News

THE MENTAL HEALTH OF SEAFARERS

Mental illness among seafarers is of growing concern and it's believed that mental health problems may contribute to many other physical health conditions that seafarers experience. Due to the nature of their work, seafarers are often separated from their families and support networks for long periods of time and may feel very lonely. The fast turnaround times of modern ships often result in limited time for shore leave. Recent research by international maritime organizations has shown that seafarers may be more likely than their shore counterparts to experience mental health problems.

Different cultures are often found aboard ships and differing cultural expressions and stigma associated with mental illness can make it difficult to recognize and to treat effectively. Seafarers who are severely depressed, thinking of suicide or self harm may not tell their fellow crew members because mental illness is not discussed openly in their cultures. It is hoped this booklet will give Masters information needed to identify crew members at risk and help depressed seafarers on their ships.

Depression is more than just a low mood – it's a serious illness. People with depression find it hard to function every day. Depression has serious effects on physical and mental health.

A person may be depressed, if for more than two weeks they have:

felt sad, down or miserable most of the time	or	lost interest or pleasure in most of their usual activities.

and experienced a number of these symptoms:

In most cases, depression will go on for weeks or months if left untreated. If it isn't properly treated, depression is highly likely to recur.

Behaviour	Thoughts	Feelings	Physical
Stopping going out	"I'm a failure."	Overwhelmed	Tired all the time
Not getting things done at work	"It's my fault."	Guilty	Sick and run down
Withdrawing from close family and friends	"Nothing good ever happens to me."	Irritable	Headaches and muscle pains
Relying on alcohol and sedatives	"I'm worthless."	Frustrated	Churning gut
No longer doing things they enjoyed	"Life's not worth living."	No confidence	Sleep problems
Unable to concentrate		Unhappy	Loss or change of appetite
		Indecisive	Significant weight loss or gain
		Disappointed	
		Miserable	
		Sad	

Some events or situations have been linked with depression:

- family conflict
- isolation or loneliness
- unemployment
- having a serious medical illness
- drug and alcohol use
- changes in the brain
- having a family member with depression.

It's important to remember that each person is different and it is often a combination of factors that puts a person at risk of depression. Depression is very common. Around one million Australian adults and 160,000 young people live with depression each year. On average, one in five females and one in eight males will experience depression in their lifetime.

Depression is often not recognized or treated. Different types of depression require different types of treatments. This may include physical exercise for preventing and treating mild depression, through to psychology

WORLD'S FIRST HYBRID CAR CARRIER EMERALD ACE COMPLETED

TOKYO-Mitsui O.S.K. Lines, Ltd. announced the completion of the hybrid car carrier Emerald Ace, designed to generate zero emissions while berthed, at the Mitsubishi Heavy Industries, Ltd. Kobe shipyard.

The Emerald Ace was built as world's first newly built hybrid car carrier, and is equipped with a hybrid electric power supply system that combines a 160 kW solar generation system(*) - jointly developed by MHI, Energy Company of Panasonic Group (President: Masato Ito), and MOL - with lithium-ion batteries that can store some 2.2 MWh of electricity. Conventional power generation systems use diesel-powered generators to supply onboard electricity while berthed. On the Emerald Ace, electricity is generated by the solar power generation system while the vessel is under way and stored in the lithium-ion batteries. The diesel-powered generator is completely shut down when the ship is in berth, and the batteries provide all the electricity it needs, resulting in zero emissions at the pier.

The vessel's hybrid system represents a significant step forward in realizing ISHIN-I, the concept for the next-generation car carrier that MOL announced in September 2009. MOL continues to take a proactive stance in technological development with the aim of reducing the environmental burden of its vessels and operations.

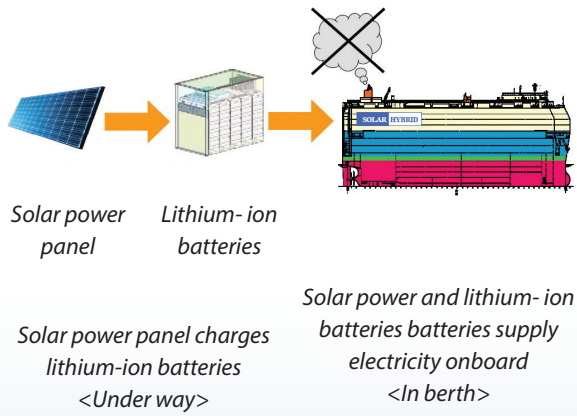

Figure 2. Conceptual Diagram of the System.

Figure 1. Car Carrier Emerald Ace.
Source: http://www.mol.co.jp/menu-e.html

Hybrid car carrier Emerald Ace The words "Solar Hybrid" on the aft of the hull designate the ship as a hybrid that makes use of renewable energy.

The development of the Emerald Ace was subsidized by the Ministry of Land, Infrastructure, Transport and Tourism as a project to help reduce CO_2 emissions from ocean-going vessels, and received support from Nippon Kaiji Kyokai as a cooperative development project to reduce greenhouse gases produced by ocean shipping operations.

Source: Mitsui O.S.K. Lines, Ltd.,; Press Release

CONCEPT OF THE NEXT-GENERATION VESSEL - CAR CARRIER ISHIN-1

MOL has advanced technologies that it has developed and utilized to the fullest, and formed the concept for its next-generation vessel, which will be technically practical in the near future. The first announcement was the next-generation, environment-friendly car carrier. MOL named the first concept vessel, a car carrier, "ISHIN-I (Ishin one)," with the key words "Senpaku ISHIN, "that reflect our approach.

The site offers a detailed look at "ISHIN-I" and the history of MOL's technological innovation. "ISHIN — History holds the key to the future"

(1) *While in port, and during loading and unloading:* Achieve zero CO_2 emissions Further develops the use of renewable energy for conventional car carriers. Realizes zero emission goal by adopting large-capacity solar-power panels and rechargeable batteries.

(2) *Under way:* Reduce CO_2 emissions by 50 % (*1)

Adopts multiple new technologies to greatly reduce the vessel's burden on the environment.

The ship achieves a 41% reduction, in comparison (per unit) to conventional vessels (PCTC with a capacity of 6,400 standard passenger cars). When needs for larger vessels arise in the future, CO_2 emissions can be reduced by 50% on that assumption.

Wider use of the solar panels partly adopted on the car carriers Euphony Ace and Swift Ace, on all areas of the upper deck on both vessels.

Achieve zero emissions while in port and during loading and unloading by installing large-capacity rechargeable batteries (lithium ion) and combining them with an electric propulsion system.

Optimization of propulsion efficiency

(1) *Contra-rotating propeller drive system*

Combine a diesel engine with an electric propulsion system, and place a pair of propellers facing each other at the stern. The propellers share the burden of powering the ship and spin in opposite directions, allowing the rear propeller to absorb the rotation energy of the front propeller. As a result, the system greatly increases efficiency.

(2) *Advanced Propeller Boss Cap Fins (PBCF)*

This MOL-developed energy-saving device has been adopted on more than 1,700 vessels all over the world. The most advanced model will be installed on the ISHIN-I vessels.

Advanced wind resistance reducing design

The design was developed by MOL, and the hull shape has been further refined, reducing wind pressure from the bow and sides. The shape of the stern also smoothes the flow of the wind.

Reduction of friction drag

Next-generation vessels will use ultra-low friction ship bottom paint. By trapping water on the coated surface, this paint eliminates friction drag caused by minute patterned indentations formed on conventionally painted surfaces.

Optimum voyage support system

This system relies on the latest marine weather information while monitoring voyage conditions, and searches for the shortest, most fuel-efficient routes while taking into account the differences in various types and hull forms of ships.

Optimization of engine system

Fuel supply to the engine is electronically controlled, and the vessel operates with the optimum fuel supply. Thermal energy conventionally lost with exhaust gas will be efficiently recovered for reuse.

Optimization of hull design

Improve the hull form, in pursuit of further improvements in fuel efficiency.

Larger hull compatible with new Panama Canal

When needs for larger vessels arise, adoption of twin-shaft propellers will allow greater improvement in propulsion performance and fuel efficiency.

This will reduce CO_2 emissions per unit transported by up to by 50%, compared to current vessels.

