

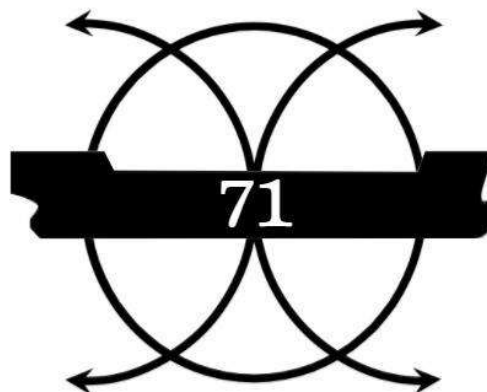
NUL-KRYDS

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# NTHS 71, Denmark 2018

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# NTHS



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# 1 Words from the President

I am, along with the the whole Danish delegation planning NTHS, glad to send you this report about the successful 71st NTHS congress.

On the following pages you can read about the many interesting companies visited during the five days of the congress, as well as some of the social activities that took place in the evenings.

Great effort was put forth in establishing an exciting program displaying the large variety within the Danish maritime industry to our fellow Nordic students. The extra effort to make the program as rich and enlightening as possible, was put in in order to continue the course set out by the Norwegians arranging NTHS 70. It was our hope that a strong program and the very professional presentations at the companies would not only increase the knowledge and experiences gained at NTHS, but thereby also demand more from the participants during the week.

I am proud to say that we succeeded in achieving this, also beyond our own expectations, and we have hereby taken an important step towards bringing NTHS into the future. Something we look forward to hand over to the combined Swedish delegations whom in 2019 will be arranging NTHS 72 in cooperation. This is a test initiated in order to make the whole of Sweden accessible for the congress, to increase the density of the program as well as the learning outcome.

I would like to thank all the funds and sponsors contributing for making NTHS possible. The Danish Maritime Fund has been the main contributor and their early commitment towards sponsoring NTHS has been of paramount importance for the planning of this years congress. Furthermore we would like to thank the A.P. Møller Fund, The Danish Society for Naval Architecture and Marine Engineering Foundation, Tranes Fund, Otto Mønstedts fund and Kai Houmann Nielsens Fund.

Many companies have sponsored this years congress, and we are grateful towards all of them, logos of the sponsoring companies are displayed at designated pages in this report. I do though want to address a special thanks to our main company sponsors MAN Diesel & Turbo and DFDS.

Finally, I want to express the gratitude of the whole congress towards the many professionals we met throughout the congress, willingly answering tough and sometimes numerous questions.

Sincerely yours

Philip Holt

President of Nul-Kryds and NTHS 71

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## 2 This years participants

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<b>- Copenhagen -</b>	
Philip Holt	
Lina Christensen	Ondine Chegaray
Anna K. Joensen	Christoffer Molven
Hans Frederik Schwarz	Frederik Berthelsen
Mads Helland	Abhiket Kashyap
Harshit Tripathi	Hedin Poulsen
Enzo Hacquin	Mikkel Borup

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<b>Mannhullet</b>	<b>Laivanrakentajain Kerho</b>
<b>- Trondheim -</b>	<b>- Helsinki -</b>
Amund Helvik	Eetu Kivelä
Frida Mattson	Henri Peltola
Tom-Erik Abildgaard	Iina Jokinen
Matias Bøe Olsen	Mika Vuorinen
Simen Mildal	Lassi Mastomäki
Mari Jensen	Miika-Matti Ahokas
Ingrid Mehn-Andersen	Eetu Vilen
Hedda Sjøvaag	Juho Jalava
Marius Røsbak	Veikko Ahola
Bjørn Børresen	Jarna Verho

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<b>Chalmers Skeppsbyggare</b>	<b>Kongl. Skeppssällskapet</b>
<b>- