Samundra Spirit

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

JAN 2010 . ISSUE 08

In this issue:

JOIN the MERCHANT NAVY!

SAMUNDRA INSTITUTE OF MARITIME STUDIES (SIMS)

A Training Commitment of Executive Ship Management Pte Ltd (ESM), Singapore
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- **DECK CADETS (AUG 2010 BATCH)** *(Last date for application: 20th April, 2010)*
  Approved under Indian Maritime University (IMU), Directorate General of Shipping Govt. of India & Maritime Port Authority (MPA), Singapore
- **GRADUATE MARINE ENGINEERS (SEP 2010 BATCH)** *(Last date for application: 22nd June, 2010)*
  Approved under Directorate General of Shipping Govt. of India & Maritime Port Authority (MPA), Singapore

DECK CADETS: Diploma from IMU

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

GRADUATE MARINE ENGINEERS

- 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 examinations.

ELIGIBILITY	DECK CADETS (DNS)	GRADUATE MARINE ENGINEERS (GME)
Age (as on date of joining) & Marital Status	• not more than 20 years for **10+2** candidates 22 years for **B.Sc** candidates 25 years for **B.E/B.Tech** candidates • Unmarried	• not more than 25 years • Unmarried
Academic	Results must be obtained at 1st attempt **All Board (Class XII):** Minimum Av Score - 60%, PCM Minimum - 60% **OR** **B.Sc** – Physics / Chemistry / Maths / Electronics with min of 55% in final year along with min of 55% in PCM during Class XII **OR** **B.E/B.Tech** - Any stream from an **AICTE/UGC** approved institute	Degree in **B.E / B.Tech (Mechanical / Naval Architecture)** from an **AICTE** approved institute, **Deemed University** with min marks of 55% in final year
Language	English shall be one of the subjects with min marks scored of 50% in Class X or XII	English shall be one of the subjects with min marks scored of 50% in Class X or XII or degree
Eyesight	6/6 vision, no colour blindness, no use of corrective lenses allowed	no colour blindness, use of corrective lenses permitted

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Samundra Spirit

JAN 2010 ISSUE 08

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Background of cover picture:
Maritime Science Building (left) and The Integrated Gas Tanker Simulator (right) at SIMS, Lonavala

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JANUARY 2010 ISSUE 08

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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

For last year's words belong to last year's language and next year's words await another voice. And to make an end is to make a beginning.
- T.S.Eliot

As we step into the third year of our existence and beginning it with the 8th consecutive issue of **Samundra Spirit** - it is indeed an exhilarating experience. We are proud to celebrate yet another year and yet another chapter in the history of SIMS through the pages of the Samundra Spirit.

The year 2009 was indeed packed with events and activities that kept all in SIMS busy and on their toes. While the achievements were tremendous, the learning was astronomical. If we are bound to pick the single most important milestone, it has to be the celebration of the inauguration of the Integrated Gas Tanker Simulator at the Lonavala campus on 15th December. Indeed a marvelous piece of innovative training equipment borne out of total devotion and dedication of an exceptionally talented group of in-house people.

We are pleased to carry a full pictorial report of the inauguration ceremony at the Lonavala campus and the celebration at the Taj Palace, Mumbai in the same evening. The appreciation and endorsement of the worldwide shipping fraternity on what the combined team of SIMS and ESM achieved is heart warming and indeed motivating. The speech of BP CEO, Mr. John Ridgway is particularly noteworthy in that respect. Excerpts of the speech is included in this issue of Samundra Spirit for our readers' benefit.

We are also reporting the other regular happenings in the campus including the passing out of the DNS-08 and GME-07 batches and the inter-house sports competitions. We are happy to include excerpts of the speech of Joint Director General of Shipping Dr. S. D. Agnihotri addressed to the passing out cadets – an absolutely marvelous piece of advice for the budding mariners.

It is heartening to see the improvement in the quality of the articles in terms of choice of subjects as well as input of information and knowledge. The intention is to inculcate curiosity and bring the knowledge to those who need the most i.e. the cadets. The hard works of the authors have been refined and enhanced further by the editing efforts of our technical team resulting another great team work.

We are happy to carry the message from our outgoing Principal Prof. DVB Swamy at the end of his tenure. Samundra Spirit offers a heartfelt thanks for his involvement and contribution to the development of the institute during his last two years here.

There are other regular pieces and voices to continue with our last year's thread of thoughts. The idea is to continue doing what we did right, to be consistent in our efforts in this new year and the years ahead.

When you have musk, you will automatically have fragrance, said an ancient Chinese proverb. It's our new year aim that SIMS will continue to spread fragrance through the pages of Samundra Spirit .

Happy new year and happy reading!

Sikha Singh

A Message from the Principal

Looking Back...

As I come towards the end of my tenure, I cannot help looking back at my two years at SIMS, Lonavala. When I had first seen SIMS I was so impressed, I felt a sense of great pride that it was in this country the founders had the vision and determination to create something which is unique and truly world class. It was a realisation that if you have the determination and perseverance, you could do it in India. SIMS, to me, represented a world that was something which could exist in an advanced country. In my earlier 41 long years of service, I had come across many fine establishments, but none matching SIMS. It was, again, a moment of great pride that I was offered the opportunity to lead this progressive institute as the principal.

The two years have been associated with growth and advancement in several ways - increase in the strength of DNS course, staff strength, Award of Grade-1 by ICRA, starting of FFLB and Safety Seamanship Courses, a host of value added courses which are of direct relevance to ESM, bringing in the OIL & Chemical Tanker Familiarisation courses under the same roof, addition of several simulators including the OOW/SMS and the new jewel in the crown of SIMS, i.e. the IGTS – entirely due to the vision and guidance of the management.

The cadets have been making a mark in the campus and outside. It was very gratifying to note that the cadets have been performing very well with excellent results not only in university examinations but also in intercollegiate competitions – be it in the presentation of technical papers or by winning awards like Champion of Champions in the extra curricular categories. The entertainment programmes presented by the highly talented cadets in the amphitheatre and auditorium are a pointer to their versatility. Today, SIMS produces all rounders.

Having come from a somewhat regimented atmosphere, it was refreshing to migrate to an environment where guidance and decisions are forthcoming at a lightening speed. It is an atmosphere where I had the benefit of association with thorough professionals from SIMS as well as ESM. The kind gesture of the management in helping me in unlearn and re-learn processes at Singapore and the naming ceremony of a panamax bulk carrier M.V. Eria Colossus in Japan is something that will stay with me forever. It has been a truly enriching period.

As I will be stepping into another phase of my life, I sincerely thank the management for having given me an opportunity to be with this great institute and wish each and every member of SIMS and ESM family all the very best for years to come. I wish that SIMS continues to blaze new trails and reach the highest level of success ahead. May God Bless.

Prof. DVB Swamy, Principal
SIMS, Lonavala

Travelogue

Casablanca Calling…

Capt. Anil Mehta
Nautical Faculty
SIMS, Lonavala

Port of Casablanca

Sixty years after the western classic movie Casablanca was released in 1942, Capt. Anil Mehta, our faculty member, then commanding bulk carrier Federal Welland arrived at the shore of ad-Dār al-Bay – the Arabic name of Casablanca -one of the world's best known chic towns of the rich and the famous. Interestingly what he seemed to have had topmost in mind was not the glamour and exotica of this famous sea port of the Kingdom of Morocco, but more mundane things like how to get out safe in this potential stowaways infested territory! Here's his own account of that memorable visit that may assist our future young mariners likely to undertake the same voyage. Here's his account…

When our ship M.V Federal Welland was nominated way back in the year 2002, to load a cargo of Rock Phosphate at Casablanca, our crew were both excited and anxious. Excited about visiting this famous Arabic tourist destination and anxious about the challenge of keeping stowaways at bay.

Though Casablanca was an exotic port for sailors, it had its downside also. Hence the possibility of gathering stowaways was the first thing that sprang to the mind. The cargo was to be rock phosphate fertilizer and the total port stay was expected to be about 3 to 4 days.

As we entered the harbour, we were inundated with the number of people wanting to come aboard –most though were sellers of leather and dates along with a few barbers who stood by the gangway waiting to offer their services. Even though our next port of call was in Europe we were compelled to write the name of another West African port at the gangway to deter potential stowaways.

Casablanca is a city in western Morocco, located on the Atlantic Ocean. It is the capital of the Greater Casablanca region. It's also Morocco's largest city as well as its chief port. The city is considered the economic capital of Morocco because it is the heart of Moroccan business; the political capital is Rabat. The Port of Casablanca is one of the largest artificial ports in the world, and the largest port of North Africa. It is also the primary naval base for the Royal Moroccan Navy.

As you disembark from the ship and make your way through to the city you walk onto the date palm-lined boulevard. Hail one of those petite red taxis and say, "To the Rick's Cafe" and unlike in the famed classic Casablanca the cabbie would not zip off into one of those walled by-lanes of the old city, lit by intricately carved, low-slung, wrought iron lamps, but head straight for the porch of the swanky Hyatt in the city centre.

There is the Casablanca bar - painstakingly recreated to resemble Humphrey Bogart's famed watering hole, which is inextricably etched in the memory of every movie buff. Posters from the 1942 Hollywood film line all the walls even as the main floor with its assembly of drums has Bogart's face as its backdrop. The bar looks just like the one in the classic movie that this Moroccan city is best known for, even today.

Indeed this hotspot is reflective of the city's overall attempt to hang on to its old-world charm—its main draw, really—in the face of fast change, apparent economic progress and that new, modern varnish.

The contrast is striking. On the streets where a young girl walks about in the trendiest designer wear, arm-in-arm with a friend clad in traditional robe and scarf. In the town where it's easier to find a discotheque today than a belly dance performance, a Pizza hut than authentic camel meat.

Still some sights from The Arabian Nights are all there. Men with flowing robes sit with their medieval wares of brass pots, kettles, hand-woven rugs, stained glass lamps and, of course, the shisha or hookah, which may be a rage in India nowadays but is a way of life in Morocco. The most enduring sight of course is of the magnificent Hasan II mosque built on water—both the location and the mosque's intricate carvings are stunning.

From there it's on to Casa Blanca; the first house of the city that apparently gave the place its name as well as its overall look, with Casa meaning house and Blanca meaning white. It is also clear why most of the buildings and homes in Casablanca are white.

One more sight that lingers is of the plethora of cafes that perhaps is the legacy of the French who had colonised Morocco. All the chairs in the cafe face the huge glass pane that looks out onto the road. That, plus the line of chairs outside the cafe facing the road, results in clients sitting for hours nursing a cup of Moroccan tea or coffee and watching life go by.

We strike up a conversation with a cafe owner. I want to know more about the places where Casablanca was shot. He too has movies in mind but wants to know all about Amitabh Bachchan instead!

Nevertheless, when we sailed out to our next port of call I heaved the big sigh of relief - there was no addition to our crew strength of 22!!

Paralleling of Generators and Related Problems:

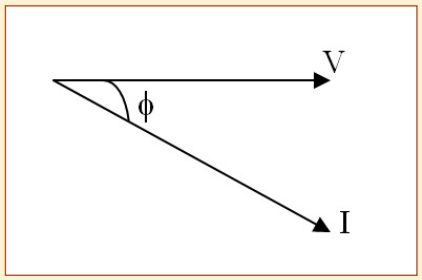
Know Your Electricity On Board

P.V.Shankaramani
Engineering Faculty
SIMS, Mumbai

Consider two generators running in parallel. The total bus bar load is shared equally between these two generators. There is fluctuation of total load due to machinery cutting in and out. But the generators are taking equal share of the KW load which is √3VICosΦ.

Lets consider a scenario when it was found that No1 generator was drawing much higher current than No2 generator. It was also noticed to be operating at a much lower lagging power factor .The No2 generator was drawing a much lesser value of current and was operating at a 'leading power factor'.

Let us carry out an analysis of this scenario:



Active power is given by *KW* = √3VICosΦ
Reactive power is given by KVA r = √3VISinΦ
The active power is the wattful component which takes care of the load torque of the motors.

The reactive component is called as the wattless component which goes high for lower power factor loads and increases the required current value for the same KW load. But this wattles component has to exist as otherwise there will be no flux for the induction motors to work. As our loads in the ship are all inductive this naturally gives rise to some reactive power.

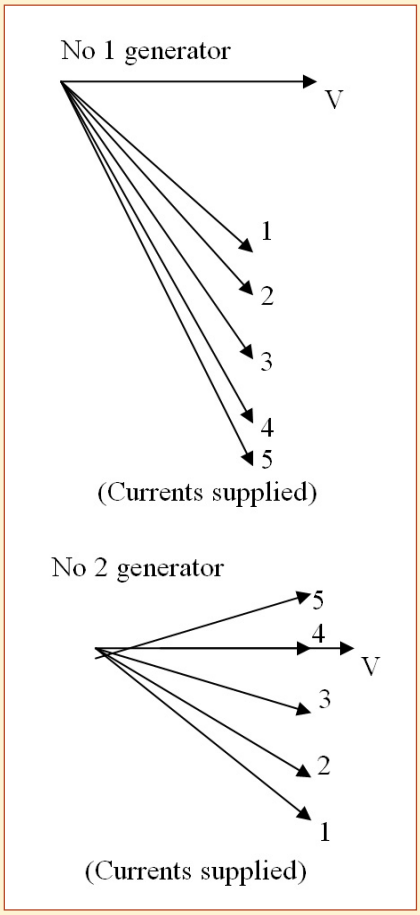
For proper parallel operation the reactive power also has to be shared equally between the two generators.

In parallel operation, when there is a load increase the generators prime movers slow down momentarily causing a slight frequency dip and then the governors swing into action boosting the fuel index to restore the frequency to normal. Then the engines consume more fuel to meet the new higher load requirements.

Also due to higher inductive current drawn by the load there is a voltage dip, flux cancellation in the alternator due to armature reaction etc. Then the Automatic Voltage Regulators (AVRs) swing into action to boost the Direct Current (DC), excitation current into the machine field windings in the rotor to increase the flux strength and restore the voltage to what it was.

So the higher the value of the DC excitation current in a generator implies that it delivers more lagging current. So as the load fluctuates, the two generators have to receive same values of DC excitation current for equal reactive load sharing. If this reactive load sharing is not equal it can lead to serious problems.

Consider the case of the two generators as in this phasor diagram:



1. To start with both generators supply equal currents (1) and have same lagging power factor.
2. As more DC excitation current is drawn by No 1 generator, it operates at a lower lagging power factor supplying more current (2). As lesser DC excitation current is drawn by No 2 generator it supplies a lesser current (2) at a higher power factor.
3. Still as more DC current is drawn by no 1 generator it operates at a still lower value of power factor supplying a higher value of lagging current (3). No 2 generator draws a lesser value of DC excitation current and operates at a higher power factor supplying a lesser lagging current (3).
4. For a still higher DC excitation current, no 1 generator supplies a larger current at a still lower lagging power factor (4). Now as No 2 generator receives a lower DC excitation current and supplies a 'unity power factor' current (4).
5. As DC excitation to No 1 generator is further increased, it supplies a higher lagging current at a still lower power factor (5). No 2 generator receives a lower DC excitation current and now supplies a 'leading power factor' current (5).

In all the cases as above, the Kilo Watt (KW) supplied by each generator is the same. But the currents supplied by each generator and also the power factors vary widely.

As both generators are parallel to the bus bar; in order to keep the bus bar voltage constant; when No 1 generator operates at a lower lagging power factor, then No2 generator operates at a higher power factor to keep system voltage within limits.

In the last stage, No 2 generator operates at a 'leading power factor', as a leading power factor current aids to enhancement of flux. Thus No 2 generator 'reverse powers' with respect to Kilo Volt Ampere (KVAr) but this will not cause the reverse power trip to act (reverse power trip will act only in case of negative KW). In this condition No 1 generator supplies a large current causing it to overheat. Also a wattles current circulates

Continued on next page

Continued from page 6

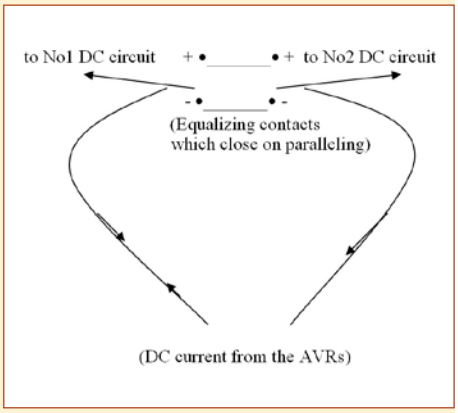
between the two generator stator windings.

This phenomenon can be caused by:

- Excitation circuit problems due to bad slip ring and brush contact.
- Discontinuity in the excitation circuit.
- Rectifier problems in brushless generators.
- Mismatch of AVRs.
- Open circuit of equalizer connection of DC excitation circuit.

I want to recall my personal experience on the 'open circuit of equalizer connection of DC excitation circuit' during my sailing days.

In this ship there is an equalizer contactor which also closes in synchronism with the Main Circuit Breaker (MCB) at the time of paralleling to enable both the DC excitation circuits to be coupled ie, the + and – of the two DC excitation circuits are connected via the equalizing contacts as shown:



It was found that the equalizer contactor was broken and the respective + and – contacts became free leading them to float and inject unequal DC currents into each generator excitation windings. The phenomenon as discussed was created causing both the generators to run at abnormal power factors and stator currents.

The watch keepers were not aware of such a situation and hence nobody bothered to check the ammeters and the power factor meters. In this case No 1 generator power factor meter was showing a very low lagging power factor while No 2 generator was showing a leading power factor. Also both the generators were operating with wide difference in the value of currents.

A Brief Introduction to Liquefied Gas Carriers

Sajal Sengupta
R & D Department
SIMS, Lonavala

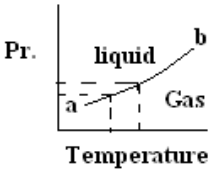
Liquefied gas tankers have their unique cargo properties & construction feature that set them apart from other classes of ships & other categories of hazardous cargoes.

Liquefied gas transportation:

A liquefied gas is a substance that at ambient pressure & temperature is a gas but which, in order to store or transport economically to a much reduced volume, is liquefied by application of pressure or by cooling or by a combination of both.

IMO adopted following definition of liquefied gas carried by sea: "Liquid with a vapor pressure exceeding 2.8 bar absolute at a temperature of 37.8° C".

Fig. shown below, indicates the pressure-temperature relation of liquefied gas cargo. Line a-b is saturation curve of liquid & gaseous-vapor. For example, if liquid-cargo temperature increases (say ship sailing in tropical region) the pressure in the tank should be increased so that cargo remains in its liquid state.



Structural strength:

Since cargo tanks are subjected to high pressure or low temperature, the structure must resist impact damage, or be flexible & able to distort without rupture. More importantly tanks should be independent of ship's hull structure & need to be protectively located within ship's structure above double bottom & inboard of outer hull. These ships are exceptionally resistant to grounding & collision. Furthermore, ballast water should neither be stored in empty cargo tanks nor in a compartment adjacent to cargo tank. Although ballast water are spaced in double bottom or in double hull that gives an exceptional reserve of buoyancy in damaged condition.

Flammability of gas cargo:

With all liquids, the surface temperature of liquid determines the absolute pressure exerted by its vapor in immediate contact with liquid. Transported liquefied gases fall into two categories. Liquefied gases which produce flammable vapor when mixed with air (e.g. hydrocarbons, butane, propane, ethylene, Liquefied Natural Gas (LNG)) and in the other vapors are either flammable, toxic or both (e.g. Ammonia, Vinyl Chloride Monomer (VCM), Methyl chloride).

In all method of carriage, cargo is stored above atmospheric pressure with ullage spaces only cargo vapors. Void spaces surrounding the cargo containments are automatically monitored for any vapor leakages, many times filled with dry inert gases. Thus prospects of an explosion of flammable gas are rare. Because of their rapid & complete evaporation at ambient temperature & pressure, generally no threat of any water pollution.

Liquefied gases are transported by sea under following conditions:

a. Fully pressurized - Under pressure but at ambient temperature
b. Refrigerated, semi-pressurized - Under some pressure but below ambient temperature.
c. Fully refrigerated - Slightly above atmospheric pressure & below ambient temperature.
d. Liquefied natural gas (LNG) – Slightly above atmospheric pressure & insulated at cryogenic temperature i.e. cooled to -163°C.
e. Note a), b), c) are categorized under liquefied petroleum gas (LPG).

Fully pressurized ship:

These ships are fitted with independent type C tanks. Tanks are designed to accept a cargo working pressure (say up to 20bar) at highest temperature encountered in the area of trading. Tanks may be spherical, cylindrical or lobbed type. Cargo Capacity varies from 2500m3 to 8000m3. These tanks cannot withstand sub zero temperature. So they are fitted with cargo heater, which is used while loading from fully refrigerated vessel. These ships do not require secondary barrier *(refer fig 1, page 8)*.

Refrigerated semi-pressurized ship:

These ships are also fitted with independent type C tanks. Cargo is stored in cylindrical tanks up to a pressure of 7 bar and temperature of up to -48°C. Tanks are also

Continued

insulated to minimize heat input to cargo *(refer fig 2)*. The required cargo temperature of cargo is maintained by vaporization which is re-liquefied & returned to cargo tanks. Cargo tank capacity up to 15000 m3. Special grade steel is used. Because of its design, these ships can load or discharge from fully pressurized or fully refrigerated vessel. These ships do not require secondary barrier.

All ethylene carrier ship (with tanks designed to withstand -103°C) is also referred as refrigerated -semi pressurized ships. These ships are provided with thermally insulated tanks and high capacity reliquefaction plant (cascade type)

Fully-refrigerated LPG ship:

They are large ship of 5000 m3 to 100,000m3. Cargo carried at near ambient pressure & down to -500°C. Tanks are free standing prismatic type A & constructed of special low temperature resistance steel. Tank surrounding structure is also made of special grade steel that acts as a secondary barrier in case of any leak from primary containment *(refer fig 3)*. The tanks are independent of the ship structure and are resting on chokes. Anti rolling, anti pitching chocks are provided in inerter barrier space to restrict the movement of the cargo tank. Cargo tank pressure & temperature are maintained by re-liquefaction plant. **SIMS Lonavala** has made an IGTS (integrated gas tanker simulator) of a fully refrigerated ship.

LNG carrier:

Basically carry liquefied methane product. Cargo capacity ranges from 25,000 m3 to 200,000 m3. Roughly a liquefied natural gas (specific gravity =0.45) takes up 1/600th volume of its gaseous state. Tanks may be free standing spherical or prismatic or membrane type & with some limited pressure range capability. The spherical tanks (Kvaerner Moss – independent type B) requires only partial secondary barrier and they undergo complete stress analysis. A drip tray is provided around the tank to contain any leakage.

For membrane type of ship, two membranes are provided. One is called primary membrane (made of stainless steel or nickel-steel -'invar' with thickness 0.7mm~1.2mm) & secondary membrane (made of invar or glass-aluminum-glass-'triplex').

Primary membrane holds cargo & secondary prevents leakage (if any). Two layers of insulation made of plywood filled with perlite (volcano rock) fitted between primary & secondary membranes & between inner hull & secondary membrane to maintain cargo temperature at -163°C *(Refer fig 4 & 5)*. Watertight inner hull supports the tank.

LNG boil-off gas (BOG) gives off about 0.10% to 0.15% by volume per day. Existing LNG carrier do not re-liquefy BOG. This gas is used as a fuel for boiler. A controlled venting of gases is used in case of excessive pressure in the tank. However natural gas vapour once warmed above -110°C, are lighter than air & very quickly dispersed in to air. The pressure and temperature inside the tank is controlled by controlling the boil off extraction.

Safety record of gas carriers:

A gas carrier is often portrayed in the media as a potential floating bomb but accident statistics proves it quite contrary. As per experts, in reality, the sealed nature of liquefied gas cargoes completely segregated from oxygen or air virtually excludes any possibility of a tank explosion. In spite of the fact that these ships tend to be the regular target of special inspections by various authorities, the truth is that serious accidents related to gas carrier cargoes have been few. In fact, the safety record of these type of vessels is acknowledged as an industry leader. An illustration of the robustness of such a vessel could be found when Gas carrier Gaz Fountain was hit by rockets in the first Gulf war, and despite penetration of the containment system with huge jet fires, the fires were successfully extinguished and the ship was salvaged together with most cargo on board.

During casualties few recommendations are: a) In case of fire, suppress all re-ignition sources, use fire extinguishing systems & establish a 5 km exclusion zone around the vessel to have protection from flammable & toxic cargo gas. b) Tow the vessel to a safe shelter place.

Development in liquefied-gas carriers:

Sloshing (movement of liquid cargo) in the tank involves complicated physical phenomenon such as sloshing wave breaking, phase transition between liquid & gas during impact, gas entrapment, cushioning effect due to corrugation etc. More general structural arrangements need to be considered near the free surface since sloshing causes a very high peak pressure over a small area or an average pressure over a large area. Plans can be made to fit on board equipment for real time measure or indication of sloshing. A number of sloshing risk diagrams can be prepared to indicate when more severe sloshing activity is likely for various filling levels. Few of new technologies involved in LNG carries (all are in operation) are use of steam turbine propulsion system, dual fuel diesel engine with electric motor propulsion, new cargo containment systems, LNG FPSO (Floating Production Storage & Offloading), LNG FSRU (Floating Storage & Regasification unit), reliquification plants etc.

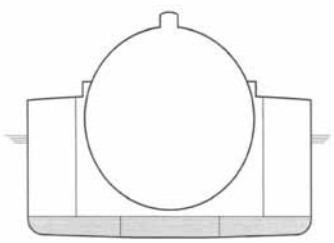


fig 1. Fully pressurized (Spherical tank)

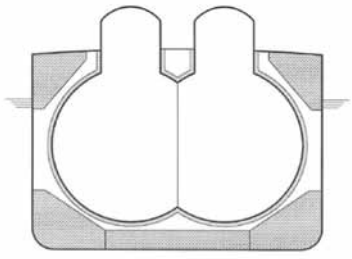


fig 2. Semi pressurized tanker

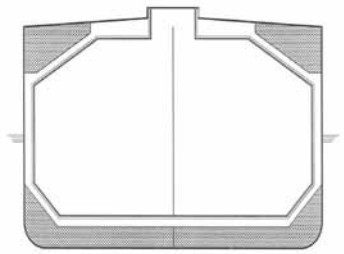


fig 3. Fully refrigerated (Prismatic tank)

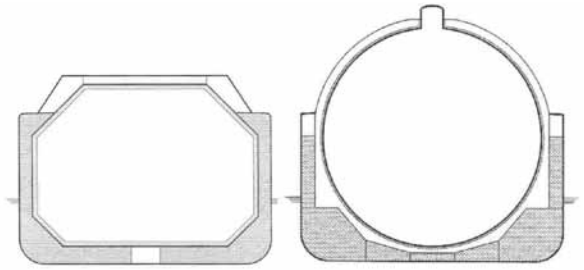


fig 4. LNG carriers (Prismatic & spherical)

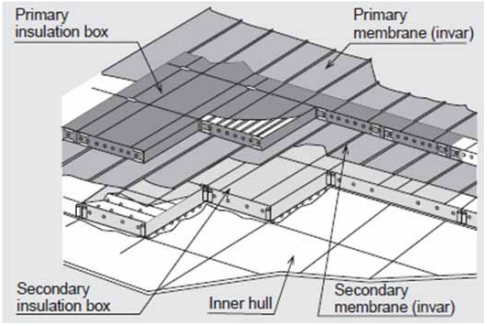


fig 5. Insulation system of a LNG tanker

First Trip:
Launching a Career at Sea

Capt. Olaf Olsen, Advisory Consultant SIMS, Lonavala

A long time ago, 51 years to be exact, I joined my first ship, a 26500 dwt 'supertanker' and a leading ship of the oil transport industry. In those days many young deck men joined ships for anything between one and two year voyages, generally far from home, either as junior deck hands or, as in my case, as an indentured deck apprentice to a ship master of the ship. Indentures then transferred from one ship master to another during a four year apprenticeship towards studying for a second mate's 'ticket'- with no intervening college time and only one thousand dollars pay for the four years!

First impressions and memories from that experience live for ever, the great number of them being happy and fulfilling, however there is one memory of a shocking and very sad incident that resulted in the passing of a substantial number of fine seafarers in a sister ship of the one I was sailing in. It was one of those 'milestone' points in the history of oil tankers and it is with an intention of explanation that this article is written.

The story had started prior to my first trip when a fleet of World War 2 oil tankers built in the US, the ubiquitous T2 and T3 fleet, was progressively being replaced by new and larger ships. The scale of this replacement was of such an extent that 26500 tons deadweight was a quantum leap and four ships of that size were built for an American consortium called Standard Vacuum Transportation Co. Ltd., registered in London UK, with whom I became employed. The fleet operating area was within the quadrant of the Middle East Gulf, India, Far East, Australasia and South Africa.

This did mean many Indian Ocean, China Sea, Western Pacific and even Southern Ocean voyages. My introduction was to a very common 'ferry' trade of crude oil from the Gulf to the Bombay Butcher Island oil terminal. It was on this trade that the incident I refer to happened to the sister ship of my own.

Oil tankers in those days all shared some common features such as uncoated tanks, prone to severe rust corrosion due to the repeated operation of oil content one way, followed by tank washing and ballasting with chlorine laden salt water on the return leg. Another and central feature to this story was the positioning of the deck officer accommodation in a superstructure out on deck, just forward of the midships port and starboard cargo manifold connections.

The incident occurred to a British flag tanker named 'Stanvac Japan' with British officers and Indian crew, having carried crude oil to Bombay and having just sailed out on a return ballast leg back to the Gulf for another load.

It was normal for the crew to do some water tank washing with portable 'Butterworth' machines. (this was long before crude oil washing became normal). The story continues as an afternoon period when most off duty were catching up with some sleep, while the watch officers were on the bridge or in the engine room and the crew got on with tank washing in a tank immediately below the mid-ship house.

Suddenly a major ignition and resultant explosion took place. The force of the explosion lifted the mid-ship house off the deck and ripped open the deck plating forward and aft like a banana peel. Two photographs that I took, one on board my own ship and one on board the incident ship when the hulk had been towed back to Bombay Harbour, are attached. From these the mid-ship house can be seen in place and the scale of destruction can be seen in the latter.

Sister ship of M.T Stanvac Japan

M.T Stanvac Japan after the incident

This event traumatized many. It also crystallized the industry to discover the cause. My ship carried a company chemist and technician for a long period; this was with the intention of observing, analysing and reporting on operations and also resulted in a major development of a document that was known as the 'Tanker safety Guide' and in time became a large component of the 'International Safety Guide for Oil Tankers and Terminals – ISGOTT.

The cause? Well it took a while with many possible ideas coming into the picture and then falling by the wayside with investigation. But one point did keep coming back and that was the fact that oil tanker bare steel tanks had been fitted with magnesium metal anodes. These were fitted as sacrificial corrosion points within the electrolytic field built up in a tank during salt water ballast containment and in tank washing.

It had been noted that occasionally these large 500 x 300 mm globes of magnesium had been 'washed' off their anchorage points in the deckheads of the tanks, then fallen down onto a water wet empty tank bottom, and by compression with iron oxide rust, had converted to a magnesium oxide surface auto igniting in open air non inerted tanks.

Although reducing oxygen by tank inerting was a known safety factor, the world's fleet had not yet gone that distance. Another factor was that during World War Two, magnesium oxide had been used as a component of incendiary bombs and it seems nobody had realized we had these inside our tanks!

The incident wasn't unique. A review of incendive metal hazards took place where magnesium and aluminum were identified as dangerous when in the presence of rusted steel iron oxide.

As in most industries it took a few more incidents to realize that things had to change and a world wide refitting of non incendive zinc metal anodes followed – a focus for the paint industry to formulate and follow up with zinc based tank coatings in coincidence with the introduction of the early 'chemships' carrying vegetable and solvent oils.

As to the mid-ship house accommodation, it was clearly not such a safe place to live, with air conditioner not yet fitted in ships, often with open portholes for ventilation and with cigarette smoking taking place, indeed the 'Officer Smoke Room' was in the middle of that superstructure!

In further coincidence, centrifugal pump gravity feed , larger and longer flexi hull design, and reduction in ship complement numbers were all driving factors towards the 'all aft' tanker bringing the deck officers off the cargo deck and into the after superstructure.

What a change. The fact that the photographs I have shown were taken only three months after going to sea has meant a career long interest in hazardous cargo transport of all and any of the nine classes recognized at the United Nations and in the IMO International Maritime Dangerous Goods Code, three of which we most often come across as oil, gas and chemical liquids.

However, back to the beginning, the Stanvac Japan explosion has always meant a heart felt sorrow for those who lost their lives, and for their families and friends. It is therefore with that last word that this article closes.

Reduced Voltage Starting of Motors (Star-Delta):

Demystifying an Electric Motor

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It would make a world of good to all of us marine engineers if all the motors located throughout the ship were the same configuration whether Direct On Line (DOL) or Reduced Voltage. The connections and the methods of starting coupled with application specifications only complicate the matter further. Let us try to detangle the subject by studying these methods in a little clarity.

Across the line (Full Voltage) starting of a motor is the most economical, simple to configure and diagnose, besides being easy for maintenance. However, the starting current drawn by the motor falls between four to eight times the Full Load Current (FLC). This is acceptable as long as the voltage dip is not more than 10-15% within the run up period. For higher hp motors voltage dip will fall into the unacceptable percentage thereby affecting the consumers. The problem is further compounded by the running motors drawing additional current (Reduced V X Increased I) to maintain the power output. Such a situation if persists for some time will only cause a blackout.

It is for this reason that large motors (not all of them) are put on reduced voltage starting so as to correspondingly reduce the starting current drawn by them. This can be achieved by having a Star-Delta starter, Auto-transformer starter or a Soft Starter. We will discuss the Star-Delta starting method of motors here through appropriate data.

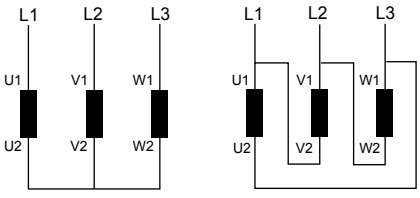

Fig.1. (a) Star Connection (b) Delta Connection

In Star Delta starting, the motor is run with the stator windings connected as Star initially and then changed over to Delta connection as shown above. The changeover is affected once the motor reaches 80% revolution per minute (rpm) (approx) as at this time there is not much of difference in current drawn in Star and Delta as shown

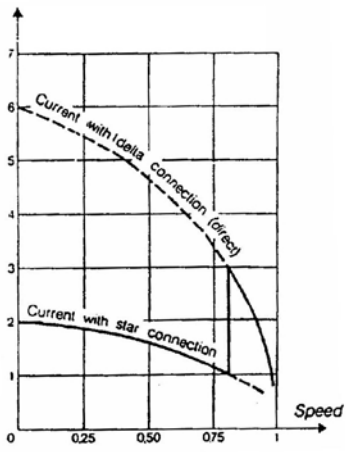

Fig.2. Switchover from Star to Delta

Let's consider an example motor: 120kW, 4 Pole, 380 Volt, Delta connected, 3 Phase, 50 Hz.

Comparison of motor parameters in Star and Delta:

Parameter	Unit	Delta Connected		Star Connected	
		Full Load	Starting	Full Load	Starting
Power	KW	120	98	120	33
Voltage	VA	380	380	380	380
Current	A	205	1495	212	500
Torque	Nm	769	1038	780	343

It clearly highlights the requirement of having Star-Delta starters for the motors. The starting power is reduced from 98 kW to 33 kW (by approximately 67%), the starting current is reduced from 1495 A to 500 A (by approximately 67%).

What is also prominent is the starting torque which has been reduced from 1038 Nm to 343 Nm (by approximately 67%).

The reason for these 67% changes becomes clear when we examine the phase voltage on the motor, we see that the phase voltage when the motor is connected in Delta is 380 Volt. When the motor is however connected in Star, the Phase Voltage will be 219.3 Volt. This is due to the following relation of Voltage and Current in Star and Delta connections.

	Star	Delta
Voltage	VLine = √3 X VPhase	VLine = VPhase
Current	ILine = IPhase	ILine = √3 X IPhase

The voltage is reduced by a factor of √3 in Star and therefore the current. This saves a lot of cost as the electrical equipment such as the cables, switchgear, fuses are all rated for the current and a reduced current contributes in positive way. The benefit however cannot be applied across all the motors. This is due to the fact that the torque as seen in the comparison table is reduced from 1038 Nm to 343 Nm. While this substantial reduction may not affect some motors (with good motor accelerating torque), a few others can get heated up or might even stall (with load torque higher than the motor torque).

Reduced voltage starters can only be used where low starting torque is acceptable or a means exists to remove the load from the motor or application before it is stopped.

Standard induction motors started direct-on-line are capable of driving most loads quickly up to speed without excessive voltage dip on the supply. For very large, high inertia loads the heavy surge current and long run-up time may result in unacceptable voltage dip. Reduced voltage starting cannot be used because the loss of starting torque will prevent the motor from starting the high inertia load. The problem is further compounded if alternator capacity is limited.

Special high torque, low current motors such as the double-cage induction motor and the slip ring induction motors are used for such applications.

Bunker, How Much is Safe Margin?

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Voyage bunker planning is one of the most critical jobs undertaken by a Chief Engineer in ensuring safe and efficient operation of a vessel. It is done upon receipt of new voyage orders from the charterers and basis information provided by the master/ navigating officers on the distances and estimated port stays in the forthcoming voyage to make the estimate as realistic as possible. In the event of a long ocean passage sufficient reserve bunker needs to be kept, which is usually in accordance with the charterers/owners requirements. At the same time the unpumpable quantities as residue on tanks are also taken into account. On occasions, internal transfer may need to be done to get the tanks emptied for maximizing the bunker intake. Finally an estimate is made basis above and previous voyages experience. Here is an interestingly account as recalled by Nautical faculty member Capt. Pada during his sailing days which depicts an interesting scenario that transpired during a voyage.

This incident took place during a trans Pacific voyage.

Ship type: Product tanker
DWT: 35500T
Maximum FO bunker capacity 1350 cubic mtr,
FO bunker tank capacities

1P - 400 CUBIC
1S - 350 CUBIC
2P - 300 CUBIC
2S - 300 CUBIC
TOTAL 1350 CUBIC

Ship's laden speed 14.0 Kts with 33 Mt FO consumption/ day including aux engine. For Cargo heating, 9 MT/day, to raise temp by 4 deg c for full cargo capacity. Also had 60 MT of Gas oil which is mainly used for inert gas generator.

It happened like this:

Vessel transited Panama canal after previous discharge in US Gulf and was ordered to proceed to Pisco, Peru for loading naphtha, as per charter party, discharge range was from US gulf to Japan and was asked to give maximum bunker intake at La Libertad, Ecuador, enroute to Pisco, Peru.

Existing bunker position prior bunkering at La Libertad, as below:

Ship was having full bunker in 2S and about 30 cubic metres in 2P total about 300 MT. Due to company's bunkering guidelines which clearly stated "Not to comingle bunkers of different ports". Bunker guideline also mentioned to start consumption only after analysis report is received from DNV.

Intake was calculated basis 1p+1s = 750 cubic = about 650 MT .Also allowing for maximum volume limit each tank can take as per various guide lines.

It was also made clear to vessel by charterers that no bunker is available at Pisco, Load port. and to make intake maximum. Vessel took 600 MT only ,leaving "2 stbd tank" almost empty since it had previous bunker(quantity 30 MT.) After bunkering 600 MT at La Libertad, vessel proceeded to Pisco for loading.

Then the crucial message comes:

On arriving Pisco, discharge order came from charterers declaring discharge port as Chiba, Tokyo bay, Japan. Distance from Pisco to Chiba by great circle route is about 8500 miles, At 14 kts Charter Party laden speed ,number of days of sea steaming = 25.3 days and bunker consumption at 33 MT/day = 834 MT.Vessel had about 940 MT of FO on departure Pisco. About 106 Mt FO as reserve , just sufficient for 3 days, and ship had to cross Pacific ocean.

A scheduled ship's "command change" was effected at Pisco and old master signed off from same port.

Voyage begins:

As the new master was studying the bunker scenario, ship completed loading and sailed for Chiba.

Weather routing company was employed by charterers, for optimum sailing criterions. Their recommended route was "Rhumb line sailing" to South of Hawaii island and then great circle sailing to Tokyo bay, This increased passage distance by 100 miles making bunker position critical.

During first few days, weather was good ,current favorable and ship did about 15 Knots (kts). After crossing equator, from latitude of 15 deg North, wind and current changed and now ship's speed dropped to 13 kts. As days passed, things started looking gloomy and master notified owners and charterers about the situation.

Squabbles among various stakeholders:

With only about 3 days reserve bunkers, decision to cross pacific was questioned by owners & charterers. Everybody was praying for good weather and good speed for the ship which would avoid lot of unpleasant events.

The chaos starts:

To ship's bad luck ,her main engine started giving problem, fuel oil pressure was not building up to the required level from purifier and engine was slowing down automatically to "slow ahead" speed, It took about 3 days to rectify this problem.

Now it was clear that vessel can not reach Chiba without bunkering enroute. There was only one port where bunkering could be done, Honolulu (Hawaii).

Decision was taken to call Honolulu for bunkering and agent was appointed. The news what we received from Honolulu agents was not all that encouraging. Agent said that there is only one bunker barge available at Honolulu port with a small quantity of bunkers FO (About 400 MT).After this quantity is emptied bunker barge is due for a scheduled dry docking and there will not be any bunker available for 10-15 days.

Ship made deviation to Honolulu. Since the original passage was taking close to south of Honolulu, ship had to do only about 100 miles extra. Vessel arrived one evening ,all port procedures were done and waited for bunker barge.

At Honolulu port , barge will come outside and supply bunker only if sea/swell is low, which is not the case there 360 days a year. So one day was spent, waiting bunker barge and barge never came outside due to swell.

Blame game continued and neither the owners nor the charterers made any decision to berth the ship. Next day another urgent message came from agents saying that if ship does not take bunker this day, barge will deliver existing bunker to another vessel which is expected in the evening and then our vessel had to wait for 2weeks for next supply. Then both owners and charterers instructed agents to berth the ship and supply 400 Metric Tonnes (MT) of bunkers immediately.

Ship berthed in the evening, took bunkers at berth and sailed to her original des-

Continued

tination Chiba, in just about 6 hours.

"Lows and cold fronts"

From Hawaii to Tokyo bay, in latitudes of higher than 30 deg north, sea and swell picked up due to "low pressure and cold fronts" and speed dropped further.

Vessel arrives Tokyo Bay pilot station:

Finally when the ship arrived Tokyo bay pilot station, ROB FO was 400 MT, exact quantity that was taken at Honolulu which means, if ship had not bunkered at Honolulu, then ROB would have been nil on arrival.

For any worse weather condition which is common in this area, the situation would have become "GRAVE".

"if ship had not bunkered at Honolulu, then in a worst possible scenario, tug would have to be employed , for towing her in to port. Following points were analysed:

- Bunker intake at La libertad was calculated excluding the tank 2 P which had about 30 MT of previous FO to avoid comingling. At this point we can say Chief engr in consultation with master and office, should have taken full in that tank ,comingling with previous FO. It is always better to have" comingled bunker" rather than not having any bunker at all.
- Master also took a chance from charterers "voyage fixture message" which was received after Panama transit, where the discharge range was given from US-Gulf to Japan. Since the vessel was on US Gulf run for previous 4 months, he took it for granted that ship would not perform a transpacific voyage and hence did not put this issue before owners/charterers.
- Also no weightage was given to the "Safe margin " of bunker ROB before sailing for ocean passage which should be at least 25%-30% of bunker required for normal voyage distance.
- Ship's command was changed at Pisco and new master should not have sailed out under no circumstances without having sufficient bunker to cross pacific even if it meant to call another port near Pisco after loading.

After arriving Honolulu, one day was lost by not taking firm decision to berth vessel by both parties involved, (owners and charterers).

The Chief Engineer was signed off from the ship in line with company's "Just Culture". A case is still in progress for claim of US$ 125000/ by charters from owners for this "miscalculation" of master/Chief engineer and "owners office" and subsequent events that resulted in commercial loss to charterers.

Here's an interesting debate open for all our learned readers and budding mariners and we welcome any suggestions/comments/advice on the case. Some of the questions that could be pondered over are as follows:

- What part did the charterer play in the above incident ?
- What part did the vessel/owners play in the above scenario ?
- Action taken was to remove the CE – what possible role could he have played to deserve this treatment ?
- On hindsight what should the CE have done to prevent this outcome ?
- Who should be liable in the above scenario for the additional costs involved – owners or charterers ?
- What role could the charterers and/ or managers (owners) have played in preventing the incident ?
- What factors should the CE in general take into consideration when requesting for bunkers in similar situations ?
- What percentage of bunker commingling can be considered safe ?
- What should be the safe margin for bunkers when vessel sails on a cross ocean sea passage ?

Responses for Accidental Fall in Forepeak Tank: Issue 07 (Oct 2009)

Readers were invited to give their responses to the causes and lessons learnt through the previous Case Study - Accidental Fall in Forepeak Tank by Capt. Sunyil Pada, Nautical Faculty from SIMS, Lonavala. Here is a compilation of the responses received...

Capt. Rakesh Pradhan, Nautical Faculty/ DLP Administrator, SIMS, Lonavala wrote:

In my opinion, the entire exercise of sending the Chief Officer and 2nd Engineer to the Fore Peak tank was unnecessary since the author has mentioned that the amount of ballast to be taken was small and hence fire hoses were used when it was found that the valve spindle was broken.

If a vessel is approaching a pilot station, I would prefer the Chief Officer to be at Forward stations and the 2nd Engineer to be in the Engine room!

Some of the basic points which I feel were missed out have been listed below:

- Illumination inside the tank was bound to be poor since fire hoses were being used to ballast the tank and there was bound to be some spray. To add to the problem, 2nd Engineer was not even carrying a flashlight!
- Surfaces inside the tank were bound to be slippery with the water spraying and possible sediments from previous ballast carried.
- It should have been considered that 2nd Engineer would not be familiar with the tank layout of ballast tanks and Chief Officer should have guided the 2nd Engineer at every stage of the process.
- Considering above two conditions, both the persons entering the tank should have worn a safety harness to arrest any slip/fall in the tank.
- Rescue procedures of a casualty from ballast tanks were obviously not considered/ practiced as the crew members were unable to hoist up the 2nd Engineer with a stretcher.
- No mention of proper filling out of an 'Enclosed Space Permit' is written in the article. Some of the lapses could have been corrected with the permit.

2nd Engineer should indeed consider himself extremely lucky to escape the incident with minor injuries!

On a personal note, a similar incident was narrowly avoided on one of my ships which highlights the importance of illumination and familiarization with the work area.

I was Chief Officer on a Forest Products Carrier and we were carrying cargo of bales of Paper pulp. It was a standard procedure to inspect the holds throughout the voyage and check the tightness of the rubber airbags which were used for chocking of the cargo. I always insisted on total of at least 4 cargo clusters in each hold, at least 2 from each of the entrances to the hold (one fwd, one aft). In one of the holds, there was an unnoticed gap between 2 rows of the bales and one of the O.S. (ordinary seaman) on his first ship was heading for it when the A.B. (Able Seaman) who was an experienced hand on these ships/cargo, spotted the gap and instructed the O.S. accordingly. A major accident was thus avoided as the fall would have been from a height of about 12 meters!

Application of 'CAE' in Marine Field

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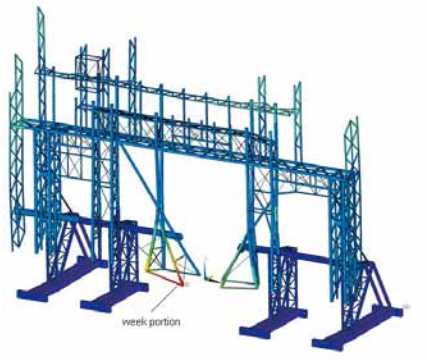
Computer Aided Engineering, popularly known as CAE, is the most powerful computational simulation tool, widely used in all streams of the engineering field. CAE tools are used to analyze the robustness of component, optimization of the product and performance of the individual component and the entire product. CAE tool helps in reducing the total product lifecycle management (PLM), by providing information to help the design team in decision making, by reducing the number of physical prototypes and testing of prototypes. This ultimately reduces the cost of the product, improves the quality of product, enhancing the safety, durability and comfort of the product and most importantly reduces the product development time to sustain in highly competitive business world.

CAE plays important role in virtually all engineering fields like aerospace, automotive, oil and gas, environmental, healthcare, civil engineering, power generation and in marine and offshore field.

In marine and offshore field, CAE covers both structural analysis and the fluid analysis. The structural analysis is done with the help of Finite Element Analysis, popularly known as FEA, while the fluid analysis is done by Computational Fluid Dynamics, generally known as CFD.

With the help of FEA tool, naval architects and design engineers, simulate the ship's structure and offshore structure. At design phase itself, simulating ship structure and offshore structure under stormy and extreme stresses, decreases risk and delivers greater structural integrity. FEA tools provide stresses generated within the structure, maximum deflection of the structure, modal analysis of the structure and most importantly the forced dynamic response.

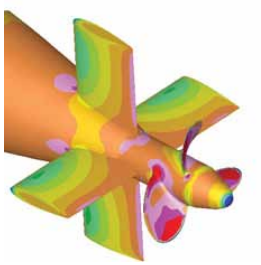
The below picture showing the offshore structure and the red colored zone in that indicates the maximum stresses are going to develop in that region. The designers redesign the structure so that the structure should withstand the load on that. Thus the FEA gives warnings to the engineers in initial phase of product development, reducing the risk of failure, enhancing the safety, minimizing the cost of physical prototyping with minimum time frame.



Similar to FEA, CFD tool is used to study and analyze the fluid flow pattern around the ship structure. This study mainly used to analyze the flow pattern and minimize the drag forces on the outer hull structure, analyze the unsteady flow behind the propeller to decrease noise, vibrations, and most importantly decrease the energy requirement.

With the help of FEA and CFD, design engineers and navel architect study the behaviour of ship by simulating effect of rough sea condition ultimately enhance the stability of the ship.

The below figure showing the stresses developed on the blades of propeller. The stresses are developed due to the rotation of the blade in sea water. The fluid forces acting on blade will develop the stresses on blade. The fatigue life of the blade can also be calculated with the FEA software.

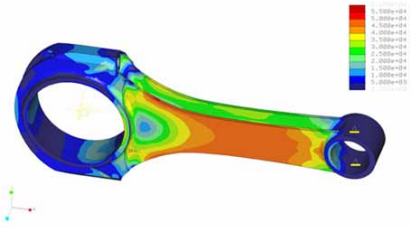


As we all know marine engineering is the hydro-mechanical engineering. The basic definition of ship is the vessel floating on water and driven by mechanical means such as Internal Combustion IC engine as far as merchant navy ships are concerned. Other than hull structure of the ship, rest of all the parts comes under mechanical domain. Different equipments and machinery such as main engine, propulsion equipments, deck equipments such as anchors & anchor chains, crane, air compressors, boilers and many more are installed on the ship for various applications.

The application of CAE is extended to design and optimise of all the equipments and machinery to reduce the weight of the machinery and enhance the life of the equipment.

The main engine components such as crank shaft housing, the crank shaft, the engine block, connecting rod, piston, and engine head all are analyzed with the help of CAE software. These equipments are always under tremendous forces, extreme thermal conditions, with lot of vibrations. So, designing these components is the real challenge for the design engineers. With the help of FEA we can find out the maximum stressed region in the engine component and redesign the component and again check the stress level till all the design criteria are satisfied. Thus making of costly physical prototype with setting huge testing facility with expensive instrumentations, all these steps are to be reduced with the help of Finite Element Analysis. Most importantly, the product development time is reduced with huge margin.

The below figure depicts the stresses developed in the connecting rod. With this stress data, designer changes the dimensions of the component and again analyzes the component. The area where the stresses developed are very low, the material is removed from that region to reduce the unnecessary weight without compromising the functionality of the component.



The CAE software is used in the boilers and heat exchangers to study the thermal properties such as heat transfer rate, the temperature distribution, the pressure drop, the fluid flow in the thermal equipments. This software also provides the thermal stresses developed on components of thermal system. CAE helps in increasing the efficiency of the thermal equipments, enhancing the life of the equipment by modifying the heat transfer area, changing material, and using the insulating material.

The burning of fuel in boiler is the chemical process which produces heat energy with ash carryovers, NOx, CO as bi-product. If the combustion process i.e. mixing of fuel oil with oxygen is more and more

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The Melting Earth

It was December 2006, an island called Lohachara, in the Sundarban at the confluence of the Ganges and the Brahmaputra River was found to have vanished in the geographical map and failed to show up in the satellite images. About 10,000 inhabitants of the island were forced to relocate to neighbouring island called Safar which itself lost 7500 acres of its land to the surrounding sea.

The fate of more low lying islands like Lohachara in all over the planet are in the process of being sealed forever. That include cities such as South Pacific Island of Tuvalu, Venice, the Marshall islands, the Maldives, Indonesian islands, Philippines and the list continues.

The Organization for Economic Co-operation and Development, an international organization with 30 member countries, including the United States, recently released a report listing the 10 cities with the highest risk from flooding right now. They are Mumbai, Guangzhou, Shanghai, Miami, Ho Chi Minh City, Calcutta, greater New York City, Osaka-Kobe, Alexandria and New Orleans. Pretty scary indeed!

Why do we lose land to flooding?

The rising level of sea is not a fantasy. Scientists have been doing extensive research on the ice and the snow covering various parts of the earth. Ice in the sea and the land makes almost 15% of the earth's surface. Greenland holding 12% of land ice, followed by East and West Antarctica containing 87 per cent and Glaciers and ice caps containing 1 per cent. The current rate of the melting of ice sheets is rapidly increasing and scientists predict that a quarter of the ice sheets could melt by the year 2050. If these trends in fact are true then the world could have to deal with a rise in sea levels and world wide flooding.

What are the causes of this rapid melting?

Several greenhouse gases are responsible for global warming, and humans emit them in to the earth's atmosphere in a number of ways. Most come from the combustion of fossil fuels in cars, factories and electricity production. The gas responsible for the most warming is carbon dioxide, also called CO2. These gases trap heat within the earth's atmosphere and therefore cause melting of ice sheets due to the change in global temperatures.

What are the effects of the Melting ice sheets?

Global Warming which causes the melting of the ice sheets has numerous consequences on the earth. Some of the implications of Sea-ice loss are:

- Sea and atmospheric temperatures increase when ice melts and larger areas are left exposed to the sun so more energy is absorbed in to the ocean, causing further melting
- Stronger waves and winds are created due to loss of ice cover, this leads to coastal and shore erosion.
- There is a release of previously frozen arctic soils in the form of Methane gas and Carbon Dioxide in to the environment, leading to more environmental deterioration.
- Thawing of the soil could also produce a Thalik. This is a layer of unfrozen soil between a seasonally frozen layer above and an always frozen layer below. This layer which is unfrozen traps heat and increases the long term procedure of thaw and release of carbon dioxide.

Why Sea-Ice is important?

The below numbers show the relevance of preserving sea ice and ensuring that further damage to the ice sheets is reduced and stopped completely. Ice with snow has the lowest absorption rates. Whereas open oceans have dangerously high levels of absorption rates of the suns energy.

Ice with Snow:
Reflects 90% of sun's energy
Absorbs 10% of sun's energy
Bare Ice:
Reflects 50% of sun's energy
Absorbs 50% of sun's energy
Open Ocean:
Reflects 6% of sun's energy
Absorbs 94% of sun's energy

Preventions of further damage:

With the current trend in climate change and the growing concern over global warming, there is a role for every individual to play by minimizing the consumption and preserving the earth's resources for the future generations.

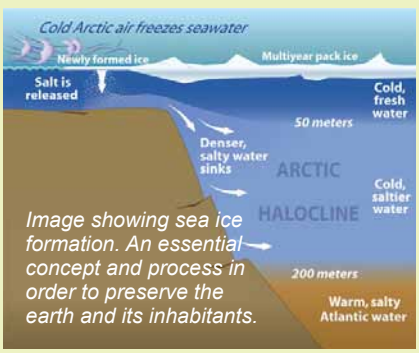
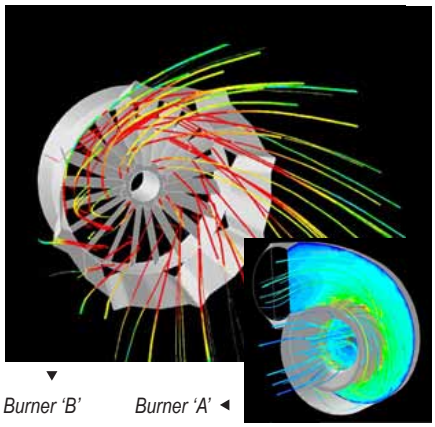


Image showing sea ice formation. An essential concept and process in order to preserve the earth and its inhabitants.

Continued from page 13

effective the amount of bi-product is less and less.


Burner 'B' *Burner 'A'*

The combustion of fuel and air is analyzed in both the burner "A" and "B". The CFD software is used to study the flow distribution of the fuel. In burner "A" the flow pattern is almost same and covering only particular area in boiler. Because of this, the combustion process is not effective and efficient as most of the fuel is exhausted unburned and thus increasing the amount of unburned carbon and nitrogen compounds. The designers changed the design (burner "B") to increase the throw area of the fuel. The swirling effect is provided to the fuel at the injection with providing the angled blades. The profile of circular blades is seen in Burner "B" which helped in atomization of fuel also. With such modification, the fuel burning process is enhanced and the amount of bi-product generated in reduced. Thus the efficiency of the burner is increased without performing the actual prototype and performing experiments.

FEA is used for NVH analysis. The NVH analysis means noise, vibration and harshness analysis of the component which is under unbalanced forces or moments. The study of behavior of air compressor installed on the ship comes under NVH analysis as the compressor is always under tremendous unbalanced forces. The compressor transmits its vibration to the skid on which it is mounted. The skid also experiences huge amount of vibrations. If the natural frequency of the assembly matches with this external frequency, the design fails due to resonance even though the design is safe under static and fatigue analysis.

The field of FEA and the application of FEA are touching new heights day by day. This powerful tool is playing very vital role in R&D and design departments in all types of industries and has become the main pillar in the industrial growth.

Inauguration of the Integrated Gas Tanker Simulator at SIMS, Lonavala

Guests arriving for the inauguration of The Integrated Gas Tanker Simulator

Chief Guest - Mr. John Ridgway, CEO, BP Shipping taking the salute before the Guard of Honour

Mr. John Ridgway unveiling the plaque

Mr. John Ridgway (left) - CEO, BP Shipping and Dr. Agnihotri (right) - Joint Director General of Shipping cutting the inauguration ribbon of the IGTS room

(from left to right) Mr. John Ridgway; Mr. J.K.M.Nair - Director Principal, SIMS Mumbai; Dr. Agnihotri and Mr. Vaisakh Chavan - faculty, SIMS Lonavala at the IGTS console

Mr. John Ridgway addressing the gathering

Gathering of guests, SIMS faculty and students at the SIMS auditorium

The Integrated Gas Tanker Simulator (IGTS)

BP CEO Mr. John Ridgway Applauds ESM & SIMS:

Offering High Standard of Services to BP

ESM (Executive Ship Management) and SIMS (Samundra Institute of Maritime Studies) is a winning combination and BP has been very pleased with the relationship built over last 6 years as ESM has "held up its side of the bargain with high standards", announced Mr. John Ridgway, CEO, BP Shipping who had officially inaugurated the latest training equipment **The Integrated Gas Tanker Simulator (IGTS)** at SIMS, Lonavala on 15th December, 2009.

Congratulating the institute and the team behind the project, Mr. Ridgway described it as another chapter in the ever visionary training modules and skill training of the institute. Mr. Ridgway dwelt on both "written and emotional" contract with Executive ship management and declared that officers provided by ESM are of the "highest international standards who while having safety as the first thing" also look after BP's assets efficiently. He further added that relationship and commitment have been both emotional and contractual with ESM and SIMS and they are a major contributor to the safe shipping operation of the BP group.

Earlier, Mr. Ridgway received guard of honour in a ceremonial parade by the cadets at the institute's parade ground for the occasion. Thereafter, he proceeded to the Gas Tanker facility in the campus to unveil the marble plaque in front of the gas tanker amidst great fanfare and festive mood surrounded by the congregation of invited distinguished guests of the marine industry from India and abroad, Mr. Ridgway along with Dr. S.B. Agnihotri, Joint Director General of DG Shipping, India later cut the ribbon to inaugurate the simulator of the project at the first floor of the adjacent Science building. They showed keen interest in the functioning of the innovative equipment – built with the in-house expertise and knowledge and which will go a long way in providing hands on gas tanker training integrated with computer simulation.

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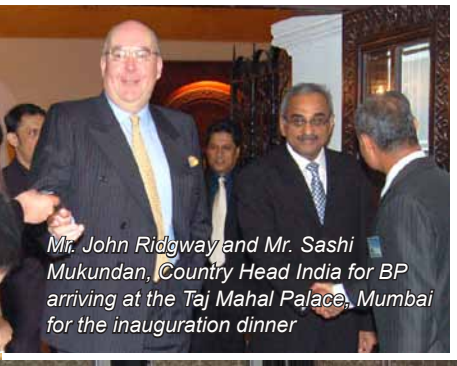
Guests touring IGTS room


Mr. John Ridgway lighting the lamp


Dr. Agnihotri lighting the lamp


Mr. Bjarne Tvilde - Chairman, ESM lighting the lamp


Mr. John Ridgway and Mr. Sashi Mukundan, Country Head India for BP arriving at the Taj Mahal Palace, Mumbai for the inauguration dinner


Capt. J. Uppal Dty (left) - Nautical Advisor and Capt. Rajeev Gupta (right) - GM, ESM Mumbai arriving at Taj


Capt. Krishnan - Faculty, SIMS and Mr. Oliver Beavon - the then Executive Assistant to CEO, BP Shipping at the party


Mr. John Harris (left) - Director of Isephus Inc., Mr. Siju George (center)- Accounts Manager, ESM and Mr. V.Chavan (right) - SIMS faculty at the party


Guests gathered for the evening function at the Taj Mahal Palace


Mr. John Ridgway acknowledging and awarding those involved in the IGTS project

Continued from page 16

Delivering his inaugural speech in the institute auditorium, Mr. Ridgway told the cadets that they have an obligation to take all they can from SIMS since SIMS not only provides academic training but also gives practical training “of the most important nature so that when you get out there you can carry on your task and you can be safe”.

Later, addressing the distinguished guests attending the evening party at the Crystal ball room of the Taj Mahal Palace and Towers Hotel, Mumbai, Mr. Ridgway once again recalled his association with ESM and SIMS with appreciation of the service provided by the duo as a “winning combination”. While congratulating the team for developing the integrated gas tanker simulator with all in-house expertise, he applauded the drive and ability of the team and the vision of Mr. B.S.Teeka behind its success. Talking about the success story of SIMS which had earlier developed a string of innovative facilities like Free fall Life boat, he mentioned the Ship-in-Campus as “one of the great wonders of the modern world as you come up over the top of the great mountains to see this ship in the middle of the mountains - is still stunning! Many of you probably used to it by now, but it’s a fantastic sight to see that people go to the effort to bother to do that”, he added.

Mr. Ridgway later handed over a token of appreciation to the members of the team behind the project headed by Mr. Vaisakh Chavan (Monty) on behalf of the management of ESM and SIMS.

In a lighthearted and humorous address to the gathering, Dr. S.B.Agnihotri, Joint Director General of Shipping applauded the ethos of ESM and SIMS in achieving great success in a most unlikely Indian fashion i.e. sticking to the highest form of professionalism and practicing what they preach and most importantly, displaying a great team work all along. Dr. Agnihotri who had visited the Lonavala campus in the morning praised the professionalism and high standards in developing institute policy and opined that other maritime institutes in the country should take this as an example for their growth. Dr. Agnihotri, opined that institutes like SIMS can assist many bright and deserving young men and women of the interior of the country close to the coastal region to come into maritime profession.

Earlier in the morning, in a written speech read out in his absence, Mr. B.S.Teeka, the Principal Trustee of SIMS and Managing Director of ESM said that the story of development of the IGTS is another fascinating story of the spirit of SIMS and ESM. We are extremely lucky to be able to nurture a group of extremely talented, creative and focused experts within ourselves whose eight months of labour is seen as the Integrated Gas Tanker Simulator. The project dwelt on entirely uncharted waters, conceived somewhat unrealistic targets, provided heart and soul to infuse logic into illogical expectations, don wings of imagination to put life into impetuous requirements. They creatively pulled in resources from scrap yards in Alang, picked brains of SIMS faculty and staff as well as the ESM technical team. At the end, what they have produced is nothing short of a marvelous piece of art and science and a symbol of SIMS spirit of dedication to innovative training. At the end it has also proved what the great scientist Einstein has said, “Innovation is not the product of logical thought, although the result is tied to logical structure.”

Emissions Regulations and Impact on Engine Performance: Winner of Fourth Prize for Technical Paper Competition by MERI, Kolkata

The shipping industry has been the bearer of the torch in the endeavour for growth and efficiency of trade, commerce and overall economy of the mankind all along.

Although the increase in commerce is required to sustain the quality of life that one has got accustomed to, it must be understood that all this comes at a cost, and disruption caused to environmental and the planet we live in.

This study which won fourth prize in the technical paper competition organized by Marine Engineering Research Institute (MERI) looks into the growing concern on the emissions of nitrogen and sulphur into the environment among the marine fraternity and environmentalists alike.

Emissions regulations and impact on engine performance:

The regulations on emissions should be accepted for worldwide trading and have internationally approved special areas such as ECA (emission control area) and Sulphur Emission Control Area (SECA), where inland waters and the environment call for further regulation, as is already seen with SECA in the Baltic Sea and North Sea in Europe today. Furthermore, it is very important that the regulations do not dictate which emission control methods should be used, but only specify the levels to be met. The goal of our research is that internal methods like Exhaust Gas Recirculation (EGR), White Film Evaporator (WFE), Scavenge Air Moisturising System (SAMS) and/or combinations of these will make our two-stroke engines ready for current and future International Maritime Organisation (IMO) regulations with regard to Nitrogen Oxide (NOx), without using Selective Catalytic Reduction (SCR) with agents such as urea or ammonia. Compared with SCR, which for many years has been considered the optimum solution for NOx reduction, the new methods have significant advantages that need to be further investigated and matured for the market. The SCR system is best suited for steady high-load conditions with limited use of fuel oil under defined conditions. Furthermore, SCR is suited for situations where practically all NOx has to be removed. SCR is less suited for low-load operation and manoeuvring in costal and harbor areas. IMO regulations give the permissible limits of emission of NOx which is acceptable. So engine manufacturers have to make engines which should be able to meet with the IMO criteria.

New Tier II and Tier III emissions regulations on engine performance:

The emissions regulations in Annex VI of MARPOL 73/78 have now been in force since 19 May 2005, retroactive for engines from 1 January 2000, referred to as the Tier I level. At the moment, a review process is progressing to revise the existing emissions regulations and the NOx Technical Code into a Tier II level. The regulations are of vital interest to the customers when discussing new orders to be delivered in the relevant time frame. The decisions on the new limits and regulations have been finalized at the BLG (Bulk, Liquid and Gas) meeting and been approved at the MEPC (Marine Environment Protection Committee) meeting.

Formation of NOx:

The major source of NOx production from nitrogen bearing fuels such as certain coals and oil, is the conversion of fuel bound nitrogen to NOx during combustion. During combustion, the nitrogen bound in the fuel is released as a free radical and ultimately forms free Nitrogen (N2), or Nitrus Oxide (NO).

Thermal NOx:

NOx is also formed through high temperature oxidation of the diatomic nitrogen found in combustion air. The formation rate is primarily a function of temperature and the residence time of nitrogen at that temperature

Fuel NOx:

Fuel NOx can contribute as much as 50%

Continued

of total emissions when combusting oil and as much as 80% when combusting coal.

Although the complete mechanism is not fully understood, there are two primary paths of formation. The first involves the oxidation of volatile nitrogen species during the initial stages of combustion. The second path involves the release of nitrogen radicals during the combustion of the char portion of the fuels. This reaction occurs much more slowly than the volatile phase.

Prompt NOx:

This third source is attributed to the reaction of atmospheric nitrogen, N2, with radicals such as C, CH, and CH2 fragments derived from fuel, where this cannot be explained by either the aforementioned thermal or fuel processes. In fuels that contain nitrogen, the incidence of prompt NOx is especially minimal and it is generally only of interest for the most exacting emission targets.

In low and medium-speed diesel engines, by far the most important part of NOx is generated in the thermal NO process. However, fuel-derived NO becomes important when using heavy fuel oil because such fuels contain more organic nitrogen than marine diesel oil and other distillate fuels. Most of the nitrogen in the fuel is oxidized to NO in the combustion region.

Nitrogen is normally an inert gas. At the temperatures in the burning fuel spray, nitrogen is no longer inactive and some will combine with oxygen to form oxides of nitrogen. Initially NO is formed. Later, during the expansion process and in the exhaust, some of this NO will convert to nitrogen dioxide (NO2) and nitrous oxide (N2O), typically 5% and 1%, respectively, of the original NO. The mix of oxides of nitrogen is called NOx.

Measures to reduce NOx emissions:

Measures to reduce emissions can be split into internal and external measures. Internal measures influence the combustion process itself leading to decreased raw emissions of NOX. External measures leave the combustion process untouched and utilize additional equipment to convert the NOX produced during the combustion. External measures are generally combined with considerable investments for the additional equipment and the operation of the equipment can cause an overall efficiency loss of the propulsion system, too.

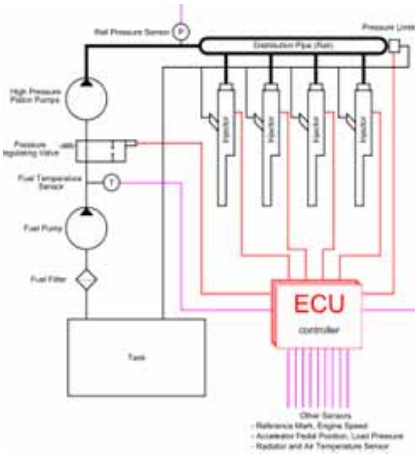
As far as our analysis is concerned, in order to reduce the emission of NOx, the method we found to be best is "**Electronic fuel injection system**".

Electronic fuel injection system:

Engine management system includes:

1. Electronically controlled injection.
2. Common rail injection system.

The adoption of electronically controlled common rail system provides improved low speed operation, better combustion at all operating speeds and loads giving benefits in lower fuel consumption as well as reduced NOx emissions and a cleaner engine with less deposits of combustion residues.



Formation of SOx:

The combustion of sulphur in fuels invariably leads to the formation of sulphur dioxide and sometimes sulphur trioxide.

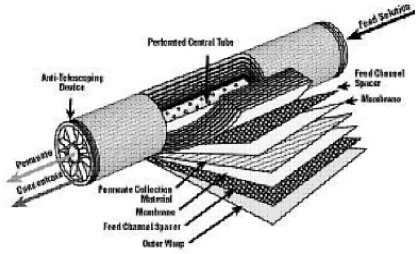
SOx emission control:

As far as our analysis is concerned, in order to reduce the emission of SOx, the method we have found to be best is "**Membrane based fuel sulphur management system**".

Membrane based fuel sulphur management system:

The main part of the system is a polymeric membrane. Two types are under development.

1. Organic solvent nano filtration (OSN)
2. Pervaporation (permeation + evaporation) high flux membrane (HFM). It can produce low sulphur fuel during ship's journey in the open seas and then use the fuel when operating at or near the port.



Controlling emission by changing fuel:

- By using Natural Gas

CDT Somnath Chatterjee,
CDT Manmath Subudhi,
CDT Savtanter Saini & CDT G. Santosh
GME-07
SIMS, Lonavala

- Low-sulphur fuel operation

Low sulphur fuel challenges:

Reducing the sulphur content to a level less than the level for which the equipments have been designed to work on will be facing a number of problems due to:

- **Reduced Viscosity:**
  Most marine equipments are designed for working on the fuel whose viscosity is 2 Centistokes (cSt) at operating temperatures. With reduced viscosity the related problems are
  1. Increased internal leakage in fuel pumps.
  2. Increased flow rates through nozzles, restrictors and injectors.
- **Reduced Lubricity:**
  Reduced lubricity will result in wear and tear of the moving parts of the machinery.
- **Reduced Acidity:**
  Reduced sulphur content will lead to adjustment of the alkalinity of the lubrication oil otherwise the corrosive acids in the fuel will not get neutralized.
- **Reduced Flashpoint:**
  The fuel with a lower flashpoint is dangerous to carry onboard.

Conclusion:

Most engine manufacturers are now producing standard engines which comply to Marpol Annex VI NOx and SOx emissions levels. This has been achieved by engine tuning measures, which commonly involve increased compression ratio, retarded injection timing, increased injection intensity and optimised spray patterns and for reduction of SOx,the methods of reducing sulphur content in fuel are used.

Marpol Annex VI will reduce global ship sourced emissions at a small rate because it only applies to new installations or major conversions.

'Starting Troubles' with Emergency Generator & Life Boat Engine

All Emergency equipments on board- as name implies, should be in a state of readiness at all times. Port state inspectors request for testing them in their presence whenever they inspect the vessels. If they do not start at the first instance in their presence they have the authority to detain the vessel. In spite of the routine tests that are done onboard, sometimes they do fail to start at times during Port State Control (PSC) inspections. Here are two such incidents recounted by Engineering Faculty Mr. Wakankar to warn the future engineers on board.

Incident 1: Emergency Generator 'starting trouble'

During an United States Coast Guard (USGC) inspection, emergency generator started satisfactorily on No.1 set of battery, but failed to start on No.2 set due to weak battery. USCG required closing the deficiency before vessel's departure. Each battery set was of 24 volts, 150AH capacity, and maintenance free type. Ship staff was regularly checking/ charging the batteries, recording the voltages and trying out the emergency generator without any problem.

Batteries were procured on urgent basis. New batteries were installed in place and tried out. However emergency Diesel Generator (D/G) could not be started by using the new battery(No.2 set). Ship staff checked the terminals at the new battery by using Global Maritime Distress Safety System (GMDSS) battery from Bridge but emergency D/G could not be started. Therefore, shore electrician was arranged to check the system. Wrong wiring rectified, wired correctly using new connectors finally emergency D/G was started, with the new set of batteries.

USCG checked and confirmed that emergency D/G can be started on both sets of batteries and the vessel was cleared.

General measures to avoid Emergency D/G starting problems:

1. Regularly try out the emergency generator by using each set of battery power source.
2. If 2nd starting arrangement is provided, both must be tested routinely as stipulated by the company
3. Ensure that both the sets of batteries are getting charged, monitor the voltages and maintain battery log.
4. Regularly check and keep the fuel oil filters clean.
5. Ensure fuel oil tanks are filled up to safe maximum capacity.
6. In case standby, start arrangement is 2nd set of batteries to maintain stock of spare starter motor *(pic 1)*.

Pic 1: Starter motor

Incident 2: Life Boat Engine 'starting trouble'

During an anchorage period in Australia, a vessel launched both life boats and manoeuvred in water. During the exercise, one of the life boat engines gradually lost speed and stopped by itself. Life boat engine was of Daihatsu make, fitted with three timing belts (pic 2) - one timing belt each for cam shaft drive, fuel injection pumps and sprinkler pump.

On close investigation, the timing belt for cam shaft drive was found broken. Both other belts were found in good condition. There were no spare belts and correct size belts were not locally available. Master duly disclosed the facts to the attending Australian Maritime Safety Authority (AMSA) inspector and a deficiency was issued.

Company arranged supply of correct timing belts from the maker's authorized service centre in emergency. The deficiency was cleared after successful demonstration to AMSA inspector.

Detailed investigation revealed that the belt was worn out and got gradually slackened in course of time. The slackened belt may have been touching the casing during engine operation and finally broke. The belt was not visible for inspection without removing the casing and hence never attended to.

Pic 2: Lifeboat timing belt

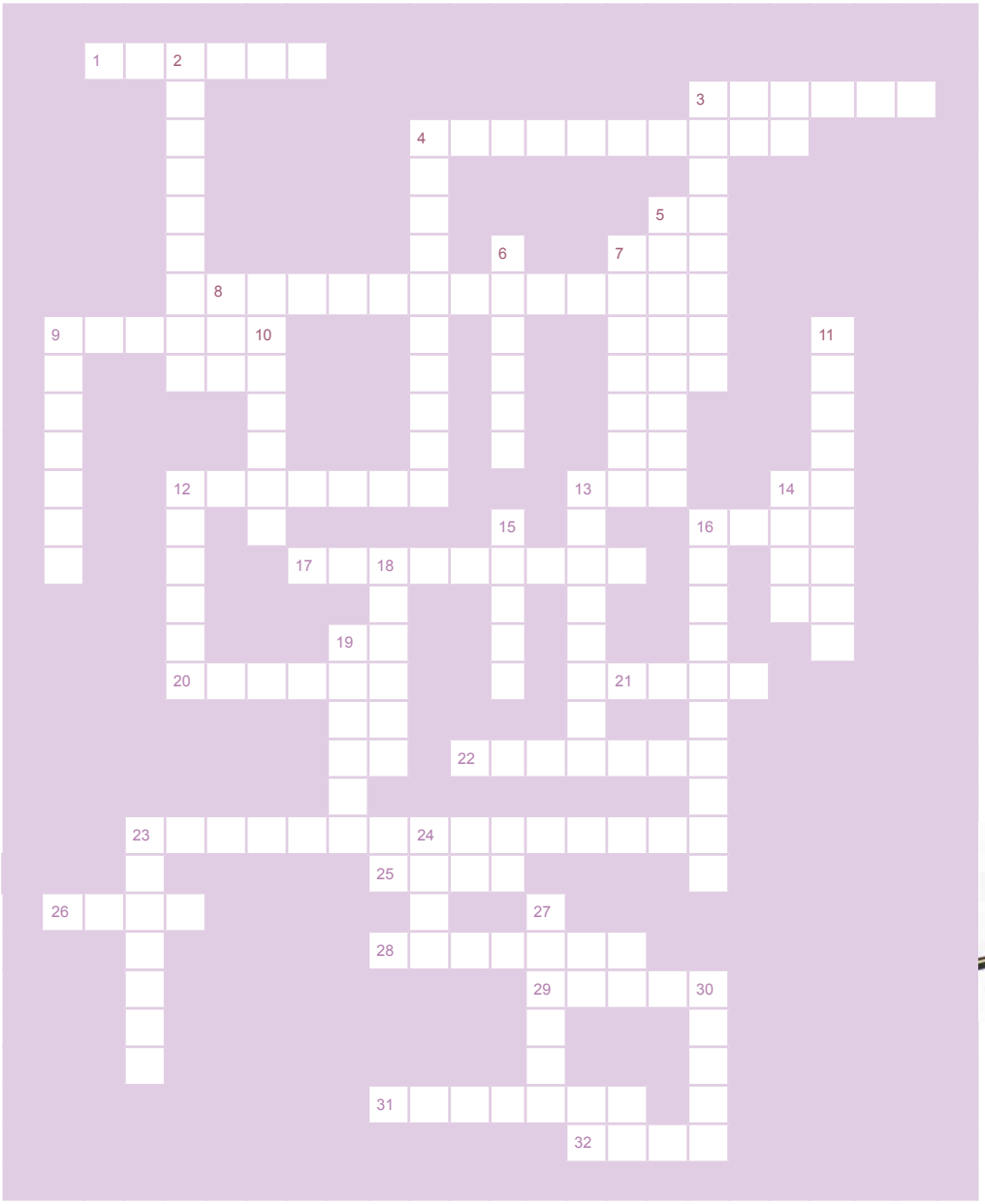
General measures to avoid Life Boat engine starting problems:

- During weekly testing of life boat engines, observe performance, check for any abnormal sounds, vibrations etc.
- Life boat engines on all the vessels are not the same and the number of belts fitted and their function, type and sizes may vary based on the Engine type, design and Make. Always ensure one complete set of spare belts *(pic 2)* are held on board. Any rubber product has a shelf life and needs to be changed at regular interval. Even the spare has to be changed at a fixed interval.
- Regularly checking and cleaning fuel oil filters is imperative.
- Ensure fuel oil tanks are filled up to safe maximum capacity.
- Keep spare, engine starting aerosol *(pic 3)* for starting cold weather if required.

Pic 3: Engine Starting Aerosol

Abhiram Wakankar
Engineering Faculty
SIMS, Lonavala

Crossword Puzzle



Answers:

Across

1. ullage
3. lloyds
4. cavitation
8. chlorination
9. piston
12. bulwark
16. soot
17. antartica
20. rudder
21. keel
22. racking
23. synchronisation
25. AFFF
26. zero
28. garbage
29. SOPEP
32. unillow
33. star

Down

1. ullage
2. labyrinth
3. liferaft
4. collision
5. vanadium
6. camber
7. hogging
8. COW
9. priming
10. needle
11. flagstate
12. boiler
13. pacific
14. roro
15. steam
16. scavenging
18. tie rod
19. megger
23. surging
24. NFPA
27. pascal
30. power

CDT Animesh Joshi,
CDT Deepak Gupta &
CDT Pritesh Shetty
GME-08
SIMS, Lonavala

Across

1. distance from surface of liquid in tank to the top of the tank
3. _____ Register is 1st classification society.
4. Formation of vapour bubbles of a flowing liquid in a region where pressure of liquid falls below its vapour pressure in centrifugal pump.
8. last stage of sewage treatment plant
9. it transfers gas forces to crankshaft.
12. used to prevent falling and being washed overboard
16. _____ blowing is to be carried in economiser
17. a special area
20. pintle support
21. bottom part of ship
22. transverse distortion of ship during rolling
23. 1st step in parallel operation of alternator
25. high expansion foam
26. in DC motor at starting back EMF is_____
28. annex 5 of marpol is related to _____ pollution from ships
29. emergency plan on ships to assist master what to be done in case of an oil pollution
31. scavenging type having highest efficiency
32. in _____ connection phase current = line current

Down

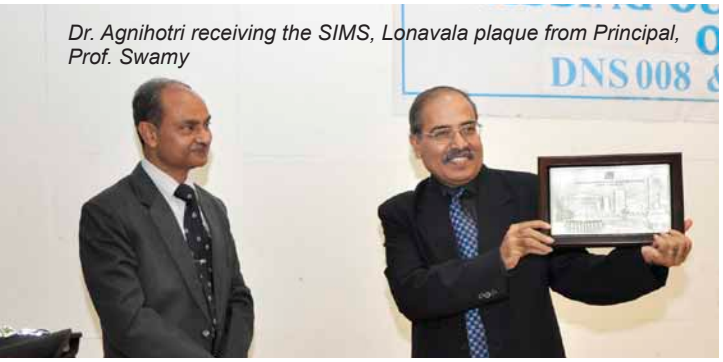
2. sealing used in turbocharger
3. survival craft of inflatable type.
4. bulkhead separating forepeak tank and cargo spaces
5. high temperature corrosions of exhaust valves due to deposits of _____
6. used on exposed deck to drive water to sides of ship
7. if buoyancy amidship exceeds the weight then ship will undergo _____
8. method used for washing cargo spaces in oil tanker
9. removal of air from suction line of centrifugal pump
10. valve used in fuel injector
11. the country where ship is registered is called its _____
12. equipment used in the production of steam
13. largest ocean
14. a type of vessel having ramp
15. used for heating heavy fuel oil
16. removal of exhaust gases with pressurized air
18. it keeps the whole engine structure under compression
19. equipment used to measure insulation resistance
23. odd noise of turbocharger during _____
24. classification of fire by ISO & _____
27. unit of pressure
30. product of voltage and current

Passing Out of DNS-08 & GME-07 Batches from SIMS, Lonavala

Chief Guest Dr. Agnihotri - Joint Director General of Shipping India (8th from left) for the passing out ceremony of DNS-08 and GME-07 at SIMS, Lonavala on January 3rd, 2010

Dr. Agnihotri being introduced to SIMS faculty at the passing out parade

Dr. Agnihotri taking the salute before the Guard of Honour



Dr. Agnihotri receiving the SIMS, Lonavala plaque from Principal, Prof. Swamy

Chief Guest touring the engine room of the Ship-in-Campus

Dr. Agnihotri with prize winners

Joint Director General of Shipping Congratulates SIMS for Imparting Practical Maritime Training

Joint Director General of Shipping, Dr. S.D Agnihotri has congratulated Samundra Institute of Maritime Studies for imparting hands on practical training enabling the cadets to be fully prepared for their future jobs on board a ship. Dr. Agnihotri was addressing the SIMS cadets at the passing out ceremony of over hundred cadets of DNS-08 and GME-07 batches at the Lonavala campus on Saturday, 03rd January, 2010. Dr. Agnihotri added that he is inspired by the atmosphere as he notices that the institute practices what it preaches which is contrary to the normal practice among the other countrymen.

In an interesting and witty speech Dr. Agnihotri, an erudite scholar himself apart from being a civil servant paid huge tribute to the standard and practices of the institute which sets itself a class apart in the country. He further advised the cadets that at the end of the day it's a question of not just what the institute has given to you but what you will give back to the institute. It would be nothing but the "sterling reputation" of the product of the institution that could be befitting a return gift to the institute, he said. Quoting an Urdu poem he told the cadets that the real gift will be the day the shipping industry would ask an alumni of SIMS what's the secret of his success!

Earlier, Dr. Agnihotri was accorded a guard of honour at a ceremonial parade of the cadets at the institute's parade ground witnessed by the faculty, staff and the family members of the passing out cadets. He also presented the winners of the Class NK research project competition for the GME cadets. The winners received medal and a certificate of merit on behalf of the Japanese classification Society Class NK- a research collaborator of SIMS.

(Pictures on opposite page)

List of Prize Winners

DNS-08

- Best Cadet
  - CDT Durgesh Patankar
- First Best in Academics
  - CDT Manpreet Singh
- Second Best in Academics
  - CDT Vikas Mankotia
- Best Cadet Captain
  - CDT Akhil Sudeendranath
- Best Cargo Handling and Seamanship
  - CDT Sunal Arora
- Best Hands on Training
  - CDT Durgesh Patankar
- Best in Bridge Equipment and Watch-keeping
  - CDT Durgesh Patankar
- Best in HSSE
  - CDT Pawan Kumar Bana
- Best Nav. and Chartwork
  - CDT Manpreet Singh
- Best Orator
  - CDT Nitesh Pant
- Best in Music
  - CDT Shafeeq Shefi
- Best Sportsman
  - CDT Harikuttan K
- Most Popular Cadet
  - CDT Emil Abraham

GME-07

- Best Cadet
  - CDT Gaurav Kumar
- First Best in Academics
  - CDT Savtanter Saini
- Second Best in Academics
  - CDT Debjeet Barman
- Best Cadet Captain Div A
  - CDT Jaswinder Toor
- Best Cadet Captain Div B
  - CDT Shunmuga Sastha J
- Best Hands On Training
  - CDT Damanit Singh Dhillon
- Best in Automation And Control
  - CDT Debjeet Barman
- Best in HSSE
  - CDT Preetinder Singh
- Best in IC Engines
  - CDT Savtanter Saini
- Best Orator
  - CDT Santosh G
- Best in Music
  - CDT Somnath Chatterjee
- Best Sportsman
  - CDT Sawant Pravin Dinkar
- Most Popular Cadet
  - CDT Sarin S

SIMS Cadets Win Lonavala Marathon

A team of 16 enthusiastic athletes from SIMS, Lonavala including cadets and their faculty mentor took part in a marathon run to create awareness for a clean and Green Lonavala on 31st October, 2009. The run was organized by the INS Shivaji, Lonavala to celebrate the 25th anniversary of its Naval Engineering Course (NEC).

The cadets were placed in the toughest 8 Km category open to all along with the Armed forces personnel. The three grittiest of them completed the run bagging the third, fourth and the seventh positions. Their mentor Capt. Rakesh Pradhan, the sports in charge was equally sportive in bagging the seventh position in the 3Km open category for all civilians.

Three proud winners as seen in the picture with the principal Prof. Swamy, Capt. Pradhan and PT teacher Mr. Sathyen Thomas are CDT Independent Singh, DNS-09 (7th prize, 2nd from left), CDT Utham Dutta, DNS-09 (3rd Prize, 3rd from right), CDT Ashit Deb, DNS-09 (4th Prize, 3rd from left).

Inter-House Volleyball Championship

The three-day Inter-House Volleyball Championship was held in the SIMS, Lonavala campus from 18 November 2009 and the Godavari House clinching the coveted trophy by beating Kaveri House in a tough match scoring 25-21 and 25-19 respectively.

While the Godavori went on the hunt right from the moment go, huge credit should go to the trio Cdt Midhun K.R., Cdt G. Sastha and Cdt Nagaraj K. for providing the solid wall of defense as well attacking in full vigour with breath-taking spikes and well-placed drops.

However, another match which stole the limelight was the friendly match between the Faculty and the Cadets which nonetheless clinched by the latter.

Champions from Godavari House

IC Engine Exhaust System

Sunil R Gaikwad
Senior Marine Instructor
SIMS, Lonavala

The function of the exhaust system in Internal Combustion engine is to carry away the combustion products from the engine to the atmosphere within prescribed limits and conditions. Some features of the exhaust system are as follows:

a) System restriction:

The exhaust system is designed to minimize the restriction to flow of exhaust gases. The back pressure in the exhaust system is to be within prescribed limits to assure proper engine operation. As the soot or carbon deposits in the exhaust trunking increase over a period of time, the back pressure acting on the pistons increases thereby decreases the usable output of the engine. The back-pressure causes the scavenging of cylinders to be incomplete and hence air-fuel ratio is reduced, resulting in increased fuel consumption and exhaust temperature. Although turbocharged and mechanically supercharged engines are affected to lesser degree than natural aspirated engine due to the positive pressure in the intake manifold. It is essential that the exhaust system for all engines be designed to offer the least possible restriction to the exhaust flow.

b) Exhaust piping design:

Flexibility is provided in the exhaust system by incorporating metallic bellows between the engine and the exhaust piping so that no damaging stresses are imposed on the exhaust system due to expansion of component at high temperature and vibrations of the engine. It should be ensured that none of the compensators are under stress due to misalignment of pipes.

c) Supports:

The exhaust system pipes are provided with supports or load hangers at various places in order to avoid any undue stresses over the long lengths of piping. However, flexibility is maintained by providing adequate number of supports and flexible connections. As a general guideline, not more than four feet of exhaust piping should be left unsupported.

d) Muffler location:

The mufflers or silencers are to be located in the system at definite lengths in the exhaust system. The location of mufflers has definite influence on both the silencing capability and the back pressure imposed on the system. Formula used for calculating the location of the mufflers is as follows:

- For inline engines – Best theoretical location for the muffler is next to the exhaust manifold outlet.
- The second and third best locations for denoted by 2/5L and 4/5L respectively.
- The best calculated muffler locations for 'V' type engines with duel exhaust system are as follows:

First Best:	d1=(4L-5)/5
Second Best:	d2=(2L-5)/5
Third Best:	d3=(3L-10)/5

Where 'd' is the distance in feet from manifold flange to the centre of muffler (for mufflers with both the inlet and outlets on the front end, measured to the rear of the muffler), and L is the total system length measured from the manifold flange (measured from turbo casing outlet in case of turbocharged engines). A balance tube between the dual system can provide additional muffling. The equation for determining the best and worst locations for such a tube are the same as for the muffler location above. The balance tube will decrease loudness by approx. 20% when properly located and when no mufflers are used. The % of noise reduction decreases with increase in number of mufflers.

The internal spaces and the baffle plates of exhaust gas silencers become fouled after a period of service. The dirt on the baffle plates increases the back pressure on the exhaust system, and must therefore be cleaned off at regular intervals so that the back pressure is kept at a minimum. The silencers are fitted with doors at the sides or bottom of the silencer outlet casing to facilitate cleaning.

Accumulations of dirt are also dangerous. If the dirt ignites, burning carbon particles and sparks may be discharged with the exhaust gases from the funnel.

e) Moisture exclusion:

Exhaust system outlet or funnel uptakes are designed to prevent entry of moisture in the system thereby restricting the exhaust flow and causing deterioration of the system due to rust. The exhaust trunking is provided with rain caps, right angle bends in vertical pipes and bevel cut under horizontal piping. Also, small drain holes are provided in some pipes to drain water. In ships where the exhaust is being lead to the area around the water level to lower the exhaust emissions, a non return valve is provided to restrict the flow of water into the exhaust trunking. The valve should be kept operational and free from soot both to avoid ingress of water into exhaust manifold and restriction to flow of exhaust gases from the engine.

Apart from all above mentioned components explaining the proper maintenance of exhaust system, turbocharger also need to be considered since the performance of the engine is directly connected to the performance of turbocharger which is operated by the waste heat from the exhaust gases.

f) Types of exhaust systems:

There are two basic types of exhaust system in use:

- Wet exhaust – Part or complete exhaust line is water jacketed.
- Dry Exhaust: Not water cooled.

In a wet exhaust system, seawater from the engine cooling system outlet or from a separate seawater pump is injected into the inside of the exhaust pipe so that it can be safely lead through areas thus avoiding high temperatures in the engine room and also reducing the temperature of the exhaust gases being led to the atmosphere. This is accomplished by downward sloping of the exhaust pipe and / or by the use of risers.

The dry exhaust system is simple and easy to install and is commonly used. It must be lagged or well insulated to prevent high engine room temperature and to prevent damage or injury from hot surfaces.

g) To extract the energy from the hot exhaust gases, the marine installations are mostly designed with turbochargers and waste heat economizers. These equipments in the system if fouled pose a restriction in the flow of exhaust gases with a detrimental effect on the engine as explained in (a).

With use of poor quality residual fuel (IFO 380Cst), the fouling of turbocharger and economizer is more frequent and it is essential that these are inspected and cleaned periodically while in service as explained below.

Continued

Turbocharger:
Turbochargers are centrifugal compressors driven by the exhaust gas turbine. By utilizing the exhaust energy of the engine it recovers a substantial part of energy which would otherwise go waste.

The unburnt carbon particles get accumulated on the turbine blades which directly affects on the efficiency of the engine. Hence it is important to clean turbine blades periodically as a part of maintenance schedule.

Turbine rotor blades cleaning:
Turbine rotor blades can be cleaned by water washing while the turbo blower is in service, or the turbo blower can be dismantled to clean all parts thoroughly. Water washing of the blades while the turbo blower is in the service requires special apparatus and connections on the turbo blower exhaust gas inlet spaces. This apparatus consists of a probe which passes into the gas space. The probe is in fact a sprayer which fixes into the gas inlet space the outer end of the probe is fitted with connections for compressed air and water, which are taken through flexible pipes from the supply points at the side of the blower. An automatic cock is fitted into the probe. When opened, it allows water and compressed air to flow to the sprayer. The compressed air atomizes the water as it is blown into the gas space. The usual cleaning time is 10 to 15 mins depending on the amount of dirt.

The ash found in the nozzle blades is usually water soluble. Finally the atomized water breaks down the ash formations, which then pass up the exhaust pipes with the exhaust gases to the atmosphere.

While the blades are being washed the turbine blower speed must be considerably reduced, and the water drain cocks from the exhaust spaces must be left open. It is very important to reduce the main engine speed during this process so that the temperature of the exhaust gases is low enough to avoid immediate vapourisation of the water droplets in order that deposits on the blades are impinged by the water and at the same time the turbine revolutions are low enough to avoid heavy impinging effect of water droplets on the blades. After washing, the speed of the engine must be increased gradually, and the water drain cocks left open until all the water is cleared.

Some turbo chargers are fitted with an arrangement to inject small particles of broken walnut shells into the exhaust gas passage before nozzle blades. The sharp edges of the broken shell have a good scouring action on the nozzles and blades without damaging the smooth surfaces required for high velocity gases to operate the turbine in an efficient manner, with only minimum losses from blade and nozzle friction.

When a turbo blower is dismantled to clean the turbine rotor blade the rotor is set up on a pair of wooden 'V' – notched trestles that allow part of the rotor disc and blades to soak in a water bath. During the soaking period the rotor must be regularly and frequently turned, so that the deposits are completely removed. Incomplete removal may leave the rotor out of balance.

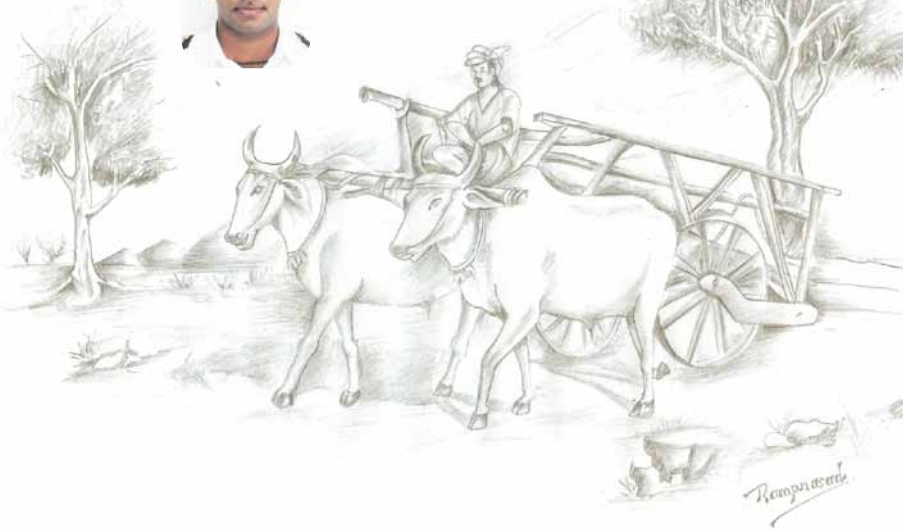
Accumulation of carbon particles in the exhaust manifold:
Due to improper combustion in the engine or prolonged low load running of the engine, carbon particles get accumulated in the exhaust manifold and the components on its way out. It is very important to remove all these carbon particles in time to avoid back pressure and also to avoid funnel fire. Timely soot blowing for the exhaust gas economizer is of prime concern in addition to regular maintenance to the economizer and exhaust manifold inspection.

For proper combustion of the fuel in the combustion chamber, ensure following:

- The fuel supplied to the engine should be very clean.
- The fuel should be introduced into the combustion chamber within a precisely defined period of the cycle.
- The amount of the fuel injected per cycle should be metered very accurately. The clearances between the working parts of fuel pump as well as the size of the orifice are very small. The working clearance is as small as 0.001mm and the nozzle orifice size of even a big engine is as small as .625 mm in diameter. If it is in large by even .975 mm, the output would vary by about 35%. This increased output may result imbalance, overheating or smoking exhaust.
- The injected fuel must be broken in very fine droplets, ie, good atomization should be obtained.
- The spray pattern must be such that it results in rapid mixing of fuel and air.

For ensuring all above points, fuel valve testing and setting is required to be carried out as per schedule given by makers. Calibration of the fuel injection pump is also required to be carried as a part of maintenance routine.

CDT Ramprasad, GME-08
SIMS, Lonavala



CDT Baskaran
GME-08
SIMS, Lonavala

Seminar for Senior Officers

Capt. Arthur Batty presenting topics on SIRE Inspections, Vetting Process and Risk Assessment at the SIMS, Lonavala Auditorium

A gathering of all the participants engaged in activities

Leadership workshop

Mr. B.S.Teeka - MD, ESM addressing the gathering

Addressing the gathering are:

Mr. Venkiteswaran - GC member, SIMS

Capt. Arun Sundaram - General Manager, ESM

Capt. Olaf Olsen - Advisory Consultant, SIMS Lonavala

Capt. Rajeev Gupta - GM, ESM Mumbai

Mr. A.K.Saxena - Fleet Mgr, Tech Dept., ESM

Mr. Prakash R. - Fleet Mgr, Tech Dept., ESM

Capt. Rajesh S. - Marine Superintendent, ESM presents his segment in a parallel presentation with other ESM superintendents

Officers at their best shot

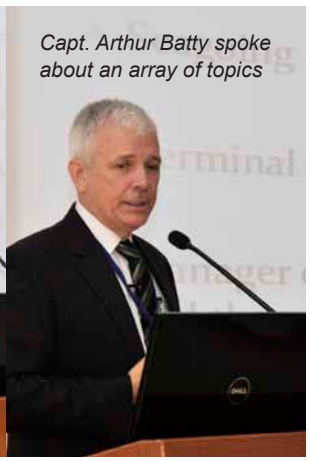
Team members with their trophy and all smiles!

ESM Officers Seminar at SIMS, Lonavala

Interactive sessions during the seminar

Mr. Rob den Heijer - Green Award Foundation

Mr. Bjarne Tvilde - Chairman, ESM



Capt. Arthur Batty spoke about an array of topics

Early rising each morning to Yoga by the pool

SIMS cadets performing to traditional Indian Bhangra music

Road to Safety & Operational Excellence: Seminar for Senior Officers

A three day seminar on "**Road to Safety and Operational Excellence**" was held at the tranquil and scenic campus of SIMS, Lonavala from the 4th to the 6th of November 2009 for the senior officers of ESM. The proceedings saw an overwhelming participation from senior sailing officers -be it technical discussions, manning issues, cricket games, yoga or other entertainments by the cadets arranged around the three days of busy schedule.

Inaugurating the seminar on 04th morning, Managing Director of ESM, **Mr. B.S.Teeka** called upon the officers to be aware and alert about the present downturn of the shipping industry and the role to be played by a ship manager to support the owners and charterers in providing a thorough professional service so that the latter can still remain in business. Any unrealistic expectation from the seafarers to take the advantage of the situation will only backfire in the long run and jeopardise the smooth operation and would be harmful to both seafarers and the ship manager.

Capt. Arun Sundaram, GM, ESM Singapore commenced the proceedings on the first day by giving the audience an overview of the Health, Safety & Environment (HSE) performance of the company ships in the past 9 months of the current year. He also highlighted the achievements over the past 3 years and challenges faced with the current trend of incidents. Capt. Arun also reinstated the company's further objectives and steps that will be taken to implement the same. He emphasized that with TEAM work a "zero-incident" work environment was very much possible and not a dream.

Mr. Bjarne Tvilde, Chairman of ESM board gave an insight into commercial requirements which the senior officers must be fully aware of, as the ships were meant to earn money for their owners and operators. Only by clearly understanding the vessel operators' instructions, can the Master ensure that all voyage requirements were duly fulfilled. He stated that communications with the operators and other major stakeholders were of primary importance and if Master was not clear about anything, he must raise questions promptly. Later, Mr. Tvilde also presented a speech prepared by **Capt. Kurt Damkjaer**, Technical head of the Clipper Group on expectations of a shipowner from the senior officers on board to ensure a smooth operation of his ship. He highlighted that with sincere teamwork both owners and officers can produce a win-win combination and ensure a happy and well performing ship.

Mr. Rob den Heijer, representing Green Award Foundation, Rotterdam explained the noble

Continued on next page

Continued from page 26

aim of his foundation for making the quality ships count for rewards and benefits.

Capt. Olaf Olsen, Adviser to SIMS, Lonavala spoke at length about vicarious liability and crew negligence issues to cover the progress made by ship management companies and advent of Safety Management Systems.

Two parallel sessions were held back to back for engineers and deck officers by ESM representatives **Mr. A. K Saxena**, Fleet Manager – Technical Department, **Mr. Rajesh Subramanian**, Marine Superintendent, **Mr. Prakash Rebala**. Fleet Manager – Technical Dept and **Mr. Vijay Cherukuri**, Marine Superintendent. Mr. Saxena provided an in-depth analysis of purification techniques, operating parameters for machinery and measures to achieve optimal performance from the purifiers onboard.

Capt. Rajesh Subramanian presented the subject of 'Cargo stewardship and Tanker operations' and brought out the lessons from some of the recent cargo related experiences from within the ESM fleet. Mr. Prakash Rebala drew focus on source of bunker spillage, importance of training and pre-bunkering conference, bunkering checklists and precautionary measures. Capt Vijay Cherukuri spoke about the Cargo documents and Commercial practices, with a focus on Bill's of Lading, Mates Receipt and notice of readiness.

Capt. Arthur Batty, former vetting head of the French Oil Major TOTAL covered a wide array of topics ranging from SIRE inspection, Vetting Process and Port state control, to Pilotage and Cargo Matters. He interacted with the participants on subjects like Risk Assessment and Incident Investigation with a focus on navigation causalities related to a recent case study.

In his hard hitting presentation, veteran maritime lawyer **Mr. S Venkiteswaran** questioned the popular sentiment of 'Criminalization of seafarers" and pointed out that all nations follow their own law of the land and a seafarer is expected to follow and respect those law like any other individual. Any violation will automatically make him/her liable to be punished under the law and this fact can not be construed as any "criminalization" or bias act against seafarer of any nationality. As long as you are a thorough professional, follow the law of the land and company procedures, you have nothing to fear, he emphasised. With interesting case studies and real life examples he explained the criminal justice system and established in his trademark frankness that the popular term used is rather jingoistic and does not hold water in legal world.

SIMS, Mumbai Receives ICRA Grading 1

We are pleased to announce that in continuation of its glorious past records of excellence, SIMS, Mumbai has been approved grade 1 recognition from the Investment Information and Credit Rating Agency (ICRA) in January, 2010. The approval re-emphasises the fact that the institution has resources and processes consistent with those required for delivering the highest quality of maritime education and training.

The major criteria for the rating under which the rating is granted are- Strong infrastructure, Faculty experience and standing in the industry, Strength of courses (including course development and review processes), Quality certification and process, Financial standing and governance, Excellence in Teaching/training methodology and above all the Management quality and sustainability

SIMS Cadets Join as ESM Officers During the Last Quarter Ending 15th January, 2010


3/O Jagdish Joshi


3/O Chatrath Bhaskar


3/O Pankaj Tyagi


3/O Bawa Aman


3/O Khanna Varun


3/O Mohanan Sajith Chittilappilly


3/O Thomas Shejin John


3/O Manikantan Achuthan Menon Kizhakepat


3/O Narpat Ram


4/E Khati Tushar


4/E Shewal Saxena


4/E Uvaise Ellias


4/E Singh Jagmohan


4/E Velpandian Kumar


4/E Inderpreet Singh


4/E Robin Jose


4/E Vattamakal Mariadas Roshan


4/E Subramaniyan Natarajan


4/E Unnithan Arun Sukesanandanan


4/E Kundumattathil Valson Babblu


4/E Jain Yatendra


4/E Madhu Rajesh


4/E Manoharan Rajkumar


4/E Cuddapah Venkata Anil

IGNOU Project by DNS-08

DNS-08 batch cadets produced a number of interesting and relevant working models for their Indira Gandhi National Open University (IGNOU) Project which drew favourable attention in the campus. Some of them are as below:

Portable Fire Alarm

A working model on the Heat Detector based portable fire alarm.

Group members:

CDT Durgesh Patankar, CDT Bhartesh Kant Sharma,
CDT Amit Phadtare, CDT Abhishek Patel &
CDT Dharmendra Yadav

Project Co-ordinator:

Capt Anil Mehta

Group members proudly presenting their Portable Fire Alarm project for the camera

Bridge Layout & Equipments

A model of the full Bridge and navigational equipments on board a ship and a presentation on how they work.

Group members:

CDT Abdul Vahid, CDT Angad Yadav, CDT Anoop Antony,
CDT Shafeeq M.P & CDT Tony Thomas

Project Co-ordinator:

Capt. Anil Mehta

Prof. Swamy - Principal, SIMS Lonavala with the team of Bridge Layout and Equipments project

Sounding & Ullage System

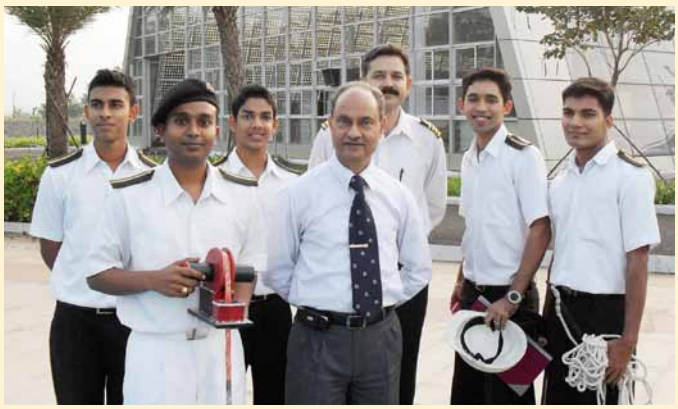
A working model on demonstrating a sounding and ullage system which explains to cadets on taking soundings through a simple system .

Group members:

CDT Emil Abraham,
CDT Jirin Sam John,
CDT Jithin Sarendran,
CDT Mohammed Rameez NA &
CDT Sivakumar S

Project Co-ordinator:

Capt. Sunil Bhoite



Sounding & Ullage System team with Prof. Swamy and Capt. Anil Mehta - Nautical Faculty, SIMS Lonavala

Prof. Swamy with the project team members of the Opening and Closing Mechanism of Hatch Cover

Opening and Closing Mechanism of Hatch Cover

The project was a simple model to explain the working of cargo hatch cover onboard the ship.

Group members:

CDT Remo Francis Walter,
CDT Harikuttan K.A,
CDT Bichu Y. Babu,
CDT Akhiil Nath S &
CDT Nikhil Nasaru

Project Co-ordinator:

Capt. Sunil Bhoite

Winners of the SIMS Technical Paper Project

Oily Water Separator (1st prize winner)

Oily water separator is a device, which utilizes the difference in density between oil and water to separate oil from water. On board oily water separator (OWS) is used for separating oil from the bilge water and it is a requirement by the international MARPOL Convention Annex I.

We have made a transparent working model of oily water separator which has three chambers for different stages of separation. First chamber contains polycarbonate coalescer pack for coarse separation. Second and third chamber contains stainless steel mesh and polypropylene granules respectively for fine separation. An arrangement is made for bypassing the inlet line for two reasons

- For controlling the flow rate to the OWS
- For draining the OWS.

Oily Bilges from the bilge tank is pumped to the first chamber and the separated water is taken out from the third chamber and is collected in the overboard tank. Oil is collected from each chamber through tappings provided on top and is directed to the sludge tank.

The discharge from OWS is continuously monitored by a 15 parts per million (ppm) monitor. If the ppm is within the limits it will be pumped overboarded and if not it is bypassed back to the bilge tank. We have successfully separated oily bilges using our OWS.

Group Members:
CDT Kishore K, CDT Jibin Tom Jose, CDT Dhirendra Kumar Dubey, CDT Nikhil Pareek & CDT Naveen Kadam

Project Guide:
Mr. Dev Dutta Paranjape
Engineering Faculty, SIMS, Lonavala

Fresh Water Generator (2nd Prize winner)

The concept of a freshwater generator is simple desalination; sea water is evaporated using a heat source, separating pure water from salt, sediment and other elements. Freshwater generators often use the diesel engine jacket as a heat source, although steam can also be used as a heat source. Because freshwater generators often use existing heat to run, the cost of operation is low.

There are two main elements in a freshwater generator, one heat exchanger evaporates the sea water, and another condenses the fresh water vapour into drinking water. In the condenser element, the vapour is condensed through cooling, often simply using cold seawater to cool the outside of the unit. The freshwater generator should include a feature to monitor the salinity of the processed water. If the salinity exceeds a specified level, usually between one and ten ppm, the freshwater generator will automatically return the water to the feed line and put it through the cycle again.

The project made an exact replica of the original fresh water generator scaled down, so that its parts and working can be understood and explained in a simple logic. The group recycled scrap materials from the institute's scrap yard bringing the cost of the project to the minimum. The fabrication process included gas cutting, grinding, buffing, arc welding etc

Group Members:
CDT Sarin.S, CDT Bharanidaran M, CDT Thomas Daniel, CDT Shunmuga Sastha.J & CDT Joel Bruno A

Project Guide:
Mr. Biju Baben
Engineering Faculty, SIMS, Lonavala

Development of a REAPER (3rd Prize winner)

The project REAPER (Remote Electronically Actuated Position Encoded Rudder) is a concept to control the position of rudder electronically .An electronic control overcomes the problem of our conventional hydraulic rudders. This can be used as a main unit or as an auxiliary unit .It has two control board, one at bridge and another local (steering room/ECR), there is an interlock between stations.

Now once a signal is sent from any of the control it has to be displayed at the another control board and then a return feedback signal is sent that it has been displayed there, then only the positioning of the rudder will take place according to the given direction and angle of rotation, if the signal is not sent back then command for rudder actuation will not be given. These signals are fed through the push button switches provided on the control boards. Direction & angle can be changed through the (DIP) switches. The display is shown in the LCD. The control is achieved by the microcontroller AT89C51 which is a 40 pin IC of the 8051 microcontroller family. It converts the input from the switches and sensors into logic signals which is controlling the movement of the rudder, alarm, serial transmission & LCD. The movement of the rudder is controlled by a stepper motor. A stepper motor rotates in steps, thus the program converts the angle into number of steps & rotates only that number of steps in the direction given by the operator. To be further sure about the rudder position a feedback from the IR sensor (photodiode) fitted on the rudder is given to the microcontroller. When the rudder is in position a confirmation message is given on the LCD. If the rudder is not in the required position within 40 seconds an alarm will be sounded (proposed: Can incorporate a relay which will activate so that the existing stepper motor can be disengaged and engage an auxiliary steering unit using gear drives). The local control can isolate the bridge control and take full control of the steering by pressing a switch.

Group Members:
CDT Debjeet Barman, CDT Shashi Ranjan

Project Guide:
Dr. (Ms.) S.Laskar, Electrical Engineering Faculty, SIMS, Lonavala

Visitors' Comments

Excellent facility & excellent people. "shine light on ignorance"

- Mr. John Ridgway, Chief Executive Officer, BP Shipping

An ounce of practice is better than a ton of theory – and you've been doing a 'ton' of practice! Keep it up.

- Dr. Satish B. Agnihotri, Joint Director General of Shipping

Excellent ambience and infrastructure for quality education.

- Dr. T. Sahay, Director, IMU, Mumbai Campus

Excellent facility and a remarkable achievement. Heartiest congratulations.

- Mangala P.B.Yapa, Managing Director and CEO, Colombo Dockyard PLC

Truly remarkable and impressive feeling. Congratulations!

- Ms. Nicola Mason, Vice President, SKULD (Far East) Ltd

Congratulations – Another great achievement and big contribution to world class maritime training in the region.

- Capt. Ajay Singh, Training Manager of BPMS

Wonderful facility! Need to take this message far & wide!!

- Mr. Debo Banerjee, Assistant to Country Head, BP

Was a great honor to be here, hope the development will be continued.

- Capt. SH.T.Haghighi, Manager Training of Centre Applied Science and Technology NITC

It was a privilege to learn about the excellent training facilities & IGTS.
Best wishes.

- Capt. M.P. Singh, Vetting Coordinator, ConocoPhillips

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