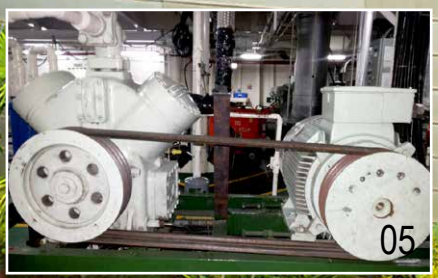
APR 2017 . ISSUE 37

Samundra Spirit

QUARTERLY IN-HOUSE MAGAZINE FOR SAMUNDRA INSTITUTE OF MARITIME STUDIES (SIMS), MUMBAI & LONAVALA

IN THIS ISSUE



SAMUNDRA INSTITUTE OF MARITIME STUDIES (SIMS)

A Training Commitment of Executive Ship Management Pte Ltd (ESM), Singapore
(Certified by leading maritime classification society, DNV GL, Germany for ISO 9001:2008)

INVITES APPLICATION FOR:

DECK CADETS (DNS) - AUG 2017 BATCH

Approved by Directorate General of Shipping, Govt. of India & The Maritime and Port Authority of Singapore (MPA), and affiliated under Indian Maritime University (IMU)

- One year Diploma in Applied Nautical Science at SIMS, Lonavala
- Minimum 18 months of practical shipboard training before 2nd Mate's examination

4-YEAR B. TECH. (MARINE ENGINEERING) - AUG 2017 BATCH

Approved by Directorate General of Shipping, Govt. of India and affiliated to Indian Maritime University (IMU), Chennai

- Four years B. Tech Marine Engineering course at SIMS, Lonavala
- 6 months shipboard training before appearing for Class IV examination

1-YEAR GRADUATE MARINE ENGINEERING (GME) - SEP 2017 BATCH

- One year training in Marine Engineering at SIMS, Lonavala which includes 6 months hands-on practical training in the **Ship-in-Campus**
- 6 months shipboard training before appearing for Class IV examination

Eligibility	For Deck Cadets	For B.Tech	For Engine Cadets
Age	For Class XII: **Not less than 17 years & Not more than 20 years** as on date of commencement of the course For B.Sc. in PCM or Electronics: N**ot more than 22 years** as on date of commencement of the course For B.E./B. Tech. Degree from I.I.T or a college recognized by AICTE: **Not more than 25 years** as on date of commencement of the course	**Not less than 17 years & Not more than 20 years** as on date of commencement of the course	**Not more than 25 years** as on date of commencement of the course
Marital Status	Unmarried		
Academic	**Results should be obtained at FIRST ATTEMPT All Boards (Class XII):** Minimum Percentage – 60% PCM minimum – 60% (Physics & Maths Min 60% each) (For Andhra Pradesh & Kerala State Boards, separate board exams held for each class(11th & 12th) & hence, aggregate of both marks are considered) **BSc:** Degree in Physics/ Chemistry/ Mathematics/ Electronics with minimum 55% in final year along with Min 55% in PCM in Class XII **BE (Mechanical) Engineering:** Degree from an AICTE/UGC Deemed University Approved Institute with min 55% in final year	**All Boards (Class XII):** Minimum Percentage – 60% PCM minimum – 60% (Physics & Maths Min 60% each) (For Andhra Pradesh & Kerala State Boards, separate board exams held for each class(11th & 12th) & hence, aggregate of both marks are considered)	Graduation in **BE (Mechanical) Engineering / Naval Architecture** from an AICTE approved Institute with a minimum marks of 55% in final year. Candidate must clear his BE/ B.Tech in 4 years only Numbers of ATKTs / Arrears / Repeats / "E" grades obtained during the entire degree programme: Not more than six attempts
Medical	Physically fit and meet the standards laid out by DG Shipping*		
Language	English shall be one of the subjects with minimum marks scored 50% in class X or XII		
Eyesight	No Colour Blindness , 6/6 vision in better eye and maximum permissible up to 6/9 in the other eye (without visual aids)	No Colour Blindness, Use of corrective lenses permitted but the maximum permissible limits, at entry are 6/12 in each eye or 6/9 in the better eye and 6/18 in the other eye for Distant Unaided Vision. (As given in M.S. Act, Medical Examinations, Annexure B.)	
IMU - CET	Candidates must clear IMU-CET		N.A

"100% in-house placement on ESM-managed vessels upon successful completion of the course"

**Approved Educational Loans from IDBI, SBI & other Nationalised Banks available! *Scholarships available basis SIMS entrance test and first semester results.*

For more information on what we have to offer and downloading the application form, please visit our website at www.samundra.com or contact us at the following:

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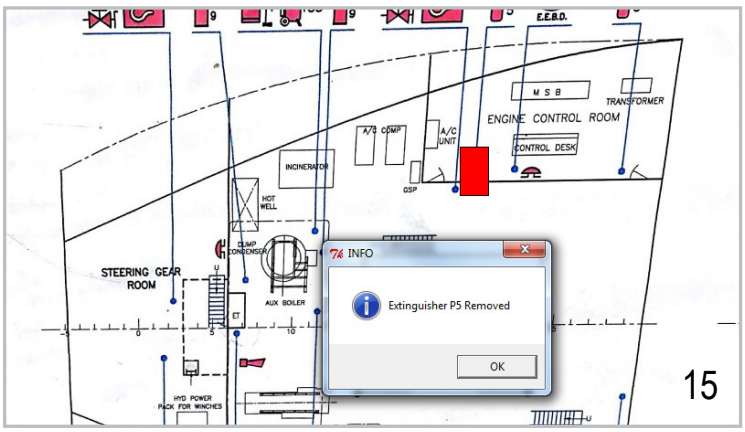

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Background of cover picture:
SIMS Lonavala: Academic building and Maritime Science building

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Samundra Spirit is a quarterly in-house magazine produced by Samundra Institute of Maritime Studies (SIMS) for private circulation.

Our Editorial Team wants to hear from you!

If you wish to submit any feedbacks and/or contributions, feel free to write to the Editor at: samundraspirit@samundra.com

**Please note we reserve the right to publish your letters/articles or an edited version of it in all print & electronic media.*

Editorial Note

In spite of the uncertainty due to severe climate and weather changes across the globe, we still wait for the spring. The cuckoo's voice brings the freshness to the environment and most importantly, the assurance and hope that all is fine and Nature is holding out life as usual. We do hope this spring issue of Samundra Spirit once again brings forth the enthusiasm of learning and teaching and the spirit of sharing knowledge permeated in the ethos of SIMS.

As usual we have a strong presence of our engineering faculty and teaching staff presenting us with their practical knowledge on operating various equipment on board. "Design Features and Operational Efficiency for Belt drives" by Praful Choudhari and "Operation and Maintenance of V-Belts" by Mr. S. Viswanathan will bring the subject down to our marine engineers or even those inclined to engineering knowledge in a much simpler and practical form. Electrical equipment onboard need not be sole domain of the electrical officer. The articles "How does Protective Relays work" and "An overview of Smoke Sensors" are simple explanations of seemingly complex topics from our teachers K.V. Hariprasad and Satish Babar respectively.

We are equally pleased to include the immensely educative and interesting articles from our seasoned master mariners. "Preventing Hull damage from Secured Anchors" from Capt. V. Fernandes is a valuable insight gained through years of practical experiences. Capt. V. Krishnan , presently a mentor to our young officers in the ESM fleet points out to the new workings and possibilities in the industry through his article "Rotor sails to improve ship energy savings".

One need not be a scientist or an inventor to be the most productive and effective in one's work. Our veteran Engineering faculty Biju Baban has come out with his valuable insight "Application of Constructive Thought Process at Work" which is indeed an engrossing reading.

We have continued with our regular other articles and features on knowledge sharing and case studies and campus diaries including writings and interesting project works from our talented cadets.

Overall, here's yet another issue of "Samundra Spirit" eagerly bringing a fresh smell of spring to the inquisitive minds of our readers. Hope you enjoy reading.

We eagerly wait for your valuable feed backs and suggestion as always!

Be safe and be happy,

Sikha Singh

Message from Mr. A.B. Dutta

A ship is only as good as the crew who sail her. It is of paramount importance for the global shipping fraternity to acknowledge this fact and strengthen the foundations by focusing on the human resources who are the backbone of the industry. I am very happy to note that Samundra Institute of Maritime Studies (SIMS) Lonavala, is a step taken in the right direction to achieve this objective.

A raw diamond needs to be cut and polished so that it can sparkle for countless years to come. In a similar way, a pre-sea cadet needs to be made ready for the sailing career ahead by building up the competencies and polishing the skills. Equally important is nurturing a culture where the prospective seafarer fosters an attitude which is most conductive for the career path chosen. SIMS as a premium maritime training institute is well equipped to meet these challenges.

Nestled in the mystic mountains of the Sahyadri range, and away from the hustle and bustle of big cities, the picture-perfect campus in Lonavala provides for the impeccable ambience for channelizing the untapped talent in these young minds. Added to this is the unparalleled training infrastructure, taking care of every single aspect of honing the skills of these aspiring mariners towards achieving our goal of safer and cleaner ships. The towering ship-in-campus, the Integrated Gas Tanker Simulator. The Free Fall Life Boat training facility, the Main Engine Manoeuvring Simulator etc. add to the state-of-the-art training infrastructure, making it possible for a cadet to assimilate beyond what is stipulated in STCW.

SIMS also sets a commendable example by tapping into the renewable energy solutions by sourcing a major chunk of its energy needs from solar panels. It is indeed laudable that here in SIMS, an aspiring cadet gets initiated into the future of shipping, green ships. It is worth mentioning here that the projects taken up by the dedicated SIMS R&D team, like the Ballast Water Treatment System (BWTS), are relevant to the global shipping industry. SIMS is also moving ahead in the right direction by making available to the students a power learning platform, the facilitator-led Blended Learning.

I take this opportunity to wish all SIMS cadets all the very best for their future. You have made the right decision by choosing shipping as your career choice and SIMS as your launch pad. Now make it count.

