For all those who feel passionate about the maritime sector,

Welcome to the new edition of YMI!

Young Maritime International is a magazine that aims to provide youth in the maritime sector with the opportunity to publish their projects, innovative ideas, and graduation projects.

In this edition YMI:

Matthias Kempen with his thesis Zero-Emission-Fleet. He studied at the University of Applied Sciences, Faculty of Maritime Studies; Maritime Technology and Shipping Management in Emden Leer, Germany.

The magazine is meant for youth and students in the maritime sector, maritime businesses, educational institutes, business schools, governmental institutes, and other interested parties.

Daniëlla Vermeer
ZERO-EMISSION-FLEET

BACHELOR THESIS
by: Matthias Kempen, matriculation number 7000 882, WS 2013/14

course of study: Maritime Technology and Shipping Management, (B.Sc.)
branch of study: Ship and Environmental Engineering
1st examiner: Prof. Dipl.-Ing. Freerk Meyer, HS Emden / Leer
2nd examiner: Prof. Dr.-Ing. Marcus Bentin, HS Emden / Leer
7th, March 2014
INTRODUCTION:

With this bachelor thesis I’d like to give the dear reader an inspiration as well as a substantial overview about the today’s technical feasibility and the ecological as well as the economical benefits of introducing the world’s first seagoing zero emission merchant fleet. The ecological need is obvious in these days where we need to tackle climate change - a battle we all have to fight! The IMO regulations TIER II & III / (S)ECAs, and other environmental protection regulations make it necessary to react. Consequently most shipowners and operators are evaluating which measure could be best for his needs to meet these regulations. Scrubber? LNG? Furthermore the economical long-term success for the company and calculate able charter rates rely in my opinion on independence from the future fuel price scenario. The way to long term business growth in shipping is to stop using fossil fuels and the clue is: Don’t depend on others - produce your own renewable energy with own wind-, water- and solar- power plants onshore/offshore - depending on location and geographic characteristics. In this manner the company (or better: a pool of companies) gains independence from whatever fuel price scenario other shipping companies are confronted and have to deal with.

This very special shipping company would put up the world’s first zero emission merchant fleet and would become so leader in green shipping sector by creating a unique selling point to step out from the rest and would invest in a stable growth for the company instead of paying fuel bills for the next decades. Savings are profit! With the production of clean hydrogen (or LNG alternatively) by their own, shipowners / shipping companies could gain independence of the future fuel price scenario. Without relying on the future price scenario shipowners can calculate with stable running costs. Company growth and success is possible to be planned on long-term view while creating jobs, strengthening local infrastructure and contributing to our fight against climate change. By the way, nowadays hydrogen is possible to be handled safely: Hydrogen itself doesn’t smell, isn’t toxic nor explosive but you can ignite it when it has a mixture ratio from 4 % in the air. Detonations in free spaces practically don’t occur, but in closed spaces they have to be avoided by security measures (i.e. in the engine room you need to take care for ventilation, ex-proof, separation of rooms)¹.

Hydrogen can be stored under high pressure in high-pressure tanks (like in cars), in metal hydride storage (quite expensive right now - still under R&D) or liquefied by cooling it down on -259.2° to -259.9° C, vacuum-isolated in a cryogenic tank. The problems with corrosion effects (embrittlement), permeation and diffusion of hydrogen are known since decades and nowadays practically solved. It is safe and reliable to handle hydrogen on the road (in the car itself - i. e. in the parking garage or the intermodal transport) and crash tests show that hydrogen fueled cars are as safe as cars running on petrol, Diesel, LPG or methane. Then it should work as safe and reliable on ships as well is my conclusion.

TURBOELECTRIC DRIVE

The characteristics of hydrogen make it a problem using it as renewable ship fuel on seagoing vessels. An internal combustion engine in Megawatt-size wouldn’t stand the higher temperature and pressure. Fuel cells have not enough power output and cost over ten times more for same power. The solution would be using steam ships. In old days steam ships were fired with wood, coal and oil. That steam engines ran commonly with pistons and they were by far not that efficient and could not cope with the „new“ smaller internal combustion engine. So they slid into obscurity. Nowadays there are high efficient steam turbines on the market (i.e. in most power plants as well as on ships) - ready to buy - with up to 40% efficiency², even capable handling a range of different workloads efficiently.

