy is stated as "new/ innovative emission reduction mechanism(s), possibly including Market Based Measures (MBMs), to incentivize GHG emission reduction" The primary intention for considering MBMs is that they implement the "polluter pays" principle and put a cost on GHG emissions. An appropriate MBM is expected to encourage changes in shipping practices that would reduce GHG emissions. Thus, the discussion on MBMs for the shipping industry can be expected to grow in the future and, consequently, carbon and other GHG emissions will influence the investment decisions for innovative energy efficiency technologies.

MBMs place a price on GHG emissions and expected to serve two main purposes:

1. Providing an economic incentive for the maritime industry to reduce its fuel consumption by investing in more fuel efficient ships and technologies and to operate ships in a more energy efficient-manner (in-sector reductions); and
2. offsetting in other sectors of growing ship emissions (out-of-sector reductions).

Proposed Market-Based Measures

The MBMs proposals, from governments and observer organisations, that have been considered by MEPC so far range from contribution schemes for carbon dioxide (CO_2) emissions from international shipping (to be collected and transferred to a fund), via emission trading systems, to schemes based on the actual ship's efficiency both by design and operation.

To date, Governments and observer organisations have proposed the following MBMs (source: www.imo.org) :

1. International Fund for GHG emissions from ships (GHG Fund) (Cyprus, Denmark, the Marshall Islands, Nigeria and IPTA) (MEPC 60/4/8)): Establishes a global reduction target for international shipping, set by either United nations Framework Convention on Climate Change (UNFCCC) or IMO. Emissions above the target line would be offset largely by purchasing approved emission reduction credits. The offsetting activities would be financed by a contribution paid by ships on every tonne of bunker fuel purchased.

2. Leveraged Incentive Scheme (LIS) (Japan) (MEPC 60/4/37)): GHG Fund contributions are collected on marine bunker. Part thereof is refunded to ships meeting or exceeding

agreed efficiency benchmarks and labelled as "good performance ships".

3. Port State Levy (Jamaica) (MEPC 60/4/40): Levies a uniform emissions charge on all vessels calling at their respective ports based on the amount of fuel consumed by the respective vessel on its voyage to that port (not bunker suppliers).

4. Ship Efficiency and Credit Trading (SECT) (United Sates) (MEPC 60/4/12): Subjects all ships to mandatory energy efficiency standards. As one means of complying with the standard, an efficiency-credit trading programme would be established. These standards would become more stringent over time,

5. Vessel Efficiency System (VES) (World Shipping Council) (MEPC 60/4/39): Establishes mandatory efficiency standards for new and existing ships. Each vessel would be judged against a requirement to improve its efficiency by X% below the average efficiency (baseline) for the specific vessel class and size. Standards would be tiered over time with increasing stringency. Existing ships failing to meet the required standard through technical modifications would be subject to a fee applied to each tonne of fuel consumed.

6. Global Emission Trading System (ETS) for international shipping (Norway) (MEPC 61/4/22): Sets a sector-wide cap on net emissions from international shipping. A number of allowances (Ship Emission Units) corresponding to the cap would be released into the market each year via a global auctioning process. The units could then be traded.

7. Global Emissions Trading System (ETS) for international shipping (United Kingdom) (MEPC 60/4/26): Differs from the Norwegian ETS proposal in two aspects: the method of allocating emissions allowances (national instead of global auctioning) and the approach for setting the emissions cap (set with a long term declining trajectory).

8. Emissions Trading System (ETS) for International Shipping (France) (MEPC 60/4/41): Sets out additional details on auction design under a shipping ETS. In all other aspects the proposal is similar to the Norwegian ETS proposal.

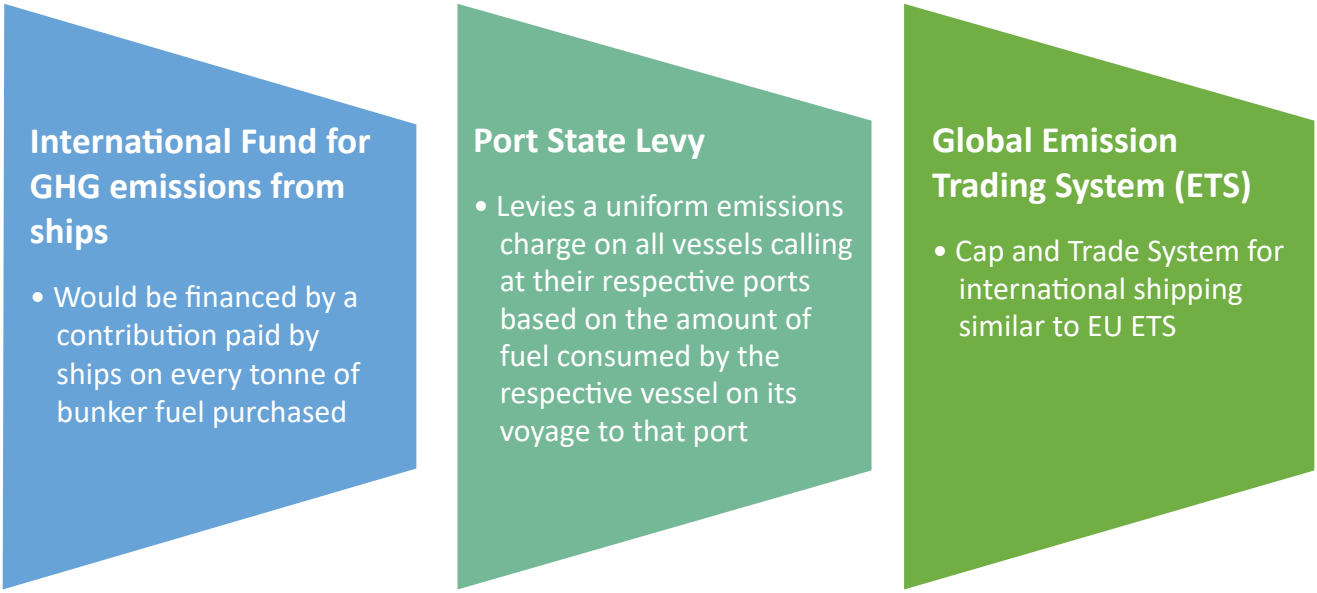
9. Market Based Instruments: a penalty on trade and development (Bahamas (MEPC 60/4/10): Insists that the imposition of any costs should be proportionate to the contribution by international shipping to global CO2 emissions.