Bon Voyage…

Mr. A.B. Dutta
Chief Surveyor of DG Shipping

Design Features & Operational Efficiency of Belt Drives

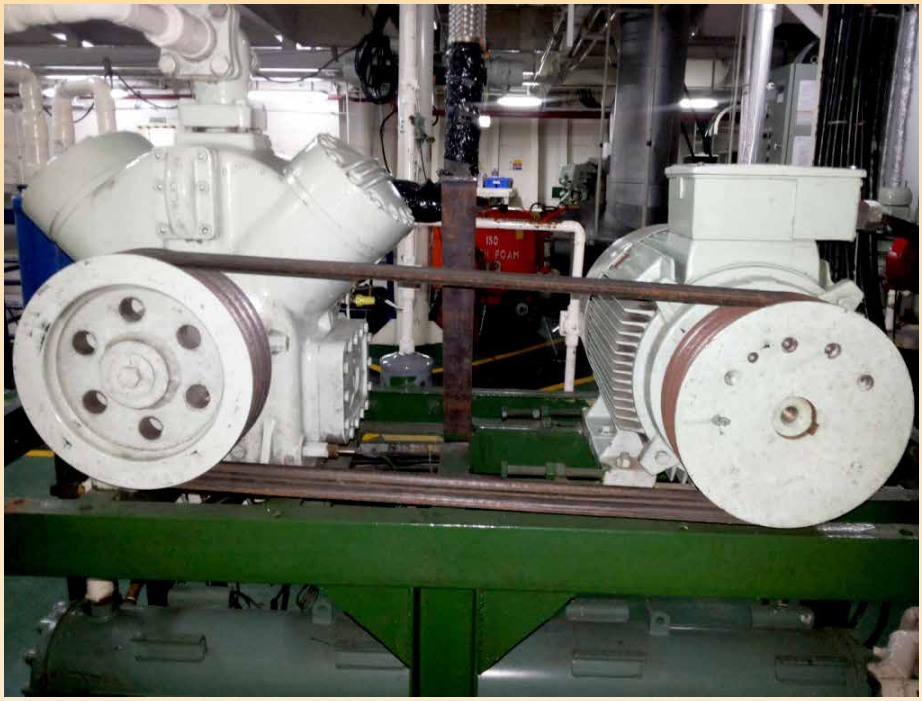


Fig. Belt Drive

Mr. Praful Choudhari
Academic Faculty - Mechanical Engineering
SIMS, Lonavala

Mechanical power drives are used in the application of marine auxiliary components like bilge pumps, compressors for air conditioning and refrigeration plants, and blowers. These drives are used to transmit power from the prime mover to the machine, one machine to another or from one member of a machine to the other by means of intermediate mechanism.

Commonly used mechanical transmission power drives are belt drives, rope drives, chain drives and gear drives. In this issue, we will be looking at the belt drives. A belt drive is widely used because of its advantages like suitability, when the distance between the shafts' axis is large. It is used for high speed and low torque operations. Its advantages being - quiet in operation, flexible, cheap, and highly efficient. It can also be used to dampen vibrations.

As seen in figure.1, a belt drive consists of an elastic belt wrapped around two or more pulleys, generating a tangential force due to the friction between the belt and pulleys.

Belt drives can be classified into two categories: Flat Belt Drive and V-Belt Drive. For maximum amount of power transmission, V-belts are mostly used. Due to the wedging action of the V-belt in the groove of the pulley, it results in higher forces of friction; enabling it to transmit maximum power.

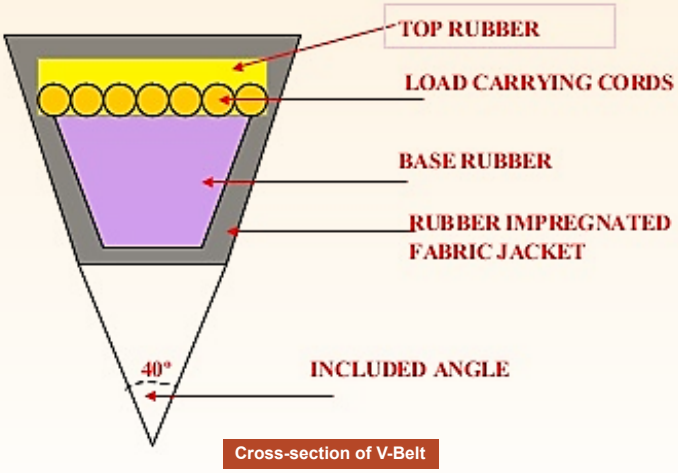
The single most important factor necessary for long and satisfactory operation is the proper tensioning of V-belt. The tension in a belt decides the power transmitting capacity of belts.

Shortcomings to look out for

1. Improper installation of belt may cause it to fail shortly after fitting.
2. Dynamically unbalanced pulleys, create the high shock loading leading to noise & vibration.
3. Use of belts in unfavourable environmental condition may cause the belt to break & crack.
4. Poor pulley alignment & belts rubbing against guards and frames may cause early belt wear.
5. If the drives are running overloaded & under tension, it may cause belt to slip.
6. Too little amount of belt tension may cause the slippage, causing rapid belt and sheave wear. Similarly too much amount of belt tension may cause the excessive stress on belts, bearings, and shafts and reduced efficiency and loss of productivity.
7. Oil or grease on belts makes the belt sidewalls sticky or swells the belt's cross-section.

Installation & Maintenance:

- Ensure pulley grooves are of the same size
- Maintain pulley groove alignment and centre distance between two pulleys while tensioning the drive.
- Always use the belt as recommended in the maker's manual.



Cross-section of V-Belt

- After installation of the belt on the drive, inspect the belt tension during first 24 hours of run-in operation.
- Make sure that the drive remains free from overloading.
- Always check the belt tension periodically during inspection.
- Never mix the different types of belt on the same drive.
- Never replace the single belt of multiple grooved pulleys.
- Grooves and belts should be free from foreign materials.
- Ensure the belt drive is covered with safety guards to avoid any accident.
- Do not apply oil on to the belt to eliminate the noise

New belts are arranged on the pulleys with initial tension. However, the belt tension does not remain constant throughout the life of the belt, as yielding occurs and the belt length eventually increases. This reduced the tension in the belt.

The tension or slackness can be checked via a trial and error method as seen in Fig 1. Getting accustomed to estimating the tension or slackness comes through experience or regular inspection. Approximate deflection at the mid span =1/64" per inch of span.

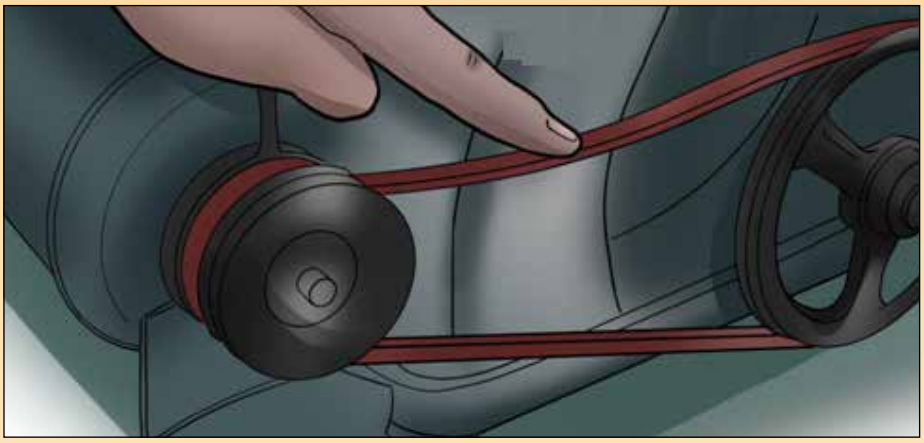


Fig. 1. Deflection at the mid span

Otherwise for accurate belt tension the following devices like tension tester and tension strain gauge can be used. (Fig. 2)

To reduce initial tension effect, a number of arrangements can be made to ensure that the loss in tension in the belt is compensated. Some of these are:

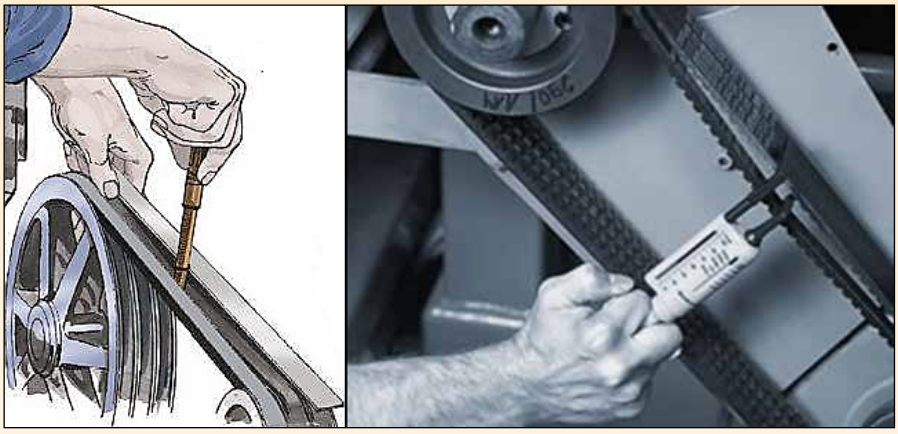


Fig. 2. Tension Tester Device (left) and Tension strain Gauge (right)

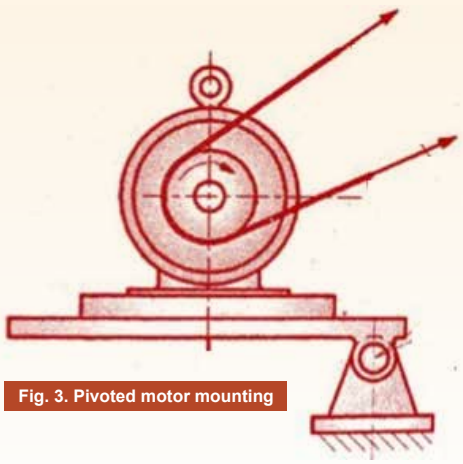
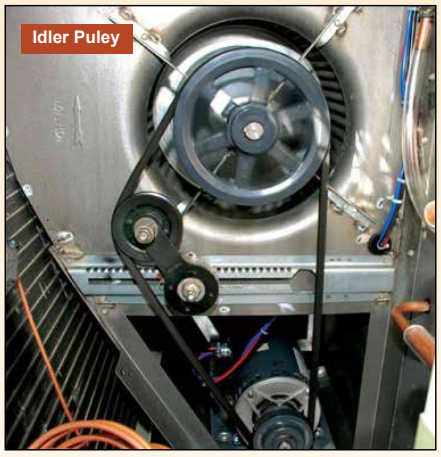


Fig. 3. Pivoted motor mounting

1. Pre-tensioning by adjustment of center distances. (Sliding base)

2. Pre-tensioning by means of a belt tightener acting on the slack side. (Idler Pulley)



3. Pre-tensioning by pivoted motor mounting. (Fig. 3) ■

How does Protective Relays Work?