In comparison with the common internal combustion engine the steam turbines costs approximately double to three times the price, but not the vessel actually. Another advantage: they need less maintenance & repair. The lubricated, rotating parts are in a separate, external chamber - thus it’s called an external combustion engine. In the combustion chamber itself the hydrogen can burn slowly and completely. In this manner no NOx or other emissions from burnt lub oil occur. Until the day that fuel cells become more powerful and the prices more reasonable - the steamship is the means of choice when realizing a seagoing zero-emission

¹ DWV Wasserstoff Sicherheits-Kompendium, Reinhold Wurster (LBST), Dr. Ulrich Schmidtchen (DWV), November 2011
² MAN, ANLEG, WIKI, WEISSHAUPT, DAEGOO
vessel. 3—> 12 t/h steam at 256° C to generate 2,528 kW —> load span steam turbine 1,000 - 6,000 kW before you need a different (more expensive) type 4—> existing combustion chambers are easily possible to modify from CH₄ to hydrogen —> approx. 700 kWh⁵ for the production of 1 t steam. It was commonly realized until ten years ago on gas-carriers to connect the steam turbine with a reduction gear on the shaft drive - driving mechanically the ship’s propeller. By doing so it is quite difficult to handle different speeds and engine/work loads during different operations. If there is a malfunction or defect of the machinery or it needs instant repair, the ship would have to stop and wouldn’t be safe, because it’s not possible to navigate without having propulsion. The vessel needs to have an auxiliary diesel-engine onboard to assure redundancy. Like any internal or external combustion engine - steam turbines have a certain load range to work most efficiently. Using two or three smaller steam turbines that are feeding the generator which again produces the electricity for onboard power and for the propulsion i.e. consisting of a couple of azimuth pod propellers (electric drive) could be the solution.

This measure would result in a low noise emission, zero exhaust gas emission, a perfect handling in maneuvering of the ship on different speeds and power loads while the load range of the turbines stays same: When maneuvering in the harbour only one steam turbine needs to run to supply the generator with power that it can give enough energy for the electric drive. This could be a perfect solution for river ships also that run constantly the river up and down, to adjust the engine power to the different work loads (using two or three when river up, using one river down). Last but not least it ensures the safety of crew and vessel through redundancy: If one turbine fails - there are still one or two left. Another advantage when the boiler is modified for hydrogen (and the higher temperature of its flame), we can actually burn any gas. If we use standardized cryogenic tanks as FEU ISO containers, we can easily switch from hydrogen to LNG/LPG tanks if no hydrogen available and use this instead.

ROUTE / LINER / GEOGRAPHIC CHARACTERISTICS

We make it a concrete example on a determined route: Rotterdam - Nador (Morocco), which are 1414 nautical miles from harbour to harbour. Our vessel has a speed of approximately 17 knots, which means it takes approximately 4 days (1414 / 17 / 24 = 3.5) with the propellers running constantly (24/24). The coastline of the Netherlands has very good wind resources for using wind turbines for generating power onshore while in Morocco the intensity and hours of the sun are outstanding for using concentrated solar power plants (SCP) to gain energy for our hydrogen production. For this route we take a 2,500 TEU container vessel with approx. 18,000 tdw. and about 185 metres in length. It should need around 12 Megawatts for propulsion: Three steam turbines, having each 5,000 kW (safety factor) power output, feeding one or two generators which give the power to two azimuth propellers, a bow thruster and for the onboard energy.

HYDROGEN CONSUMPTION

In different talks with sales and technicians from manufacturers of steam turbines and steam boiler I received the same empirical formula which says we need approximately 700 kWh to produce 1 t steam. That figure complies with the h,s diagram for water enthalpy.

Our 5,000 kW steam turbine needs 12 t/h, means: —> 12 * 700 kWh = 8,400 kWh = 8.4 MWh

times 3: (for three turbines) —> 3 * 8.4 = 25.2 MWh

challenge: (liquid) —> 8.400 kWh / 33.33 kWh/kg = 252 kg

—> 252 kg / 70.81 kg/m³ = 3.6 m³

—> 8.400 kWh / 2.359 kWh/l = 3.550.8 l

—> = 3.56 m³ ± 3.6 m³ (liquid) ✓

³ MAN Denmark, Mr. Steen Lykke Petersen
⁴ Viessmann Germany, Mr. Schröder
⁵ ANLEG, Viessmann, ECO Prozesstechnik, Jumag (Schulze-Lohhoff, 2002)
times 3: (for three turbines)  \[\rightarrow 3 \times 3.6 \text{ m}^3 = 10.8 \text{ m}^3/\text{h}, \text{let’s say:} \rightarrow 11 \text{ m}^3/\text{h} \text{ LH}_2 \text{ (little safety factor)}\]

\textbf{challenge:} \[\rightarrow 25,200 \text{ kWh} / 2,359 \text{ kWh/m}^3 \rightarrow 10.6 \text{ m}^3 \text{ (liquid)}\]

For the range of 4 days and with the turbines running 24/24 we would need:

\textbf{in kWh:} \[\rightarrow 25.2 \text{ MW/h} \times 24 \text{ h} = 604.8 \text{ MW} \]

\textbf{means per travel:} \[\rightarrow 604.8 \text{ MW} \times 4 \text{ days} = 2,419.2 \text{ MW one-way} \triangleq 2.5 \text{ GW} \]