10. Rebate Mechanism (RM) for a market based instrument for international shipping (IUCN (MEPC 60/4/55): Compensate developing countries for the financial impact of an MBM. It could be applied to any maritime MBM which generates revenue.

MEPC 63 while considering the proposed MBMs agreed on the need to undertake an impact assessment of the MBM proposals with focus on possible impacts on consumers and industries in developing countries, in general, and in particular, Least Developed Countries, Small Islands Developing States and remotely located developing countries with long trading distances. MEPC 65, in noting several submissions on this matter, agreed to suspend discussions on MBMs and related issues.

In the past the key concerns highlighted in respect of MBMs are the inequitable burden on developing countries, economic and social disadvantage that Market Based Measures may impose on the developing countries.

However, with external pressure growing on the shipping industry to raise its GHG emission reduction targets, discussions on Market Based Measures have been revived at IMO's MEPC and intersessional working groups. The idea to develop a global MBM comes as the European Union is poised to introduce regional shipping emissions trading scheme – EU ETS. There was also a proposal for a $100-per-tonne tax on carbon and some of the funds to be used for R&D and some to help developing countries combat climate change. Another proposal calling for MBMs to be adopted to incentivise the shift to cleaner fuels, estimated that a greenhouse gas levy, or carbon tax, in the region of $250 to $400 per tonne of carbon emitted would be required to encourage shipowners to shift to zero-carbon fuels.



Most studies undertaken to date conclude that low carbon and zero GHG fuels will cost substantially more than conventional fuel oil. The cost difference of these fuels can be expected to be three to five times the cost of conventional fuel oil, atleast in the near future. If the ships emitting zero GHG emissions are to compete with other ships with significantly lower fuel cost, then this may require establishment of a carbon price that effectively levels the playing field.

In the short term, an MBM could encourage slow steaming or other operational measures that would lead to reduced GHG emissions. In the long run, an MBM could incentivize the adoption of energy savings technologies or alternative, low carbon fuels. Such technologies or fuels would lead to GHG emissions reductions, and adopting them might be preferred over paying for the MBM.

The key challenge which remains for the member states and industry is to agree on a Market Based Measure that provides the necessary financial conditions where companies can build and operate low and zero-GHG ships and still remain competitive in the market, whilst also ensuring that the developing countries, Small Island Developing States (SIDS) and Least Developed Countries (LDCs) do not face disproportionately negative impacts.

Technical Software Development

IRS offers a range of digital solutions aimed at improving the efficiency of operations for Surveyors and for our clients in the field. These applications assist faster in surveys and examinations by digitalising processes like rule compliance checks, thickness measurement and associated analysis. They also help provide specialised services such as onboard record maintenance and emergency response system.

These services further aim to achieve digitalization in the Marine Industry keeping with the global industrial trend of deriving and utilizing data-driven solutions. Technical Software Development Group (TSDG), under the Plan Approval (PAC) division develops and maintains a suite of applications.

Mr. Swapnil S Khadilkar,
Plan Approval Centre

DX-MACHINA

Compliance check tool for Machinery requirements
On-board machinery is checked for compliance against IRS Rules and Regulations as part of the Plan Approval process. These compliance checks typically involve a fair number of calculations and iterative approaches. DX-Machina makes these processes quick and streamlined.

Key Features

An **Intuitive UI** guides the User through the file initialization process which involves inputting the basic ship machinery data. A number of forms are provided to the User to collect relevant inputs where necessary. Many help windows along with pictorial aids are also provided with these forms to simplify the interpretations of these inputs as clearly as possible.

Machinery Assemblies can be created in the file, which lets the User create an end-to-end assembly such as the power train transferring power from the engine to the propeller through a series of components. Each component (e.g. Gear box, coupling, various shafts, stern tubes etc.) can be created individually and their relevant details entered in the forms generated by the application.

Propulsion System assessment evaluates each component in the power train leading up to the propeller using IRS Rules for Main and Auxiliary Machinery. The User can provide details of the propeller geometry in any of the standard formats, which DX-Machina can interpret and evaluate for various rule requirements.

Steering System assessment

module is capable of evaluating Main Steering Gears, Handwheel operated gears and tillers. A standardized checklist of requirements is also provided which guide the user through manual qualitative analysis of the machinery.

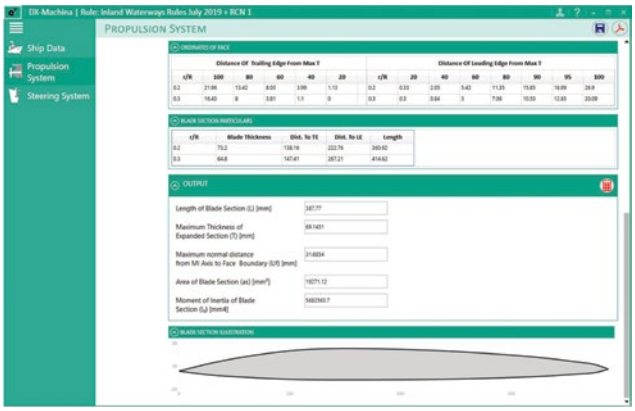
Applicable rule version

can be changed at any point of time by the user, without having to re-enter any inputs. With a click of a button, the user can re-evaluate the assembly for compliance against the currently selected version of IRS Rules for Main and Auxiliary Machinery.

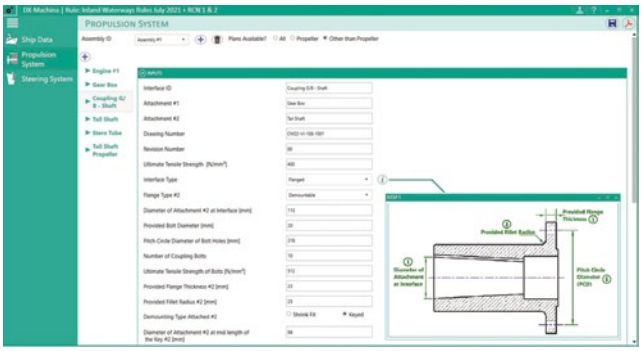
A Comprehensive reporting module generates the summary and detailed reports for all the analysis performed. Summary reports are useful to quickly view the compliance of machinery components to Class rules. The reports are easy to share and store.