MOL ordered a new cape-size bulker that will adopt element technologies of the next-generation ISHIN-III vessel program to achieve high fuel efficiency. Universal Shipbuilding Corporation (president: Shinjiro Mishima) will construct the new ship, slated for completion in late 2014.

MOL has repeatedly studied various technologies to realize the concept for the ISHIN-III series of next-generation vessels (large-scale iron ore carriers) announced in April 2010.

The new building vessel will adopt the following element technologies which are at the core of the ISHIN-III concept. New technologies will boost fuel efficiency of the new ship by more than 20% compared to conventional cape-size vessels, with a corresponding reduction in CO_2 emissions. Advanced features include:

A steam turbine that generates electric power using exhaust heat from the engine.

A hybrid power generation system to convert rotational force from the supercharger into electric power.

In addition, the electric power gained through the steam turbine and hybrid systems will assist vessel propulsion.

MOL continues to take a proactive stance in technological development with the aim of reducing the environmental burden of its ships.

Specifications

Lenght:	300.0 m
Bearth:	50.0 m
Depth:	25.0 m
Draft:	18.4 m
Capacity:	About 209,000 tons
Gross tonnage:	About 107,000 tons

Source: Mitsui O.S.K. Lines, Ltd.,; Press Release

ENERGY-SAVING PROPELLER BOSS CAP FINS SYSTEM REACHES MAJOR MILESTONE – ORDERS RECEIVED FOR 2,000 VESSELS

Figure 3. PBCF

Research and development on the Energy-Saving Propeller Boss Cap Fins System- PBCF started in 1986, and sales began the following year. Since then an increasing number of ship-owners, mainly in Japan, began to adopt the system. By 2006, the 19th year since the start of sales, the PBCF had been ordered for 1,000 vessels. Since then, it has gained worldwide recognition by vessel owners and operators, and the number of ships adopting it has doubled in just five years, reaching the 2,000 vessel milestone this year.

At the Second International Symposium on Marine Propulsion in Hamburg, Germany, in June 2011, BMT Defence Services Ltd. of U.K. presented a paper reporting on a before and after speed test using an Aframax tanker operated by a major firm, showing nearly 4 % energy saving effect. This independent study once again brought the PBCF to the attention of the shipping industry and the public.

The MOL Group is promoting its next-generation vessel concept called Sempaku ISHIN, and the PBCF is one of its key technologies. Mandatory energy efficiency measures for international shipping were adopted at the International Maritime Organization (IMO) IMO environment meeting on July 15, 2011, and regulations on greenhouse gas emissions by the ocean shipping will make the PBCF even more valuable in the future. The MOL Group continues its research and development on various green technologies and promotes global environmental protection by helping reduce CO_2 emissions from vessels.

PBCF (circled in yellow) is being installed.

Its business covers a wide range of fields, including: sales of fuel and lubricants, various ship machinery, ship stores, ship parts, and telecommunication equipment; sales of land-based air conditioning equipment and industrial machinery and equipment; real estate agency and sales; and maintenance of the National Oil Storage Barges. Its environmental products include heat shield paint and energy-saving lighting fixtures in addition to PBCF. The company also markets safety-related products include scaffolding for inspection of bulk carrier cargo holds and maintenance operations.

Features of PBCF

- 3-5 % reduction in fuel consumption and a corresponding reduction in CO_2 emissions
- A reduction in propeller torque
- Reduced vibration in the stern less underwater noise
- Reduced rudder erosion

Installation is simple and straightforward, requiring only the removal of the propeller boss caps and replacement with the PBCF. No hull modification is needed. The PBCF is an integral part of the propeller, with no other moving parts. The PBCF system is custom made, with design optimized for the shape of the vessel's propellers. Lead time is three to four months from order to delivery.

It is maintenance free after installation, requiring only inspection and polishing when the vessel is in dry-dock, and performance does not decline over time.

Source: Mitsui O.S.K. Lines, Ltd.,; Press Release

THE RESEARCH VESSEL SIKULIAQ

The Research Vessel Sikuliaq will replace the more than 40-year old R/V Alpha Helix that is now retired and was owned by the National Science Foundation. The need for a more capable ship to operate in the coastal and open ocean waters of the Alaska region was first recognized by marine scientists in the U.S. in 1973. In 2001, Congress appropriated $1M for a design study. Sufficient ice strengthening will allow the Sikuliaq to work safely in moderate seasonal ice, operating over a longer period than formerly possible in the North Pacific Ocean, Gulf of Alaska, and the Bering, Chukchi, and Beaufort Seas. The design is based on science mission requirements developed by the University-National Oceanographic Laboratory System community.

Climate change (reflected by Arctic sea ice decreasing by approximately 9% per decade) and increased human use of the region will influence ocean circulation and ecosystem dynamics,

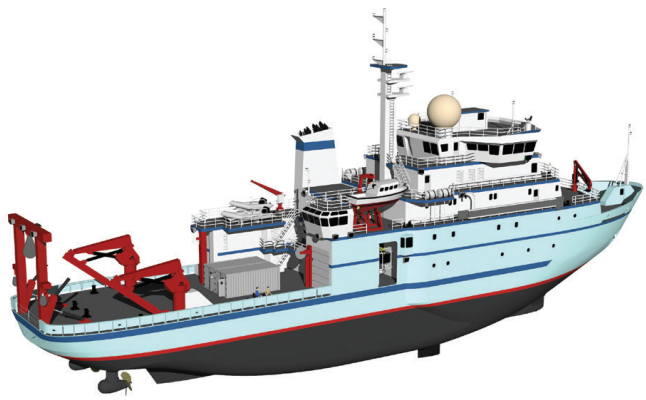

Figure 4. The Research Vessel Sikuliaq
Source: http://www.sfos.uaf.edu/sikuliaq/about/

impacting biological productivity, marine mammals and fish stocks.

This technologically advanced platform will allow up to 26 scientists and students, per cruise, to conduct multi-disciplinary studies on these complex issues, and facilitate broadband real-time virtual participation of classroom students in expeditions, including remotely operated underwater vehicles.

Arctic Ocean influences on oceanic and atmospheric circulation: Decadal variations in sea ice cover have profound effects on climate, global warming and global ocean circulation.

High productivity of Alaskan continental shelves: Effects of these processes on ecosystems and fisheries are not well understood.

Marine geological studies: Arctic oceanic sediments can reveal the history of paleoclimates. Better understanding of sub-sea volcanic activity and natural seismicity can predict potentially devastating tsunamis and other hazards.

Increasing anthropogenic contaminants: Great potential for adverse environmental effects.

Native subsistence users: Diversity and abundance of marine biota, including fish stocks, marine mammals and bird populations, will be critical to their traditional way of life.

~ Modern suite of science winches suitable for 10,000m of cable including: deep-sea traction winch; CTD winch; and hydro winch.
~ Flexible over-side handling equipment, including articulated stern A-frame.
~ Full suite of modern deck cranes on Aft deck.
~ Covered and heated equipment staging and deployment area (Baltic Room) featuring hydro-boom (Load Handling System).
~ Accommodation for three ISO standard 20 foot science vans.
~ Two multi-beam sonars (Kongsberg midwater EM302 and shallow water EM710), which are protected by ice-capable acoustic windows.
~ Acoustic Doppler current profilers, 75 kHz and 150 kHz. The Sikuliaq will be delivered with a transducer well that can accommodate a 38 kHz ADCP.
~ Jumbo piston coring capability.
~ Undulating towed vehicle (Triaxus) deployment capability.
~ MOCNESS multiple net towing system.
~ Precision vessel motion sensors.
~ Ethernet based, fiber-optic Local Area Science Network (LAN).
~ Modern vessel control system.

Planning efforts for an Alpha Helix replacement have been on-going for many years. The current design effort began in 2001 under the auspices of the University of Alaska Fairbanks and Woods Hole Oceanographic Institution Design Committee.

Source: http://www.sfos.uaf.edu/sikuliaq/about

THE WORLD'S LARGEST CONTAINERSHIP

On 5 November 2012, the CMA CGM Group took delivery of the biggest vessel in its fleet and currently the world's largest (capacity) containership: the CMA CGM MARCO POLO carrying up to 16,020 TEU-s.

