

The MET Network with NGO Observer Status at IMO

GlobalMET

NEWSLETTER



To promote, develop and support in the spirit of cooperation, the common interests of its members in all matters concerning the development and quality of maritime education and training.

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Editorial

It has been a busy period, with the developments on two big projects, in response to representations from GlobalMET, the ADB funded Fisher Report and the TK Fund facilitating conduct of 'Closing the Gaps' in the Philippines.

The Fisher Report has the potential to reshape maritime education and training in Asia and the Pacific. However we first need clear expressions of support from the maritime safety agencies for it to go ahead. That was the reason why I was a guest speaker at the Asia Pacific Heads of Maritime Safety Agencies in Shenzhen, China, which was held from 21-23 April. The Fisher Report is described in the following article. The next step will be to distribute a paper to the MSAs soliciting their support.

Newsletter issue 33 described the first very successful workshop in the TKF-GlobalMET Professional Development Workshop Programme in the Philippines. Our thanks go to Deputy Chairman Vice Admiral Eduardo Santos and his staff for the use of the Maritime Academy of Asia and Pacific. The programme concluded with a presentation to the Asia Pacific Manning and Training Conference in Manila in November 2014. GlobalMET is now preparing to facilitate three such programmes, starting in July and conducted by Dr Chris Haughton and Capt Richard Teo.

There are two new Honorary Members, Dr Doumbia Henry and Captain Keith Miranda. Dr Doumbia Henry's is President designate of IMO's World Maritime University and the article about her was printed in issue no 42. Capt Keith Miranda has retired and has provided his own article. Congratulations to you both.

There are also two new Members; the Admiral Ushakov Maritime State University in Novorossiysk, Russian Federation, the country's main port on the Black Sea and a leading Russian port for exporting grain; and the Abu Dhabi Ports Company in Abu Dhabi, the capital and the second most populous city in the

United Arab Emirates (the most populous being Dubai), and also capital of the largest of the UAE's seven member emirates. Both are very welcome to membership.

IMO is forming a Working Group on the Development of a new Strategic Framework. Submissions have been invited for a meeting, to be held at IMO HQ on 24-26 June, to consider. GlobalMET's Technical Committee, led by Secretary/Treasurer Captain John Lloyd, is refining a submission on the future of maritime education and training, to be submitted by 23 May. Basically, the recommendation seeks a group of experts from industry, IMO and NGO's to consider the present situation in MET and recommend the steps needed to cope with the foreseeable future.

Readers will have noticed the change in the newsletters since the beginning of the year. A revised cover was introduced, which will be maintained throughout the year. Iman Fiqrie, who frequently submits interesting articles, edited the January and February issues. He was followed by Richard Teo, who also frequently submits interesting articles, editing the March and April issues. I am editing the current and next issues. So now it is time to consider who will look after the July and August issues. Any offers? Also, as often stated, articles written by members are welcome.

Your Board of Directors is planning its next meeting at the Singapore Maritime Academy on 18 June. A major consideration will be the future shape of GlobalMET. We will be pleased to hear from anyone with ideas about development of maritime education and training and about GlobalMET. Please - let us have your input.

Red Short
Executive Secretary





I attended the 16th Annual Meeting of the Asia Pacific Heads of Maritime Safety Agencies, held in Shenzhen from 21-23 April, to seek the support of the MSAs for the Fisher Report. The paper I presented follows. Afterwards there were many expressions of support and these are being followed up.

It will be recalled that the Asian Development Bank at GlobalMET's behest commissioned a consultant at the end of 2012. Fisher Associates of the UK was appointed and produced a report 'Human Resource Development in the Maritime Sector in Asia and the Pacific'. When produced in June 2013 this report was well received. The outputs and activities are in the accompanying diagram. The first 'Policy and regulatory environment improved' with its activity 'Technical Assistance to Individual MSAs' and the fourth 'Knowledge sharing strengthened' with its activity 'Centre of Excellence for Knowledge Sharing' were stressed in my presentation to APHoMSA.

Given sufficient support we will go back to the Asian Development Bank and, hopefully, formulate a project.

Guangzhou Maritime Institute kindly invited me to visit the campus and on the Friday William Tan, Director of the International Office kindly picked me up from Shenzhen. I met President Wang Yuqian and senior staff and saw the extensive campus with its many fine buildings, including the extensions to the campus where building are currently under construction. After a lunch hosted by President Wang, William escorted me to the Shekou ferry to Hong Kong International Airport.