That means for the tank capacity: \[\rightarrow 2.5 \times 10^6 \text{ kWh} / 33.33 \text{ kWh/kg} = 75,007.5 \text{ kg} = 75 \text{ t} \]

\[\rightarrow 75,007.5 \text{ kg} / 70.81 \text{ kg/m}^3 = 1060 \text{ m}^3 \text{ per travel} \]

\textbf{challenge:} \[\rightarrow 11 \text{ m}^3/\text{h} \text{ (liquid)} \times 24 \text{ h} \times 4 \text{ days} = 1056 \text{ m}^3 \]

\textit{That are approximately 24 cryogenic tanks in ISO standard 40 ft. container size with 45 m}^3 \text{ LH}_2 \text{ intake capacity.}^6 \text{ If the year had 364 days and the travel takes 4 days we would make 91 travels maximum per year: 91 * 1060 m}^3/\text{h} \text{ LH}_2 = 96460 \text{ m}^3 \triangleq 100,000 \text{ m}^3 \text{ LH}_2 \text{ per year. Or respectively 91 times 2.5 MW makes 227.5 MW per year.}

\textbf{challenge:} \[\rightarrow 96460 \text{ m}^3 \times 2,359 \text{ kWh/m}^3 = 227,549,140 \text{ kWh} = 227.5 \text{ MWh} \text{ (liquid)}\]

\textbf{HYDROGEN PRODUCTION}

When we need 75 tons or rather 1060 m}^3 \text{ of liquid hydrogen (LH}_2\text{) or 2.5 GW respectively and the vessel would need 4 days when running approximately 17 knots, we should have on each location a bunker station / manifold for our vessels, where we can supply it with our hydrogen i. e. in cryogenic 45 m}^3 \text{ vacuum isolated tanks in ISO standard container size. When we need 1060 m}^3 \text{ of liquid hydrogen for the vessel each travel, it makes approximately 30 containers that should be always stand ready to switch while lashing/loading the ship.}

\textbf{HYDROGEN PRODUCTION:} When we multiply the full load hour with the nominal power of a wind turbine we can get a quite precise impression for the energy harvest. By having more then a couple of wind turbines - means a wind park - there is a problem with the WAKE effect: Many wind turbines interfere each other with turbulences. So we should lower our expectations and deduct 10 % from the nominal power as further safety factor before or after multiplying that figure with the full load hour.

\begin{center}
\textbf{Onshore Windpower:} \quad \begin{array}{|c|c|}
\hline
\textbf{full load hours} & \textbf{electricity production per 1 kW} \\
\hline
\textbf{(Northsea, near coastline)} & 2000 \text{ kWh/a} & 2000 \text{ kWh/a} \\
\hline
\textbf{CSP} & \textbf{sun radiation} & \textbf{electricity production per 1 kW} \\
\hline
\textbf{(MENA Regions)} & 2300 \text{ kWh/(m}^2\text{a)} & 4000 \text{ kWh/a} \\
\hline
\end{array}
\end{center}

source: Fraunhofer ISE, electricity production per installed nominal power, Nov. 2013

\textsuperscript{6} ANLEG GmbH, Duisburg
In Morocco on the other hand I would consider concentrated solar power plants (CSP). Which are parabolic mirrors that focus the sun rays on a liquid (i.e. water) which changes from liquid to gaseous state - „steam“ - that flows through a steam turbine which again feeds a generator to produce electricity for the electrolysis.

They're three times more effective per kWh\(^7\) and cheaper as well in manufacturing than photovoltaic cells and they don't need any toxic substances for production, so no pollution after wrecking. This technology is ready to use and to name some existing projects: Andasol I, II & III in Spain and Shams1 in Abu Dhabi. The sunshine in Morocco/(MENA)\(^8\) delivers at least 2,500 kWh/(m\(^2\)a) which means a renewable electricity production of round 4000 kWh p.a. per 1 kW installed nominal power (see table above):

The yearly electricity production would be 50 MW * 4000 kWh/a = 50,000 * 4000 = 200,000,000 kWh/a = 200 GW/a.

From the total electrical energy production of 290 GW/a (wind + solar power) we need to deduct the efficiency factor to know how much chemical energy in Joule or kWh is left. The efficiency factor of electrolysis is nowadays up to 80 %, but let's calculate with 75 % to include another safety factor:

\[ \varepsilon = 0.75 \quad \rightarrow \quad 290 \text{ GW} \times 0.75 = 217.5 \text{ GW} \]

This is the amount of chemical energy stored in the hydrogen gas - expressed in the upper heating value. After liquefying the hydrogen we calculate with the lower heating value\(^9\). The difference between these values is the energy needed for liquefying it. Now it would be good to know how much hydrogen we can produce:

\[ \rightarrow \quad 217,500,000 \text{ kWh} / 3 \text{ kWh/m}^3 = 72,500,000 \text{ m}^3 \text{ hydrogen gas.} \]

Coming to the point of liquefying our sun and wind gas, I could find different sources about the efficiency factor of liquefiers, but they are all between 10 and 33 % (up to „One Third“ of the contained energy). The most common and most up to date figure is One Third. By calculating in the middle with 25 % efficiency factor we should be on the safe side.