First of a series of three vessels named after great explorers, the CMA CGM MARCO POLO is deployed on the Group's FAL 1 service (French Asia Line) linking Asia to North Europe. With some of the fastest transit times on the market between Asia and the English market and optimal coverage of Central and South China, FAL 1 provides a quality service to the Group's customers. FAL 1 calls at the following ports: Ningbo ‣ Shanghai ‣ Xiamen ‣ Hong Kong ‣ Chiwan ‣ Yantian ‣ Port Kelang ‣ Tangier ‣ Southampton ‣ Hamburg ‣ Bremerhaven ‣ Rotterdam ‣ Zeebrugge ‣ Le Havre ‣ Malta ‣ Khor al Fakkan ‣ Jebel Ali ‣ Ningbo.

In line with the sustainable development policy of the Group, CMA CGM MARCO POLO is equipped with all the latest environmental technologies:

An electronically controlled engine allowing a significantly reduced consumption of fuel(-3 % on average) and of lub oil (-25 %).

A twisted leading edge rudder improving the hydrodynamics of the vessel (optimization of the water flow), and significantly reducing energy expenditures as well as CO_2 emissions.

A Pre-Swirl Stator® allowing the straightening up of the water flow upstream from the propeller in order to improve its productivity. Combined with the twisted leading edge rudder, this innovation optimizes the hydrodynamics of the vessel and makes it possible to reduce by 2 to 4 % the consumption of energy and the atmospheric emissions.

An "Exhaust Gas Bypass" system, which improves the energetic efficiency of the vessel, reducing the fuel consumption by 1.5 % at low speeds.

An optimized hull design allowing to sensibly improve the propulsion of the vessel into the water. A ballast water treatment

Figure 5. CMA CGM Marco Polo

Ship's Characteristics

Delivery Date	5.11.2012
Service	FAL
Deployment	ASIA-EUROPE
Previous Name	DSME
Flag	UNITED KINGDOM
Built	2012
Nominal TEU-s	16020
TEUs 14TH	12100
Reefer Point	1200 x 40' on deck
S. DWT	187626
S. Draft	16
L.O.A	394.4
Beam	53.6
Suez GT	176714
Suez NT	159080
Speed	24.1
Builder	SME, South Korea
Propelling Engine	WARTSILA 14 RT Flex 96 C
Classification	BV CleanShip, Green Passport
Call sign	2FYD5
Bowthruster	3600
Imo Number	9454436
Managing Owners	CMA CGM HEAD OFFICE
Operator	CMA CGM

system,, in order to preserve the biodiversity of the oceans by not rejecting chemicals into seawater.A vessel 400m in length and able to carry up to 16,020 containers is a business in itself. On board, 27 crew members (including 2 officer cadets) keep this giant of the seas up and running. The Captain of the CMA CGM MARCO POLO, Velibor Krpan, 44, talked to us about his career and what it's like navigating this vessel.

"I started at the age of 22 as a cadet on Croatia Lines' vessels, a company based in Rijeka. In 1999, I worked for a German owner and then joined the CMA CGM Group in 2002 on the 350 TEU CMA CGM ORAN. At the time I never dreamt that one day I would become Captain of the world's largest containership!

There's really not much difference with the previous vessel I commanded, the CMA CGM CORTE REAL (13,800 TEU-s), despite the extra 31 metres in length. Longer and wider than any other vessel in the fleet, it does however require much closer attention during berthing and unberthing procedures. Regards navigation, fundamentally it is no different but you have to adapt quickly to the new technologies on board."

First Impressions on Navigation of Captain Velibor Krpan

Figure 6. Captain Velibor Krpan.

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Source: CMA CGM, Reprint with permission of CMA CGM

LEGAL ASPECTS OF ARCTIC SHIPPING

Arctic navigation routes include the 'Northwest Passage' between the Atlantic and Pacific oceans along the northern coast of North America and the 'Northern Sea Route' (NSR) which includes all passages along the North coast of the Russian Federation (see Figure 7). As a result of the continued melting of Arctic sea ice a new 'Central Arctic Ocean Route' may soon become an option alone or in combination with elements of the Northwest Passage or the NSR. At present most Arctic shipping is 'intra-Arctic', comprising summer operations in the Canadian Arctic and around Greenland and year round operations along

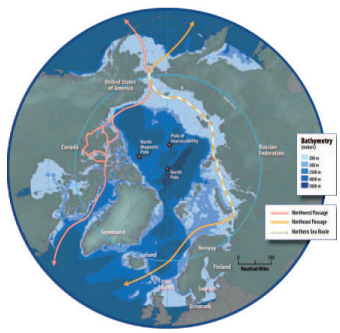

Figure 7.
The location of the North West Passage and NSR – Arctic Marine Shipping Assessment (AMSA) 2009, Report (available at www.pame.is), at p.17.

Figure 8. Arctic's sustainability development.

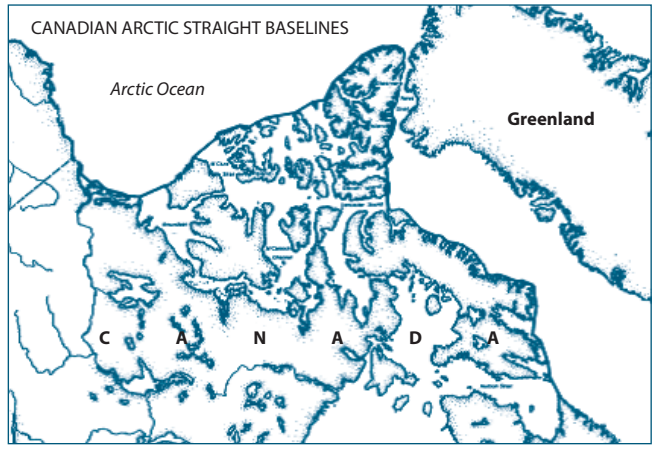

Figure 9. Straight baselines claimed by Canada – J.A. Roach and R.W. Smith, United States Responses to Excessive Maritime Claims (The Hague/Boston/London, Martinus Nijhoff Publishers : 1996 (2nd ed.)), p.119.

parts of the NSR. There have been only a handful of trans-Arctic voyages in summer along the Northwest Passage and the NSR since 2000 mostly for science and tourism.

Nevertheless, as noted in the European Commission's 2008 Arctic Communication1, the melting sea ice is progressively opening opportunities for navigation through Arctic layers which could considerably shorten trips from Europe to the Pacific with ensuing environmental and economic benefits. The successful navigation of the NSR by two German owned cargo vessels, the MV Beluga Fraternity and the MV Beluga Foresight in September 2009 has generated considerable interest in the use of this route for commercial shipping, not least because further passages are already planned for summer 2010. Other potential drivers for increased Arctic shipping activity include the development of hydrocarbon extraction activities in Arctic waters and growth in Arctic cruise ship tourism.

International Law

International law is the body of law that regulates the rights and duties of States and other actors, such as international organizations, recognized by international law. The law of the sea is the branch of international law that is concerned with all uses and resources of the sea. The sources of the law of the sea include customary international law as well as a range of conventions, treaties and agreements, the most important of which is the 1982 United Nations Convention on the Law of the Sea (LOS Convention).

All Arctic States are parties to the LOS Convention except for the United States, which nevertheless takes the view that, except for its Part XI, the LOS Convention is already part of customary international law. The European Union (EU) is also party to the LOS Convention. This is important in view of the fact that Denmark, Finland and Sweden are Member States of the EU and Iceland and Norway are parties to the Agreement creating the European Economic Area (EEA). The membership of Denmark, however, does not extend to Greenland which chose in the mid 1980s to withdraw from the then EEC and hence is not part of the EC/EU.

Part of the balance aimed for by the LOS Convention is achieved through the division of the seas and oceans into maritime zones. The starting point for the measurement of the seaward extent of all the coastal State's maritime zones is the 'baseline'. The LOS Convention provides that a 'normal' baseline is the low-water line along the coast. In some circumstances, however, for instance where the coast 'is deeply indented and cut into, or if there is a fringe of islands along the coast in its immediate vicinity' and across the mouths of rivers and bays, the LOS Convention allows coastal States to determine 'straight baselines'. Controversially, Canada has drawn straight baselines around its Arctic islands or Arctic archipelago – as illustrated in Figure 2 below.