Mr. K.V.Hariprasad
Electrical Faculty
SIMS, Lonavala

It is essential to protect the generators, motors, switch boards and other electrical equipment from damage. Damage to such components can be caused by various electrical faults such as overcurrent, earth-fault and short circuits in the distribution system.

This article provides a general idea of how protective relays used on a ship's electrical distribution system work.

Relays play the main role in the overall protection of all the electrical equipment in the ship's distribution system. It is also mandatory to comply with the SOLAS regulations, for the safety of personnel, machineries, ship and the environment. They are normally connected to the equipment through the control circuit of the respective circuit breakers. For the different types of electrical faults, specific relays are provided. A typical protection circuit involving relay and circuit breaker is shown in Figure 1.

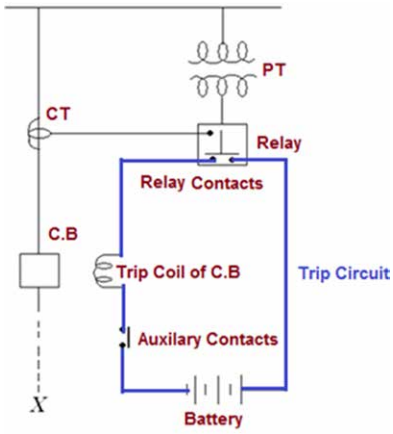


Figure 1

Protecting the Equipment

The CT (Current Transformer) & PT (Potential Transformer) provided in the above circuit reduces the high current and the high voltage, to match with the relay sensor coil values. The relay coil/sensor is basically set for the fault current/voltage. Once a fault occurs in the system, the relay coil exceeds its set value and attracts its auxiliary contacts. The NO (Normally Open) contact changes its state to close and the NC (Normally Closed) contact changes to open. The NC contact is connected in the circuit breaker tripping circuit, which opens and de-energizes the circuit breaker trip coil, cutting off its supply and tripping the circuit breaker, thereby protecting the equipment from damage.

Relays are of mainly three types. Electro-Magnetic (Fig. 2), Thermal or Bi-metallic (Fig. 3) & Electronic type solid state (Fig. 4).

Most of the modern ships use electronic relays due to their compactness, more accurate trip setting, less heat generation and fail safe mode of operation. They are also used in the ladder/logic circuits in automation systems.

Lately, the electronic relay manufacturers have now come up with more reliable and economical components with wide range of selections depending on type of fitting, applications and environmental condition. ■

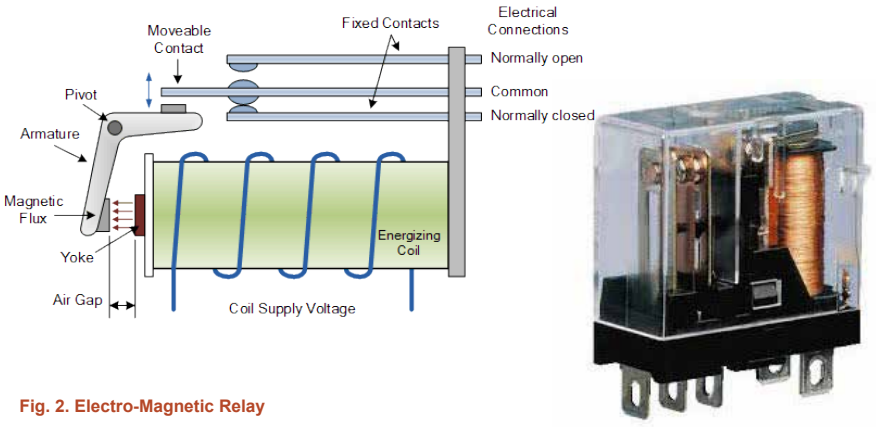


Fig. 2. Electro-Magnetic Relay

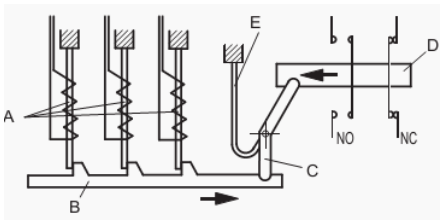


Fig. 3. Thermal/Bi-metallic Relay

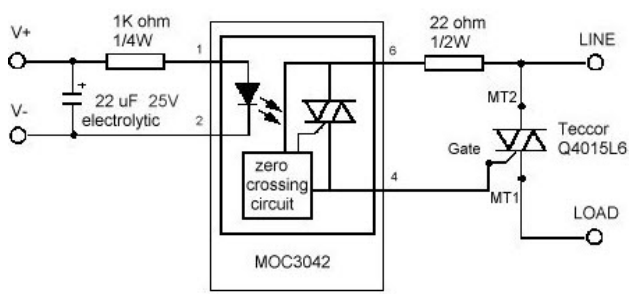


Fig. 4. Omron Brand Electronic Relays

Preparing for a Port State Control Vessel Inspection

Mr. Mahesh Patil
Engineering Faculty
SIMS, Lonavala

I was sailing onboard a LPG tanker when one week into my joining, I was informed that the vessel's charter was about to end. This vessel had only been trading in the South American region for the past five years and now as per the new charterer's requirements, she would be moving out, and going to either the Mediterranean or US/ Caribbean Region.

While we always work towards maintaining the ship at its best possible condition, I had to ensure that the vessel was up to the stricter standards of inspections that Port State Control (PSC) of these regions enforce. Hence, my first major task was to prepare the ship to undergo a PSC inspection by Paris MoU or a thorough examination by the US Coast Guard (USCG).

Port State Control (PSC) is an internationally agreed regime for the inspection of foreign ships in other national ports by PSC inspectors. The responsibility of these PSC officers is to check and verify compliance with the requirements of international conventions, such as SOLAS, MARPOL, STCW, and the MLC.

The United States Coast Guard (USCG) verifies compliance on all foreign vessels operating in United States waters. PSC inspections under the Paris Memorandum of Understanding (Paris MoU) covers 26 European countries and Canada. There are several other regional PSC MOUs around the world, such as the Tokyo MOU (Pacific Ocean region nations), Acuerdo Latino or Acuerdo de Viña del Mar (South and Central America), the Caribbean MOU, the Mediterranean MOU, the Indian Ocean MOU, the Abuja MOU (West and Central Atlantic Africa), the Black Sea MOU and the Riyadh MOU (Persian Gulf).

The company had a very elaborate checklist for PSC inspection preparation and for USCG inspection preparation onboard. These came together with latest reports of findings, deficiencies and observations. Furthermore, management circulars and guide notes with regards to the PSC focused areas and regimes were easily accessible on Phoenix – the company's online documentation system. These documents were readily accessed and can be downloaded for printed. Company also has its own Fleet-wide inspection findings reports and targeted Key Performance Indicators (KPIs).

Soon the Engine Control Room table was full of printouts of checklists and the ECR desktop computer was brimming with informative files and folders. It was tough to decide where to begin with the PSC preparation.

Since there was a lot of ground to cover, I decided to start with the basics, and kept questioning as to what a PSC Officer (PSCO) would want to inspect? Putting myself in the shoes of an officer, we worked as a team on the preparations. As the vessel was already in good shape thanks to the due diligence of the crew, very little amendments were required and later, the inspection was successfully completed and the vessel passed with nil deficiencies.

Lesson Leant

PSC authorities use various systems to identify and target ships that they consider as weak in implementation of the international regulations. Paris MOU has developed a system to identify High Risk Ships (HRS) by assigning points based on the following queries:

1. Ships coming for the first time or coming after a gap of more than a year to that country or alliance (also known as Memorandum of Understanding).
2. Ships that are permitted to sail from previous port with some deficiencies & allowed time for rectification of these.
3. On basis of deficiencies reported by pilots/ terminals/ port authorities, etc.
4. On the basis of suspicions raised regarding Machinery or hull condition.
5. Ships involved in grounding, collision or accident before arriving to the port.
6. Ships involved in violation of IMO regulations, regarding threat to crew's rights, environment or other property matters.
7. Ships which are older than 12 years or flagged under a targeted flag (Medium Risk)

Prime Importance to a PSCO

For ensuring compliance with these international laws, the PSC inspector verifies the competency of the ship's master & his crew, ship's manning level, ship's condition with regard to safety & hygiene of personal and ship's structure, safe operation of the ship's equipment

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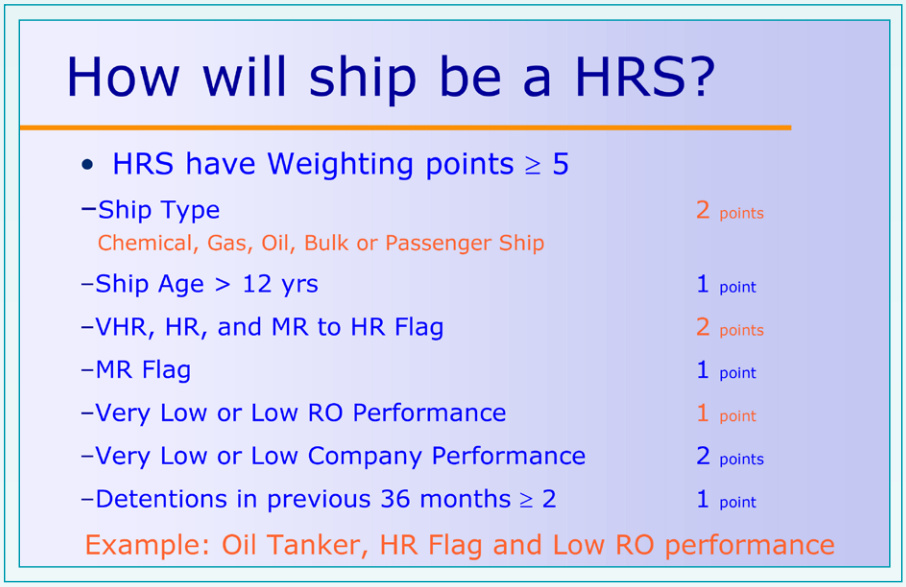


Preventing Hull Damage from Secured Anchors

Capt. Vincent Fernandes
Nautical Faculty
SIMS, Mumbai

While our training is focused on anchoring safely, a very common question raised by our students at SIMS, Lonavala is whether the weight of the anchor should be on the brake or on the bow stopper to prevent hull damage when it's housed. This article explores the various scenarios of the best way an anchor should be secured; whether a vessel is at sail, at anchor or docked at a port.

