The South African Institute of Marine Engineers and Naval Architects

SAIMENA

The Two Oceans Journal

1st Edition 2019

National Council 2018/2019

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Editors:

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President's report

This AGM is the end of a year as the President of SAIMENA, I cannot believe it has gone so fast.

During this past year we eventually lost access to SAIMENA House. The Berea Rovers Club closed down and SAIMENA has had to vacate SAIMENA House. The various artefacts have been relocated to safe storage and the Durban Branch has established a very good working arrangement with Grindrod Shipping to use their Training Facility for meetings. Many thanks to Quentin Foyle and Grindrod for this support.

SAIMENA Membership growth has continued of the year past, and I encourage all members to actively solicit new members, especially the younger generation, students/cadets and this who are currently not as active in our marine association, especially people of colour who are significantly missing from the structures of council and branch committees. I believe growing our numbers in these areas is vital to enable SAIMENA to play a more meaningful role in the maritime space in the future.

We have had a change of Treasurer due to personal circumstance, I wish Akash well for the future and thank him for the services that he rendered to SAIMENA. Phillip Wood has ably stepped into the breach and is already making huge strides in aligning and strengthening our financial management situation.

The support from Council and the Branch Committees has been essential to ensuring that SAIMENA is robust and able to continue playing its role in the marine sphere. I do note that the Cape Branch has been battling for some years now to get adequate number of committee members to function easily. All SAIMENA members are again requested to please get involved at a branch and council level, more participation means a lighter work load on committee members and makes it more pleasant for all involved, it also gives you a chance to have your way and ensure that service and support you want from SAIMENA is achieved, get involved as only you can make a difference, don't sit on the side-lines.

The support that SAIMENA has received from the companies associated with the Chairmen Cape and Durban, AMSOL and Grindrod Shipping, is especially recognised and my personal thanks and that of SAIMENA are conveyed to yourselves and your companies.

Upgrades of the SAIMENA website is on-going, please consult the website and feel free to forward any constructive suggestions you may have so that we can enhance the communication with our members via this means.

We still have many SAIMENA members who are not in email contact with us, please encourage all your shipmates to ensure that the make electronic contact with SAIMENA to ensure that we can deliver on-time and relevant contact with our members, the use of the postal system is very expensive and highly unreliable. Many members also fail to update their details resulting in a breakdown of contact, please keep SAIMENA up to date so that we can be of service to you our members.

Take note that ECSA has changed the way it registers professionals, moving to a largely decentralised system. This places a demand for discipline specific assessors in all our geographic locations. Presently there are no Marine related assessors on the ECSA database, which means that our Marine related disciplines are not effectively or fairly evaluated when members apply for registration. Please make yourselves available for assessor training so that we can strengthen our marine representation and ensure that the standard of marine engineering is maintained at a level that we as SAIMENA, will be happy with.

I am pleased to note the new ship construction projects launched for the South African Navy for the provision of 3 x Inshore Patrol Vessels and one Hydrographic Survey Ship, especially as these are all being locally built by the South African industry with local people.
The future acquisition of a replacement Rescue tug remains on the cards; hopefully this can also be built in South Africa.

Slow growth of South African Shipping Register has been a disappointment after a very promising start. I believe that more should be done nationally to encourage the growth of the register, but that to succeed South Africa must ensure that value is added to ships that come into the register, it can't only be a name in a book.

The continued demise of ship repair companies in the face of regional competition and limited national support is also very detrimental to our marine industry.

Thank you for the support during the past year, and I look forward to enhanced levels of participation and interaction with SAIMENA members in the year ahead.

Best regards

Kevin Watson

Down Memory Lane

It is suggested that **TOJ** start a series of articles focusing on the life story or interesting experiences of our members ..

Past President Bill Rice did this on the old web site some time ago and I think it would be interesting to our members to resurrect this within the **TOJ**.

So if you would like to tell your story please write it down and send it to me at iainfran1@gmail.com and I promise to print it (subject to editing) in the mag. Got pictures? Send them too.

To start the ball rolling here is my story:

I was born the son of a Chief Engine Room Artificer of the British Royal Navy and spent my early years living at outposts of the now defunct British Empire such as Singapore, Hong Kong and Malta.

Having passed the necessary examination I entered Portsmouth Naval Dockyard UK at the tender age of 16 where I served an indentured apprenticeship as a fitter/turner immediately joining the merchant navy on completion after being graded 2A by the Board of Trade.

My first ship was the 1948 built MV "Cannanore" of the P & O. S. N. Co. a general cargo ship of just over 7000 GT which was last heard of as being sold to Somalia and renamed Santa Ana in 1972. She was powered by an opposed piston Doxford which as anybody who has sailed with this engine knows, is a horror when having to repack the front and back elbows the minute you hit port, The crankshaft bearing shell white metal also had a tendency to fail resulting in having to find the globules of white metal in the sump, melt them down reform them , and scrape them to fit before we could proceed.

Having steam auxiliaries and a scotch boiler supplying the steam meant the ship often had Chief Engineers (steam), on board getting motor time in for their combined C o C. The fear in the eyes of these guys when they were forced to take over the controls was palpable especially when blowing the engine safeties meant a case of beers. (no ECR's in those days)

Sailing from Tilbury my first trip was a European coastal to Bremerhaven and Hamburg where I got to know the Reeperbahn which any seafarer of that time and perhaps even today would remember well

From that voyage we then did the Indian /Pakistan coastal going round the Cape, refueling at Durban, thence proceeding to Karachi, Bombay, Visakhapatnam, Madras, Calcutta, Chittagong and Chalna.

The Indian coast at that time was indeed an eye opener, The Sulphur ladies at Visakhapatnam after several weeks at sea started to look attractive, the river Hooghly was said to be the backside of the world and Calcutta is forty miles up it, we got robbed in Madras by some kids who offered a very good exchange rate for our British pounds but disappeared very quickly with our notes grasped in their grubby hands and our hands empty, the divers at Bombay who when you threw a coin into the sea would dive in to get them and amazingly always found them. Many other instances of interest went on but nobody could forget the Bombay canaries that were easily the largest cockroaches I have ever, and to this day, seen.

My next ship was the "Pando Cove" A steam turbine powered cargo ship built in 1954 originally named Ballarat and sold to Ben line in 1972 being renamed Benledi. When I was on her she was on the far east run to Singapore and Hong Kong. where I got to know the now defunct Boogie street in Singapore, where a good laugh was always on the cards with the characters that collected there. The fortune tellers who came on board and by just looking around your cabin and asking what seemed to be innocent questions could tell you all about your history , family and throw in your future. Would have been great as spies.

The Queen Alexandra Army nurses at Singapore were always on for a party on board, so we lowered a lifeboat and picked them up at the quay but had to return them by 2300 and they were chaperoned. Nevertheless the sight of an attractive girl with a saucy grin and a turn of ankle did great for moral on those long trips of yesteryear.

After the cargo ships I must have done something right as I was transferred to the Passenger division and went on board the liner Orcades . But that is another story for the future.

Iain Armstrong

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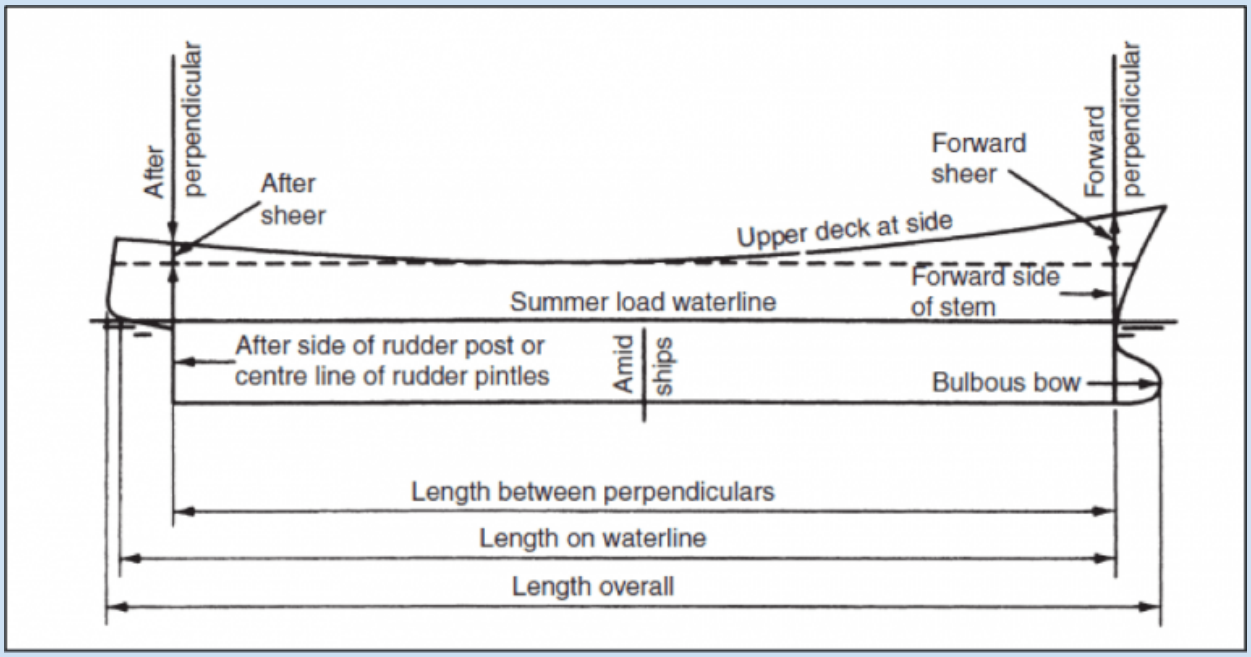
Design and Characteristics of a Ships Hull

The hull of a ship is the most notable structural entity of the ship. To define the hull, it can be said that it is the watertight enclosure of the ship, which protects the cargo, machinery, and accommodation spaces of the ship from the weather, flooding, and structural, We will see how the hull of a ship is designed for various factors taken into consideration during the entire lifetime of the ship, and how the design of a ship's hull plays the most important role in the entire ship design and ship construction.