The paper I spoke to follows:

16th Session of APHoMSA ADB – Human Resource Development in the Maritime Sector in Asia and the Pacific - Implementing the Fisher Report

Paper sponsored by: GlobalMET Limited

Purpose

1. APHoMSA support for the activities recommended by the Fisher Report is requested; eg the improvement of policy and regulatory environment through technical assistance to the MSAs, strengthening the knowledge sharing through the creation of a centre of excellence. The Fisher Report and a summary of its Outputs and Activities are attached.
2. APHoMSA support is also requested for the development of an app for disseminating knowledge of the impact of shipping on the marine environment.

Background to Fisher Report

3. Asia Pacific is a major source of demand for shipping and a leading supplier of seafarers. It needs to retain its competitiveness in the light of economic development and changing social contexts.
4. In 2012, at the behest of GlobalMET Limited, the Asian Development Bank agreed to a consultancy project. The project SC 100966 "Human Resource Development in the Maritime Sector in Asia and the Pacific" was funded.



Fisher Associates was commissioned and delivered the Consultancy Report in June 2013.

5. The Fisher Report is a high level strategic review of seagoing human resource needs. It informs the adoption and implementation of a human resource strategy by stakeholders. Under Outputs and Activities, the Report provides sieved and prioritised activities which address Maritime Safety Agency administration and Maritime Education and Training.
6. The Report reaches out to four key constituencies:
 - Maritime safety agencies, responsible for accreditation of colleges and certification of seafarers in accordance with international convention and their own standards
 - Employers of seafarers – primarily shipping companies or manning agencies
 - Seafarers themselves – primarily through collective organisation (unions)
 - Maritime education and training colleges – where the seafarers are trained.

It also reaches out to a large geographical region, covering many countries, large and small, in Asia and the Pacific.

Discussion on Fisher Report

7. The Vision is that the Asia Pacific will sustain and enhance its position as the leading source of seafarers.

The Mission is to positively influence recruitment, training, certification and retention of seafarers from Asia Pacific countries, and encourage a cascade of seafarer supply from one country to another as countries develop socio-economically over time.

The Objectives are:

1. Enhance the overall capability of MSAs in Asia Pacific, and specifically their implementation of regulations related to seafarers (by improving the policy and regulatory environment);
2. Improve the overall level of competence of professional seafarers newly trained in Asia Pacific (by strengthening knowledge sharing and improving the quality of maritime education and training);
3. Better match the resources *required* to train seafarers, with the resources *available* to train them (by strengthening partnerships in maritime human resource development between employers, seafarers, maritime education and training colleges and MSAs).

For countries that wish to participate, the Report recommends the provision of technical assistance to individual MSAs to:

- Consider their structure and identify resources required to improve overall capability;
- Raise standards of implementation of regulation in Asia Pacific for:
 - (i) Accreditation of colleges and examiners;
 - (ii) Assessment/examination/certification of seafarers to international best practice standards;
- Develop quality management system guidelines to support accreditation and assessment/examination processes.

The key steps would be to agree on terms of reference for the review, undertake a baseline review, prepare an action plan and implement the plan.

Homogeneity is not the aim. Country-by-country solutions are sought, using this framework to identify bespoke actions to improve standards that suit the location.

For all countries, the framework is:

- Forward thinking policy makers and MSAs from current leading supply nations will have opportunity to receive support to sustain their positions;
- Secondary supply nations, or new entrants that wish to grow as supply nations, will have the opportunity to set up well-structured supply capabilities with reference to best practice.

It is proposed that assistance is available to support one-off implementation costs, to assist MSAs to set fair on a new course if they wish to do so.

In addition, the Fisher Report's recommendations give priority to the following activities:

- Improved partnership working
- Increase direct participation of employees in colleges
- Asia Pacific recruitment and retention initiative
- Asia Pacific regional quality mark for colleges
- Support training of trainers
- Course structure and curricula
- Centre of excellence for knowledge sharing and it gives second order priority to:
 - Development of model competency management system
 - Gap funding for equipment and classroom improvements
 - Improved use of distance learning techniques
 - English language instruction.