CONTACT US

For queries, contact us at:
Technical Software Development Group
tsdev@irclass.org
irhull@irclass.org



DX-Machina application displaying a modelled propeller section and analysis results



Coupling module with help window

IRS Emergency Response Service (ERS)

Ms. Janane Viswanathan,
Plan Approval Centre

Introduction

IRS Emergency Response Service (ERS) has been designed to assist ship owners/ managers (client) in the event of ship casualty by providing a dedicated team of experts ready to support round the clock, based on ship data and damage information provided by the client.

An emergency response situation arises when a ship has suffered damage caused by either Collision, Flooding, Grounding, Fire/explosion, Hull failure, Cargo Liquefaction or other similar situations, by virtue of which the ship's stability and strength may be impaired.

Emergency Response Service of IRS has been continuously evolving to meet the client's needs. ERS can be utilised by clients for handling emergency situations for any type of ship and there are no restrictions on flag, size etc.

Objective

The aim of Emergency Response Service is to provide rapid technical assistance by assessing the damage stability and residual longitudinal strength of the ship in a casualty event.

Emergency Response Service is provided to comply with the following Regulations, Guidelines and National Authority requirements, as applicable:

- MARPOL Annex I, Regulation 37 - Shipboard oil pollution emergency plan (SOPEP)
- MARPOL Annex II, Regulation 17 - Shipboard marine pollution emergency plan for noxious liquid substances (SMPEP)
- Oil Pollution Act (OPA 90), CFR 155.240 - Damage stability information for oil tankers and offshore barges
- ISM Code, Section 8 - Emergency Preparedness
- SOLAS, Chapter II-1, Part B-1, Regulation 8-1 - System capabilities and operational information after a flooding casualty on passenger ships
- MSC Circular 1400 - Guidelines on Operational Information for Masters of Passenger Ships for Safe Return to Port by Own Power or Under Tow.
- Any charter or voluntary compliance (on mutually agreed requirements).

Benefits

This assistance is provided by ensuring:

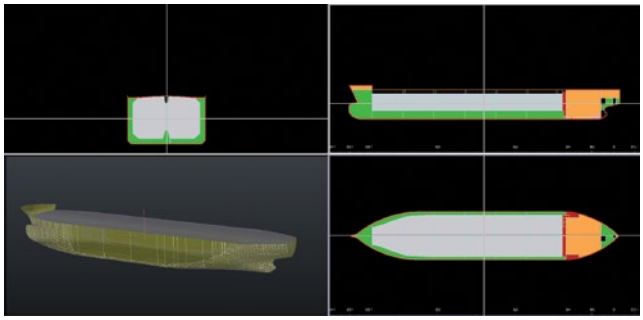
- 24 hour all year-round emergency response support, with access to an expert team of Naval Architects, Marine Engineers, Master Mariners & Technical Specialists, to assist the ship's crew and management in making quick decisions.
- All necessary and critical data of the ship are stored in electronic format.
- Software models of the ship are prepared in advance. The result of casualty analysis is provided rapidly by using computer programs, based on the data provided by client.

ERS team of IRS also conducts simulation drill to verify the effectiveness of communication and to ensure that the ship operating staff are familiar with the ERS procedure.

Enrolment process

The following is the procedure for enrolling a ship under ERS:

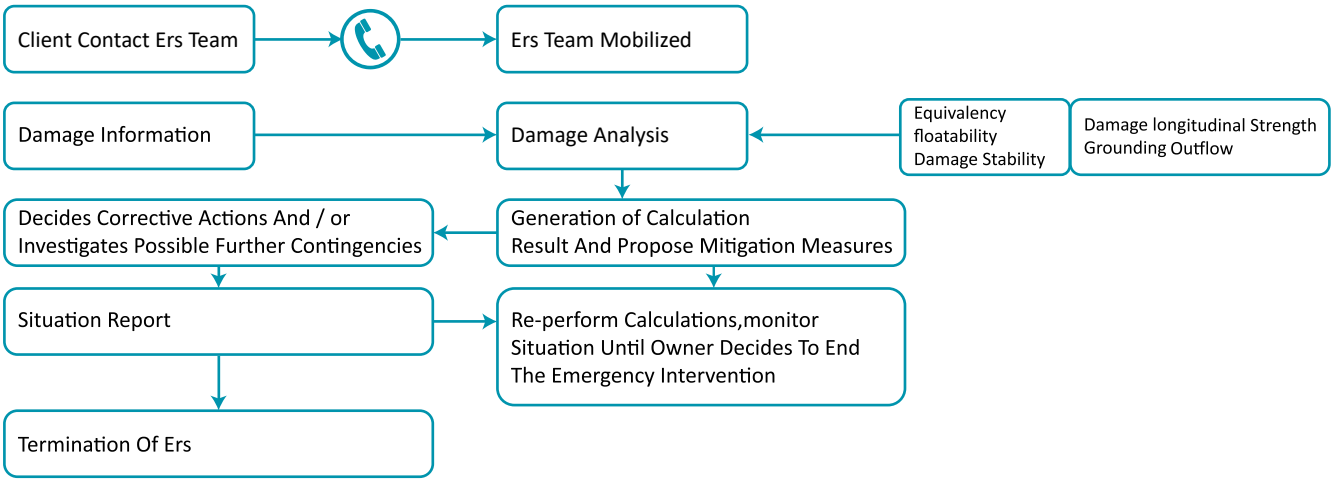
- Upon receipt of a request from owner/ manager, list of plans/documents required for the specific ship are forwarded.
- A computer model is prepared and validated based on the data provided. An internal verification is carried out to establish the accuracy of the model. On completion of internal verification, a ship specific Emergency manual and Casualty Report Form (CRF) is forwarded to the client.
- A simulation drill is offered to the client to examine the readiness of ERS scheme for the ship against a fictitious damage scenario. On successful completion of the simulation drill the ERS scheme is considered to be established for the specific ship.
- ERS Certificate valid for 5 years is issued to the ship.