The international legal validity of enclosing the Canadian Arctic Archipelago with straight baselines remains contentious. The United States and EU Member States lodged formal protests against the baselines regarding them as inconsistent with international law. Whether Canada can justify the status of internal waters for the enclosed waters by the argument that they are historic waters, is in doubt.

Internal waters are waters landward of the baseline of the territorial sea (described in the next paragraph) and can include bays, estuaries and ports. A coastal State has full sovereignty over its internal waters and can, in most circumstances, restrict entry into them. This is where the significance of Canada's straight baselines arises. If Canada's arguments are correct, then large parts of the Northwest Passage would lie within Canada's internal

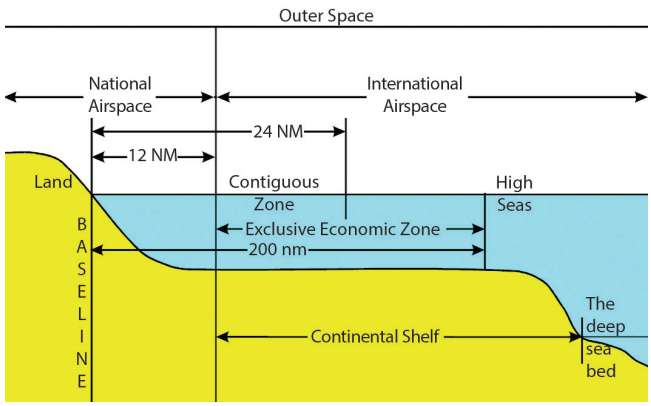

Figure 10. Maritime zones under the LOS Convention.
Source:http://ec.europa.eu/maritimeaffairs

waters. As ports lie wholly within a coastal State's territory, customary international law and the LOS Convention also recognize a port State's wide discretion in exercising jurisdiction over its ports. Pursuant to the LOS Convention, archipelagic States may draw straight baselines around their respective island groups thereby enclosing archipelagic waters. This notion does not extend to islands situated off a mainland. Therefore neither Canada nor Norway qualify as archipelagic States. The practice by these two States is consistent with this view.

Every coastal State has the right to a territorial sea up to a limit of 12 nautical miles (NM) from the baseline. A coastal State has sovereignty over its territorial sea, together with broad prescriptive and enforcement jurisdiction, subject to the right of 'innocent passage' by foreign vessels. Special rules apply to straits used for international navigation whereby the prescriptive and enforcement jurisdiction of coastal States are considerably curtailed. In terms of the Arctic, Canada and the Russian Federation take the view that this regime does not apply to the Northwest Passage and the NSR respectively due to a lack of actual usage. The United States takes the opposite view, one likely to be supported by other States with large fleets.

Beyond the territorial sea a coastal State may claim a contiguous zone that can extend to 24 NM from the baseline for customs, fiscal, immigration and sanitary enforcement purposes and an exclusive economic zone (EEZ) that can extend up to 200 nm from the baseline. Within its EEZ a coastal State has sovereign rights for the purposes of exploring, exploiting, conserving and managing living and non-living natural resources (e.g. fish and hydrocarbons) and other activities for the economic exploitation and exploration of the zone (such as the production of energy from the water, currents and winds) as well as jurisdiction with regard to artificial islands, installations and structures, marine scientific research and the protection and preservation of the marine environment.

A coastal State has a continental shelf comprising the soil and sub-soil of the submarine areas that extends beyond its territorial sea to the outer end of the continental shelf or up to 200 NM from the baseline if the continental shelf does not extend that far. In other words, some States may be entitled to an outer continental shelf that extends beyond 200 nm. A coastal State has sovereign rights for the purpose of exploring its continental shelf and exploiting its natural resources (such as the harvesting of sedentary fish species, drilling, tunnelling etc.). No State may claim sovereignty over the high seas, the international commons beyond the EEZ, and consequently no State can exercise jurisdiction in a coastal State capacity there. All States enjoy the freedom of the high seas. Beneath the high seas and seaward of the coastal States' continental shelves, the seabed and ocean floor is categorized as the Area in the LOS Convention.

In terms of substantive standards, the international regime for the regulation of maritime shipping contains a wide number of categories, including:

- discharge and emission standards, including standards relating to ballast water exchange;
- construction, design, equipment and manning (CDEM) standards, including fuel content
- specifications and ballast water treatment requirements;
- navigation standards, in the form of ships' routing measures, ship reporting systems (SRS-s)
- and vessel traffic services (VTS-s);
- contingency planning and preparedness standards; and
- liability, compensation and insurance standards.

For the purpose of the Study, separate attention was devoted to the following categories of standards:

- cruise tourism;
- security issues;
- bunkering and transport of non-living resources; and
- the protection and preservation of the marine environment

Shipping Guideline

A rationale for Norway's 2006 High North Strategy was the growing recognition of the importance of the area to Norway as a whole. The 'High North' includes the Northern part of Norway and the adjoining maritime areas northwards up to the Greenland Sea in the west including the island Jan Mayen and to the Barents Sea in the east including the Svalbard Archipelago. The High North Strategy also includes a reference to the integrated management plan adopted for the Barents Sea and the sea areas off the Lofoten Islands.

The Arctic has long been a specific item of Russian state policy. In terms of shipping the regulatory focus is on the NSR. Although opened to foreign shipping in 1991, volumes of cargo transported along the NSR have actually decreased fivefold since the 1980s.

Its name notwithstanding, the NSR is not a single linear

'route': due to the highly variable and difficult ice conditions the optimal course of vessels navigating the NSR will vary. Rather it constitutes the entire corridor that is the sea area to the north of the Russian Federation irrespective of the distance from the coastline including Russia's EEZ, territorial sea and internal waters.

Specifically with respect to the Arctic marine area, however, there are a range of disagreements on issues within the international law of the sea as well. For the purpose of this Study, a distinction can be made between those that relate expressly or directly to merchant shipping and those that do not. The latter issues include the following:

(a) the dispute between Canada and Denmark on title to territory over Hans Island;
(b) unresolved maritime boundaries between States;
(c) absence of final and binding outer limits of the continental shelf beyond 200 nm involving the Commission on the Limits of the Continental Shelf (CLCS); and
(d disagreement on the spatial scope of application of the

Treaty of Spitsbergen.

It is submitted that the first two issues may have implications for (the regulation of) merchant shipping but the latter two do not. Disagreements that relate expressly or directly to merchant shipping include the following:

(a) the consistency with international law of the straight baselines drawn by Canada around its Arctic archipelago and, as a corollary, the legal status of the landward waters and the navigational rights for foreign vessels therein, especially those that form part of the Northwest Passage;
(b) the legal status of certain marine areas within the NSR;
(c) the spatial scope of application of Article 234 of the LOS Convention; and
(d) the relationship between the LOS Convention's Article 234 and its regime of transit
passage for straits used for international navigation.

The disagreements listed in the previous paragraph converge in the Northwest Passage as well as the NSR. As regards the Northwest Passage, the United States and several EU Member States have protested the straight baselines and the United States also takes the view that the Northwest Passage – or at least part of its routes – is subject to the regime of transit passage and that this regime trumps Article 234. Apart from the issues of straight baselines, the United States has a similar view with respect to the NSR. If the Canadian and Russian views were to be upheld, they would be entitled to the in principle absolute coastal State authority States in internal waters or the extensive coastal State authority in territorial sea in addition to the fare aching powers of coastal States pursuant to Article 234.

Based on the analysis of the national laws and regulations on merchant shipping of Canada, Denmark (Greenland), Iceland, Norway, the Russian Federation and the United States carried out in this Study, it can be concluded that only Canada and the Russian Federation have enacted laws and regulations that are significantly more stringent than GAIRAS. Assuming that not the regime of transit passage but Article 234 would be applicable, the laws and regulations of Canada and the Russian Federation do not seem to overstep the limits imposed by Article 234. Both States formally recognise the various navigational rights of foreign vessels through their maritime zones. Moreover, the analysis did not indicate that the substantive standards or requirements are unreasonable or discriminate unjustifiably between national and foreign vessels. The Canadian enactment that has most relevance for this Study is the AWPPA, the Act that 'inspired' Article 234 of the LOS Convention. With its scope recently extended to apply throughout Canada's EEZ, the AWPPA and its implementing regulations specify a number of standards that are stricter than GAIRAS, including construction, design, equipment and navigation standards, including mandatory navigation and ice breaker service fees.