\[ \varepsilon \approx 0.25 \quad \rightarrow \quad 217.5 \text{ GWh} \times 0.25 = 56.25 \text{ GWh LH}_2 \]

Further I would deduct losses of 5 % during storing & transportation:

\[ \varepsilon = 0.95 \quad \rightarrow \quad 56.25 \text{ GWh} \times 0.95 = 53.4 \text{ GWh LH}_2 \]

The total capacity factor is: 0.75 * 0.25 * 0.95 = 0.178 —> that’s almost 18 % from the produced electricity. It doesn't sound very good, but after financial write-off, 18 % from „free“ is still for „free“ and we can estimate to increase the plant and ship efficiency in the future.

53,400,000 kWh / 2,359 kWh/m\(^3\) = \textbf{22,636.7 m}^3. When we divide that with our consumption of 1060 m\(^3\) per vessel we could supply over \textbf{23 vessels} (23.35) with hydrogen.

**ENERGY COSTS**

WIND POWER: We intend to put up 10 wind turbines with 5 MW nominal power output each: Let's calculate with 1 million Euro per Megawatt for onshore wind power (different sources i.e. Fraunhofer, Enova, Enercon). Let's say the lifetime is 25 years for financial write-off. That are \textbf{50 Million Euro} investment for erection and installing of equipment. The electricity production costs are 0.08 - 0.10 €/kWh and the annual running costs are 0.018 €/kWh. (1.62 million Euro when 90 MWh produced p.a.)

SOLAR POWER: The figures from Fraunhofer Institute are on basis of Andasol I-III (50 MW) in Spain and Shams1 with 100 MW in Abu Dhabi. For erection of the plant and installing equipment I will calculate with 5200 €/kW nominal power.

\(^7\) Fraunhofer ISE Studie „Stromgestehungskosten“, Nov. 2013 edition
\(^8\) MENA (Middle East & North Africa)
\(^9\) lecture notes „Wasserstofftechnologie“, Prof. Dr.-Ing. R. Lohmüller
That makes **260 million Euro** and includes already the steam turbines and generator set and an 8h storage (all incl.). The electricity production costs are 0.16 - 0.18 €/kWh and the annual running costs are 0.028 €/kWh. (5.6 million Euro when 200 MWh produced p.a.)

10 million Euro per location is my estimation for ELECTROLYSIS and it’s quite a realistic figure on basis of various input sources such as Audi, Solarfuel, E-ON, SwissGas or Wasserstoffstadt-Herten from existing projects (see later on)—> times 2 (for two locations) makes for two units **20 million Euro**. Remote control and supervision of the plant, estimated running cost **2 million Euro p.a.**

**HYDROGEN LIQUEFACTION / LH2**: Each one needs to produce approximately 275 m³ LH₂ per day:

Let’s assume that each one costs approx. 25 million Euro makes **50 million Euro** for both. Remote control and supervision of the plant, estimated running cost **2 million Euro p.a.**

**HYDROGEN STORAGE / BUNKER TERMINAL**: The liquefied hydrogen gets stored in cryogenic tanks in ISO standard 40 ft. container size (FEU) with 45 m³ LH₂ intake capacity. The way from power plant to bunker terminal needs to be as short as possible. If geographic characteristics allow it, it should be the same place. The storage should always have at least 96 cryogenic tanks available for serving 3 or 4 vessels, means a capacity for roundabout 100 FEU containers, which are handled like other containers with a crane / derrick.

For putting up buildings and infrastructure including cranes, hydrogen storage and bunker terminal let’s estimate with approx. 25 million each, makes **50 million Euro**.

**RUNNING COSTS**: For running this plant isn’t much staff necessary, because they can mostly be remote supervised and controlled. That makes it quite cheap. Still I would build in another safety factor in this case just to be on the safe side and calculate with the double, means approximately **26 million Euro total running costs**. That makes a total investment of **470 million Euro**. To build in another safety factor I would calculate with **600 million Euro**.

For taking a credit, the capital costs for paying the interest could possibly question the profitability of the whole project. Saving this money is the reason, the benefit and necessity, why stakeholders have to team up for fundraising.

**SAVINGS ARE PROFIT!**

The international bunker price for **HFO** (2.7 % sulphur content) is approx. **600 €/t** while **MDO** (0.1 % sulphur content) costs in average approx. **900 €/t** since half a year now. That’s today approx. **475 €/t for HFO** and **660 €/t for MDO**. Some vessels with comparable engine size (≈14,000 kW) that I used to know needed approx. **16 tons HFO per day or 15 tons MDO** respectively (next tot 90 litres of lub oil).