Hull Related Nomenclature



The above figure shows the schematic profile of a conventional ship's hull. Understanding the meaning and applications of the nomenclatures related to it forms the basics of understanding ship design and shipbuilding technology.

Bow and Stern: The forward most contour of the ship's hull is called the bow, and the aft-most, is its stern. The stem is the forward most contour part of the bow.

Forward Perpendicular: If a perpendicular is drawn at the point where the bow intersects the waterline, this imaginary perpendicular line is called the forward perpendicular. For most of the hydrostatic calculations, the forward perpendicular is used as the forward reference of the hull.

Aft Perpendicular: Depending on the designer, the aft perpendicular can be the perpendicular drawn through the aft side of the rudder post or through the center-line of the rudder pintles. The aft perpendicular is the aft reference line for all hydrostatic calculations.

Length between Perpendiculars: The length between the forward and aft perpendiculars is the length between perpendiculars. The LBP is a very important parameter in all stability calculations, hence calculation of the LBP at various drafts becomes an important step in carrying out stability analyses.

Sheer: The upward curve formed by the main deck with reference to the level of the deck at the midship, is called sheer. It is usually given to allow flow of green water from the forward and aft ends to the midship and allow drainage to the bilges. The forward sheer is usually more than the aft sheer to protect the forward anchoring machinery from the waves.

Summer Load Line: The summer load line is the waterline of the ship at sea water when it is at its design weight and ballast conditions. It is also called the design draft; this forms the reference for all other load lines of the ship.

Hull Lines and Shape

Block Coefficient:

Block coefficient is the ratio of the ship's underwater volume to the volume of the imaginary rectangle enclosing the underwater portion of the hull. Since the length, breadth, and height of this enclosing rectangle would be the length between perpendiculars, Maximum Beam, and Draft of the ship, the block coefficient is expressed as follows:

$$Cb = \frac{Volume\ Displacement\ of\ the\ ship}{LBP \times Max.beam \times Draft}$$

The value of the block coefficient is one for a ship with the rectangular cross-section. Hence, for a typical ship's hull form, it would be less than one. The higher the block coefficient, the fuller is the hull form (e.g. oil tankers, bulk carriers)..

Finer hull-forms have lower block coefficients (e.g. container ships, warships).

The midship coefficient is the ratio of the submerged area of the midship section to the enclosing rectangle. It is hence expressed as:

$$Cm = \frac{Submerged\ Midship\ Area}{Beam\ at\ midship \times Draft}$$

There are a number of other form coefficients like prismatic Coefficient, Volumetric Coefficient, etc. which are basically the parameters used to define the volumetric distribution of the ship's hull along its length. Once these coefficients are arrived at, from statistical studies, the hull lines are developed. The lines plan of a ship's hull comprises of three views. To understand the lines plan, we first need to know what are buttocks and waterlines.

When the hull of a ship is cut into multiple sections longitudinally, that is, if you slice the ship's hull at every two meters starting from port to starboard, you would produce longitudinal sections at every two meters. The contour of each longitudinal section is called a buttock line, and this is exactly what is represented in the profile plan, as shown below. The reference lines for the profile view are the stations (vertical grid lines, which denote the longitudinal position) and waterlines (horizontal lines, which denote vertical positions).

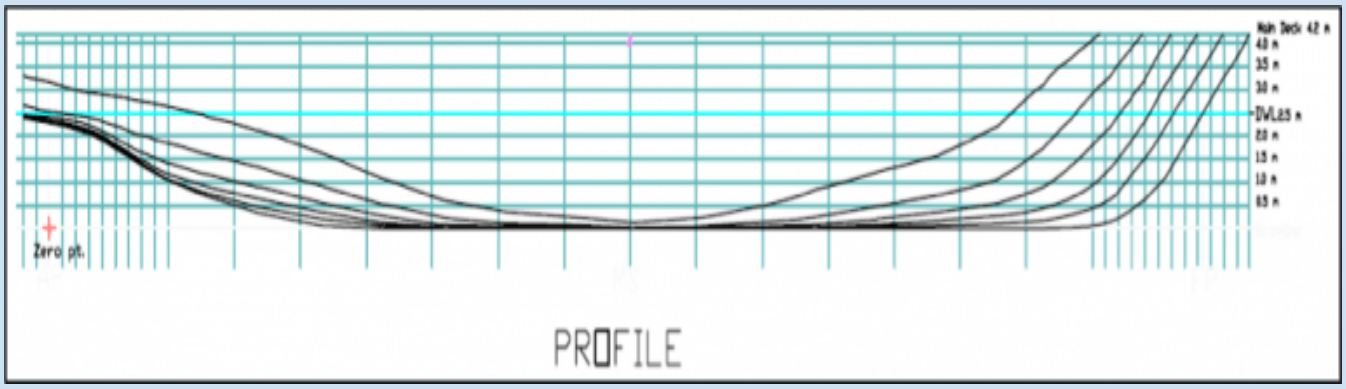


Figure 2: Buttock Lines

If the ship's hull is sliced along each waterline, then every waterline produces a distinct curve. Since a ship's hull is symmetric about the centerline, a common practice prevails in which the curve is drawn on either side of the centerline, and this view is called the body plan or the half breadth plan of the ship.

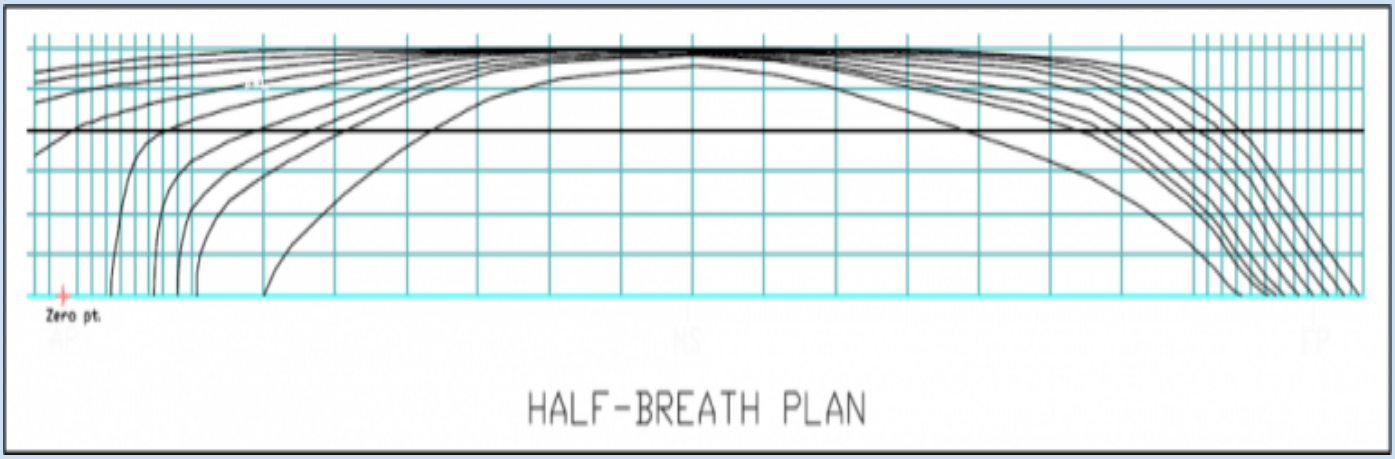


Figure 5: Lines plan of a ship

If the ship's hull is sliced to form a section at every station, we obtain the body plan, as shown below. The typical practice of drawing the body plan is to denote all the half sections (due to the hull's symmetricity). The sections forward of the midship are drawn on the right side of the center line, and all the sections from the midship to the stern are drawn on the left side.