1) When sailing - weight of the anchor must always be on the brake.

A properly positioned bow stopper leaves little or no gap between the anchor flukes and the ship's hull and this would be an ideal condition to have. However, with time and wear on the cable links this gap tends to increase.

This means that if we were to put the weight of the anchor on the stopper, there would be a gap between the flukes and the hull. Rough weather/swell would now slam the anchor against the ship's hull continuously, in some cases causing damage and even a hole in the hull.

For instance in 2015, a freight ship was underway in 15 foot seas when the forepeak flood alarms activated. The crew investigated and discovered the starboard anchor had slipped 10-15 links, causing it to strike and puncture the hull. As a result, seawater flooded the bow thruster and emergency fire pump compartment. The casualty resulted in excess of $1 million in vessel damage and a month's lost revenues while the vessel was out of service affecting repairs.

There is a more serious issue to deal with when putting the weight of the anchor on the stopper. Under a blackout scenario, where emergency anchoring is required, with the weight being on the stopper, a ship's crew would be unable to let go the anchor until windlass power is restored and anchor weight is taken off the stopper.

This will end up with losing critical time and possibly result in a grounding due to the anchoring being delayed.

Under such circumstances, keeping the weight of the anchor on the Brake would be the best solution. Needless to say the stopper must be put down but there should not be any weight on it.

Here's what you need to do.

a) Heave up the anchor completely so there is no gap between the flukes and the hull.

b) Ensure that the stopper is sitting properly. In some cases when the links are inverted the stopper does not sit. In this case there is no choice but to leave a gap between the anchor fluke and hull as in all circumstances the Stopper must be completely secure.

   It must be emphasized here that the links must be correctly turned at the earliest opportunity to ensure the stopper is correctly sitting with the anchor fully heaved up.

c) Once the anchor is fully heaved up, weight is on the brake and bar is down, ensure that anchor lashings are taken and made tight enough to share some of the load on the brake. Condition of the anchor lashings must be constantly checked for wear and tear. These are usually ignored and normally found in rusted/ deformed condition. The tightness of the anchor lashings must also be checked daily.

With weight on the brake and anchor fully heaved up, there will be a small gap between the anchor link and the stopper.

This gap needs to be checked daily when at sea to ensure it is maintained, especially when rough weather has been forecast. It may happen that slight slip of chain may cause the link moving and resting on stopper. If cable is not heaved up again, the cable movement in rough weather may result in excessive grooving on bow stopper providing passage for cable movement and slippage.

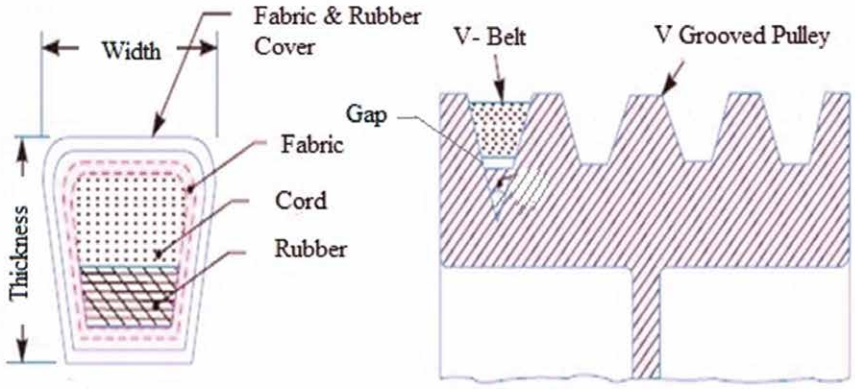
2) When at Anchor – weight of the anchor on the stopper.
The strength of the bow stopper is much more than the brakes. When the vessel is at anchor, the anchor must be housed in a way that the link is in contact with the stopper and the brake tight. Any excessive strain coming on the chain must be taken by the bow stopper. This is not the case when at sea as there is no strain on the chain and the weight of the anchor can be easily supported by the Brake.

There could be a case where the anchor needs to be slipped in an emergency when another vessel is dragging onto you. You must remember that without power you will be unable to take weight off the stopper and slip the anchor. Hence while sending the anchor party forward also get the winch power ready.

3) In Port – Weight of anchor on brake but Bow stopper properly secured.
VIQ 9.19 mentions - *Whilst moored alongside, anchors not in use should be properly secured by brake and guillotine, but otherwise be available for immediate use.. (ISGOTT 23.4.2.5)*

Hence it is important that the anchor is fully stowed with weight on the Brake and the Bow stopper down. Where terminal restrictions are in place, additional Anchor lashings may be a Port regulation which needs compliance. ■

Operation and Maintenance of V-Belts



S. Viswanathan
Advisor
SIMS, Lonavala

There are many types of drive mechanisms on board a ship, V-belt being one of them. Machines such as Refrigerating/ air-conditioning compressors, control air compressor, fans and bilge pumps are some examples of belt driven equipments.

Some advantages of belt drives are:

1. The V-belt drive gives compactness
2. The drive is positive,
3. Since the V-belts are made endless, therefore the drive is smooth.
4. It provides longer life, 3 to 5 years.
5. It can be easily installed and removed.
6. The operation of the belt and pulley is quiet.
7. The belts have the ability to cushion the shock when machines are started.
8. The high velocity ratio (maximum 10) may be obtained.
9. The V-belt may be operated in either direction with tight side of the belt at the top or bottom.

V- belts are made of rubber for elasticity and fibre for strength.

Installation
While renewing worn-out belts, full set of belts are to be renewed. The belts will stretch to different lengths and if new ones are used with old ones, the entire load will be taken by new ones, which in turn will wear them off quickly. While fitting V-belts, alignment of the pulleys has to be checked with straight edge. The pre-tension on the belts is adjusted as per manufacturer's instructions. No spray to be used on the belt or pulley while fitting the belts. V-belts being made of rubber cannot be stored for a long time. It is better to order just before use and also store them horizontally, to prevent stretch by hanging.

Care in Operation
Heat, dust, oil/grease are detrimental for V-belt operation and life. Care must be taken V-belt do not touch the guard. Higher tension will cause un-necessary wear of the belts and may affect shaft bearings and seals. Squeak noise may be normal in humid weather and may not continue for a long time. If the belts are slack, the continuous screeching noise may be heard. The belts require re-tensioning. The groove base on the pulley must not look bright and shiny. This means the belts have worn more than the limit and belt bottom is touching the groove base. In this case the belts have to be renewed.

Safety
Never attempt to touch or carry out any maintenance on the equipment without first isolating the same. ■

Application of Magnus Effect for Ship Propulsion

Capt. VR Krishnan
Superintendent -
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With the ever-rising fuel costs, and stringent environmental protection standards, the shipping industry is constantly researching ways to find pragmatic solutions to overcome their losses and meet the stringent environmental standards set by the industry.

One such option explored to save fuel is the use of rotor sails on ships; spinning cylinders that uses the Magnus effect to harness wind power. Instead of using conventional underwater propellers, as the rotating cylinders spin, rotors would generate thrust through the Magnus effect, pushing the ship forward.

When tested using 18 meter long rotor sails for six months by a Finnish company, a significant fuel reduction and cost savings of up to 2.6% was noticed.

Principle of Magnus Effect

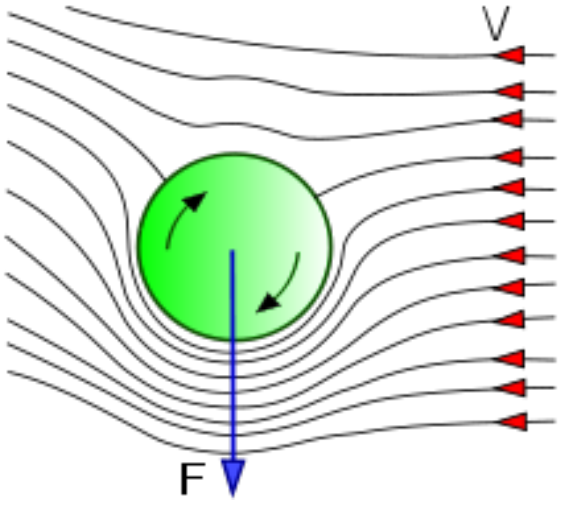
Magnus effect is a force generated by a spinning object traveling through a viscous fluid. It was first discovered by Heinrich Magnus in 1852. This force is perpendicular to the velocity vector of the object.

To illustrate this effect we can see below a ball which is rotating clockwise in a wind stream, the pattern of the wind stream under the ball appears pulled under it due to its rotation. Due to Magnus Effect, the force is exerted in the downward direction which is perpendicular to the direction of the wind stream.