Emergency manual

An Emergency manual, specific to the ship is forwarded to the Client after establishment, which includes instructions and guidance for initiating the Emergency Response Service (ERS) to report an emergency. It also includes the results of a worked out intact case & damage case and Casualty Report Form (CRF) for reporting the actual scenario onboard which will enable us to respond effectively. It is essential that the ship's officers and the owner / manager representatives on shore become thoroughly familiar with the procedures described in this manual and remain so throughout, to enable faster response during an unfortunate event

Working procedure



In case of an emergency, based on the information provided by the ship's Master/Client, ERS Team analyses the ship's condition using the stored stability & strength information and proposes various options along with suggestions regarding possible courses of action. The ERS team remains available for any re-analysis based on the updates or proposed alternatives and the service is concluded in agreement with the client.

Emergency Contact Details:
The 24x7, IRS Emergency response number and email id are provided to the client during the Establishment Phase.

IRS emergency Contact Number:
PRIMARY NUMBER : 0091 82 911 00 872
SECONDARY NUMBER : 0091 82 911 00 871
IRS emergency Contact Email id: ers@irclass.org

Numerical Studies towards EEXI Calculations

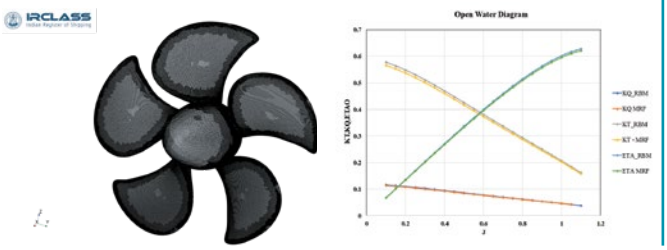
Mr. Ramkumar Joga,
R&D Division

Introduction

EEXI calculations require determining reference speed (V*ref*) i.e. the speed corresponding to the 75% MCR for calm weather condition. Numerical techniques such as Computational Fluid Dynamics (CFD) can be utilized for estimation of reference speed, (V*ref*) which involves the prediction of speed-power curves. Relevant aspects of propulsion characteristics and Energy Saving Devices (ESD) were given in the article in previous issue of Touch of Class. Present article covers details of numerical assessment of propeller characteristics in the context of propeller behaviour in open water and behind hull. Various methods such as virtual disc, Moving Reference Frame (MRF) and Rigid Body Motion (RBM) can be utilized for this purpose and are briefed in this article.

Open water characteristics

The input power (or torque) and output in terms of thrust generated by the propeller are the essential parameters of propeller performance. These are predicted numerically in terms of non-dimensional coefficients KT (thrust coefficient), KQ (torque coefficient) and efficiency when propeller is running at various advance ratios in open water, i.e. without any obstruction to flow towards propeller. Geometry and meshing of the numerical model requires careful attention to resolve blade edges and the tip in particular. Large deviations (> 3%) compared with available data e.g. model testing; in prediction can be attributed to inaccurate CAD model and/or numerical model. RBM technique can be implemented for higher accuracy compared to MRF technique, although significant difference with these two in general may not be observed in open water simulations.



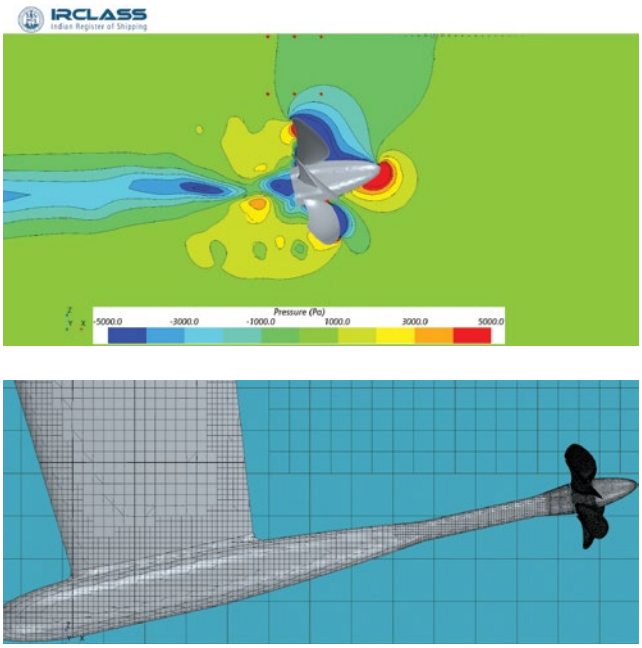
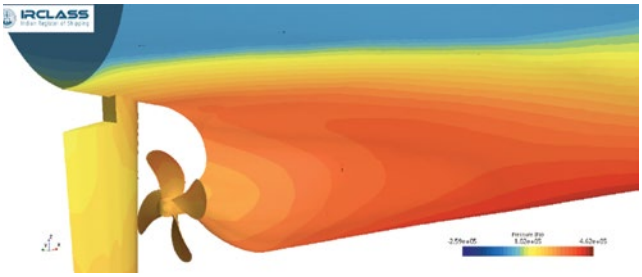


Fig. 1-4 Open water simulations – meshing, pressure contours and kT – kQ curves

Self-Propulsion characteristics

Propeller performance in the behind hull condition is assessed with self-propulsion simulations. Propeller action results in the augmentation of resistance. Also the flow in the region of the propeller gets modified due to propeller rotation. These two parameters govern the efficiency of the hull, and it is predicted through numerical assessment. Simulations are carried so as to arrive at a condition when the thrust generated by propeller is just enough to overcome the resistance offered by the hull. This condition is called self propulsion point. The net force is zero at this condition. RPM of the propeller corresponding to zero net force is arrived at by trial and error. Hull efficiency and the relative rotative efficiency of propeller, i.e. propeller's effectiveness in behind condition compared to the open water condition are arrived at with self propulsion simulations.