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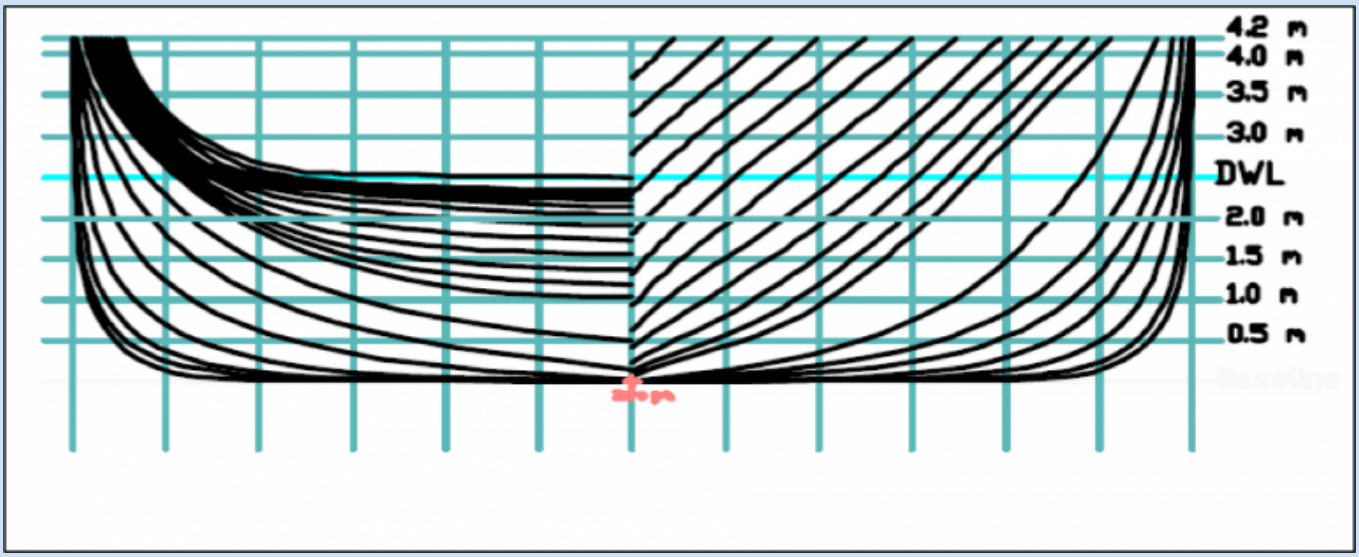


Figure 4: Body Plan.

The body plan is the most useful representation of the ship's hull lines. The reference lines in the body plan are the buttocks (vertical grid-lines), and the waterlines (horizontal grid lines). The body plan, along with the reference lines can be self sufficiently used to develop the profile plan and half breadth plan of the ship. It is also useful in developing the sectional area curve, and bonjean curves of the ship.

The complete lines plan of a ship is arranged by placing the profile view on top, with the half breadth plan just below it, and the body plan to its right, as shown below. The lines plan provides for the foundation of developing not only the three-dimensional hull model, but also developing frame-wise structural drawings, general arrangement, and loft drawings at the shipyard.

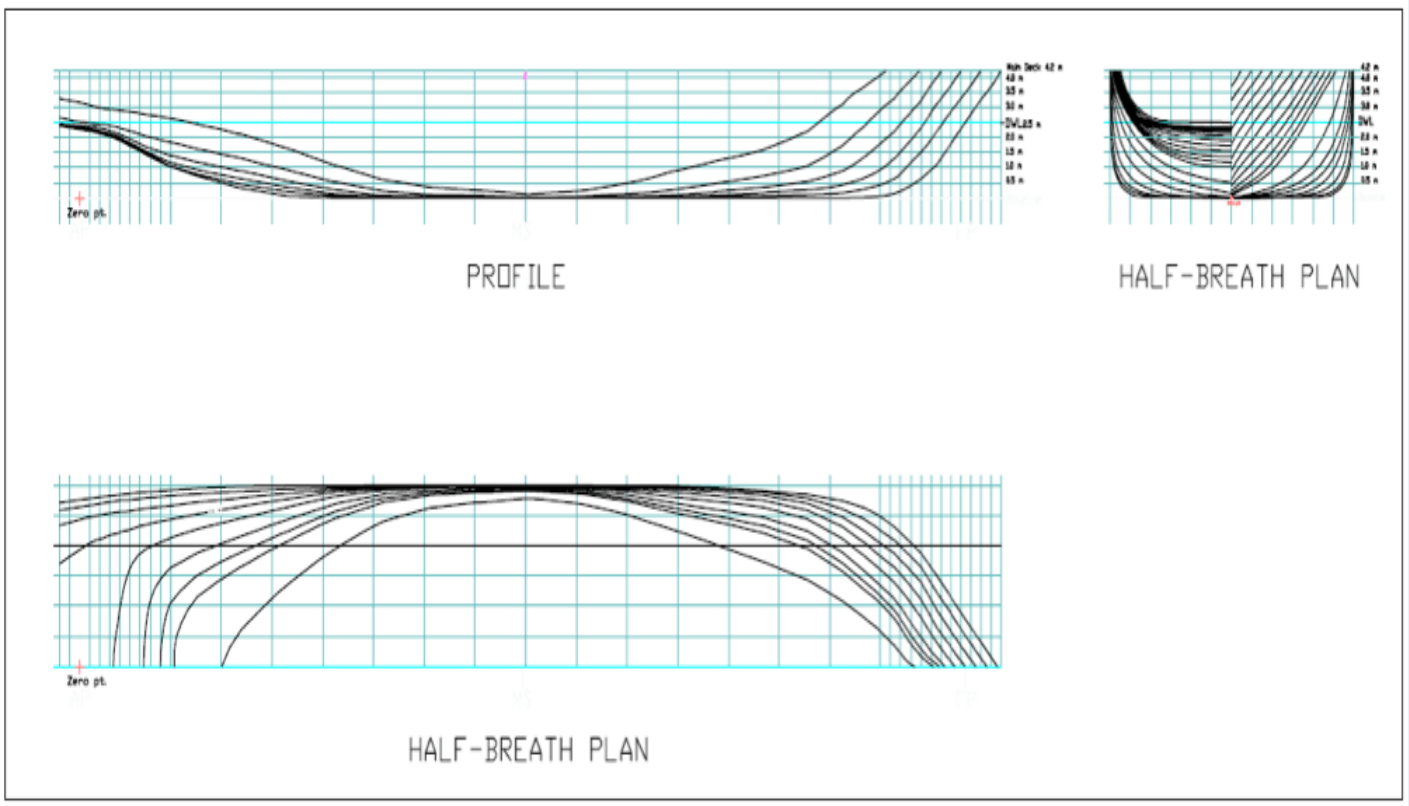


Figure 5: Lines plan of a ship

Hull Structure and Strength

The structural design of the hull of a ship amounts to approximately 70 percent of the total structural design of the ship. The stages in designing the hull structure are as follows:

Step 1: Calculation of Loads on the Hull: This is where the classification society rules come into play. Rulebooks have specialized formulae for calculation of wave loads on the ship's hull. The still water bending moment, wave bending moment, and shear forces are to be calculated using these formulae. These load values act as set points in the entire structural design process.

Step 2: Scantling Calculations for Midship: The dimensions of all the structural members of the ship (plates, stiffeners, girders, beams, pillars, etc.) are collectively called scantlings. The loads calculated in Step 1 are used to arrive at the scantlings, and this is calculated for structural members at every frame.

Step 3: Midship Section Modulus: The midship section structural drawing is prepared according to the calculated scantlings. This is followed by locating the neutral axis of the midship section and calculating the section modulus of the midship section. Two criteria are to be satisfied at this stage:

1.The obtained midship section must be equal to or more than the minimum section modulus value obtained by the empirical formula in the rule book.
2. The bending stress at the deck and the keel are calculated, and it is checked if the stress values are within the required factor of safety.

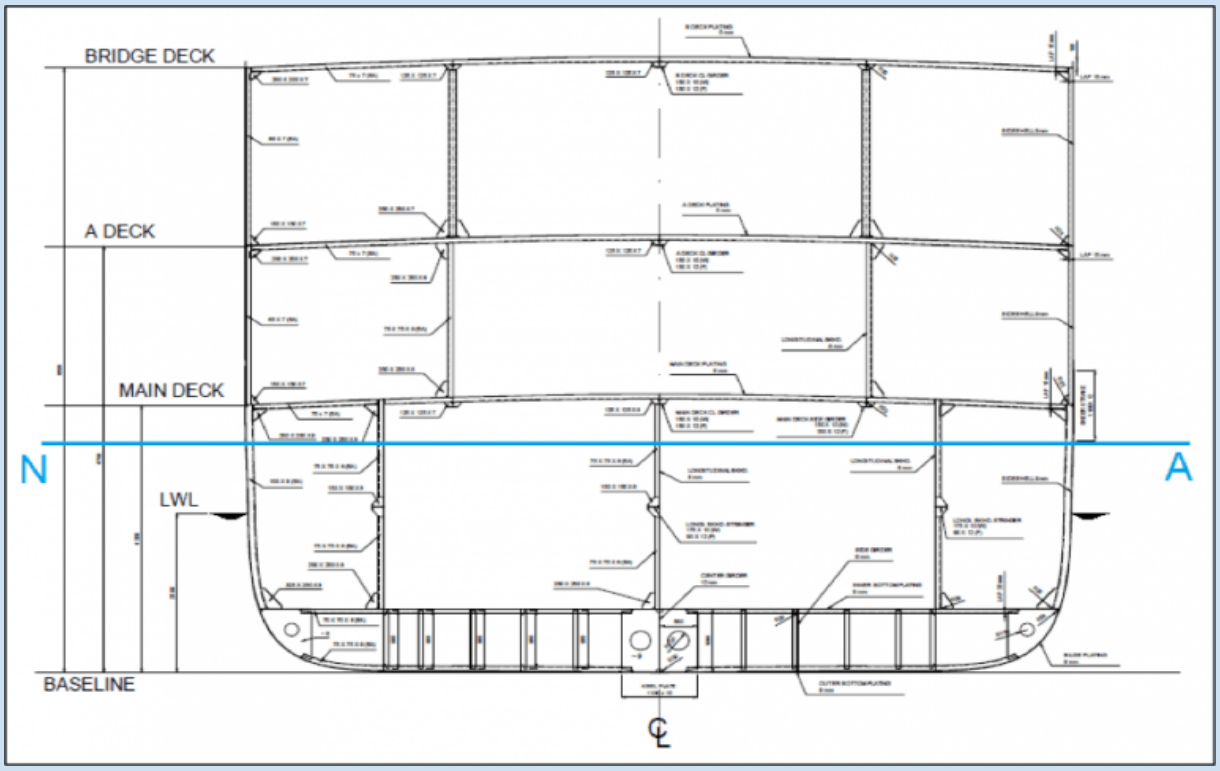


Figure 6: Midship section drawing of a passenger vessel.