While the Fisher Report opens a door to the possibility of a project funded by the Asian Development Bank and/or IMO's International Technical Cooperation Programme, it is necessary to first get the support of the MSAs in Asia Pacific.

Background to App Proposal

9. Four years ago GlobalMET, funded by WWF and assisted by the Nautical Institute and member Maritime Training Services, produced a chart of the Sargasso Sea on which information in words and pictures as to environmentally sensitive elements endangered by ships passing through the area was printed. 1500 copies were printed and distributed.

Two years ago GlobalMET proposed development of such a chart and an app to the Co-operation Forum on Safety of Navigation and Environmental Protection in the Strait of Melaka and Singapore.

The idea is supported, but little progress has been made.

Discussion on App Proposal

10. The thinking now is that development of an app is more appropriate, which would be used to convey information to seafarers, including fishermen, about the environmental impact of shipping and fishing on areas such as the Straits of Melaka and Singapore, Indonesian Territorial Sea, Philippine Territorial Sea and other areas of concern.

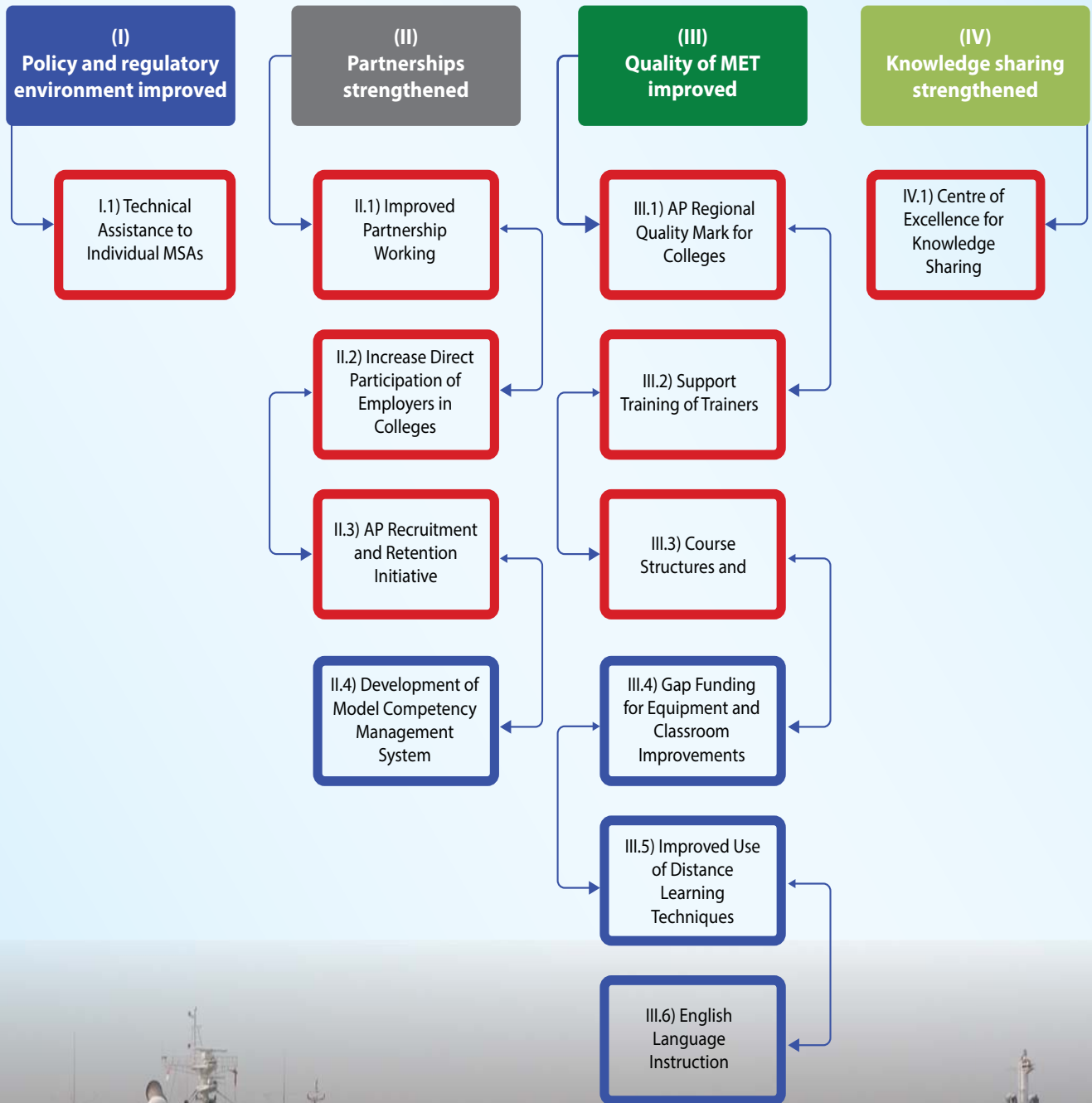
Recommendations

11. It is recommended that APHoMSA members:

- (a) **Agree** to support the recommendations in the Fisher Report;
- (b) **Agree** to support development by GlobalMET of an app to raise seafarer awareness of the impact of shipping on the marine environment.

By **Rod Short**
Executive Secretary

Outputs and Actions



Reimagining Training and Development, Part II: Big Blue Oceans



Be bold enough to use your voice, brave enough to listen to your heart, and strong enough to live the life you've always imagined" - Keller Williams, MAPPS.

There's such a thing as Red Ocean (ROS) and Blue Ocean Strategy (BOS), Figure 1 refers, it's a game changer that essentially asks whether an organization will continue doing the same mediocre things (ROS) or will it create uncontested market space, make the competition irrelevant in the pursuit of valuation, differentiation and low costs (BOS); essentially, embrace the paradigm shift in front of it!

teamwork, diversity, corporate and trainer competency training became the order of the day (Chpt 1). However, as mentioned in part 1 and Globalmet Newsletter 44, at its very core—TD today centers on enabling individuals and businesses to perform; and in the broader scope of HPI and change management encompasses three levels— organization, process and worker/performer; due consideration of which could translate into a potential upside in business performance of up to

Red Ocean Strategy	VS	Blue Ocean Strategy
Compete in existing market space.		Create uncontested market space.
Beat the competition.		Make the competition irrelevant .
Exploit existing demand.		Create and capture new demand.
Make the value-cost trade-off.		Break the value-cost trade-off.
Align the whole system of a firm's activities with its strategic choice of differentiation or low cost .		Align the whole system of a firm's activities in pursuit of differentiation and low cost .