The force of the Magnus Effect can be calculate by the formula F = S (w x v); where “F” is the force, “S” is the air resistance coefficient across the object’s surface, “w” is the angular velocity of the object and“v” is the velocity of the fluid. Once F is ascertained we can use kinematic equations to predict the characteristics of the spinning object in flight.

The Magnus Effect was used to advantage by a German engineer Mr. Anton Flettner in the 1920s. He designed towers of about 25 meters lengths and 4 meters in diameter. When the wind blows across the spinning rotors, they develop a lift, an effect similar to that described in the figure above. In 1925, the first ship BUCKAU was installed with rotor sails and made a voyage across the North Sea. The voyage parameters of this voyage were closely studied and results were found encouraging.

Over the years with improvement in technology and engineering, the Flettner design which was patented in 1922, have improved to the extent that this technology is now being further enhanced and the first trials were done with Flettner Rotor sails on the vessel E Ship1. Flettner rotor sails are expected to save about 35% fuel costs at speeds of upto 15 knots.



Principle of Flettner Rotor Sails

When wind meets the spinning rotor sail, the airflow is accelerated on one side of the equipment and restricted on the other. The resulting pressure difference creates a force perpendicular to the wind flow direction – a lift force.

When fitted on board a ship, a downstream turbine is used to divert the exhaust gases from its main engines while sailing on power, to drive Flettner rotors. With favourable winds at sea, the rotor sails allow the main engines to be throttled back, saving fuel and reducing emissions. As compared to other methods aimed at improving vessel fuel efficiency, such as air bubble systems, this system is uniquely bringing renewable energy to the board by harnessing the wind power.

Prototype testing of rotor sails installed on a roll on-roll off carrier owned by a Finnish company which operated in European waters in the North Sea was carried out. The test results were overseen by maritime data analysis, software and services provider and researchers. Weather conditions were mainly calm throughout the study. The tests undertaken predicted savings of 20% for vessels with multiple large rotors travelling in favourable wind routes. Windier conditions would increase the amount of power generated.

Availability and Compatibility of the system

Rotor sails can be used with new vessels and retrofitted on existing ships. The required number of rotor sails and the size of each sail are based on the size, speed and operating profile of each vessel. Rotor sails are available in 3 sizes. This system could be effectively used when the average wind speed of the sea areas in which the ship is operating exceeds 7 m/s in conjunction with beam winds en route. By simulation methods the most cost effective solutions can be determined for a particular ship operating in a particular sea area.

Contemporary application of Flettner Rotor Sails

In a major move to promote this renewable energy source application in the shipping industry, a modern day

110000 DWT tanker is set to be fitted with two Flettner rotor sails. This experiment that would test the new technology's potential to reduce fuel consumption in modern day shipping. This project could provide insights into fuel savings and operational experience. The ship would be retrofitted with two 30m tall by 5m diameter Rotor Sails. Each Rotor Sail is made using intelligent lightweight composite sandwich materials. When wind conditions are favorable, the main engines can be throttled back, providing a net fuel cost and emission savings, while not impacting scheduling. Independent experts will analyze the data gathered from the project before publishing technical and operational insights, and performance studies.

Combined, the alternative propulsion technology is expected to reduce average fuel consumption on typical global shipping routes by 7 to 10 percent. It is expected that this project would be accomplished by the end of 2019 and the results would be analyzed and made available for future enthusiasts to ponder and deploy on specific ship types to good advantage.

What are the benefits of this project?

Optimism that this project will open up the market for such technology to a larger number of long-range product tankers thus paving the way for more fuel efficient ships and ultimately reducing emissions, including greenhouse gases. This will enhance the efforts already being made by the Shipping Industry today by following various regulations under MARPOL Annexe VI towards the improvement of energy efficiency. Wind energy is abundantly and freely available as a renewable energy source and this energy source has a significant role to play in supporting the shipping industry to reduce its fuel consumption and meet impending carbon reduction targets. This innovative technology can improve fuel efficiency on ships of the future and help to reduce their environmental impact safely.

Flettner rotor sails installed on tankers and bulk carriers have the potential to reduce ship fuel consumption substantially. It is one of the few fuel saving technologies that could provide vast cost saving improvements. As of today, there has not been sufficient full scale demonstration on a suitable ocean going trading vessel to prove its operational impact and that this technology benefits the industry, Demonstrating the technology in this project, will make it more attractive to shipping companies and investors, and could play a significant role in reducing the fuel costs and improving the environmental impact of shipping in the future. ■

An Overview of Smoke Sensors

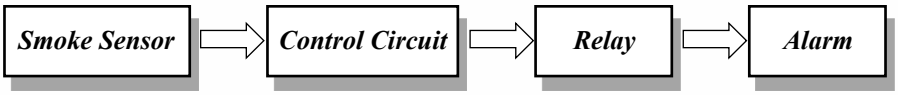


Fig. 1. Block diagram for simple Smoke Sensor Circuit

In the shipping industry, the process of automation is rapidly increasing. Today, many automated operations have already replaced the traditional manual processes; some of which are the power management operation on the auxiliary engines, auxiliary machinery operation, cargo on-and-off-loading operation and navigation.

One such is also the Smoke Sensor, a crucial equipment for onboard safety. When smoke is detected by a sensor, that sensor will give a logic signal to control circuit. Depending on that logic signal, the control circuit will generate a signal to turn on the alarm. That signal is sent to the relay to activate the alarm. The relay module expands the functional scope of the modular smoke detector. It enables the connection of external alarm signalers, such as a horn or warning light.

This is very simple example of Automation.

Common issues faced on board:

1. Due to vibration, detector head & connections of the smoke sensor may get dislodged from the base plate securing and false alarm can be generated.

   Regular checks: detector head and base plate matching notch to be inspected. If it is mis-matched, that means it tends to slip from its base plate. To avoid false alarm, detector head needs to be securely fastened.

2. If ship is sailing nearby desert area, fine dust is brought in through air suction inside the accommodation and engine room, which cannot be filtered using felt filters. Hence, if air duct opening is directly facing towards smoke sensor, then most of the dust will get accumulated on sensor. This may give rise to false alarm or even cause damage to detector head.

   Regular checks: Felt filters need to be changed when ship is proceeding through desert area and fresh air intake damper controlled to avoid damage in smoke detectors and critical electronics of control panels.

   Air duct should not directly face the smoke detector sensor head.

3. Fire alarm control panel gets back up power supply from its own battery supply as well as from Emergency generator. Most of the times Port State Control (PSC) inspector ask ship's staff to operate fire control panel on back-up power supply. In this case if main supply is disconnected by putting off main switch, during this power supply interruption, and before load is taken by emergency generator; back up battery power supply will play major role to operate fire control panel and keep it alive. However, if back up battery is not sufficiently charged or is faulty due to its charging circuit, then there is strong chance that all the program in the fire control panel may get corrupted.

   Regular checks: Fire control panel battery power supply to be routinely inspected in charging mode and without charging mode. It should show its respective voltages while charging and without charging.

Now we will see how the alarm is activated through Relay.

The basic block diagram for above example is as Fig. 1.

Relay is an electronics switch mostly used in Automation sector.

It has mainly five terminals
1. Common
2. Normally Open (NO)
3. Normally Closed (NC)
4. Coil +
5. Coil -

Following Fig. 2 is the simple internal structure of Relay showing terminals.

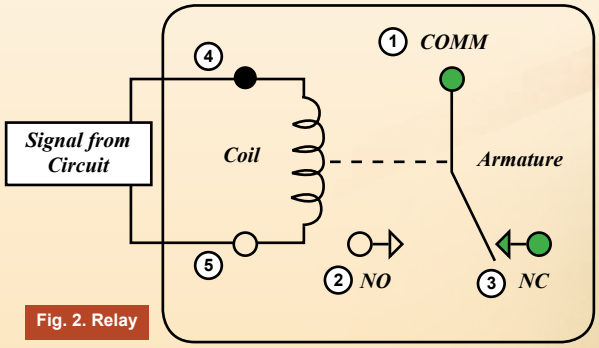


Fig. 2. Relay

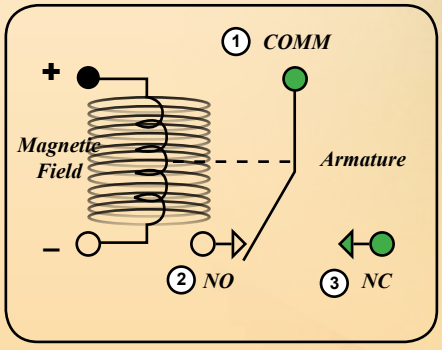


Fig. 3. Signal from Control Circuit present

In normal condition, Armature is connected to one terminal which makes the connection between them (1-3) so the name “Normally Closed (NC)”.

And there no connection between 1-2, so the name “Normally Open (NO)”.

Signal from the control circuit is given to one of the coil terminal, here coil is simply an inductor, and when a current starts flowing through an inductor, magnetic field starts generating around the coil.
This magnetic field will attract Armature towards it, which will make connection between COMM and NO. Following Fig. 3 explains this concept.

So we can see, after giving signal to coil, coil magnetizes and attracts armature towards it which will make connection between COMM and NO. Now we can connect anything between COMM and NO.

Following two diagrams which show the open and closed condition of the relay circuit.

As you can see in the Fig. 4, there is no signal from the control circuit to the coil, hence no magnetic field is generated, hence armature will be at its original position, outer circuit will be open, hence Alarm will be turned OFF.

Here (Fig. 5) signal will be present from the control circuit to the coil, magnetic field will be generated, it will attract armature towards it, outer circuit will close and Alram will be turned ON.