In the above midship section drawing, the blue line (NA) is the neutral axis of the section. The bending stress graph is drawn with the neutral axis with the reference (origin), and the top-most and lowermost ends of the graph would denote the stress values at the deck and keel respectively, as shown in the stress graph below.

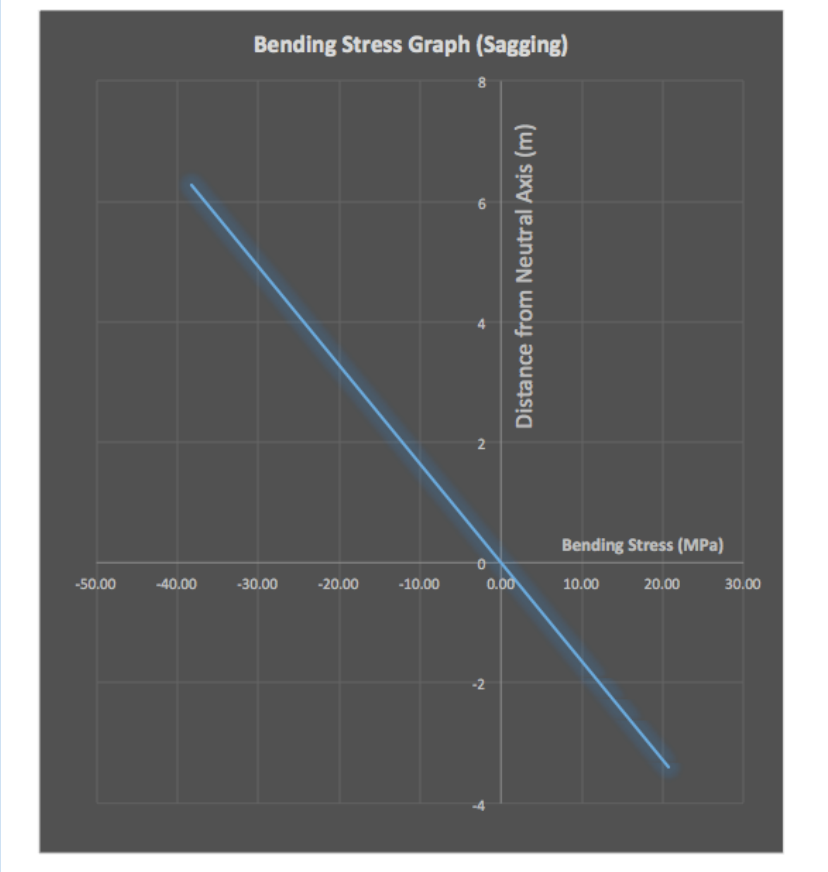


Figure 7: Bending stress diagram of a ship's midship section.

Step 4: Frame-wise Scantling Calculation: Once the midship scantlings satisfy the criteria, the scantlings for structural members at each frame are calculated, and corresponding frame-wise structural drawings are prepared. Special formulae are applied for the forward and aft sections, and bulkheads, and drawings are prepared for the same.

Step 5: Calculation of Steel Weight: The obtained scantlings are used to calculate the steel weight of the ship. This is where the iteration begins. If the calculated steel weight lies outside the empirically and statistically obtained values, the designer might have to look at using lighter weight steel at suitable regions or take other decisions to keep the lightship weight within limits.

Step 6: Development of 3D Structural Model and FEA Analyses: With the structural drawings at each frame, a three dimensional structural model is prepared for the entire hull. This process takes the longest time because the accuracy of this model would directly impact the results of the finite element analyses that are to follow. Three-dimensional meshing is carried out on the 3D model, followed by finite element analyses for various conditions. It is based on the results of these analyses that classification societies today approve a ship's structural design, as they produce more reliable data than those produced by linear calculations

Course Stability of the Hull.

Another important aspect of the ship's hull is its directional or course-keeping performance at sea. In other words, its manouvrability. In order to evaluate the manoeuvrability of the bare hull, we evaluate the following aspects:

- **Straight Line Stability**: If a ship moving in a straight line is subjected to an external disturbance, and it changes its direction but continues to move in a straight line along the new direction, without the help of the rudder, then the hull is said to have straight-line stability.
- **Directional Stability:** If a ship moving in a straight line is subjected to an external disturbance, and it continues to move along a new path which is parallel to the initial direction, the ship is said to possess directional stability. Directional stability is not possible without the aid of a control surface (e.g. rudder), but having straight-line stability makes it easy to attain directional stability.
- **Path Stability:** If a ship moving in a straight line is disturbed externally, and it continues to move along the same path (after a few oscillations), it is said to have path stability. Path stability, like directional stability, can only be attained if straight-line stability is achieved.

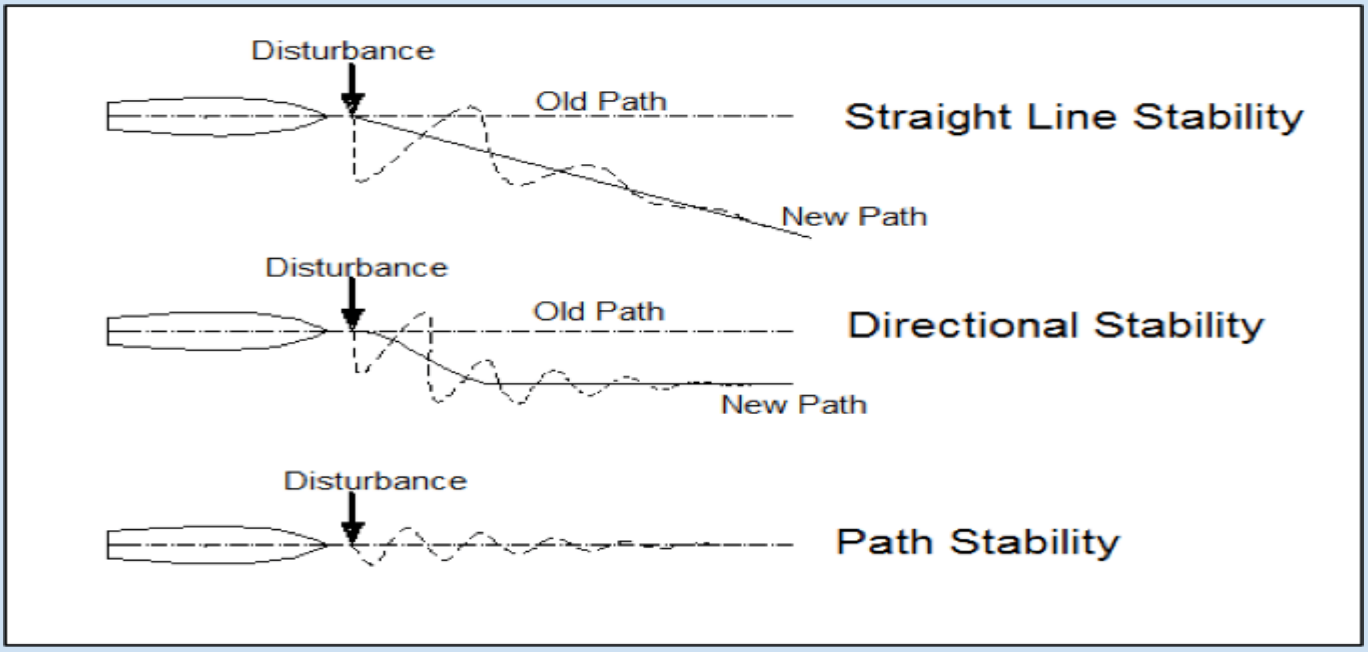


Figure 8: Course stability of a ship's hul

Hull-Superstructure Interaction

A superstructure on the main deck reduces the bending stress at the deck from the stress value predicted by the beam bending theory. This is because of the interaction of the shear stresses with the bending stress at the ends of the superstructures. However, this leads to deformations at the superstructure ends. So, in other words, if a superstructure is an efficient one, is must be able to absorb a certain portion of the bending stress at the deck. The extent to which it takes up the bending stress determines its efficiency, which some designers prefer to call Superstructure Efficiency. It can be expressed as:

$$Superstructure\ Efficiency = \frac{Actual\ load\ carried\ by\ the\ superstructure}{Load\ carried\ by\ a\ 100\%\ efficient\ superstructure}$$

It depends on the designer whether to design a superstructure that would take up the bending stress from the hull, or whether to design one that is free from any interaction with the hull. Designing a 100 percent efficient superstructure would be possible, but would come at the cost of heavy weight deep bulkheads at the superstructure ends to prevent severe distortions due to shear. However, to increase the superstructure efficiency, most ships have superstructures connected to the hull by means of bulkheads transverse bulkheads under the deck, and webs that run continuously from the hull to the superstructures at its forward and aft ends.

There are other aspects of a ship's hull that matter such as watertight integrity, intact and damage stability, and vibration

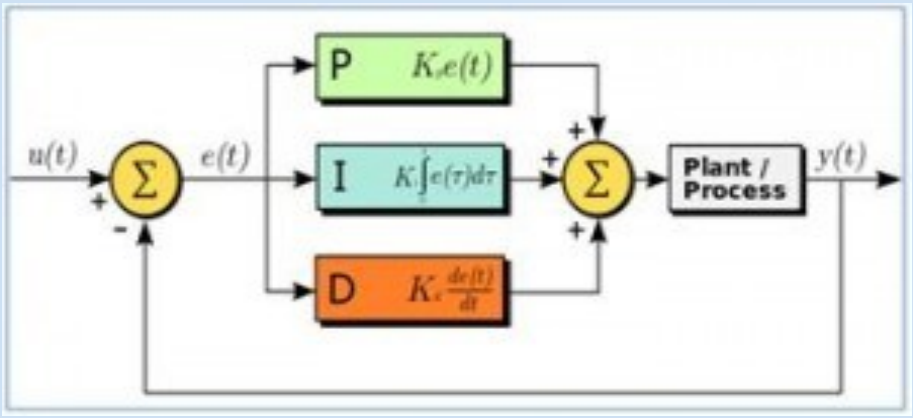
Acknowledgements Marine Insight and Soumya Chakraborty

What is a P.I.D.

It started with a differential controller which was essentially a mechanical or mechanical \electrical device which took a lower value and a higher value and operated a system within a determined range i.e. between 20 and 30 degrees C.
The value was usually determined by turning by hand an adjuster at the top to the range required shown by a value indicated by a graduated scale on the face.

Then we moved on to the PLC which led to the PID.

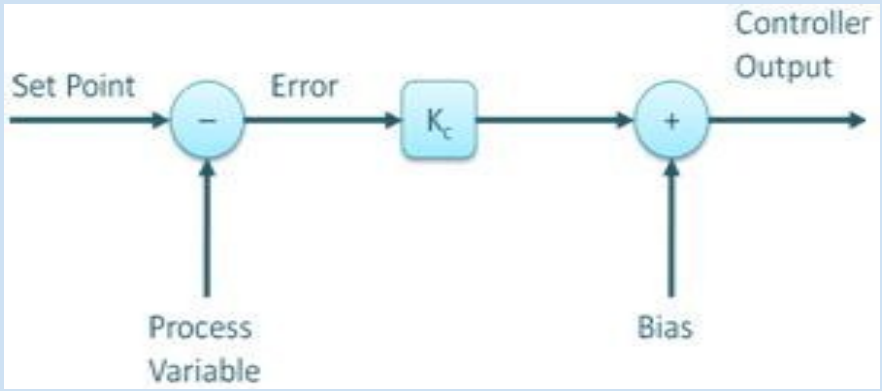
PID controllers are found in a wide range of applications with Approximately 95% of the closed loop operation industrial sector, including ships, using PID controllers. PID stands for Proportional-Integral-Derivative. These three controllers are combined in such a way that it produces a control signal.



Working of PID controller

Proportional Control

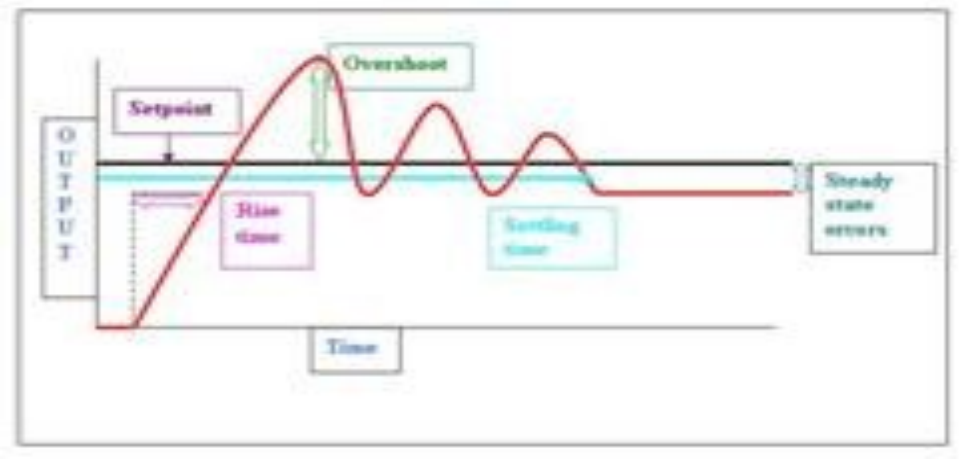
Proportional or P- controller gives output which is proportional to current error . It compares desired or set point with actual value or feedback process value. The resulting error is multiplied with a proportional constant to get the output. If the error value is zero, then this controller output is zero.



P-controller

Proportional or P- controller gives output which is proportional to current error . It compares desired or set point with actual value or feedback process value. The resulting error is multiplied with proportional constant to get the output. If the error value is zero, then this controller output is zero.

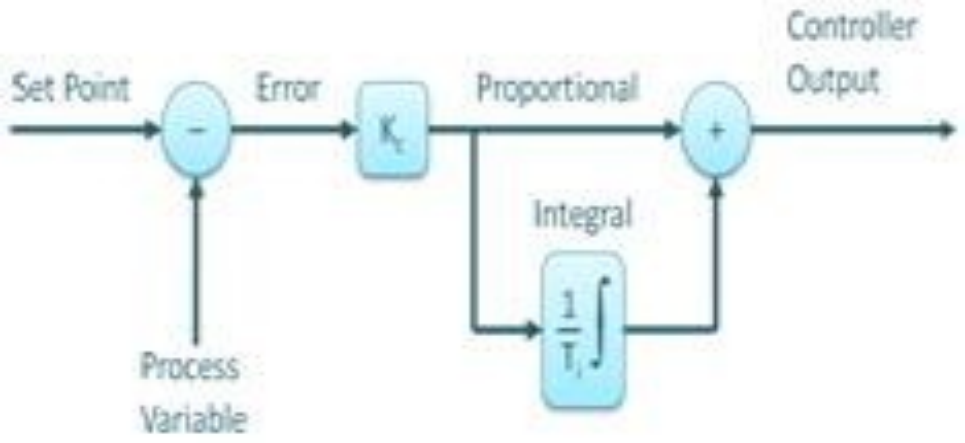
This controller requires biasing or manual reset when used alone. This is because it never reaches the steady state condition. It provides stable operation but always maintains the steady state error. Speed of the response is increased when the proportional constant increases.



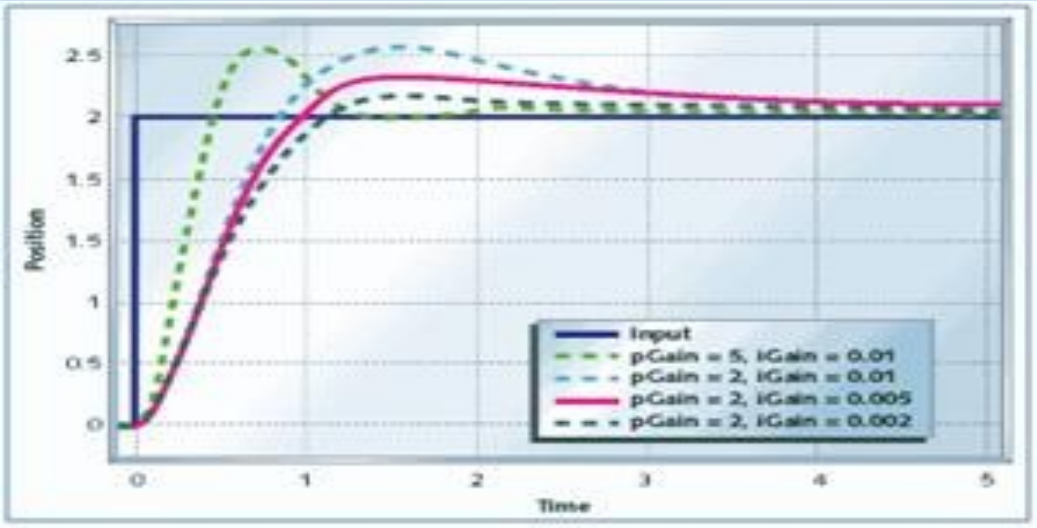
P-Controller Response

Integral Control

Integral control decreases its output when negative error takes place. It limits the speed of response and affects stability of the system. Speed of the response is increased by decreasing integral gain



PI controller



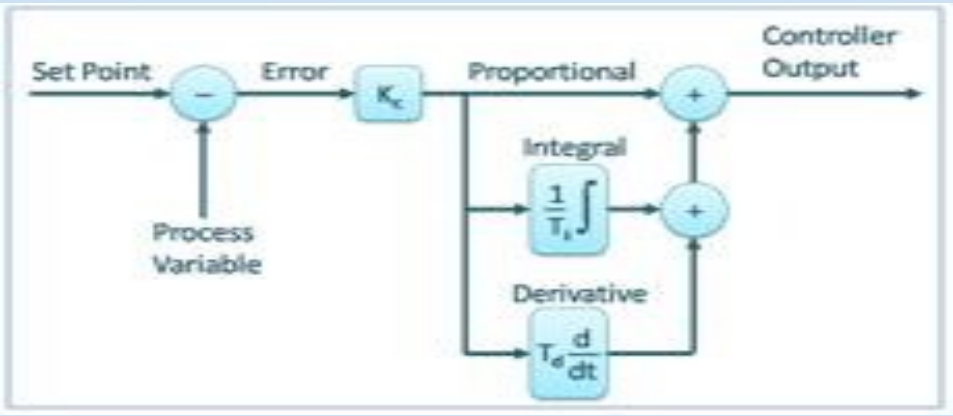
PI Controller Response

In above figure, as the gain of the I-controller decreases, steady state error also goes on decreasing. For most of the cases, PI controller is used particularly where high speed response is not required.