Figure 1 - Red and Blue Ocean Strategy. Copyright © 2015, Blue Ocean Strategy

Training and Development, hereafter transformed as Talent Development (TD); The objective in part II's article is to persuade "TD professionals" in the maritime industry to broaden the current scope of the training profession to encompass talent development and management-- inclusive of human performance improvement (HPI), for the purpose of realizing the organization's desired business results. This is the relatively new, real and relevant scope of the TD professional today-- not just creating and delivering training. The literature suggests that "training as a solution," is often the costliest and most often prescribed solution for a business when things go wrong, while it may indeed remedy the specific training deficiency in question, more than 80% of the time it doesn't actually fix the problem (e.g., organizational or process level problems) affecting the business results as unsystematic training solutions have little underpinnings in TD professional methodology and results! Interestingly, current indiscriminate training development practices may surprisingly have their roots deep in the business cycle economics of the 1980s.

According to Biech (2014), the 1980s were the impetus for reduced training budgets and focus on ROI as productivity in the U.S. slowed, followed by downsizing as managers found themselves without jobs (Chpt 1). Also according to Biech (2014), this was also a time when many women entered the field; the nature and form of training changed-- assertiveness training,

10 times current value waiting to be realized. Those appreciative of the potential BOS would wholeheartedly embrace the new game changing TD professional framework and practices.

Rather than just see a business issue (e.g., unrealized revenue) as an apparent knowledge or skill gap (which there may well be) e.g., a training opportunity for the sales division which has been turning in abysmal results of late-- the TD professional would illuminate the holistic human performance issues affecting important business drivers and outcomes. Even given an apparent training solution and direction from executive stakeholders, i.e., have training on prospecting new clients, make more cold calls and visits-- the TD professional should understand the necessity for a business analysis in the context of HPI which, among other things, includes determination of the business goals, its relation to the current performance and subsequent prescribed solutions. The TD professional would also ensure a systematic process insulated from the pressures others may be feeling to arrive at a number of methodically prescribed solutions. Anything else would have to be noted, discussed and signed off by relevant stakeholders as such, as not in alignment with the best interests of the business (given the data). Otherwise the TD professional might end up a scapegoat for failed business results. More importantly, failing the proper TD process can waste precious resources on initiatives that make little or no difference towards the organization and its longevity.