So as we can turn ON/OFF alarm here, we can operate any device on board. ■

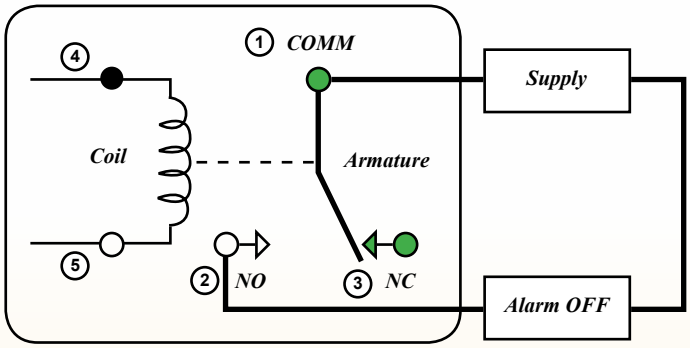


Fig. 4. No signal from Control circuit to coil, Alarm OFF

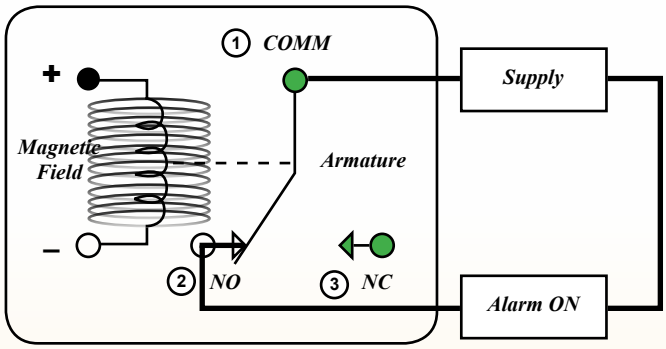


Fig. 5. Signal present from Control circuit to coil, Alarm ON

Smoke Sensor Maintenance Checklist

The following checks must be carried out during the routine maintenance of smoke detectors:

1. Check that smoke detector head is securely fastened to the Base plate.
2. Confirm that Smoke detector head shows no evidence of physical damage, paint application, or excessive grease and dirt accumulations.
3. Ventilation holes on the smoke detector shall be clean and free of obstructions.
4. Built in indicator (LED) should be confirmed free of damage during its functionality testing.
5. To avoid the possible risk of electrostatic charge, the detector head must not be cleaned with solvents.

Additional checks and precautions on Detector Base Plates:

1. Smoke detector base plate should be securely fastened to the wall or ceiling.
2. Smoke detector base plate should have no evidence of physical damage.
3. The cable entry integrity to be checked. Cables should be entering from the centre or from the side of the base.
4. Contacts/ Terminals in the detector head to be inspected for dirt or moisture & kept cleaned.
5. The address of the base plate should not be changed during inspection.

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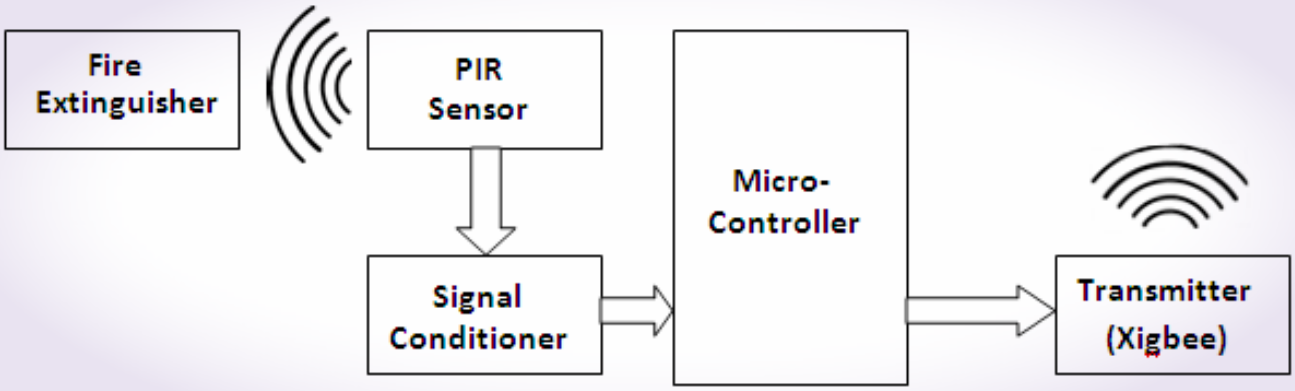
Electronics Engg. Faculty

Mr. Deepak Hargude
Senior Electrical Instructor
SIMS, Lonavala

Automation of Fire Control Plan



Project Group Members (B.Tech04):
Cdt. Rishabh Jaiswal, Cdt. Sagar Thapar, Cdt. Sandeep Sangwan, Cdt. Sarthak Anthwal, Cdt. Shivam Chawla, Cdt. Som Dev Joshi
Guide: Mr. Satish Babar (Lecturer In Electronics)

The fire control plan is a mandatory requirement of the SOLAS (safety of life at sea) convention by the International Maritime Organization. It provides us information on the fire-fighting equipment at various locations on each deck of the ship and in spaces enclosed by "A" class and "B" class divisions. It also provides us with details of the type of fire detection system and firefighting systems available on that ship.

Traditionally, physical copies of these plans are placed on the bridge, alleyways and in the common room for the ship's crew for easy reference. It is also rolled-up and placed in a weatherproof container by the gangway for the shore fire-fighters' reference during an emergency.

Today, crew members can access the computerized fire control plan (F.C.P.) program that contains the digital copy of the F.C.P, enabling a user to use it and get the desired information and locations of all the firefighting equipment like extinguishers, dampers, their quantity and contents. These can be attained by searching the database.

Wanting to improve this computerized system further, we demonstrated that if an extinguisher is used and displaced from its position, it can be detected by the system. We did this project as part of the B.Tech final year "technical paper and projects"; as per the requirement of the Indian Maritime University (IMU) syllabus.

How it works?

As seen in Figure 1, the Transmitter section is fitted at a remote location. Passive Infra-Red (PIR) Sensor is used to sense the existence of the equipment at their respective places. This detection system will detect the displacement of the equipment from its position and generate the signal. This signal can be amplified by signal conditioner circuit and make it available in readable format for Micro-Controller. Micro-Controller is pre-programmed for all possible signal conditions and can generate respective outputs. This generated output from the Micro-controller will enable the Xigbee transmitter and it will send this signal to the Master unit which is fitted in an appropriate location for prompt detection.

Fig 2 shows the Receiver section. Xigbee receiver will receive the signal from its Transmitter and insert into the software. Computer software is linked with this Xigbee receiver and parameters of this software will change according to the received signal.

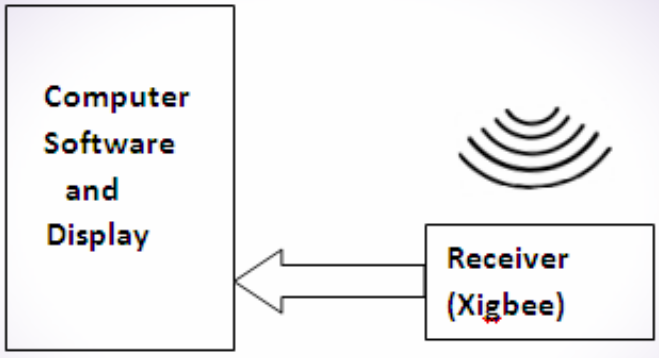


Fig 2. Receiver Section

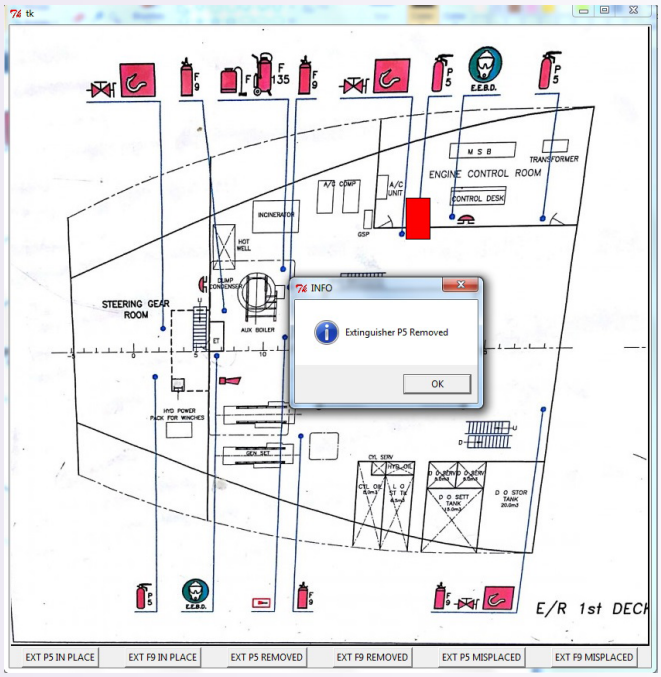


Diagram 1

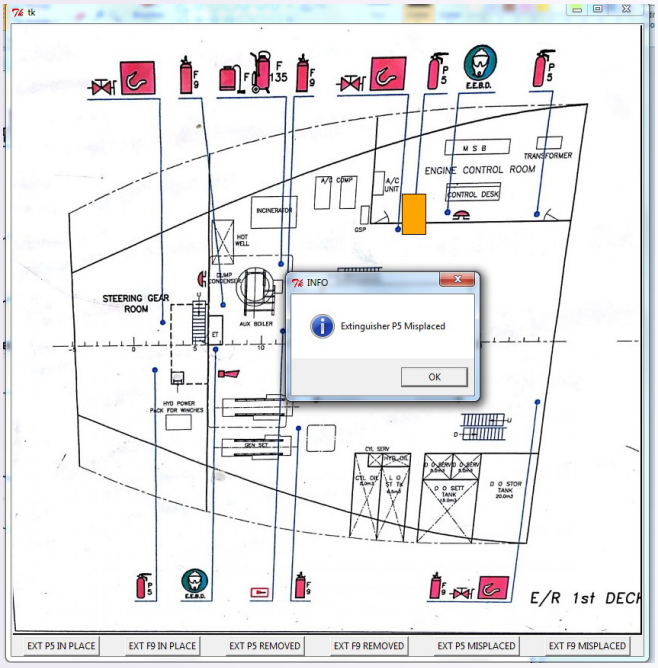


Diagram 2

Now, suppose an extinguisher named P5 is misplaced from its position, then the PIR sensor will detect this and generate a signal. This signal will be conditioned and fed to the micro-controller. The micro-controller will generate a signal to enable the Xigbee transmitter. This signal will be received at the appropriate location. On the computer screen, it will display in red that the extinguisher has been removed from its position. This is shown in diagram 1.