While the analysis of relevant laws and regulations of Denmark (Greenland), Iceland, Norway and the United States has led to the conclusion that none of these States need to invoke Article 234 of the LOS Convention for justification, the question should also be raised if they would be entitled to rely on Article 234 in the first place. The phrase 'for most of the year' would not give such an entitlement to Iceland at all but for Denmark (Greenland) it would be very broad. For Norway an entitlement would be limited to certain marine areas off Svalbard and for the United States to certain marine areas of the maritime zones off Alaska north of the Bering Strait.

In terms of considering options for consultation and reform, the main rationale for multilateral regulation of Arctic marine shipping is that it would provide a minimum level of regulation and a level playing-field between the participants. The more universal the participation in such multilateral regulation, the fewer free riders with competitive advantages there will be. At the outset it is appropriate to address a number of more general considerations. These include:

(a) whether options for reform should be legally binding or not;
(b) whether there is a suitable existing international body where the selected option can be developed and adopted and if not, whether is there a need and sufficient support for establishing a new international body; and
(c) whether participation should be limited to Arctic coastal States and the related question as to which vessels should be subject to such regulation.

THE NEW MARPOL ANNEX V GARBAGE REGULATIONS

New regulations addressing garbage management go into effect on January 1, 2013 pursuant to action taken by the Marine Environment Protection Committee (MEPC) at its sixty-second session in July 2011 after a comprehensive review of MARPOL Annex V. The new regulations impose stricter garbage management procedures and documentation requirements for all vessels and fixed and floating platforms which will have major implications for industry, as discussed below. The revised MARPOL Annex V, contained in MEPC.201(62), is available on the IMO's website for the Marine Environment Protection Committee (MEPC), 55th session.

The most significant change in the new regulations is its general approach to garbage management. Under the current regulations, discharge of garbage into the sea was generally allowed unless specifically prohibited or limited. This concept is reversed in the new regulations, which impose a general prohibition on the discharge of all garbage unless the discharge is expressly provided for under the regulations. To aid in identifying the categories of garbage which may be discharged, the new regulations include a host of new definitions, such as for "animal carcasses," "cargo residues," "cooking oil," "domestic wastes," "fishing gear," "food wastes," "incinerator ashes," and "operational wastes." The new regulations allow the limited discharge of only four of these categories: food waste, cargo residues and certain operational wastes not harmful to the marine environment, and carcasses of animals carried as cargo. Combined with the general prohibition on the discharge of garbage outside these limited categories, the new regulations greatly reduce the amount of garbage that vessels will be able to dispose of at sea. Below is a simplified overview of the new discharge provisions that is posted on the IMO website.

Any garbage permitted to be disposed of at sea must be discharged while the vessel is "en route." Per the definitions, "en route" means that "the ship is underway at sea on a course or courses, including deviation from the shortest direct route, which as far as practicable for navigational purposes, will cause any discharge to be spread over as great an area of the sea as is reasonable and practicable."

Stricter regulations will pose a number of operational challenges. The increase in the quantity of garbage required to be retained onboard and disposed of ashore is likely to create a host of logistical problems for vessels and port authorities with regard to storage, equipment, and sanitation. Indeed, many existing ships will not be able to handle the amount of garbage requiring incineration and many port authorities will not be able to handle the large amounts of dunnage without substantial investment and planning. Vessels will incur higher port garbage service charges which will have to be taken into account in chartering agreements. In addition, greater limitations on the discharge of cargo residue and wash water will affect if, how, and where the cleaning of holds and external surfaces may be conducted. For example, any cleaning agents used to wash exterior surfaces may be discharged only outside special areas and the vessel must have evidence from the producer of the product that it meets certain criteria for not being harmful to the marine environment.

The new regulations also expand documentation requirements for vessels and offshore platforms. Garbage management plans must be revised to reflect the new regulations. The IMO published guidelines for the drafting of new garbage management plans, MEPC.220(63), available here, which outlines items that should be covered by the plans. The requirement to have a garbage management plan is expanded to include all vessels of 100 gross tons or greater, whereas under the current regulations garbage management plans are required for vessels 400 gross tons or greater. Fixed and floating platforms must also have a garbage management plan under the new regulations. In addition, the Garbage Record Book on all vessels must be replaced. The new version of the Garbage Record Book includes revised categories and requires entries to be itemized by category, if possible. Fixed and floating platforms must also maintain a Garbage Record Book under the new regulations. Finally, the requirement to post placards is extended to offshore platforms. Placards currently in place on all vessels must be replaced as well.

The IMO published "2012 Guidelines for the Implementation of MARPOL Annex V" to aid governments, ports and terminal operators, ship owners and operators, vessels' crews, and equipment manufacturers in complying with the new regulations. The guidelines outline a number of recommended waste minimization and handling techniques, including that vessels minimize taking on material that could become garbage. A number of tactics are suggested in the guidelines, such as ordering supplies that come in bulk packaging as much as possible, avoiding the use of disposable dinnerware and towels, and utilizing reusable cargo coverings, dunnage, and packing materials. The guidelines also suggest multiple garbage sorting practices, emphasizing the need for careful planning of garbage handling under the new regulations as more garbage will need to be stored onboard until it can be properly disposed of ashore. An analysis as to the advantages, disadvantages, and effectiveness of grinders, compactors, incinerators, and other garbage handling equipment is provided to aid in garbage management decisions. As the new regulations will increase the quantities of garbage offloaded to shore based reception facilities, the guidelines further provide suggestions for garbage management decisions for port reception facilities and encourages consideration of alternative reception facility methods, such as the use of barges or self-propelled vessels as floating plants for garbage collection.

Revised sample placards targeting crew, offshore platforms, and passengers are located at the end of the guidelines. The guidelines, MEPC.219(63), are available here.

Vessels operating in the United States have experienced increasingly heightened enforcement of, and penalties under, oil pollution prevention requirements under MARPOL Annex I and, more recently, air pollution prevention requirements under MARPOL Annex VI. It is unclear, however, at this time when the Coast Guard will publish enforcement guidance on what to expect when the revised MARPOL Annex V goes into effect shortly. In conclusion, owners and operators of vessels, offshore platforms, and port authorities have precious little time remaining to prepare for these new requirements not only from a logistics and equipment standpoint but also from a training standpoint.

"Trash Talk: Are You Prepared for the New MARPOL Annex V Garbage Regulations?" by Jonathan K. Waldron and Dana S. Merkel first appeared in Maritime Reporter, November 2012. For more information, visit www.maritimereporter.com.

PLATFORM TO MONITOR THE MARITIME BORDERS OF THE EU FOR VIOLATIONS OF MIGRANTS' RIGHTS

The European Union wants robotic eyes on incoming immigrants. As part of a $410 million proposal to improve border security, the European Commission, the executive body of the Union, is considering a deployment of drones above the Mediterranean Sea to keep an eye on illegal immigrants. Alongside increased satellite activity, "sensors mounted on any platforms, including manned and unmanned aerial vehicles" would keep a close watch on unauthorized immigration activity in the Mediterranean Sea, according to the European agency in charge of the EU's borders.

The proposal is called the EUROSUR project (.pdf), and it's yet to be debated in the European Parliament and the Council. But eurocrats are hoping to put it into place by next year. "EUROSUR will help detect and fight criminal networks' activities and be a crucial tool for saving migrants who put their lives at risk trying to reach EU shores," said Cecilia Malmström, the EU's commissioner for home affairs.

But while EUROSUR is said to be a tool to save migrants' lives, Europe's discomfort with immigration raises the prospect of immigrant communities coming under a drone panopticon.