For example, there are techniques like Rapid Instructional Design (RID) that are just variants of the “gold” ADDIE process TD professionals might be tempted to use in a time crunch. These short sighted fixes probably won’t fix the real problem.

Even if the client’s conversation forcedly shifts towards developing a “training solution,” that process may still be short circuited as the full ADDIE process is often not followed that well because of its tedious process. For example, the process includes initial analysis (the first letter in ADDIE), follow up initial meetings, communication frameworks, time lines, deliverables and constraints (SME, people and data access), due consideration given to how training objectives were obtained in the first place and tied correctly to the proper assessment scheme; is delivery developed using adult learning schemes and the latest learning styles for implementation and evaluation that must also be done? There’s no short cut for the TD Professional. It is any wonder that issues in an organization still linger years after multiple solutions have apparently already been taken? It may even be that the business goals, vision and mission themselves are not realistic or attainable? How does that conversation go with organizational stakeholders?

In conclusion, most of us in the business of training see the daily realities of the process and short fused training initiatives designed solely for the purposes of revenue and KPI generation; you get what you pay for. My father always used to tell me when I was in a hurry, “... son, if you left home in time enough to get where you were going - you wouldn’t be in a hurry.” Maybe MET could use similar advice and if the organization doesn’t have the expertise internally—then consultation with certified TD professionals may be in order. Certification ensures the

“professionals” one is dealing with are qualified in the areas of concern - a certified professional in TD should be certified in e.g., at least 10 areas expertise and have foundation knowledge in several areas like business skills, global mindset, technical literacy, to name a few. Of course there is also the matter of local requirements like the Train the Trainer Course 6.09 - also falling short of the aforementioned. There are lots of examples in which one wouldn’t take something of significant value (say a ship, e.g.,) in need of fixing or repair and bring it to a less than qualified repairmen or ship yard. This seems obvious, yet in both the shipping industry and MET it seems doing so is no problem when it comes to training - even in today’s technically complex and fast changing work environment there’s no excuse for it. The time to embrace the paradigm has come, old methods and prescriptions for training solutions has seen its day - please get onboard and be the professional we know we should be. For more on this, connect with the globalmetblog.imanfiqrie.com Train, train and retrain.

References

Biech, Elaine. (2014). *ASTD Handbook: The Definitive Reference for Training & Development* (2nd Edition). Alexandria, VA: ASTD Press.

“Red Ocean vs. Blue Ocean Strategy.” *Blue Ocean Strategy*. Web. 30 Apr. 2015. <<http://www.blueoceanstrategy.com/tools/red-ocean-vs-blue-ocean-strategy/>>.

By

Iman Fiqrie Bin Muhammad (LCDR, USN ret)
Lecturer, Malaysian Maritime Academy

Highlight

The Culture of Training

by Iman Fiqrie

As the global village becomes more and more integrated, just how different we all really are culturally and its impact and consequences for training seems to be overlooked. According to the American Society for Training & Development (ASTD), “... language, speech, environment and psychological factors can be barriers during training delivery”(Chpt 3.8). For example, a country’s language may set up a situation where outsiders are severely hampered and no delivery method may be effective during training. The author has personally experienced this a number of times. Just as assuming because a culture is not as technologically advanced as another’s, doesn’t mean that culture has a low ability to achieve technical sophistication - it may be a cultural choice.

It’s also been pointed out in the psychology of culture, that things like social relationships (the way individuals and groups interact), how they communicate (context), respect for authority (or the perception thereof), and the concept of time are also important factors when it comes to training delivery. Either way, understanding the dynamics of culture is an extremely important and valuable skill all Training and Development Professionals must have!

Reference

ASTD (American Society for Training & Development). (2013). *The ASTD Learning System. The Official Resource for CPLP Study*. Alexander, VA: ASTD Press.

Good Watchkeeping



In a recent report, it was mentioned that a bridge watch keeper was not paying attention even when the visibility was not very good, he did not call the master and he himself was busy listening to loud dance music on his mobile phone. Masters generally do not object strictly to the use of mobile phones while on duty for the fear of getting un-popular. They want to be in the good books of their junior officers.