And if the wrong extinguisher is placed at its position then the colour indication will be given in orange, as seen in diagram 2. ■

Continued from Page 8

and the ship's certificates and records.

PSCO checks covers all departments, i.e. Engine, Deck & Saloon. They cover all areas of the ships, i.e., Bridge, Accommodation, Engine Room and Deck. Their key focus is on:

1. LSA/ FFA maintenance schedule, procedure, records/ photos/ videos of maintenance being done/ and competency of shipboard staff involved in carrying out routine Inspection. PSCO also like to witness Emergency preparedness by conducting drills, testing L/B engine, checking records/ photos of L/B lowered and manoeuvred in water. Operation of various emergency equipment such as emergency generator, emergency fire pump, etc.

2. Low Sulphur Fuel Oil (LSFO): change-over log / change-over procedure/ change-over time calculations, Vessel's position verification with bridge log book & familiarization of engine room staff with latest Marpol regulations.

3. Shipboard Incineration of sludge and garbage: limitations of the equipment onboard, entries in ORB and garbage record Book. Operating procedure of the equipment & understanding of regulations.

4. Planned Maintenance System (PMS), Equipment and Lifting appliances conditions, inspection records, etc.

These are some of very prominent points to give you an insight through PSCO's point of view. Then there are concentrated Inspection campaigns (CIC) conducted by PSC for areas which have recorded highest number of deficiencies under certain PSC, e.g. Paris MoU had MLC 2006 as latest CIC which was scheduled from September to November 2016.

It must be kept in mind that along with the inputs from company's resources and proper planning from your end, precise understanding of PSC requirements will result in fulfilling desired objectives of zero observations during a PSC inspection. ■

Application of Constructive Thought Process at Work

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Knowledge based on facts and practical learning enables one to produce positive outcome in his practical endeavour. Doubts and confusion may arise, when concepts are learned with either wrong understanding or are liable to give rise to multiple interpretations. In other way, we can say that satisfactory practical results provide evidence of the correctness of the knowledge gained earlier. In marine field, this practical wisdom is very much essential that in every step of the machinery overhauls or while carrying out any operation, one should have the complete awareness of the outcome of the action in advance. For this the knowledge gained has to be continuously verified and revised with new insights before applying it. Only then can an engineer acquire the confidence for turning out the operation into a successful one.

Most of the time, careless approach towards a procedural operation invites trouble and this arises due to the lack of alertness about the correct process of achieving the outcome in a fruitful way. Anyone can carry out operations on a work instruction but it's not necessary that it will provide one with desired results. For example, while opening a valve in the engine room for a particular operation may not require much skill, as awareness about this valve can help perform the action without much thought. But one should know when he opens the valve, what all things are likely to happen.

The work order may be transferring of sludge in the Engine room using a sludge pump and the operator needs to set the pipeline and valves. While opening the discharge valve of the pump, the engineer must know what will happen before he presses the button to start the motor for the pump. Let us reason it with probable & logical thinking process behind this simple operation sequentially:

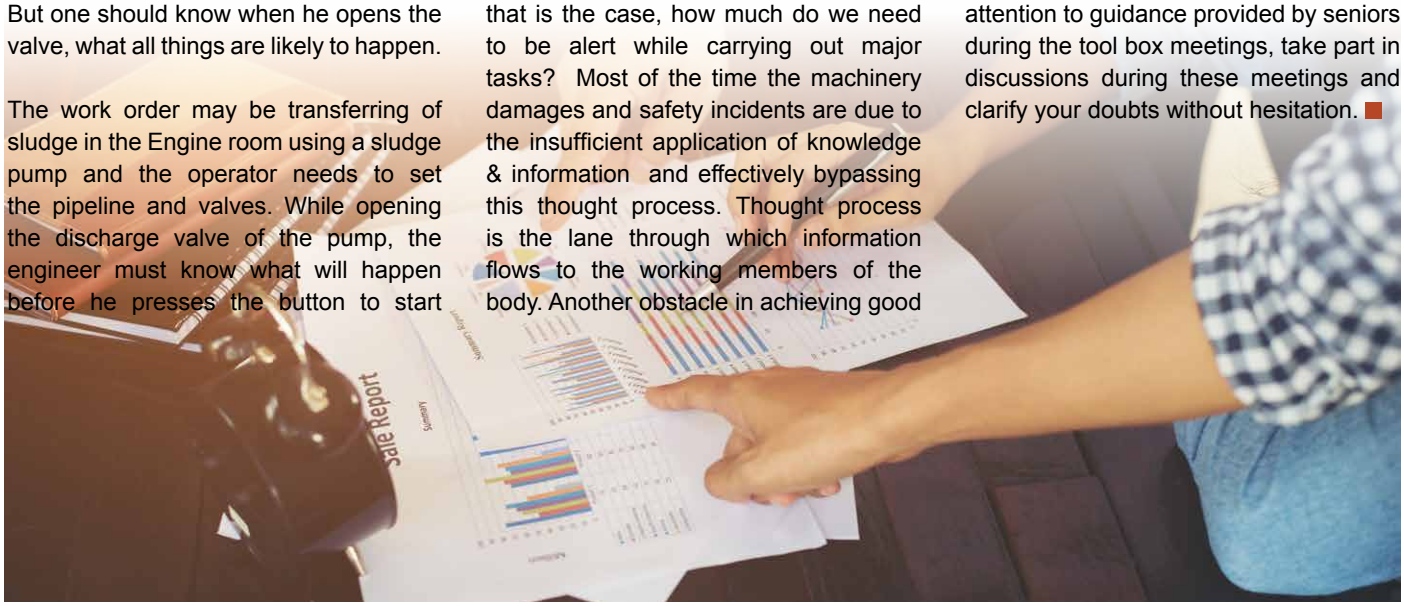
1. What is the medium to be transferred?
2. Whether the medium is hot or cold?
3. How much time would I need to complete the operation
4. Whether I need to communicate this operation to others or not
5. What is the source of the sludge and from which tank the sludge is to be transferred?
6. Is any other valve to be closed in the line or not?
7. Where this sludge will go once the pump is started?
8. Does the tank which is receiving the sludge, have sufficient capacity or not?
9. Whether I have opened the correct valve or not?
10. Is any other valve need to be opened in the discharge side of the pump?
11. Valves are fully open or fully closed or not?
12. Before starting the pump, what is the load on the generators?
13. What is the initial level of the receiving tank?
14. Whether any one is working in the tank or not?
15. Whether any work is going on in the tank or not?

What we have seen above is a constructive thought process behind carrying out a normal daily routine in the Engine room, before it is acted upon. If that is the case, how much do we need to be alert while carrying out major tasks? Most of the time the machinery damages and safety incidents are due to the insufficient application of knowledge & information and effectively bypassing this thought process. Thought process is the lane through which information flows to the working members of the body. Another obstacle in achieving good results is the lack of understanding of consequences of a wrong step.

Steps to note are:-

1. Verify the clarity of inputs you receive from various sources during the training phase by developing a questioning attitude to learn the concepts correctly.
2. Avoid doubts and confusion by clarifying with seniors before attempting to carrying out the task
3. Cultivate a thought pattern concerned and focused with the task contributing towards a positive outcome
4. Be fully aware of the outcome in advance so that you remain confident while working
5. Be fully aware of the consequence of any wrong step involved in the operation.
6. Take Guidance from the seniors while carrying out the task for the first time

Develop an attitude not to fully trust on the ideas conceived because it can be immature, rather clarify and discuss it out with seniors and cultivate patience to listen and obey their valuable directions. If you have been assigned the task for the first time, learn to devote sufficient attention to guidance provided by seniors during the tool box meetings, take part in discussions during these meetings and clarify your doubts without hesitation. ■



I Assure You Daddy!

He always tells me,
"The moment I held you in my arms,
I knew we would be the best of friends"
True enough to this day,
You have always been my pillar of support
Daddy!
Those values of life,
Those endless talks,
All those aspects of simple living,
The jokes only we understood,
The pranks we played,
The secrets we shared,
You've been there for me every time,
Never to be forgotten ever.
All those days you went to bed hungry,
Just to ensure that I ate full,
All those festivals,
you bought me new clothes,
Yet nothing for yourself.
I assure you Daddy,
I will make things better for you!
I will be there for you,
In the highs and lows of life.
Together we shall go out,
Long drives in your dream car.
Together we shall live,
In your dream house.
Together we shall roam the world hand in hand,
Reminiscing our best memories of life!
I assure you Daddy!

Poem by:
Cdt. Ashwath Jagannath Shetty
GME-21
SIMS Lonavala

Photo by:
Cdt. Ramachandra Boopathi
GME-21
SIMS Lonavala

Staying Disciplined during Watch Keeping

* We invite responses from our learned readers as to the causes and lessons learnt through this case study. Please send your responses to samundraspirit@samundra.com.

One of the important tasks on board a ship at sea, is to note carefully the various parameters of machineries using the five senses, in addition to the alarm system provided. The parameters could be temperature, pressure, level, vibration, noise, smell, electrical quantities such as voltage, current, frequency and a host of parameters. Intervention may be required to correct an anomaly; and importantly, the effect of the action taken must be followed up. The following incident happened when the author was sailing across the high seas as a Chief Engineer onboard a fully loaded VLCC.

The incident: During the morning 0800 -1200 watch, the Chief engineer on his regular rounds in the machinery spaces, noticed the main engine jacket cooling water pressure gauge reading has gone up by one bar; showing 5.0 bar when normal pressure used to be 4 bar and pressure gauge needle vibrating. The watch-keeping engineer was summoned to the engine room to find out the cause. The duty engineer went around the engine room checking all pumps, valves, pipelines and associated equipments and returned back to the control room with a blank face.