**HFO vessel**  

| 16 t/d * 364 d = 5,824 t | 5,824 t * 475 €/t = 2,766,400 € = 2.8 million Euro p. a. per vessel |

**MDO vessel**  

| 15 t/d * 364 d = 5,460 t | 5,460 t * 660 €/t = 3,603,600 € = 3.6 million Euro p. a. per vessel |

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<table>
<thead>
<tr>
<th>total investment</th>
<th>MDO SAVINGS</th>
<th>HFO SAVINGS</th>
<th>running costs</th>
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<tbody>
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<td>€1,000,000,000.00</td>
<td>€1,200,000,000.00</td>
<td>€600,000,000.00</td>
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</tr>
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||3|6|9|12|15|18|21|24|
|---|---|---|---|---|---|---|---|
| HFO SAVINGS | MDO SAVINGS | total investment | running costs |

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* based on figures from LINDE AG, Switzerland
But this is not just about one ship: If we operate a fleet consisting of 10 vessels (we could easily produce sufficient LH₂) it would be 28 or respectively 36 million Euro savings (profit) p.a. and just calculated with a stable fuel price scenario. **Calculated for 10 vessels with 600 million Euro investment for infrastructure over 25 years economic lifetime plus running costs of 26,000,000.00 € p. a.** In case the MDO price will rise we would carefully calculate with a rising MDO price of annually 2 %, the ton MDO would cost after 16 years: \(660 \text{ €/t} \times 1.02^{16} = 906 \text{ €/t}\) and the amortization of the whole investment lies around **15 years**. By that time, the economic lifetime of the vessels (around 12 yrs) is over and the vessel is paid - making just profit. The more vessels we use - the shorter is the time for amortization of the whole investment, bearing in mind that we can still expand the fleet up to the double size with our infrastructure / bunker production capacity.

The investment for the ten vessels is not included in this chart. It has two obvious reasons: on the one hand this table shows and is supposed to show the fuel savings against the costs for fuel production (running costs included) and on the other hand we calculate that we would buy new vessels anyway - it’s just that they are running on hydrogen with steam turbines. Consequently the economic feasibility of the vessels is depending on the charter rates as any other vessel and thus a different calculation, just with having a greater margin, because there’s no need for paying a bunker bill.

The problem with that calculation is very clear: It makes no sense to let 10 vessels run on the same route that takes only 4 days - we need to implement **additional routes**. For considering which routes are best suitable, we need some background information about the volume of cargo transited in the area.

On our route Rotterdam - Nador (Morocco) we can operate **2 vessels**. We should place on each further route:

2nd mediterranean route: **Nador - Cadiz (Spain) - Arrecife (Canaries, approx. 950 nautical miles - as well 4 days) —> 2 vessels, bunker location Nador**

3rd mediterranean (south) route: **Istanbul(Turkey) - Nicosia (Cyprus) - Valetta (Italy) - Nador (Morocco) —> 3 vessels, bunker location Nador**

Another additional (north-going) route could be implemented between **Rotterdam - Esbjerg (Denmark) - Trondheim (Norway) —> 2 or 3 vessels, bunker location Rotterdam & Trondheim.** In Norway hydrogen is available to buy - just in case we run out of fuel - and it’d be possible to fill up the vessel and go back to **Rotterdam** around the other side of the **UK over Dublin (Ireland).** And for inland waterways, i.e.: **Rotterdam - Basel (Switzerland) (inland waterways - approx. 800 km in as well approx. 4 days) —> 2 vessels (inland), bunker location Rotterdam**
Deelnemers dolenthousiast over feest


Eerst volgt het officiële deel met enkele toespraken. Het sectorhoofd Ludy Derksen spreekt als eerste. Hij wenst de deelnemers een behouden vaart en bedankt de docenten die de deelnemers begeleid hebben. Applaus voor de docenten! De oud-studenten vereniging ‘Volle Kracht’ nodigt de deelnemers uit om lid te worden van de vereniging. De prijs van de vakbond Nautilus voor de meest sociale deelnemer gaat dit jaar naar Rik Truyen. Problemen die hij ziet, kaart hij aan, inclusief mogelijke oplossing. Zo is op zijn aanwijzing de stagebegeleiding bij zijn eerste stageadres verbeterd!

Dan volgt nog een toespraak van de heer Van Dijk, die enkele eigenaardigheden van sommige van zijn leerlingen raak weet te beschrijven.

Eindelijk worden dan de certificaten uitgedeeld! Steeds worden vijf deelnemers naar voren geroepen, die de map met certificaten en een stevige hand van de docenten in ontvangst nemen. Natuurlijk met de nodige foto’s van het thuisfront.

Het minder officiële deel begint met een verkiezing van de beste stuurman en beste werktuigkundige van dit jaar. Na een reeks met zeer moeilijke vragen over het vermogen van motoren, environmental en situational awareness en docenten, werd Jan-Jaap van der Graaff tot beste machinist verkozen en Fredie Krug tot beste stuurman. Zij kregen een explosievrije zaklamp of een verrekijker. Vooral het onderdeel ‘Wie herkent de docent’ met oude foto’s van de vaartijd van docenten (tot dertig jaar geleden) was goed voor veel hilariteit!