In engine room watch keeping, the bad tendency is not to move out of the control room and check things physically using the senses of smell, touch and hearing. In many cases they tend to over protect themselves vis-à-vis noise protection and therefore miss many fault indications. It is desirable to wear ear protection but this is more necessary while working near the turbochargers and other such machinery producing shrill sound that irritates rather than wearing it all the time and at places where intensity may be normal.

There is a marked tendency of not seeing the boiler water level from the local position, but only from remote glass in the engine control room. That is why the practice of blowing through the gauge glasses has almost vanished.

We read too much discussion regarding use of heavy fuel oil and diesel oil. It is true that environmental concerns must be addressed but 1% Sulphur fuel (Low) is quite okay in almost all SECA areas and 0.1% LSGO good enough on berths in these areas. There is no point in discussing endlessly if the cut off date should be 2018 or 2020. Let this work for say 5 years and in the meantime devote attention to good maintenance. For, example, if you keep your injection viscosity 13-14 Cst at the injector, things will be reasonably okay but if you actually check, half of the vessels may not be having Viscotherm working properly. It was pointed out earlier that this equipment be made part of

machinery survey but no action yet from IACS.

They are doing a very good job, beyond doubt, but they must also pick up good suggestions raised through GlobalMet Newsletters.

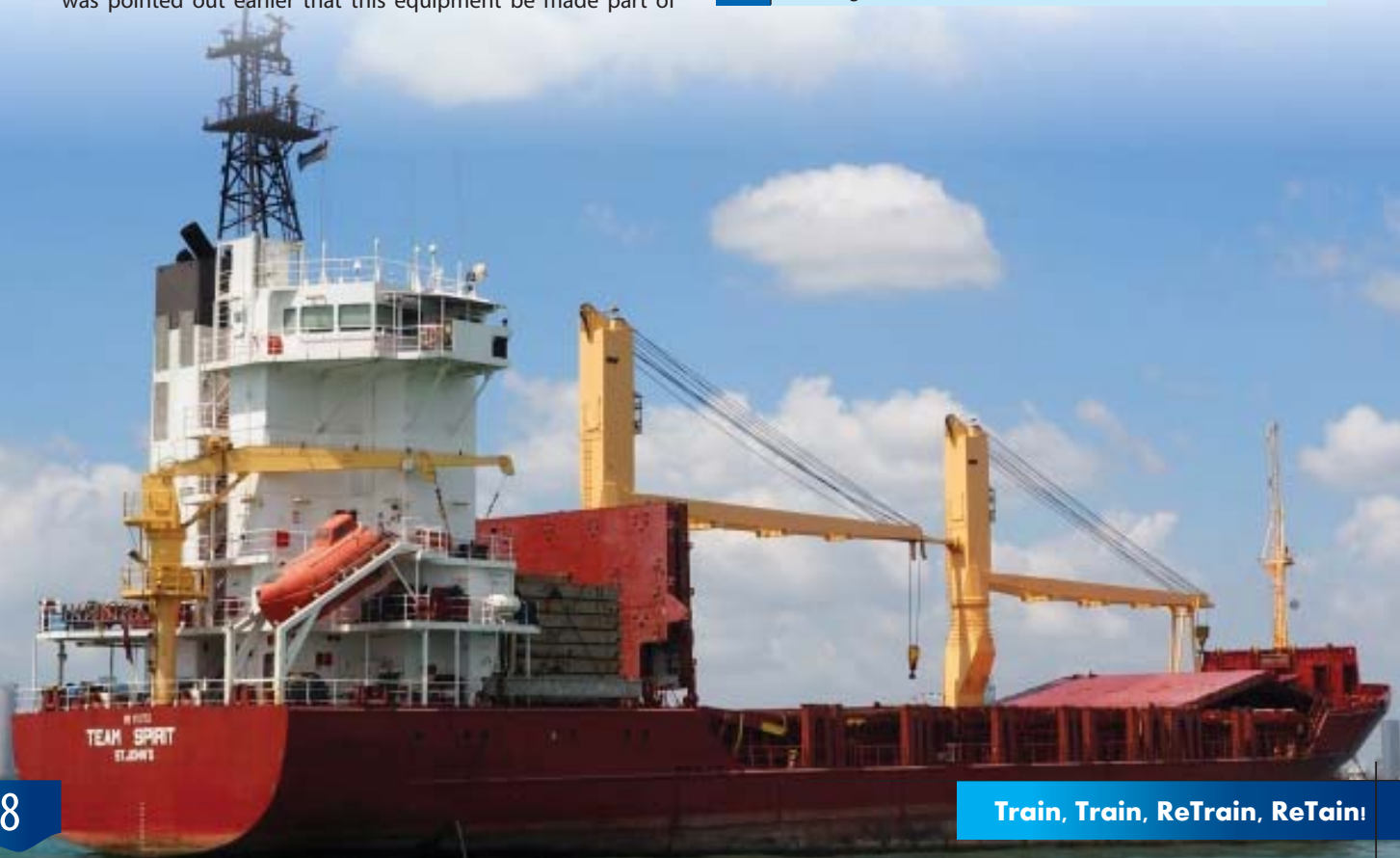
LT and HT temperature controllers for engine cooling water, steam dump condenser controller should also be included in the continuous survey of machinery items. In the recent past, while sailing on some older vessels, the control of LT temperature (central cooling) has been taking most of our time.