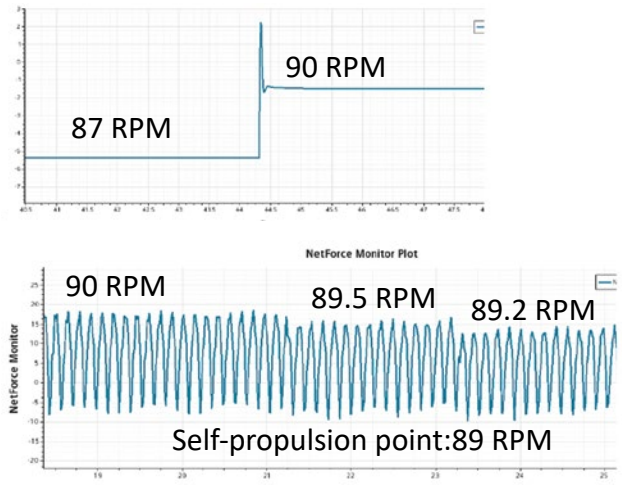


Fig.2 Self propulsion simulations – MRF and RBM techniques

Propulsion characteristics and Energy Saving Devices (ESD)

Propulsion efficiency is governed by open water efficiency and hull efficiency. In order to improve propulsion performance it is necessary to improve the flow in the region of the propeller. Various Energy Saving Devices (ESD) can be installed for the same. The improvement in the propeller efficiency due to ESD can be assessed with numerical techniques. Hull fitted ESDs such as wake equalizing duct, propeller duct etc. primarily improve the hull efficiency which is estimated with self propulsion simulations. Propeller fittings such as propeller boss cap fins (PBCF) improve the open water performance of propeller. Hence only open water simulations could be carried out to investigate PBCF effectiveness.

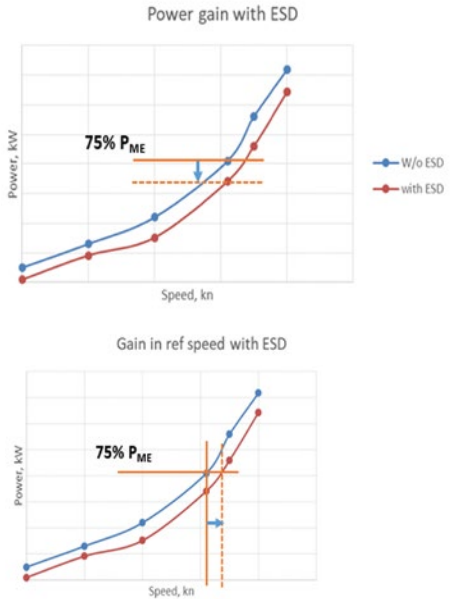


Fig. 3 Power and speed gain with ESD

Further possibilities with Numerical assessment

In case calculated EEXI is more than required EEXI, solutions such as engine power limitation (EPL) are investigated. EPL may result in reduced operational speed of the vessel. Moreover, the weather conditions during voyage limits the achievable speed of the vessel. Hence, it becomes essential to estimate the achievable speed for expected (most probable) weather and various operational drafts (loading conditions) of the vessel. Effect of weather can easily be accounted by calculating additional resistance (and hence power requirements) due to wind, wave and current conditions, e.g. as per ISO 15016. For assessing the effect of various loading conditions, numerical model considered for (V*ref*) calculations or ESD investigation can be utilized. These assessments would help in making decisions on EPL as well as ESDs and arriving at suitable operating conditions.

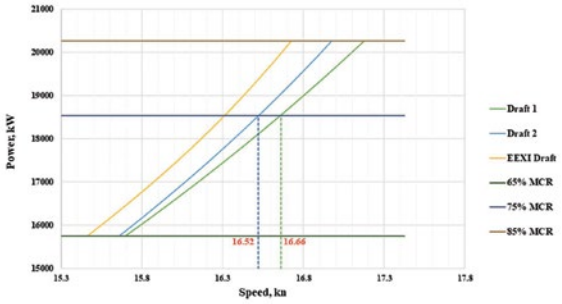
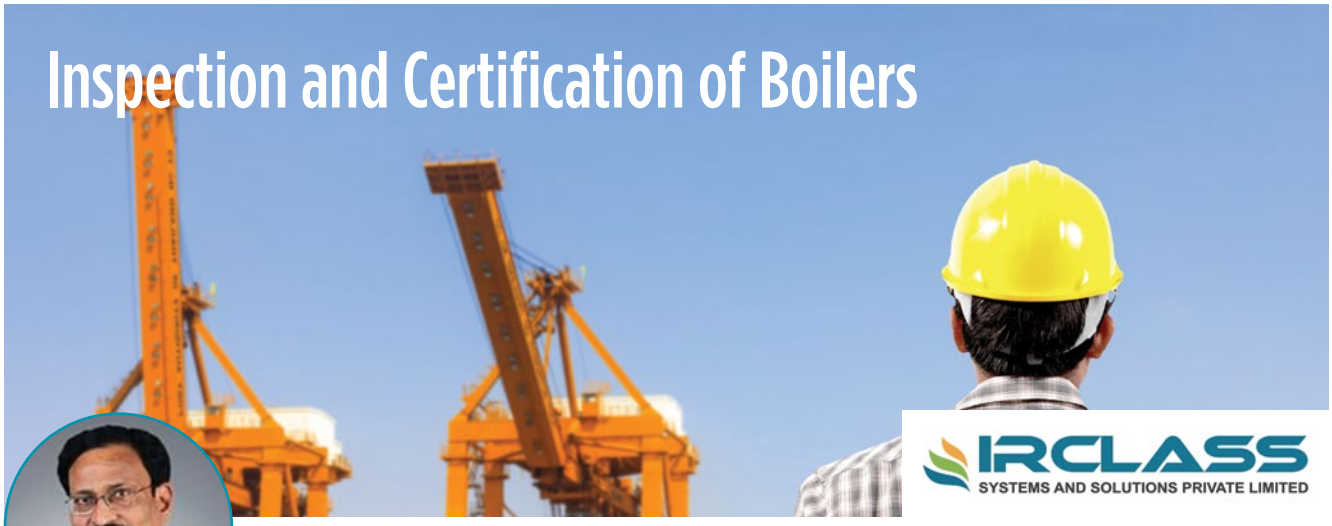


Fig. 4 Finding achievable speed for expected weather and various loading conditions

Conclusions

Reference speed as required for EEXI calculations can be estimated utilizing CFD simulations. Once the numerical model is set up it can be utilized for multiple purposes such as investigating bow modifications for reducing the resistance, studying ESDs and predicting the improvement in energy efficiency, predicting power requirements for drafts other than EEXI Draft or design draft and predicting achievable speed in given weather conditions typically in view of EPL. Any other possibilities with energy efficiency techniques such as air lubrication can also be studied with numerical assessments. CFD techniques discussed here can be a boon for the ship owners, designers and other stake holders, typically when the decisions on energy efficiency aspects are to be made based on the limited data of model tank tests and sea trials.