De uitreiking werd afgesloten met een film waaraan alle docenten zeevaart aan hebben bijgedragen. Kijk beslist even op http://www.youtube.com/watch?v=k8CXN9QyRZU of op de Facebookpagina van de STC-Group. De hele verdieping 13 heeft gemerkt dat het leuk was, het geklap en gejoel was prima te horen tot ver buiten de zaal! In de foyer naast de Lloydzaal werd daarna nagepraat en nagenoten van een hapje en drankje. Veel leerlingen en ouders vertelden dat ze iets unieks hebben meegemaakt, maar ja, laat dat maar aan de sector Zeevaart over!
Maritime and offshore industry in urgent need of staff

After the success of the seventh Navingo Maritime & Offshore Career Event (MOCE) last April, with a record of 4.352 visitors, the 8th event will be held on 2 April 2014 at the Beurs-World Trade Center in Rotterdam. This annual event is the biggest career event in The Netherlands that focuses solely on maritime and offshore jobs on land as well as at sea and technical jobs as well as administrative and nautical.

The terms ‘economic crisis’, ‘recession’ and ‘unemployment’ are used more often than we would like. We see it on the news, in our newspapers and hear much about it in our daily lives. Though some industries have struggled others continue to thrive. MOCE will show that there are plenty of opportunities within the maritime and offshore industry.

Urgent need of personnel
During the preparations for the eighth edition of MOCE, it is clear that the maritime and offshore industry is still in urgent need of personnel. Arnold de Vries, HR director of Damen: “Although the first signs of recovery are visible, you can still feel the crisis on the labour market. Employees will choose more for certainty than a few years ago and the number of qualified personnel will be a bit higher. But the trends of aging and the decreasing group of young people (<35) within the labour market will continue. “

More than 100 top companies from the entire maritime, offshore and port industry are looking for new talent. “We expect to welcome around 3.500 to 4.000 visitors to our one-day event“ says Tessa van Hees, Marketing Manager of MOCE. The spectacular increase of national as well as international visitors in recent years reflects the growing popularity of the maritime and offshore industries.

Wide range of employers
The maritime industry offers plenty of job opportunities. Nowhere else in the Benelux countries you will see so many maritime and offshore companies offering good opportunities side by side than at MOCE. MOCE focuses on employment in the following sectors: shipping, yachting, dredging, maritime personnel services, logistics, energy, marine, inland shipping, offshore and ports.

Video booth
A new and unique part of the event program is the video booth in which visitors can present themselves to potential employers. Would you like to attract the attention of the maritime & offshore employers and are you ready for the next step in your career? Come to the video booth at MOCE! MOCE is the only event that focuses on career, training and education in Netherlands, with a complete focus on the maritime and offshore industry. The entrance for visitors is free.
Welcome

The annual market for global navigation satellite products and services is currently valued at 124 billion Euros and is expected to grow over the next decade, leading to an estimated market size of €244 billion in 2020. With the Galileo system having 10 satellites by the end of 2014, many new applications will be developed in combination with other GNSS systems and other Position, Navigation and Timing (PNT) sensors.

The Netherlands Institute of Navigation (NIN) is pleased to invite you to the annual European Navigation Conference, to be held 15 – 17 April 2014 in the World Trade Center in Rotterdam, The Netherlands.

With the Galileo system emerging, the conference will focus on technology, innovation and the transfer to business applications in the Position, Navigation and Timing (PNT) sector.

WTC has been chosen, as it offers the possibility of having both plenary and parallel sessions, the poster presentations, the exhibition and the catering all on one floor.

The conference takes place in the week before Easter, allowing you to extend your stay and enjoy the tulip fields, the windmills and other objects of interest in The Netherlands. Or stay in Rotterdam; an exciting city, one of the biggest ports in the world, with many museums and attractions.

In The Netherlands we say: in Rotterdam they do not sell shirts with long sleeves, because they roll them up anyway.....

I look forward to meet you in Rotterdam at ENC-GNSS 2014!

Prof. Em. Jac Spaans
Chairman Organising Committee
HBO in de haven

SAVE THE DATE

Datum
11 juni 2014

Locatie
RDM Campus

Het HBO in de haven- TOP event!

Met veel plezier nodigen wij u uit voor de spetterende afsluiting van een vierjarige, intensieve samenwerking tussen de Rotterdamse hogescholen en de haven. Mede dankzij uw inzet hebben we de Rotterdamse haven op de onderwijsagenda gezet! Denk aan het Beste Havenidee, de Mainport Meewerkdagen, Pressure Cooker, de Masterclasses, het LAW event, de verkiezing tot Jong Haventalent en de vele excursiesprogramma's.

Benieuwd hoe de agenda ook de aankomende jaren gevuld gaat worden? Noteer dan alvast de datum in uw agenda, dit mag u niet missen!

Benieuwd naar het programma?
Een klein tipje van de sluier...