Such operational difficulties are not revealed to the class surveyor, but he himself must try to unearth the problems faced on board by interviewing the crew and checking the log books. Mostly the smoke is generated on berth when the boiler cuts in and one solution is to adjust it so that it does not cut off, but for this excess steam the dumping valve must work on auto and the dump condenser must be clean.

On latest vessels we see the use of LNG as fuel and Class NK gave an illuminating presentation on the subject of LNG use, bunkering and tank locations, which our younger seafarers now should learn thoroughly.

While using Low Sulphur fuel (0.1%S) we should keep shaft seals of fuel oil circulating and supply pumps in spares and must handle the switching of fuel very diligently. Proper recording of this in the Log Book and Oil Record Book is important for PSC checking.

By **Mahendra Singh**
Chief Engineer



Captain Keith Joseph Miranda



Capt Keith Miranda retired recently from the position of the Principal of the SCI Maritime Training Institute in Mumbai. He has been particularly helpful to GlobalMET while there in allowing us to use the Institute's facilities to hold our annual conferences. Capt Maranda was recently appointed an Honorary Member of GlobalMET. He writes:

Born 28th September 1954, completed High School and two years of B.Sc. before joining the sea in March 1973 at the age of 18.5 years.

A total of almost 42 years with The Shipping Corporation of India... March 1973 to September 2014.

As a trainee, for three years, I have served on a Bulk Carrier (India Japan), two Crude Oil Tanker (India West Asia Gulf, Singapore), Three General Cargo Vessels, a Passenger Vessel.

I was Log-Promoted Third Mate for two of the three years of cadet-ship.

I served as a Second Mate for 18 months on a Bulk Carrier on Global Tramp Trade.

As a Chief Mate over a period of three years, I have served on different types of ocean going vessels, including break-bulk, general cargo vessels, Crude Oil Tankers, OBOs, Product Tankers, Bulk carriers, and container oriented cargo vessels.

I have been in Command of ocean going vessels of all types, including Crude Oil Tankers, OBOs, Product Tankers, Specialised Lighterage vessels, Large Bulk carriers, Passenger vessels, Ro-Ro-passenger ferries, container oriented cargo vessels. As a Master I have taken delivery of one new bulk carrier and two second hand passenger vessels.

I have Knowledge of all shipboard operations, including commercial aspects of shipping such as charter parties, contracts of affreightment, bareboat charters, crew contracts etc.

I joined the SCI Maritime Training Institute in May 1989 and served in various capacities conducting training for sea farers and shore personnel for over 25 years till I retired in end September 2014.

Of the 25 years ashore two years were spent as a Technical Superintendent - in charge of six liner vessels (1993-95), and two years in the container operations department (1995-1997), scheduling vessels on India - SriLanka - Spain - UK sector, and overseeing loading and discharging operations at JNPT and Mumbai. Achieved fastest turn-around with 622 moves in one eight hour shift at Mumbai Ballard Pier (m.v. Indira Gandhi - June 1996).

I was the Principal of the SCI Maritime Training Institute for over four years from September 2010 to September 2014.