Inspection and Certification of Boilers



Mr. Sanjay Sarode,
Industrial Services

Boiler is an indispensable part of many industries and poses high risk to human life and property. Failure of Industrial Boilers may result in catastrophic accidents causing loss of human life and property. Boiler can explode or fail to work, if

1) Design/manufacturing process/welding process is not followed as per applicable standards.
2) Material used in construction of a boiler is of inferior quality.
3) Not operated as per standard operating procedures.
4) Not operated by a competent person.
5) Not inspected periodically and defects observed are not rectified.

The Indian Boilers Act-1923 was enacted with the objective to mainly provide for the safety of life and property of persons from the danger of explosions of steam boilers and for achieving uniformity in registration and inspection during operation and maintenance of boilers in India.

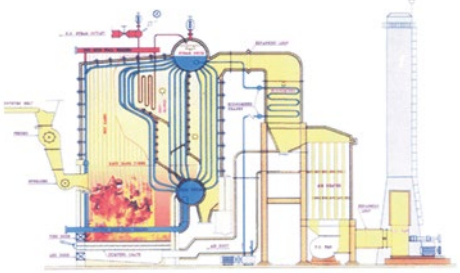
In India, activities of Construction of Boilers, Boiler Components and In-Service inspection of registered boilers are governed by The Boilers Act, 1923 & through Indian Boiler Regulations, 1950. ISSPL is geared up in executing all above Statutory techno legal functions.

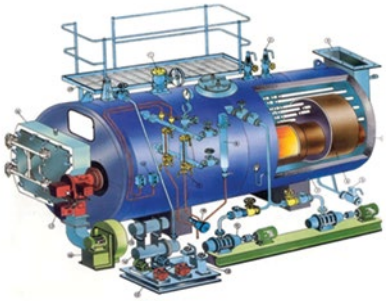
ISSPL is recognized as IBR – "Inspecting Authority" by Central Boilers Board, New Delhi. ISSPL has 11 "Competent Persons" spread across India for inspection of Boilers & its components during manufacturing and for In-Service inspection of registered Boilers.Since 2020, despite Covid pendamic situation ISSPL has left its footprint in inspection & certification of various Boiler Components such as Tubes, Pipes, Castings, Forgings, Valves, Butt welded & Forged fittings, Flanges, Dished Ends. ISSPL has also inspected & certified various Boiler Mountings, Level Gauges, PRS Stations, Fully mounted Skids, CBD/IBD Tanks, Pressure Vessels, Tube Bundles, Heat exchangers, Water Tube Boilers, Superheaters.

ISSPL certifies welders under IBR, 1950 on Form XIII. Certification of welding electrodes and filler wires is done on a large scale. ISSPL also certifies UTM & Impact Testing Machines under IBR, 1950. ISSPL has recently started In-Service Inspection of Boilers and issuance of Certificates on Form VI to Use the Boiler (Fit For Service).

Leveraging the experience and expertise gained over the years, we recently executed a Failure Analysis and Finite Element Analysis (using ANSYS 2020 R2) of deformed Front and Roof Panels of an In-Service Boiler.

Our IBR Team continuously upgrades their knowledge and skills about the latest technological developments, codes & standards, and regulatory requirements. With our extensive presence, strong technical know-how, and expertise in Design Review, Inspection, Testing, and Certification, ISSPL is fully committed to zero incidents to benefit the industry and society at large.





Inspection and Certification of Cranes

Mr. Vivek More,
Industrial Services

A crane is a machine that is widely used to lift and move heavy loads across industries such as Ports, Shipyards, Manufacturing Plants and Construction Sites etc.

Crane being an important machine for development of industries and infrastructure, it also poses high risk to human life and property. Inadequate or improper design, fabrication process, testing, periodic maintenance and operational procedures may lead to failure of crane which could possibly cause catastrophic accidents. The involvement of a qualified Third Party Inspection Agency at various stages, from design verification, manufacturing, supply, installation, testing and commissioning, ensures the product's quality.

ISSPL has a rich experience of over 30 years in certification of all types of cranes for various industrial applications.

ISSPL is taking forward this legacy beyond inspection and certification, to perform condition assessment of cranes to meet today's industry needs.

Very recently, ISSPL certified, a 140T mobile harbour crane which is erected and commissioned. ISSPL Scope involved from design review, stage-wise inspections and Witnessing of final load test in manufacturer's location at Italgru, Italy and on-site QA/QC during erection, testing and commissioning through an end-to-end design review and inspection.

Project – 140T Mobile Harbour Crane for India Port Global Limited
Location – Port Of Chabahar, Iran
Supplier – Italgru Srl, Italy

Condition Assessment Services:

Periodic Condition Assessment of Cranes is a good voluntary practice. Recently, ISSPL successfully completed a Project for Finolex Industries Limited, Ratnagiri for their requirement of Condition Assessment of Crane.

IRS commitment for a Gender Diverse and Inclusive work force

Ms. Sonali Banerjee,
QHSE Division

Gender Equality is not only a fundamental human right, but is also essential for a non-confrontational and sustainable world. The UN Agenda for Sustainable Development (Sustainable Development Goal No. 5) "Gender Equality" aims to achieve gender equality and empower all women and girls which is an effective way to uplift communities, companies and countries. A greater gender equality at all levels will enable and accelerate the achievement of all goals identified for a sustainable present and future.

There is sufficient evidence that hiring women is organisationally beneficial and financially profitable for companies in the long run. One of the major benefits of a gender equal work place is a cohesive and more productive workforce. Men and women can bring different perspectives to the table. Having different outlooks and approaches can negate many of the blind spots in the creative process. Diversity of opinion leads to a more holistic approach and therefore to greater achievements and improved decision making.