The Mediterranean is a major transit point for undocumented immigration. Just this year, 170 immigrants died trying to reach southern European shores. Earlier this month, an inflatable boat sunk miles off the Italian coast, killing 54 Eritreans who were fleeing their country.

There are few details about EUROSUR so far; it's unclear, for instance, what kinds of satellites or drones will be used. But the plan is to use sats, spy planes and drones to aid authorities in spotting illegal immigrant crossings across the Med; diminish the number of immigrants that die trying to get to Europe; and fight cross-border crime. Having drones fly over the Mediterranean will allow authorities to spot preparatory activities such as the gathering of vehicles or boats on African beaches. There's no plan to put eyes in the sky over immigrant communities in European cities.

According to opponents, these new measures will only lead to abuse. The ability to spy on African beaches has the potential of criminalizing immigrants before they even leave their border. To critics, EUROSUR is a product of European intolerance, fueled by groups that advocate returning immigrants to their countries of origin before they ever reach European shores, so they don't become the European Union's responsibility. The European Commission denies that EUROSUR could be abused. "The situational pictures will as a general rule not involve personal data but rather the exchange of information on incidents and depersonalized objects, such as the detection and tracking of vessels," states the Commission's proposal. Due to the proposal's lack of details, it's still unclear whether the authorities will store the data they collect or purge it after a certain amount of time.

Figure 11. Refugees at Sea. Source: Wikimedia Commons.

IMO AWARDS FOR EXCEPTIONAL BRAVERY AT SEA 2012

Canadian and Chilean rescuers have been presented with the International Maritime Organization (IMO) Award for Exceptional Bravery at Sea 2012, during a special ceremony held on 26 November 2012 at IMO Headquarters in London.

Sergeant Janick Gilbert (posthumously), Master Corporal Max Lahaye-Lemay and Master Corporal Marco Journeyman, crew members of the Royal Canadian Air Force's 424 (Transport and Rescue) Squadron, were nominated by the Government of Canada, in recognition of the exceptional bravery which was displayed by them, in saving the lives of two Inuit hunters stranded in an open boat in icy waters near Igloolik, Nunavut.

Able Seaman César Flores, a rescue swimmer in the aerial detachment of the Chilean Navy, was nominated by the Government of Chile, in recognition of the exceptional bravery which he displayed in rescuing seven survivors from the motor launch Rosita V, in Locos islet, Moraleda Channel, in extremely dangerous weather, and at considerable risk to his own life.

Figure 12.
Awards for Exceptional Bravery at Sea. Source: IMO.

REVISED PILOT TRANSFER ARRANGEMENTS REQUIREMENTS

Revised requirements covering some safety aspects of pilot transfer arrangements have been introduced through changes to SOLAS Regulation V/23 and apply to "equipment and arrangements for pilot transfer which are installed on or after 1 July 2012". Although the revised requirements affect primarily new ships, i.e. ships constructed on or after 1 July 2012, or for which the building contract is placed on or after 1 July 2012, some of the requirements also apply to existing ships constructed before 1 July 2012.

The revised requirements for pilot transfer arrangements can be summarized as follows:

Pilot ladders position and construction. The securing strong points, shackles and securing ropes should be at least as strong as the side ropes. The steps of the pilot ladders should comply with specific requirements set out in IMO Resolution A.1045. No pilot ladder should have more than two replacement steps which are secured in position by a method different from that used in the original construction of the ladder. Pilot ladders with more than five steps should have spreader steps not less than 1.8 m. Permanent marking should be provided at regular intervals in order to facilitate the rigging of the ladder to the required height etc.

Pilot ladders ropes. Ropes r should consist of two uncovered ropes not less than 18 mm in diameter on each side and should be continuous, with no joints and have a breaking strength of at least 24 kN per side rope. Side ropes should be made of manila or other equivalent material etc.

Arrangements for accommodation ladders used in conjunction with pilot ladders. The length of the accommodation ladder should be sufficient to ensure that its angle of slope does not exceed 45°. The lower platform of the accommodation ladder

Figure 13. **Pilot boat.** Source: Wikimedia.

should be in a horizontal position and secured to the ship's side when in use. The lower platform should be a minimum of 5 m above sea level. Intermediate platforms, if fitted, should be self-levelling. The ladder and platform should be equipped on both sides with stanchions and rigid handrails (hand ropes if used should be tight and properly secured) etc.

Use of mechanical pilot hoists is prohibited by SOLAS regulation V/23.

Access to deck: Means should be provided to ensure safe, convenient and unobstructed passage for any person embarking on, or disembarking from, the ship between the head of the pilot ladder, or of any accommodation ladder, and the ship's deck. IMO Resolution A.1045(27) sets further specific requirements for access to deck.

Approach of the pilot boat: Installation of pilot ladders winch reel. The point of access to or egress from the ship may be by a ship's side opening, an accommodation ladder when a combination arrangement is provided, or a single section of pilot ladder. The access position and adjacent area should be clear of obstructions, including the pilot ladder winch reel, for distances as

described within IMO Resolution A.1045(27). Specific positioning of pilot ladder winch reels. The pilot ladder winch reel should not be relied upon to support the pilot ladder when the pilot ladder is in useand it should be secured to a strong point, independent of the pilot ladder winch reel.

The term "installed on or after 1 July 2012" refers to the delivery date for the system to the ship, or if this is not available, the date it was actually delivered to the ship. This does not apply to equipment and arrangements installed on or after 1 July 2012, which represent replacement of equipment and arrangements provided on board existing ships before 1 July 2012.

Finally, IMPA has developed the following poster regarding Pilot Transfer Arrangements in accordance with the relevant IMO regulation.

FILIPINO SEAFARERS TO GET DOUBLE WAGE WHEN IN HRA

Last month POEA issued a Governing Board Resolution regarding Filipino seafarers working on vessels transiting high-risk areas. According to mentioned resolution the computation of double wage and compensation benefits for seafarers traversing established high risk zones/areas covers overtime and leave pay. he payment and the computation of double wage benefits was provided by POEA's 2009 Memorandum Circular No.14. According to mentioned circular the entitlement to double wage, compensation and benefits commences as soon as the vessel enters the declared high-risk zone. The compensation and benefits provided are limited to the duration of the vessel's transit through the high-risk zone. Regarding the computation of the daily rate of the basic pay, guaranteed or fixed overtime and leave pay, the monthly figures are divided by 30 days. The resulting amount (quotient) is the daily rate. This will then be multiplied by two (2) to arrive at the doubled daily rate of the compensation due the seafarer. In the case of seafarers whose overtime pay is based on an hourly rate, the computation of the daily rate shall be based on a regular working hours of eight (8) hours in every 24 hours, midnight to midnight, Monday to Sunday, in accordance with Section 10B of the Standard Terms and Conditions Governing the Employment of Filipino Seafarers onboard ocean going vessels.

In addition to the aforementioned circular POEA's 2011 Governing Board Resolution No.9 states that seafarers transiting High Risk Areas are entitle to compensation amounting to 100% of the basic wage and a doubled compensation payable in case of death and disability. This applies for each day of the vessel's "stay" within HRA.

SEAROBOTICS DELIVERS AUTONOMOUS HULL CLEANING SYSTEM

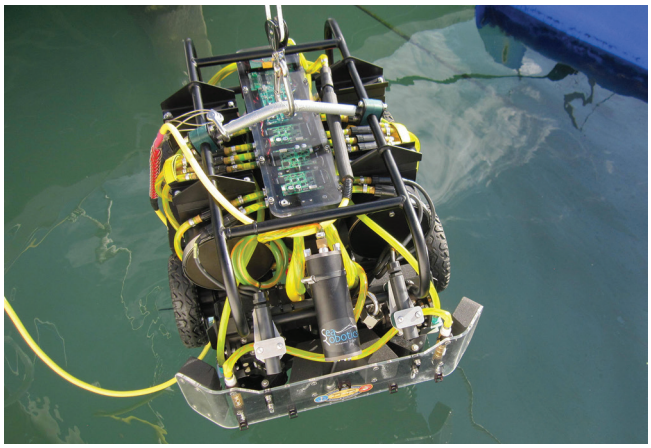

Figure 14. HullBUG System Delivered for U.S. Navy Testing.