Shortly thereafter, the watch keeping rating returned to engine room after his tea break. When queried about the Jacket water pressure going up, he rushed towards the upper deck watch keeping engineer and chief engineer in toe. To our utter shock, we found the Jacket cooling water expansion tank filling valve open and water overflowing from the vent of the tank to the nearby scupper.

The filling valve was shut and the level in the expansion tank was brought to normal working level, fortunately without any damage to the equipment.

Causes: The rating in his watch as a routine used to periodically check the level in the expansion tank and fill up if required. When he found the level was about a foot less than normal, he opened the filling valve full and went to crew's messroom to have a glass of water. Probably he took more time than was necessary and while returning back to Engine room, he completely forgot about having left the filling valve open.

Extent of damage: Fortunately, the rise in Jacket cooling water pressure was noticed quickly as it happened and corrective action was taken without any damage to the equipments. Of course 2 to 3 tons of water was lost along with treatment chemicals. ■

From the details provided and your knowledge about the operation and maintenance of ships, please provide answers to the following regarding this case study:

1. **What purpose does an expansion tank serve?**
2. **How much make up water per day can be considered normal?**
3. **What will be the adverse effects of increased pressure in the jacket cooling water system of Main Engine?**

S.Viswanathan, Advisor
SIMS, Lonavala

Responses to previous issue case study - Impact of an Inefficient Stripper Pump: Issue 36 (January 2017)

Thank you readers for the feedbacks and responses on the previous case study. Here's a compilation of the answers received:

Q1. What could be the source of rags in the stripper pump valve chest?

The crew might have forgotten to clear the rags and debris from the cargo tank after the tank cleaning process during last time and might have loaded cargo on the top of it. The settled rags had gone to the suction side of the pump while stripping.

Q2. What provision is made to prevent debris reaching the valve chest of stripper pump?

Suction strainers are arranged to avoid any debris reaching valve chest.

Debris reaching the valve chest can be avoided by

1. Frequent cleaning of the valve chest suction strainer
2. Inspect the strainer element for its intactness
3. Inspect whether strainer bucket is in place as there is a chance for someone to have removed for easy flow to the valve.

Q3. What is the duty of senior management staff of the vessel when entire crew is changed?

Familiarize the new staff with correct operating procedure. Compare the performance of the machinery according to the past records and rectify if any correction required. ■

Promotions Onboard ESM-Managed Fleet During First Quarter


JE SUBHA JANA
B. TECH 01


JE ZAKIA GIRISH
GME 15


JE ANIL THOMAS
GME 15


JE ABHIRET KHARHYAL
B. TECH 01


JE DIWAKAR SHARMA
GME 14


JE UTKARSH MISRA
B. TECH 01


JE NAGA RAJU MALLADI
GME 15


JE NAVNEET SINGH KHARB
B. TECH 01


JE NITIN SUSHILKUMAR VARMA
B. TECH 01


JE AMIT SINGH DARIYAL
GME 14


JE AARISH BAJAJ
GME 16


JE ANUJ VALSAN CHERUKKOTH KUNIYIL
GME 15


JE ADITYA RANJITKUMAR JHA
B. TECH 01


JE PRAVEEN KUMAR VIJAYAKUMAR
GME 15


JE PRASHANT DHASMANA
GME 16


JO SHUBHAM GANGWAR
DNS 11


JO ANKIT KUMAR YADAV
DNS 12


JO RAVI KANT
DNS 12


JO ARJUN VINOD
DNS 11


JO ALOK ASWAL
DNS 13


JO BABANDEEP SINGH SANDHU
DNS 11


JO ANKITH KIZHAKKILLAM NEELAMANA
DNS 13


JO SUNIL KUMAR
DNS 13


JO AMANPREET SINGH BAINS
DNS 13


JO AKHIL KESARWANI
DNS 13


JO VIJEET KUMAR CHANDERWANSHI
DNS 13


JO HARJOT SINGH
DNS 13


JO VARUN SONI
DNS 11


JO GAUTAM SINGH
DNS 13


JO SHAGANPREET SINGH
DNS 13

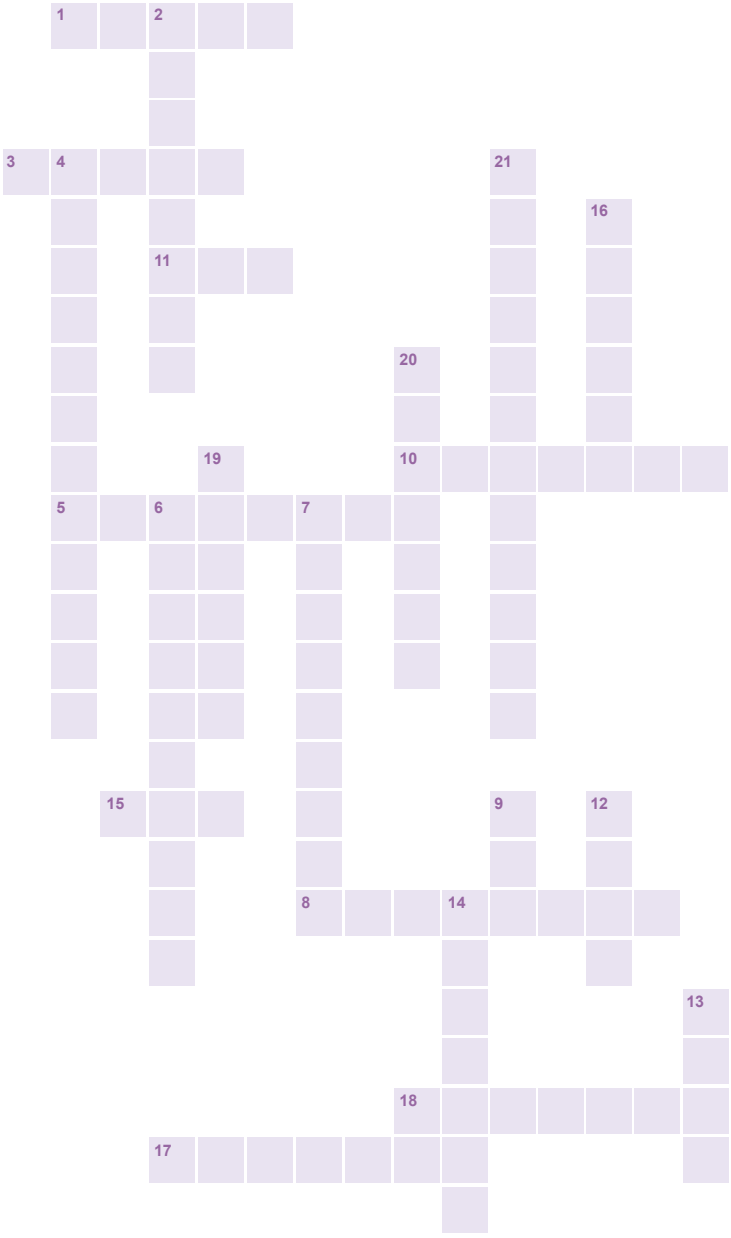

3O SHIVAM GUPTA
DNS 13


4E RAMANDEEP SINGH BHUMBER
GME 15

Crossword Puzzle

Ship Construction & Stability

Cdt. Rachit Shaw
GME-21
SIMS, Lonavala



Across

1. A rise in the height of deck in the longitudinal direction.
3. The outward curvature of the side shell above waterline.
5. During bilging metacentric height _____
8. Strake adjacent to the keel on each side of the ship is _____.
10. During rolling, the deck tends to move laterally relative to the bottom structure referred to _____.
11. _____ tonnage is intended to give an idea of the earning capacity of the ship.
15. A form of keel found on smaller vessel is _____ keel.
17. Advantage of aluminium for using in merchant ship is that it is _____ in weight than mild steel.
18. The aluminium production process starts with the mining of _____ ore.
19. Bureau veritus, the member of international association of classification society has its headquarter in _____.

Down

2. The immersed body of the vessel forward of the parallel middle body.
4. Free surface effect on any tank can be reduced by introducing _____ bulkhead.
6. _____ bulkhead often used in chemical tanker in order to help cargo tank washing efficiently.
7. Heating the steel at a slow rate to a temperature of 850˚C to 900˚C and then cooling in the furnace at a very slow rate.
9. The deck that form the roof of cabin built in the rear part of the ship is called _____ deck.
12. Net area under the load curve is _____.
13. Tank fitted adjacent to machinery space to provide ballast capacity and improving the draft is called _____ tank.
14. A protective arrangement on the exposed deck to prevent falling of personal.
16. The production of all steel used for ship building purpose starts with the _____ of iron ore.
20. The heaviest deck plating will be found _____ the hatch opening of the strength deck.
21. The total weight of the ship is called _____ of the ship.

Answers

Across:
1. SHEER 3. FLARE 5. DECREASE 8. GARBOARD 10. RACKING 11. NET 15. BAR 17. LIGHTER 18. BAUXITE 19. FRANCE

Down:
2. ENTRANCE 4. LONGITUDINAL 6. CORRUGATED 7. ANNEALING 9. POOP 12. ZERO 13. DEEP 14. BULWARK 16. SMELTING 20. ABREAST 21. DISPLACEMENT

Visitors' Comments
First Quarter, 2017

It was a wonderful experience to see this state of the art maritime institute in India. Modern seagoing youngsters are extremely fortunate to undergo training in such an institute.

Deshpande R.A
Principal
Training Ship Rahaman

Superb experience. Most professional and hospitable visit. Many thanks + continued success!

Paudie Dennehy
Overseas operations Manager
GAC Training & Service Solutions Limited,
Ireland

Wonderful facility and staff. Really well done!

Mr. Ray Johnston
Operations Manager,
National Maritime College of Ireland
Ireland

Thank you very much for an excellent tour and welcome. This is a most impressive training institute. Congratulations!

Joy Gillen
Marketing Executive
GAC Training & Service Solutions Limited
Ireland

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- Formidable shore based technical and marine team with more opportunities of career growth
- ESM is part of the Executive Group of Companies which comprises of six other Marine Services related Businesses, headquartered in Singapore.

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