IMO embraced the gender programme in 1988, which reached an important milestone in 2019 when it declared its theme for World Maritime Day - "Empowering Women in the Maritime Community". Pledging to continue the progress, IMO Assembly adopted a resolution in 2021 proclaiming an International Day for Women in Maritime, to be celebrated on 18 May annually, with this year's theme emphasizing the three tenets for achieving this goal – Training-Visibility-Recognition.

Shipping industry as a part of the global supply chain management has not been a forerunner in pursuit of gender equality, probably because many of the job profiles involve seafaring, onboard surveys and inspections in harsh conditions which have historically been categorized as arduous work not suitable for women. However, with continued awareness and focus, this perception is changing.

A 2021 Survey (Women in Maritime Survey 2021) by IMO provides a numerical insight into the current situation. Overall, the share of women employees across various maritime sub-sectors (including Shipowners, Insurance, Education and Training) stands at 29%, with Classification Societies faring slightly better at 32%.

IRS has been one of the first maritime organisations in India to employ women in general technical streams as well as core marine field. In the technical roles, IRS inducted its first lady Surveyor (qualification – Naval Architect) for Research and Rule Development Division as early as 2002 thus paving the way for greater representation of women in this sector.

In subsequent years, IRS has also earned the distinction of recruiting India's first lady Naval Architect and the first lady Marine Engineer.

Today, IRS employs women at different hierarchical levels in various Divisions. With core competencies in technical fields such as Naval Architecture, Marine, Mechanical, Civil Engineering and Information Technology, they perform key roles across the Organisation and contribute to improving the visibility of women in maritime sector.

IRS has always been a firm believer of gender equality and has been providing women equal opportunities to showcase their capabilities and ensuring their growth.

The increased awareness and impetus this movement has gained might just be the turning point in ensuring Gender Equality in all walks of life.

Vessels - Classed

Recently classed vessels by Indian Register of Shipping

Liquefied Gas Carrier
(The Great Eastern Shipping Co. Ltd.)

Passenger Ship
(Andaman & Nicobar ADM,
Directorate of Shipping Services)

Tug
(Adani Harbour Services Limited)

Floating Production Storage & Offloading Unit
(Reliance Industries Ltd.)

Research Vessel
(Defence Research &
Development Organisation)

Key Press Releases

Indian Register of Shipping holds Advisory Committee Meeting and Customer Meet in Singapore

Indian Register of Shipping (IRS) held its Advisory Committee Meeting followed by a Customer Meet on August 11, 2022 and outlined its plans for the region. The event was attended by a cross section of the maritime fraternity from Singapore.

Indian Register of Shipping supports Atmanirbhar initiative in Defence manufacturing

IRS continues to support 'Atmanirbhar Bharat' (self-reliance) initiative in Defence manufacturing with certification of Caisson Gate and Intermediate Gate, recently delivered by M/s Hindustan Construction Company to enable the Indian Navy's aircraft carrier dry dock at Mumbai.

IRClass Academy delivers ISPS code awareness training in Qatar

IRClass Academy's ISPS code training in Doha, Qatar was well attended by personnel from the Coast Guard – Ministry of Interior, Qatar Navy, Ministry of Transport, Ras Laffan Port Security and Industrial Security

IRClass Academy and NITIE sign MOU to conduct advanced training and joint operational research

IRClass Academy & National Institute of Industrial Engineering (NITIE) have signed MOU to collaborate and provide advance technical and management training in shipping, maritime, supply chain and logistics sectors.

Centre of Excellence in Maritime & Shipbuilding (CEMS) and Medhavi Skills University sign MOU
CEMS & MSU will jointly develop and promote Industry 4.0 new-age courses in latest Software & Hardware tools and technology with university credits equivalence leading to recognized higher & technical qualifications in line with the New National Education Policy, NEP2020.

Indian Register of Shipping and GRSE sign MOU

IRS and GRSE have signed a MOU at Kolkata on 07th July 2022. IRS will undertake various technical studies and analysis - such as FEM analysis, CFD, fatigue life assessment, noise/vibration analysis, signature prediction – as required by GRSE.

Indian Register of Shipping signs MOU with IIT Guwahati Technology Innovation and Development Foundation

IRS' and 'IITG TIDF' will jointly run training and certification programs and workshops. The goal of these programs will be to develop qualified human resources and research personnel with industry-aligned competencies in technologies of Underwater design and manufacturing.

Indian Register of Shipping completes Noise & Vibration Analysis of 5 Offshore Patrol Vessels built for Indian Coast Guard at Goa Shipyard

IRS has successfully completed noise and vibration measurement and analysis for five offshore patrol vessels built at Goa Shipyard Ltd (GSL) for the Indian Coast Guard. GSL has appreciated IRS for continuous support and timely completion of the project despite challenges caused by the global pandemic.

Indian Register of Shipping leads push for improved inland waterway safety through integrated IV Rules

Indian Register of Shipping (IRS) is continuing its drive to improve inland vessel safety throughout India, having played an integral role in the drafting of the Inland Vessels Act 2021.

For detailed news, visit: https://www.irclass.org/media-and-publications/news/

Events/Webinars

Waterways Conclave - 11th & 12th April 2022, Dibrugarh, Assam

During the inauguration of the exhibition, our stand was visited by Shri Sarbananda Sonowal, Hon'ble Minister of Ports, Shipping & Waterways and Ayush. IRS Vice President – Cdr K.K. Dhawan spoke at the Breakout Technical Session 2: Inland Vessel Act and Rules & made a presentation on 'Advantages of IV Act and Draft Rules including Safety of Inland Vessels'. IRS signed an MOU with Government of Tripura for development of inland waterways during the event

Improvement of Carbon Intensity Index for Ships, 22nd April 2022

Mr. Amit Bhatnagar, VP & Head IRClass Academy spoke at the Technical Webinar on "Improvement of Carbon Intensity Index for Ships" organised by The Institution of Engineers (India)