- De toekomst van de Portprofessional... koffiedik kijken of wetenschap?
  studenten, onderwijs en bedrijven in het haven arbeidsmarktdebalt, debatteren mee!
- Twan Huys in gesprek met... een very im*PORT*ant person
- Finale Beste Havenidee 2014
- Stage- en afstudeervacaturemarkt
- Lancering 2e editie INN010 magazine
- HBO in de haven goes ONLINE

U ontvangt binnenkort de uitnodiging!

Kijk [hier](#) voor meer informatie over het evenement.
is een samenwerkingsprogramma om meer hbo’ers te enthousiasmeren voor de haven en bedrijven uit de haven te verbinden met de hogescholen in Rotterdam. Onze partners zijn:

Dit programma wordt ondersteund door:

HBO in de haven

Meer hbo’ers in de haven, meer haven in het hbo!

Het programma "hbo in de haven" wil studenten en docenten kennis laten maken met de haven en vice versa. Met als doel meer studenten die projecten en stages doen in de haven en meer bedrijven die actief samenwerken met de HBO kennisinstellingen in deze regio en participeren in het enthousiasmeren van jongeren voor een carrière in de haven.

Hogeschool Rotterdam, Inholland, STC-GROUP, Havenbedrijf Rotterdam, Jong Havenvereniging, Deltalinqs en KMR gaan de uitdaging aan. Dat doen we via drie lijnen: boeien - binden - behouden.

Meer lezen over dit programma, de aanpak en de programmapartners? Ga naar Programme in het menu.
From a Legal point of view
STICHTING NBKB TEKENT OVEREENKOMST MET LUXEMBURG

Heden 10 maart 2014 is door het Nederlands Bureau Keuringen Binnenvaart (NBKB) de overeenkomst getekend met het Gouvernement van het Groothertogdom Luxemburg voor uitvoer van certificerende inspecties van in Luxemburg geregistreerde binnenvaartschepen, met uitzondering van de aan Klasse toegewezen tankschepen, door het NBKB.

De Luxemburgse autoriteiten zullen, in tegenstelling tot de Nederlandse autoriteiten, nog wel zelf het certificaat verstrekken, maar alle inspectie activiteiten en opgaaf van wijzigingen van certificaatgegevens zullen door het NBKB plaatsvinden.

Hiermee heeft NBKB, na mandatering door de Nederlandse overheid voor uitvoer van certificerende inspecties en afgifte van certificaten namens de Nederlandse overheid in November 2013, de eerste stap gezet in verdere uitbouw binnen Europa van haar inspectieactiviteiten.

Over NBKB

De Stichting NBKB werd in 2004 opgericht nadat de overheid had aangekondigd om voortaan alle inspectie taken naar de markt af te stoten. In de Stichting zijn naast de inspecteurs ook de binnenvaartsector en de transportverzekeraars vertegenwoordigd om erop toe te zien dat de inspecties onafhankelijk en op een hoog kwalitatief niveau worden uitgevoerd.

Rotterdam, 10 maart 2014

Nadere inlichtingen worden verstrekt door Ing. Henk Arntz, Directeur. 010-798 98 88
Hamburg, 11 March 2014 – DNV GL has responded to regulations mandating the use in US waters of environmentally friendly and quickly degradable lubricants in any interfaces where oil can be discharged into the water with a new service designed to smooth adherence to the new requirements. The EAL Report Service helps ship operators to meet with the new rules without the need for extensive outlays, and provides valuable feedback on areas of concern.

The "Vessel General Permit" (VGP) framework, which came into effect in December 2013 stipulates that biologically degradable oils, or "Environmentally Acceptable Lubricants" (EAL), must be used at all oil to sea interfaces, where technically feasible. All ships with a total length of 24 meters or more that enter US waters must observe the new environmental standard.

Numerous components in the underwater area of a ship are impacted by the new rules. This includes the stern tube seal, as well as mechanical components in the propeller, bow thrusters, the rudder shaft, as well as other underwater equipment.

"A number of questions arise here for ship operators," says Dr Jörg Lampe, Risk & Safety, Systems Engineering at DNV GL. "Which lubricants are allowed to be used and are there technical challenges involved in switching to them? For example, the stern tube seal, as the largest connecting piece between propeller and stern of the ship, need not be exchanged before the next planned dry dock as this is not technically feasible."

In order to be able to adhere to the VGP 2013, proper documentation on board is also required. DNV GL is making a Reporting Service available that includes the issuing of an EAL Factual Statement of Compliance in order to fulfil the EAL requirements required of ship operators. "We have received positive feedback from the US EPA agency and the Coast Guard on our new service," Dr Jörg Lampe explains. "Thanks to our global expert network we are also in the position of being able to offer an efficient and reliable service that makes it easier for ship operators to comply with the new regulations and to correctly create the reports due at the end of the year."