I have a Master of Science Degree in Maritime Education and Training from the World Maritime University, Malmo, Sweden.

I have been a visiting faculty member at Anglo Eastern Maritime Training Centre, Indian Oil Corporation, Board of Examinations of Seafarers courses among others.

I have also been conducting career guidance lectures at Jhunjhunwalla College, St Xavier's high school, Bombay Scottish School, Andhra Education Society school.

I have been an examiner for:

- the Bombay University – B.Sc. (Nautical Technology),
- the Indira Gandhi National Open University (IGNOU)– B.Sc. (Nautical Science)
- the Indian Maritime University (IMU) – B.Sc. (Nautical Science).

I have been a Ph.D. guide associated with AMET University, Chennai.

I have been on the examination board of IMU.

I have been a member of the Western Academic Council, responsible for inspection of Maritime Institutes on the West Coast of India, and random inspections all over India.

I am an external examiner for Masters and Mates for the Government of India Directorate General of Shipping.

Currently a Marine Consultant, external examiner and freelance faculty.



Mirco-Plastics are a Macro-Problem

From the Marine Professional, 01 May 2015

Micro-plastics are increasingly being found in the oceans and may prove to be as harmful to marine life as more obvious, larger debris, according to a new report.

The report – *Sources, fates and effects of micro plastics in the marine environment - a global assessment* – has been published by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), an advisory body that advises the United Nations on scientific aspects of marine environmental protection.

“While there is a need for further assessment of the problem, the report is the first attempt, at a global scale, to identify the main sources, fate and effects of micro plastics in the ocean and offers improved understanding of the scale of the problem. The assessment suggests that there needs to be a wider awareness of the potential harm that micro plastics in the oceans could cause,” said Dr Stefan Micallef, Director Marine Environment Division at IMO and the Administrative Secretary of GESAMP.

“Even tiny particles, such as those used in cosmetic products or abrasives, could potentially harm marine life if ingested. We need to work globally to ensure that plastics do not end up in the oceans,” Dr Micallef said.

Micro plastics refer to small plastic particles, less than 5 mm in diameter, but some as small as 10 nanometres. Micro plastics may be purposefully manufactured for particular industrial or domestic applications, or result from the fragmentation of larger items, especially when exposed to sunlight.

Such particles have been found distributed throughout the world’s oceans, on shorelines, in surface waters and seabed sediments, from the Arctic to Antarctic. They may accumulate at remote locations such as mid-ocean gyres, as well as close to population centres, shipping routes and other major sources.

The potential problems of micro-plastics in the marine environment were brought to the attention of GESAMP in 2010 and the assessment report has been developed by a working group of experts which has met regularly during the past five years.

The report notes that while the physical impacts of larger litter items, such as plastic bags and fishing nets, have been demonstrated, it is much more difficult to attribute physical impacts of micro plastics. Nonetheless, laboratory tests indicate that even very tiny particles can cause cellular damage in mammals. Micro plastics have been found inside the bodies of



Even large plastic waste will eventually break down into micro waste

a wide variety of marine organisms including invertebrates, fish, birds and mammals, and the ingestion of micro plastics may have an effect on the feeding, movement, growth and breeding success of the host organism.

Plastics often contain chemicals added during manufacture and can absorb and concentrate contaminants such as pesticides from the surrounding seawater and there is emerging evidence of transfer of chemicals from ingested plastics into tissues.

The report recommends solving the problem at its source rather than try to clean up the plastic after it has entered the ocean, through reduction, re-use and recycling.

The report warns that even if all releases of plastic to the environment were to cease immediately, the number of micro plastics in the ocean would be expected to continue to increase as a result of continuing fragmentation.

The report provides six recommendations:

1. identify the main sources and categories of plastics and micro plastics entering the ocean;
2. utilise end-of-life plastic as a valuable resource rather than a waste product;
3. promote greater awareness of the impacts of plastics and micro plastics in the marine environment;
4. include particles in the nano size range in future assessments of the impact of plastics in the ocean;
5. evaluate the potential significance of plastics and micro plastics as a vector for organisms in future assessments; and
6. future assessments should address the chemical risk posed by ingested micro plastics in greater depth.

GESAMP will continue to further develop knowledge on micro plastics in the marine environment.

By **Kevin Tester**



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