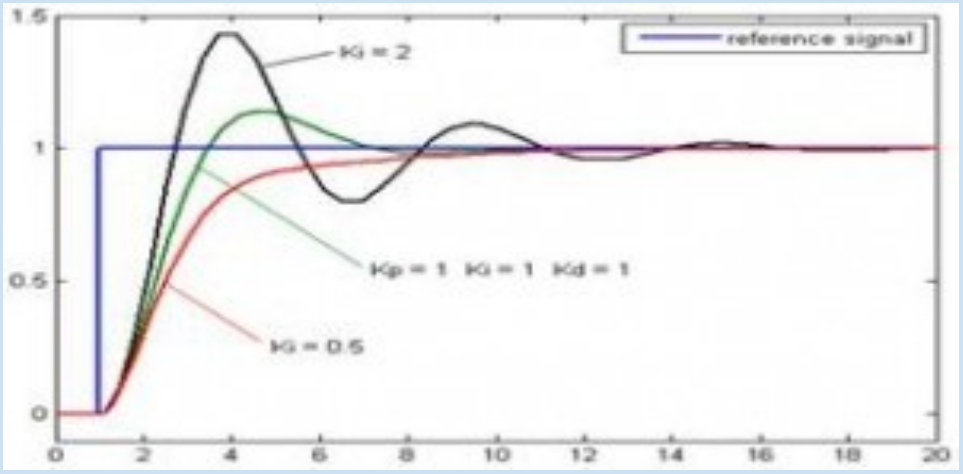
While using the PI controller, I-controller output is limited to a range to overcome the integral wind up conditions where integral output goes on increasing even at zero error state, due to nonlinearities in the plant.

D-Controller

I-controllers do not have the capability to predict the future behavior of error. So it reacts normally once the set point is changed. D-controller overcomes this problem by anticipating future behavior of the error. Its output depends on rate of change of error with respect to time, multiplied by derivative constant. It gives the kick start for the output thereby increasing system response.



PID controller



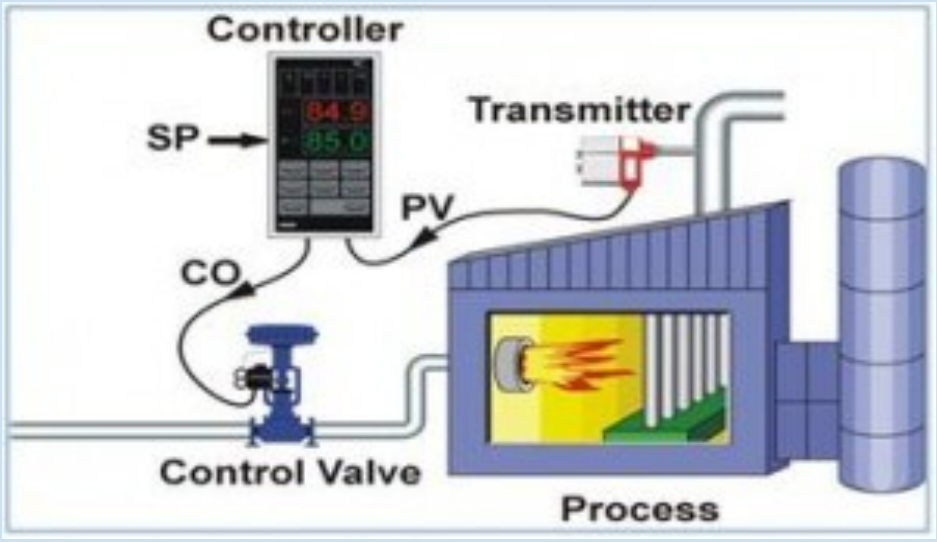
PID Controller Response

In the above figure the response of a D controller is more, compared to PI controller and also settling time of output is decreased. It improves the stability of system by compensating phase lag caused by I-controller. Increasing the derivative gain increases speed of response.

So finally we observe that by combining these three controllers, we can get the desired response for the system. Different manufactures designs different PID algorithms.

PID Controller Structure

A PID controller consists of three terms, namely proportional, integral and derivative control. The combined operation of these three controllers gives control strategy for process control. The PID controller manipulates the process variables like pressure, speed, temperature, flow, etc. Some of the applications use PID controllers in cascade networks where two or more PID's are used to achieve control.



PID Controller Structure

The previous figure shows the structure of a PID controller. It consists of a PID block which gives its output to a process block. The process consists of final control devices like actuators, control valves and other control devices to control various processes of the plant.

Feedback signal from the process plant is compared with a set point or reference signal and a corresponding error signal is fed to the PID algorithm. According to the proportional, integral and derivative control calculations in the algorithm, the controller produces combined response or controlled output which is applied to plant control devices.

All control applications don't need all three control elements. Combinations like PI and PD controls are very often used in practical applications.

The application of PID controllers or combinations thereof to the numerous processes on a ship are obvious and for modern vessels or upgrades are a must have.

Acknowledgements The Editor

News Snippets

1. On October 2016, the IMO voted on a stricter, global Sulphur oxides limit, which will be implemented in 2020. It is known that Sulphur oxides (SOx) cause many deaths every year. Setting a global Sulphur oxides cap will have a positive effect on the air we breathe and save thousands of lives every year.

2. The fire-stricken Grande America sank in the afternoon hours of March 12 some 180 nautical miles west of the French coast, the Maritime Prefecture of Atlantic confirmed after it suffered a fire during the night of March 10, the 1997-built ship developed a worsening starboard list**.** The ro-ro container vessel subsequently capsized and sank in a water depth of around 4,600 meters.

3. A simple method for growing non-toxic antifouling polymer coatings has been developed .. This could lead to longer lasting coatings suitable for use over large surfaces, such as ship hulls. A team at the Institute of Chemical and Engineering Sciences has discovered how to grow zwitterionic polymer coatings in water at room temperature, and in the presence of air, which would allow them to be used on a much larger scale. They used this approach to synthesize polymer coatings from four zwitterionic monomers and a number of anion initiators, some not amines. "In future we will use this methodology to generate anti-biofouling polymer coatings on large surface areas using a spray or dipping method," .. They also plan to investigate the fouling-prevention efficiency of these coatings for marine applications.

4. Construction of the first of three inshore patrol vessels (IPVs) for the South African Navy (SAN) formally started with a keel-laying ceremony at Damen Shipyards Cape Town (DSCT) on February 23. The small ships are being acquired under the SAN's Project Biro. The first one is expected to be completed in early 2021 and enter service in the middle of that year. The second should be delivered in 2022 and the third in 2023. Each IPV will have an overall length of 62.2 m, a beam (width) of 11 m and be able to achieve a maximum speed of 20 knots (37 km/h). Each vessel will have a crew of 40 and be able to accommodate another 22 personnel.

5.A tragic accident reportedly took place on board the bulk carrier BAHRI BULK berthed at Dammam, Saudi Arabia, on Feb 24. The ship arrived at Dammam from Brazil with cargo of wheat bran pellets. An AB entered a closed hold and collapsed. The Master and Chief Officer rushed to assist him, and also collapsed. All three were taken to hospital, but died while being in intensive care. Master was Ukrainian, Chief Officer and AB were Indians.

6.The Nigerian Navy has prevented a group of pirates from hijacking the 28,844 dwt containership Safmarine Kuramo carrying 25 crew members on February 5 off Nigeria, Maersk Line confirmed.