Additionally, DNV GL offers consulting services for sealant materials, such as those in older stern tubes still in use, for example.
History
FOR IMMEDIATE RELEASE
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DUTCH ARTISTS CELEBRATE LIGHT
Artists of the Nederlandse Vereniging van Zeeschilders show new work.

Staten Island, New York March 2014 - Snug Harbor Cultural Center & Botanical Garden is pleased to host Dutch Light Sails to New York a survey exhibition of contemporary maritime art by the Nederlandse Vereniging van Zeeschilders (NVZ), a collective of experienced Dutch maritime artists. This exhibition features more than 100 artworks in oil paintings, watercolors, drawings, gouaches, etchings, aquarelles, collages and sculptures. An opening reception, in the presence of 12 participating artists, will be held on Saturday, April 5 from 5:30 p.m. to 7:30 p.m. at the Newhouse Center for Contemporary Art on the Snug Harbor campus at 1000 Richmond Terrace in Staten Island. Admission to the reception is free and refreshments will be served.

The artists include Coob Zeeman, Leentje Linders, Erik Tierolf, Maarten Groot, Ellen van Toor, Pauline Bakker, Frans Buissink, Rein de Vries, Katinka Krijgsman, Ingrid Dingjan, Ludo van Well, Peter de Rijke, Winnifred J. Bastian, Ageeth van den Oever, Ron Moret, Geer Huybers, Leendert van der Pool, Piet Lont and Johan Meeske.

Dimp Nelemans, President of Maritime Art & Design said, “The last New York exhibition of (NVZ) was twenty years ago and we are excited to be back to show a collection of new work at Snug Harbor Cultural Center & Botanical Garden. We have published an catalogue that features personal stories as well as images of all participating artists in Dutch Light Sails to New York.”

Snug Harbor President and CEO Lynn B. Kelly said, "The exhibition is a terrific way to celebrate Dutch talent and we are excited to see the spirit for maritime art captured in a variety of styles and media."
The exhibition will be on view April 5 through May 9, 2014. The Newhouse Center for Contemporary Art is open Wednesday through Sunday, noon to 5 p.m. Admission is $5 for adults and $4 for students and seniors. Children under 12 are admitted free.

For more information and to purchase a catalog:

Mrs. Dimp Nelemans, President of Maritime Art & Design
info@gallerymaritime.nl
Tel. +31 (0)622591452
www.gallerymaritime.com
www.maritime-art-design.nl

Dutch Light Sails to New York is made possible, in part, by the Foundation Maritime Art & Design and Gallery Maritime in Middelburg, The Netherlands.

Support for the Visual Arts Program is generously provided by the New York City Department of Cultural Affairs, New York City Council, and the Samuel I. Newhouse Foundation.

About Snug Harbor
Snug Harbor Cultural Center & Botanical Garden is the largest ongoing adaptive reuse project in America. It consists of 23 historical buildings, nine distinctive botanical gardens and 10 acres of wetlands on a unique 83-acre campus in Staten Island. Formerly Sailors’ Snug Harbor, a home for retired sailors built in the 1800s, Snug Harbor is now a distinguished regional arts center where history, architecture, visual art, theater, dance, music, environmental science and botanical gardens provide dynamic experiences for all ages. Snug Harbor is also home to the Newhouse Center for Contemporary Art, the Noble Maritime Collection, Staten Island Children’s Museum, and the Staten Island Museum. Snug Harbor is a proud Smithsonian Affiliate.

Full Color catalogue with CV’s, photos of all artworks available for € 10,00 incl. post-delivery after request info@gallerymaritime.nl
INVITATION
TO THE OPENING OF THE EXHIBIT

DUTCH LIGHT
SAILS TO NEW YORK

APRIL 5, 2014 - MAY 9, 2014

DUTCH CONTEMPORARY MARITIME ART
PAINTINGS DRAWINGS SCULPTURES

Snug Harbor, 1000 Richmond Terrace, Staten Island NY 10301
Opening hours: Wednesday – Sunday 12.00 - 17.00 pm

The Foundation Maritime Art & Design and Gallery Maritime from the Netherlands are cordially inviting you to the opening reception of the exhibit

DUTCH LIGHT
SAILS TO NEW YORK

a new collection of contemporary maritime art by 19 maritime artists from the Netherlands.

On Saturday, April 5th 2014, from 3:30 p.m. – 5:30 p.m.
At the Newhouse Center for Contemporary Art at Snug Harbor,
1000 Richmond Terrace, Staten Island NY 10301
tel.718.4125.3524 [for route planning www.snugharbor.org]

In the presence of the Consul General of the Netherlands,
Mr. Rob de Vos, President of Maritime Art & Design Dimp Nelemans,
and 12 of the Dutch maritime artists: Zeeman, Linders, Van Toor,
Bakker, Buissink, De Vries, Krijgsman, Dingjan, Van Well, Bastian,
Van der Pool and Lont.

RSVP by March 31 to info@gallerymaritime.com
For more information, please visit www.maritime-art-design.nl