SeaRobotics Corporation has delivered the first HullBUG (Hull Bio-inspired Underwater Grooming) System to the Center for Corrosion and Biofouling Control at the Florida Institute of Technology in Melbourne. This is in support of their newly commissioned Large-Scale Seawater Facility for HullBUG Development funded by the U.S. Navy Office of Naval Research (ONR).

The HullBUG System is an autonomous underwater vehicle designed to crawl on ship hulls or other underwater structures and "proactively groom" the surface. Developed by SeaRobotics and funded by ONR, this highly automated proactive grooming (or light cleaning) process will revolutionize hull maintenance, allowing ship hulls to remain in a clean state at all times. The benefits of improved hull condition are dramatic—the estimated 5% improvement in fuel efficiency achieved through proactive grooming translates into a savings of $15 billion per year for the shipping industry worldwide as well as reduction in the 1 billion tons of greenhouse gases emitted by the fleet.

"The financial benefits to the commercial shipping industry of HullBUG-enabled proactive grooming are enormous. Equally impressive are the associated environmental benefits derived from the operations with improved hull efficiency," stated Don Darling, President of SeaRobotics.

HullBUG is a small autonomous vehicle weighing 30 to 40 kg that attaches to the hull and performs a gentle cleaning function, or grooming. Numerous embedded computers perform navigation and sensing tasks to allow the grooming of the majority of the ship hull. Its ability to be attached to ferrous,

non-ferrous, and fiberglass hulls and to deploy various sensors makes the HullBUG the best choice to overcome the numerous challenges involved in inspection and grooming. Opportunities in commercial shipping, oil and gas, nuclear, and conventional power generation markets are under discussion.

SeaRobotics specializes in small, smart vehicles that are remotely or autonomously operated. Its clients include major military and commercial organizations, both U.S. and foreign. SeaRobotics' marine survey software interfaces with most data acquisition hardware, software, and sensing systems to produce multi-spectral, DGPS-stamped data for survey, research, or surveillance efforts. Applications for SeaRobotics vehicles range from hull grooming and inspection to bathymetric and hydrographic surveys to coastal, harbor, and riverine surveillance. Many SeaRobotics vehicles are small, modular, and man-portable, allowing for rapid deployment in remote areas.

Source: www.searobotics.com

Advanced Simulation Helps to Solve Ballast Water Management Problems

Tobias Zorn, Jan Kaufmann, FutureShip & Milovan Peric

Ballast water management poses problems in design and operation of ships. Computational fluid dynamics (CFD) offers solutions with design, type approval and trouble-shooting.

Computational fluid dynamics (CFD) denotes collectively techniques for solving equations describing the physics of fluid flow. CFD is by now widely known and accepted in the maritime industry, but mostly associated with flows around the hull and propellers, for example in the context of designing more fuel-efficient ships. However, CFD is in many ways far more versatile than classical model testing.

The same software can be applied to a variety of flows, including also internal flow problems.

A key advantage of CFD is the insight into flow details. As flow quantities are computed (and stored) at many discrete locations in space (computational cells) and for many time steps, it is easy in post-processing to look at arbitrary cross-sections and zoom in and out at will.

Ballast water management systems have moved into the spotlight for ship operators with recent IMO regulations which drive the transition towards ballast water management to curb the spread of invasive species. But apart from the particularities of the new regulations, ballast water handling may pose challenges for ship operators where the advantages of CFD simulations come into play. The following case studies illustrate problems and solutions taken from industry experience.

Case study 1: Type approval based on CFD

The ballast water of ships carries plants and animals which frequently settle in foreign sea regions, representing a danger for the indigenous aquatic environment, potentially causing great ecological, health-related and economic damage. The growing ship traffic has increased this threat considerably. The IMO "International Convention for the Control and Management of Ships' Ballast Water and Sediments" requires a ballast water management plan. Starting from the year 2016, all ships will have to base their ballast water management on ballast water treatment.

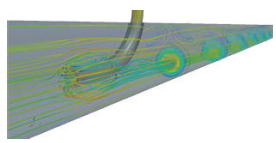

Figure 1.
CFD simulates mixing of two fluids in a pipe for type approval.

If this treatment is based on chemical approaches, rapid and effective mixing of the chemical component with the ballast water is vital to achieve a homogeneous concentration of the biocide. For type approval of new systems, simulations can be a valuable tool. In one case, FutureShip simulated the mixing of chlorine and ballast water in pipes during the ballasting operation. The CFD simulations were used to determine the required pipe length of the mixing zone to ensure homogeneous mixing. Simulations showed that the mixing in the initial design was inefficient. Very simple and cost effective modifications of the inlet geometry served to increase the turbulence level significantly with a resulting much shorter pipe length for complete mixing. Figure 1 shows compute streamlines and chlorine concentration in the mixing pipe resulting from one such simulation. The authorities accepted the simulations as engineering proof for type approval.

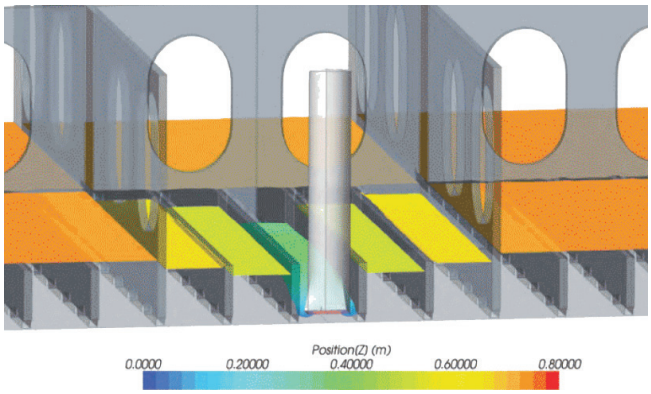

Figure 2. Snapshot of de-ballasting simulation reveal uneven water levels due to insufficient size of cut-outs (pump intake section is almost depleted).

Case study 2: Ballast water sediments

Sediments tend to collect in ballast water tanks. They reduce the deadweight (payload), restrict water flow thus delaying de-ballasting, and increase draft resulting in higher fuel consumption. For a Capesize bulk carrier, the ship owner wanted to reduce sediment accumulation and tasked FutureShip with detailed analyses and suggestions for re-design in order to minimize sediment settling in the ballast tanks.

In this case, the actual sediments were not modeled. Instead, engineering insight facilitates the simulation. Sediments settle in regions of low water speed, as found typically in areas of recirculation and flow stagnation; these are commonly referred to as dead-water regions. Figure 2 shows sediments in a real ballast water tank. The two-phase (water and air) simulations of flow in ballast tanks first identified dead-water areas corresponding to observed sediment accumulation in the original design. Figure 3 shows computed velocity distribution near bottom wall. Then various design alternatives for the ballast water tanks explored variations of stiffener spacing and cut-outs. The simulations identified the alternative design with least sediment settling (i.e. smallest dead-water regions) for future bulk carrier orders.

Case study 3: Ballast water de-ballasting

A busy coal terminal in Latin America had given strict time limits to de-ballast a bulk carrier at quay. The ballast pump was taking in air during de-ballasting, forcing the crew to stop de-ballasting intermittently. As a consequence, the vessel could not be de-ballasted in the time given by the terminal. The vessel had to leave with 3000 t of ballast water still in the tanks. As a consequence,

Figure 3. Sediments accumulate in ballast water tanks in areas with flow stagnation.

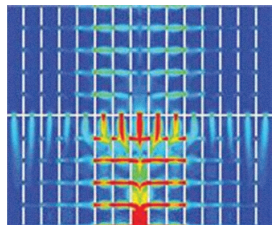

Figure 4. CFD simulation of velocity distribution in ballast water tank close to bottom wall.

2600 t of cargo could not be loaded, resulting in 125,000€ damage claims and the vessel being blacklisted at the terminal.