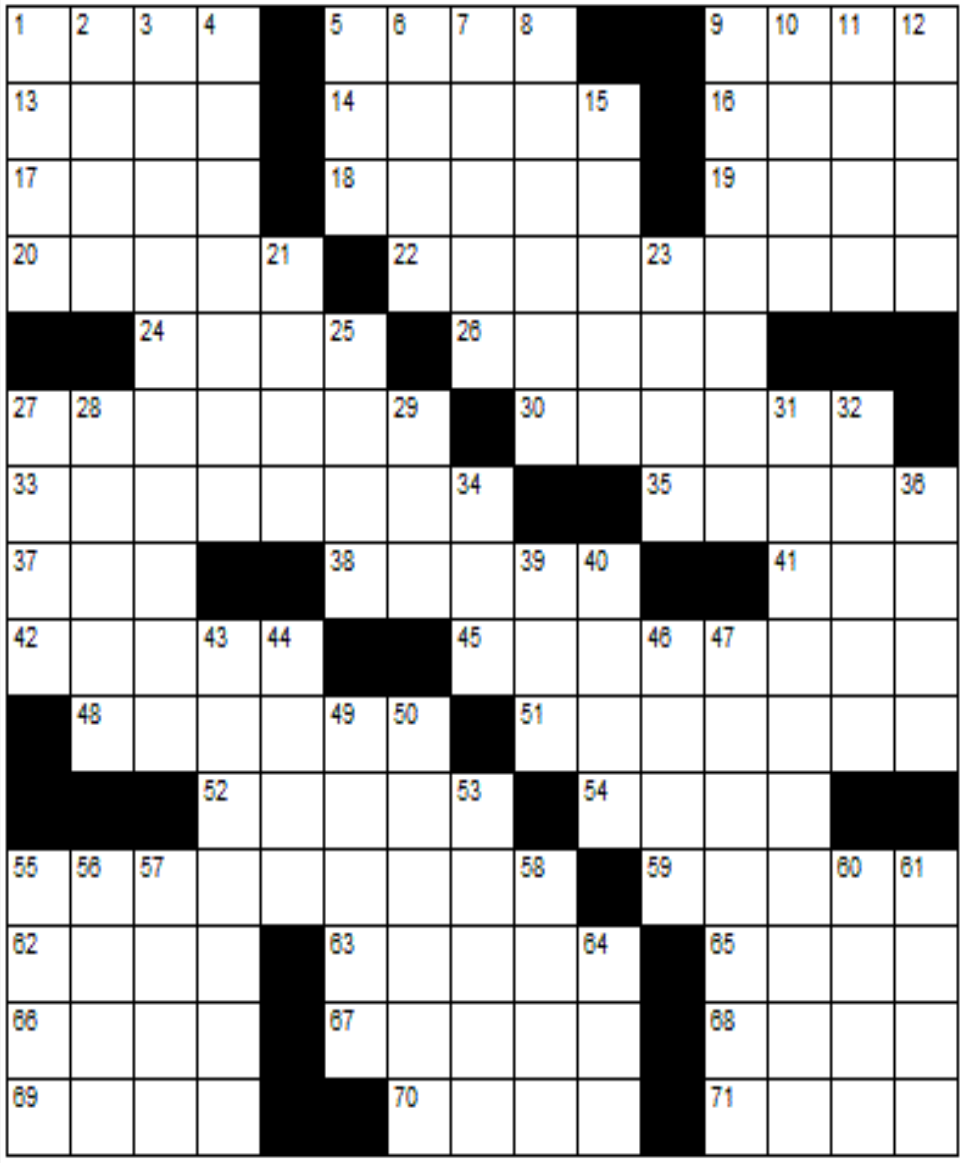
"In the morning of 5 February local time, the container vessel Safmarine Kuramo was attacked while on route to Onne in Nigeria. Presumably a number of criminals came on board and took control of the vessel," Maersk Line's Senior Press Officer, Michael Christian Storgaard, said.

"Same day late in the afternoon, the Nigerian Navy boarded the vessel in a rescue mission. At 18.20 CET, all 25 members of the crew and the vessel were reported safe," he added.

"Our primary concern is the safety and security of our crews and vessels."

Maersk Line said that the 2004-built vessel, owned by Safmarine, a part of Maersk Line, is now alongside in Onne where a support team is in place.

TOJ Crossword



ACROSS

1. Vats
5. Harvest
9. Shrub
13. By mouth
14. Possessed
16. Dwarf buffalo
17. Satisfactory
18. Macedonian monetary unit
19. Sign of boredom
20. Evanesces
22. Cavort
24. Type of sword
26. Unit of luminous flux
27. Marked by stripes
30. Bar
33. One more than a dozen
35. Place
37. Website address
38. Moved in a curve
41. Spy agency
42. Greek letter
45. Voracious reader
48. A severe scolding
51. A medieval itinerant singer
52. Course around a star or planet
54. Flutter
55. Decorated
59. Iron
62. Incite
63. Tease
65. 12 in a foot
66. Algonquian Indian
67. Electrical pioneer
68. Brother of Jacob
69. Unit of pressure
70. Abound

DOWN

1. Wealthy man (British slang)
2. Murres
3. A decorated dart
4. Roomette
5. 16 1/2 feet
6. Pitcher
7. Undo
8. Goober
9. Rifle knife
10. Two-toed sloth
11. Scattered
12. Paw
15. Literary genre
21. Chair
23. Guns an engine
25. Anagram of "Seek"
27. An upright in a wall
28. Half of six
29. A type of evergreen tree
31. Remunerate
32. Nigerian monetary unit
34. Gist
36. Vilify
39. Holiday drink
40. Tiger Wood's sport
43. A type of racehorse
44. Hairdo
46. Large brown seaweed
47. Fatigued
49. Submarine
50. Small Old World finch
53. Anxious
55. Proven information
56. River of Spain
57. Clairvoyant
58. Handout
60. Anagram of "Cabs"
61. Close
64. Sweet potato

Making the Case for LPG as a Marine Fuel

The sulfur emission control areas (SECAs) in place in North-America and Northern Europe, in combination with the upcoming global 0.5% limit on sulfur in 2020 (or 2025) and similar EU limits in 2020, call for alternative fuels as a means for compliance. Several alternative fuels are available and, at the same time, new fuel oil products with very low sulfur content have been introduced.

In this respect, the ability of an engine to run on LPG, which is a sulfur-free fuel, offers great potential for compliant ship operation within SECA zones.

The use of LPG as the fuel in two-stroke engines will reduce the C02 emission by up to 13%, when compared to MDO and up to 18% when compared to HFO. As an additional feature, the LPG engine has great potential for being a solution to handle the volatile organic compound (VOC) issue in shuttle tankers and other crude oil carriers as the engine holds novel options for burning the liquid volatile organic compound (LVOC) of the VOC. An engine that can burn any mixtures of propane and butane, and ethane. All heavier hydrocarbons normally contained in the LVOC can also be used.

Both gas carriers and container ships would be potential customers for the multi-gas engine. It is noted that gas carriers are already installing tanks capable of holding LPG, LNG and ethane (although not mixed together), and an engine that could burn all these fuels would be a considerable advantage.

The potential for containerships to use the fuel is also considerable. It's argued that operators had shied away from LNG because it often ties them to one supplier. The ability to use several fuels would give them a competitive advantage by allowing them to select the cheapest fuel at a given port, as well as ensuring compatible fuels are available at a wider selection of ports.

Against this background MAN Energy Solutions has revealed its latest two-stroke engine type, a dual-fuel engine designed for LPG running. .Interest in using LPG as a fuel, within and outside of the LPG carrier segment, is growing due to its sulfur-free character, widespread availability and ease of bunkering. In gas mode, the engine operates on just 3% pilot oil and down to 10% load. Ultimately, it is expected that engines will operate without the need for pilot oil."
The Engine can also burn liquid volatile organic compounds, a deliberate move since the IMO will inevitably turn its focus towards the reduction of volatile organic compounds in the future. The diesel principle provides the engine with high operational stability and efficiency, including during load changes and fuel change-over, while defining properties such as a stable change-over from one fuel type to another with no fuel-penalties are maintained. The negligible gas slip of the engine makes it an environmentally friendly two-stroke technology.

One Engine Fits All
There is reportedly only one liquid gas injection dual-fuel engine on the market allowing switching between conventional HFO, MGO and LPG fuels with no loss to performance.
The compact liquid gas injection system means the Engine could also be an ideal retrofit solution for existing fleets. The technology can be applied to all types of ships with an engine of bore size equal to or bigger than 500 mm.

The Liquid Gas Injection concept can be applied to all low-speed engines of this type from 500mm-bore and up, either ordered as an original unit or through retrofitting.

The primary characteristics of a suitable engines include:
Working according to the two-stroke cycle and obtainable with cylinders from 5 to 12 depending on bore size (bore: 500 mm to 950 mm); whereby the stroke/bore ratio is: 3.6 to 5.0.
With this the specified maximum continuous power range is of 5,350 kW to 82,440 kW.

Features of the available engine are:

* a low-pressure supply system;

• a fuel-injection system similar to that most recently developed for conventional MDO/HFO engines – the FBIV (Fuel Booster Injection Valve), ensures that a low-pressure fuel-gas supply system can be employed, significantly reducing first-time costs and increasing reliability,

• An injection pressure of 500-600 bar
• The ability to handle low-sulfur/low-flashpoint fuel types: methane, methanol, ethanol, LPG, and dimethylether (DME).
• Turbocharging system
• High efficiency constant pressure turbocharging systems with MAN, ABB or MHI turbochargers as standard
• Engine automation and control
• Gas safety and control system
• Fuel oil system
• Common injection system for pilot oil and for main injection
• Gas system
• LPG injection by fuel booster injection valves

Acknowledgements MAN.

Exercise “ATLASUR X1” held at Simon’s Town.

The SANDF was the host and lead nation for this years (2018) exercise. This biennial exercise usually comprises of ships from Argentina, Brasil, Uruguay and S. Africa. However, Argentina will not be taking part in this years exercise.

Friday August 31, on a cold and overcast morning, saw the arrival of the Brazilian Corvette, **V34 “BARROSO”** ; Length o/a 103m; beam 11.4m with range of 4000 nm.