Shipbuild India Expo Summit - 11th-13th May 2022, Mumbai

Indian Register of Shipping was a 'Key Industry Partner' for the event. Our EC, Mr. Arun Sharma inaugurated the event along with CMD of Hindustan Shipyard Ltd & addressed the conference as a Guest of Honour. Shri. Shripad Naik, Hon'ble Minister of State for Ports, Shipping and Waterways visited IRS stand & had a brief meeting with Mr. P K Mishra. Mr. H V Ramesh moderated the session on – Propelling Coastal and Inland Waterways. Dr. Suhas Vhanmane shared his insights on – Future Shipping. Mr. Siddhesh Prabhu spoke on Bio-Fuels (Regulatory Requirements and Indian Perspective). Mr. Dileep Gupta spoke on "Ship Recycling - Infrastructure Development & Compliance with Environmental Challenges"

DIMS - 2022 DOSTAS International Maritime Seminar - 9th-10th August 2022, Kochi, Kerala

DIMS - 2022 DOSTAS International Maritime Seminar - 9th-10th August 2022, Kochi, Kerala Indian Register of Shipping was a Silver Sponsor for "DIMS - 2022 Dostas International Maritime Seminar - An International Conference on Marine, Offshore and Oil & Gas Industry" held in Kochi on 9-10 Aug 2022

Mr.H.V.Ramesh, Divisional Head–Ships & Technical Services, received 1st copy of "Proceedings of DIMS 2022" and briefly addressed the gathering

Dr. Joseph Prabhu, Surveyor, presented a paper during Session 5 - Design and Optimisation of Marine Structures on "Application of CFD for investigating effectiveness of energy saving devices".

INMEX SMM India Exhibition & Conference - 1st-3rd June 2022, Mumbai

Mr. K. K. Dhawan spoke on "Inland Waterways - A Rich Potential". Mr. Vinay Kshirsagar spoke on "Environment & Maritime Social Responsibility". Mr. R Srinivas shared his insights on "Fuel Cell: Safety & Reliability"

Posidonia, 6th-10th June 2022, Greece

Indian Register of Shipping had a successful participation at Posidonia, Greece. Our stand was visited by all maritime stakeholders.

IRS R&D team presented papers at the following conferences:

- The Thirty-second (2022) International Ocean and Polar Engineering Conference, Shanghai, China, June 5–10, 2022
- OMAE 2022 41st International Conference on Ocean, Offshore and Arctic Engineering, June 5-10, 2022, Hamburg, Germany
- International Workshop on Water-Jet Propulsion (IWWP2022) by The Royal Institution of Naval Architects
- Classification Regulations & Advanced Technologies for Naval Ships and Auxiliaries, organized by DNA, IHQ (MoD)

Ship Shore Data Communication in Futuristic Ships – 29th July 2022

Mr. Avinash S Vaze spoke on "Ship Shore Data Communication in Futuristic Ships" at the 'Technology in Maritime' conference organised by The Naval Connection

For events details, visit https://www.irclass.org/media-and-publications/events/

Completed Training

Enhanced Classroom Induction Training spanning over ten days was conducted from 1st Aug to 12th Aug 2022 at IRS Head office. Twenty-five Surveyors participated in this programme from Head Office and Survey Stations.

Ongoing Training for Surveyors from Kenya Maritime Authority

Extensive training of 48 months for the KMA Surveyors to make them competent to undertake examination of hull plans as well as conducting of Flag & PSC inspections of vessels has commenced on 4th July 2022. The group of five KMA Surveyors have been divided into two batches. One comprising of three are posted to Plan approval Centre in HO to be trained on examination of Hull plans. The other batch of two Surveyors have been posted to Kochi SS to be trained on field surveys. On completing six months, they will return to their parent organization and will resume for the second term in July 2023.

Upcoming Training on First Aid:

A one-day session on First-aid is being arranged in mid-September for nominated HO personnel. The session will cover various medical emergencies which will enable the participants to become an effective first aider not only at work but also in the society at large, upholding IRS name!

Emergency Evacuation Drill at IRS Head Office Premises & Fire Fighting Appliances Training Programme

IRS has consistently remained committed to the philosophy of Safety and well-being of all employees as well as support staff. Evacuation drills are undertaken regularly towards emergency preparedness.

In an endeavour to enrich every employee with the safety perspectives, IRS conducts regular emergency drills, training programmes, hands-on exercises and interactive sessions. Mr. Rajesh Arora, Principal Surveyor, QHSE Division imparted training on the operation of various fire extinguishers held on 17 June 2022.

Employee Corner

Promotion from Senior Principal Surveyor (SPS) to Chief Surveyor (CS)

Mr. P. K. Mishra

Mr. T. K. Sahu

Cdr. K. K. Dhawan

Mr. Ranjeet Singh

Elevation to Divisional Head

Mr. H.V. Ramesh, Senior Principal Surveyor (SPS) has been elevated to the position of Divisional Head, Ships and Technical Services.

Promotion from Principal Surveyor to Senior Principal Surveyor (SPS)

Mr. G. Natarajan

Mr. K. Mallikarjuna Rao

Mr. Devrup Kabi

BOOSTER DOSE VACCINATION

In-house Booster dose vaccination drive for our employees, their families as well as support staff members was smoothly conducted at our Head Office, Powai on Friday, 24th June 2022.

The process was organized in collaboration with HCG ICS Khubchandani Cancer Centre with minimum waiting time and, in utmost sanitized and safe conditions.

228 employees / dependents were vaccinated successfully.

Indian Register of Shipping celebrated 75th Independence Day of India showcasing the spirit of the 'Azadi ka Amrit Mahotsav'

IRCLASS
Indian Register of Shipping

Energy Efficiency Existing Ships Index (EEXI) & Carbon Intensity Indicator (CII)

- Plan early for smooth regulatory compliance
- Web Based Electronic tools to calculate EEXI and prepare EEXI Technical File
- Enhanced SEEMP, Calculation of CII and projected CII Rating
- Verification of Energy Saving Measures
- Trainings and Workshops

www.irclass.org

IRCLASS
Indian Register of Shipping

Head Office:
52A, Adi Shankaracharya Marg, Opp. Powai Lake,
Powai, Mumbai - 400 072. India
Email: ho@irclass.org
Web: www.irclass.org
Tel : +91 22 3051 9400 / +91 22 7119 9400

BlackCoffee/IRC/0922