A detailed analysis is often the first step in trouble-shooting. Once the problem has become transparent, the solution is straight-forward. In this case, the first step was thus to simulate the de-ballasting process, setting up a three-dimensional model of the ballast water tanks and mimicking the pump by a prescribed flow rate at the outlet of suction pipe. The out flux was set to the maximum pump capacity. The simulation of the two-phase flow revealed that the water level in neighboring fields was much higher than in the field with the ballast pump intake during de-ballasting. Figure 4 shows the uneven water levels in various tanks sections. The size of the water-flow openings in the longitudinal frames was too small for de-ballasting rate of the pumps. The simulation provides information about the time-dependent flow rate through each opening and predicts the time at which air begins to be sucked by the pump. The animation of free surface motion and velocity distribution in various cross-sections gives engineers a direct insight into the physics of the flow and allows an easy assessment of the problem, aiding the design of necessary geometrical modifications. Based on the analysis of simulation data, more and larger water-flow openings for the frames in the vicinity of the pump were suggested to synchronize fluxes through openings with the pump intake flux. Size and location of the water-flow openings could then be determined such that the inflow toward the pump was above the pump rate, thus avoiding the risk of the pump taking air.

Conclusion

CFD simulations have proven to be a versatile and powerful tool to support design and operation of ballast water management systems. The combination of advanced computational software and expert users yields detailed insight and reliable answers.

Acknowledgements

The authors appreciate the help and cooperation of their colleagues Volker Bertram and Jan Rüde.

CFD method

The simulation employed CD-adapco's CFD software STAR-CCM+. This software is capable to simulate turbulent flow with resulting eddy formation and turbulent mixing, as well as multiple fluids with resolved liquid-gas interfaces. It is thus able to capture all important physics for the analysis of ballast water flows as

presented here. The solution method is based on conservation equations in integral form with appropriate initial and boundary conditions.

The solution domain is subdivided into a finite number of control volumes which can be of an arbitrary polyhedral shape and are typically locally refined in regions of rapid variation of flow variables. The time interval of interest is also subdivided into time steps of appropriate size. The governing equations contain surface and volume integrals, as well as time and space derivatives. These are approximated for each control volume and time level using suitable finite approximations, leading to an algebraic equation system which can be solved efficiently on a multi-processor computer.

The flow is assumed to be governed by the Reynolds-averaged Navier-Stokes equations. Turbulence effects can be accounted for by a variety of models, from the simplest eddy-viscosity type models (k-[] or k-[] models are typically used) up to the Reynolds-stress models. Thus, the continuity equation, momentum equation, and between two and seven equations for turbulence properties are solved. Large-eddy simulations, which model only the small-scale turbulence and resolve large-scale eddies, are also possible.

Multi-phase, multi-component systems (water-air or water-chlorine in the applications shown here) can also be simulated. The spatial distribution of the phases (liquid and gas) is obtained by solving an additional transport equation for the volume fraction of each additional phase. To accurately simulate the convective transport of immiscible fluids, the discretization must be nearly free of numerical diffusion.

For this purpose, a special high-resolution interface-capturing (HRIC) scheme is used, providing a sharp resolution of free surfaces and allowing simulation of flow with trapped gas bubbles in liquid or liquid blobs in gas.

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Seafarers' Evening- 61st Anniversary

Jadran Marinković (Head of Radio Show)

Figure 1. Editor Jadran Marinković.

Pomorska večer (engl. *Seafarers' Evening*), a programme about sea and the people related to the sea, especially intended for seafarers and their families, is one of the oldest programmes of the Croatian Radio. For the first time, entitled as A PROGRAMME FOR SEAFARERS, it was transmitted on July, 8th 1952, so this year has been the 61st anniversary of its continuous transmission every Monday. It used to last for an hour, then two hours, and currently it is transmitted from 20.15 hours till midnight‡and from 5 "maritime" radio stations of the Croatian radio: Pula, Dubrovnik, Rijeka, Zadar and Split.

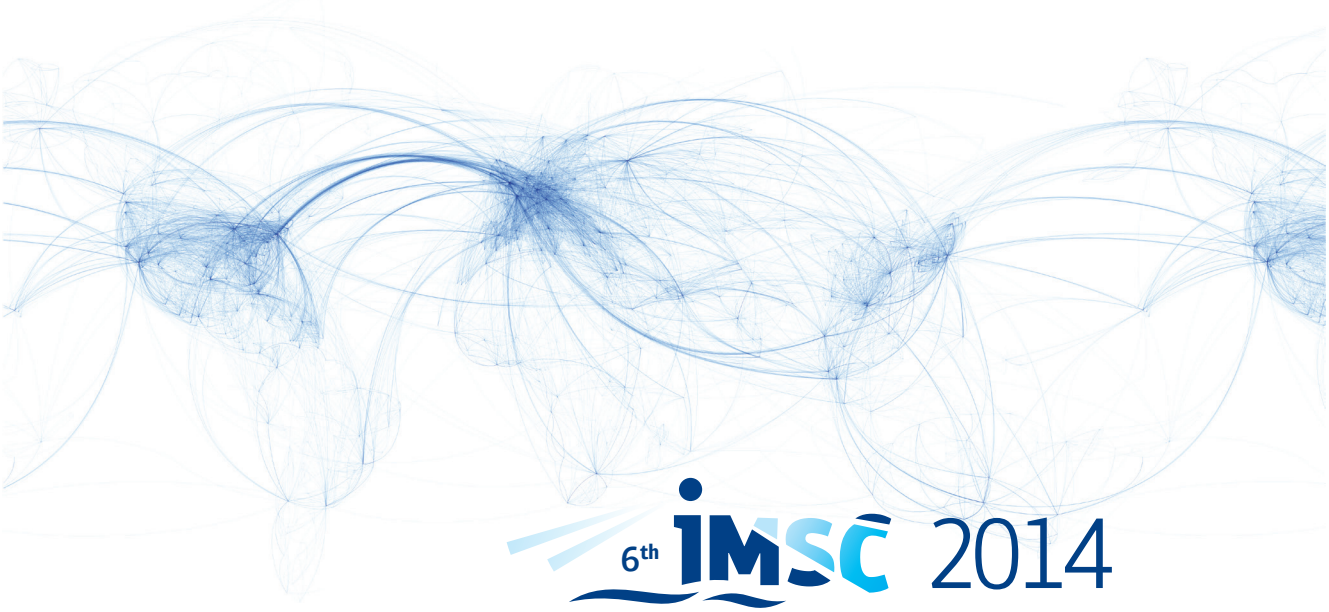
In the period of Morse symbols, without satellite navigation, mobile phone or Internet

the programme was a link to the distant seas and oceans via medium and short waves of the Croatian Radio. Greetings and messages, news from the homeland, proceeding of the vessels used to be a kind of challenge to the listeners, not only at sea, but also on the continent and Croatian emigrants.

The programme that has been with us for more than 60 years sticks to the rule "*with the taste of the sea, with the taste of the salt*" – regarding not only the stories and coverages, but also our distinctive music. There is a small number of even larger maritime countries with this type of a specialized programme dealing with all important topics from the field of maritime affairs, fishing, shipbuilding, port operations, safety of navigation. In numerous coverages, meetings, notes, severe comments and public warnings the programme editors have always strived to take the side of the seafarers, fisherfolk and dockers wishing for the things to get better and gain more success as the sea and vessels have always been a source of living.

Seafarers' Evening, which has already become a cult, every Monday wishes to convince both the general public, but especially those involved in politics that Croatia should be a MARITIME and not only a COASTAL country, some 20,000 seafarers the majority of whom unfortunately man foreign vessels not being the only reason.

IMSC 2014: Upcoming Conference on Maritime Science



Topics of interest

~ Marine Engineering,
~ Navigation,
~ Safety Systems
~ Marine Ecology,
~ Hydrography,
~ Marine Automation and Electronics,
~ Transportation and Modes of Transport,
~ Marine Information Systems,
~ Maritime Law,
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Authors are invited to submit abstracts on e-mail imsc@pfst.hr. Abstracts should be text only up to 250 words long, and should be written in English and Croatian language. Immediatly after abstract, please provide at least 4 keywords. Single author may participate in up to two papers, irrespectively of number of co-authors per paper. The abstracts should be sent until 1st December 2012. The authors will be informed about acceptance no later than 18th December 2012. All accepted abstracts will be published in the Book of Abstracts.

Official Language of the Conference

Papers should be submitted in English. Presentation slides should be given in English, and oral presentation can be made in either English or Croatian.

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