The full compliment is 154 personnel and was followed by the Uruguayian **4, “ R.O.U.GENERAL ARTIGAS”**; Length 119m; Beam 13m. The theme for this years exercise was “Combined we are combating illegal trade in Human, drug and arms” These joint exercises are aimed at maintaining, promoting and building on previous joint exercises in both Operational and Tactical co-operation between the Joint Forces of the other countries. This exercise took place in Simon’s Town from August 31st to September 21st.

Acknowledgements: Kevin Watson

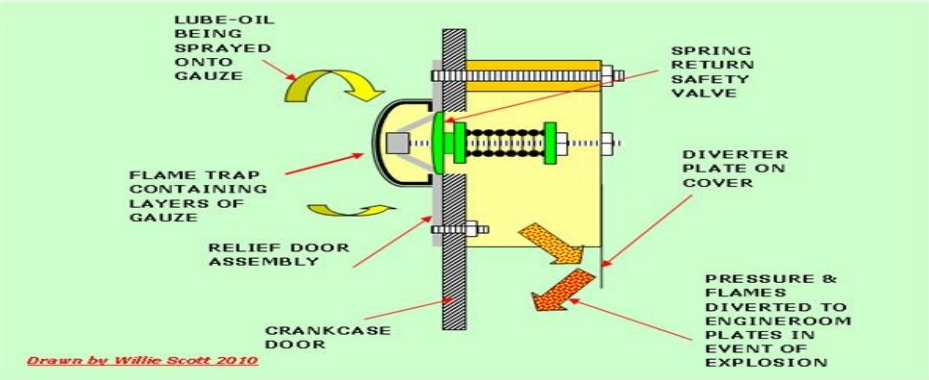
The Crankcase Inspection

Important items on an engine can be checked without disassembly of any parts, except for removal of the crankcase doors. Once the doors have been removed, the operator should take advantage of one of the most revealing inspections available to him, i.e., the crankcase inspection.

As each door is removed, its back should be inspected for foreign material thrown there by centrifugal force of the connecting rod. Bronze cuttings from a faulty wrist-pin bushing will adhere to the door. The same is true for babbitt from bearings and cast iron from liners, pistons, etc. The walls of the crankcase as well as the bottom should also be scrutinized for particles of those metals. The condition of the oil can be checked by looking for lacquer formations on machined surfaces or deposits of sludge that could come from trouble with valves, rings, or pistons. All nuts and bolts should be tapped with a hammer for the familiar ring common to tightness. Each piston should be moved to top center and the liner checked for scuffing.

Generally, two mating parts that have had a tendency to seize while in operation will generate enough local heat to discolor the casting supporting them. This is particularly true of main and connecting rod bearing caps or the wrist-pin end of the connecting rod. Consequently, the entire crankcase should be observed for any blue discoloring, and if any is found it should be thoroughly investigated. Any parts that have been hot enough to become discolored will normally be warped, cracked, or both. Therefore, they should be Magnafluxed or dye-checked for cracks. Connecting rods and main bearing saddles should be measured for warpage.

The inspection outlined so far has not consumed any more time than it takes to look at every square inch of the crankcase. The operator should make these observations every time a door is removed and certainly at intervals of not more than every three months. At all intervening crankcase inspections, the main and connecting rod bearings should be checked for clearances. .

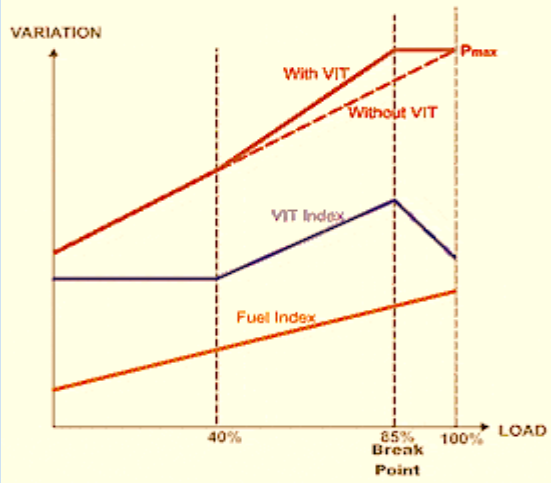


Acknowledgements : The Editor

Variable Injection Timing (VIT): What Marine Engineers Must Know?

The Variable Injection Timing (VIT) function of a marine diesel engine comes into play during load dependent adjustment of the combustion pressure. Variable Injection Timing (VIT) allows maximum combustion pressure during part load operation which helps in decreasing the fuel consumption and also achieve efficient combustion in the engine.

By controlling the injection timing of the fuel in the fuel delivery pump and advancing the fuel pump injection timing, VIT increases the maximum pressure in the engine



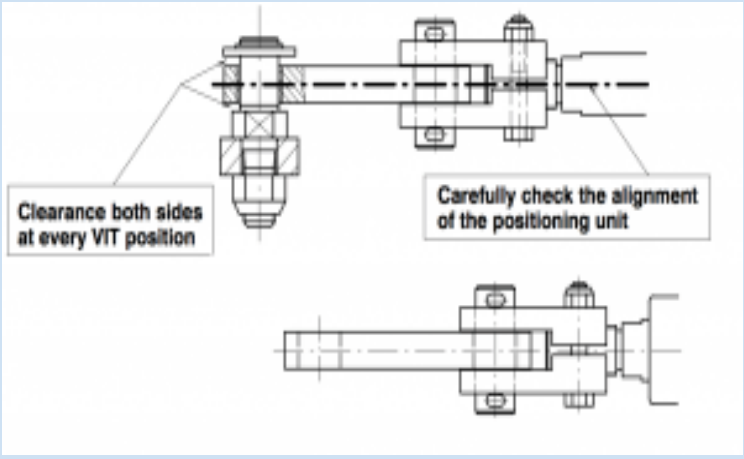
When working with a ship's Main Engine, which is equipped with Variable Injection Timing (VIT) device, a marine engineer must know the following points for smooth engine operation:

1. Freeness of Mechanical Parts: The actuator of Variable Injection Timing (VIT) operates on the movement of eccentric shaft of suction and spill control valves. Marine engineers must ensure that these valves are free from any obstruction or excessive play. The eccentric shaft spring should also be regularly checked for proper operation in order to avoid any kind of breakdown.

2. Checking Load Indicator Values: The regulating fuel linkage transmits the movement of the governor output lever and determines the fuel feed to the cylinder accordingly. Ship's engineer's must check the correspondence between the load indicator position in the setting plate provided in the linkage, and the load indicator value at the local manoeuvring stand and at the remote control position when the VIT is set to "0". If there is deviation in any of the three values, it has to be corrected before commencing any action on the fuel pump timing.

3. VIT Actuator Setting: Check the actuator stroke when VIT is "0" by inserting the distance sleeve between the suction valve regulating lever and the blocking unit. Move the VIT to its maximum advance and minimum retard position respectively and note down the values in the load indicator in the setting plate. Also check the stroke of the actuator at the remote control system. Lastly, note and compare any deviation prescribed in the manufacturer manual.

4. VIT Clearance: When fitting the VIT after maintenance, the clearance and alignment between the stop plate and the linkage must be checked with cylinder in fully retracted position. If there is no clearance, the stop plate must be ground until the clearance is achieved.



5. Electrical Connection: For electronically operated Variable Injection Timing (VIT), all the cable connections between the connecting box and VIT terminal must be checked regularly.

6. Pneumatic Cylinder: The Pneumatic cylinder which acts as the positioning unit of the VIT linkage is sometimes provided with a mechanical stoppage which should be checked for jamming. This will be useful to move the cylinder manually in the event of failure of automatic positioning system.

Acknowledgements: Insight.

Safmarine Ships

A lot of our members are ex seafarers who sailed on the many Safmarine ships over the decades. I thought you would like a series highlighting SAF ships in each edition of the TOJ. Do you have any interesting stories to tell when you sailed with SAF?

If so, please send it to me at my email address of iainfran1@gmail.com and I will include your story in the TOJ.

My next couple of ships are: :

S A Vaal (Built 1961) (GT 31793)

Called "The Big Red Boat" on her way to the scrapyard in India, the SA Vaal was a popular passenger liner on the UK SA route. Originally named RMS Transvaal Castle and owned by the shipping company Union Castle, she had several names after her Safmarine career notably SS Festivale, Island Breeze and SS Big Red Boat III

S A. Statesman (Built 1950's) (GT 8900)

Originally named Clan Sinclair, owned by Clan Lines and subsequently Springbok Lines ,the ship was bought by Safmarine in 1961. and renamed SA Statesman

Notice to Advertisers

TOJ carries an advertisement section in this electronic edition and after consultation, the SAIMENA Council approved a request to accept paid advertising, and agreed to continue accepting adverts on a regular basis.

The TOJ circulation list is essentially our individual membership, and we are aware that companies do make it into the hands of our friends and colleagues. Adverts are accepted on the basis that the interests of our members are served by highlighting goods or services which are relevant to our respective disciplines.

TOJ will accept advertising at R 500 per page per edition, and two editions per year are planned but this could go to three.

TOJ is our Institute's magazine, and while the advertising is a welcome and unexpected contribution, we may need to limit the number of pages set aside for advertising in any one edition to maintain the essence of our little publication.

We look forward to developing some new relationships!

Kind Regards,

The Editors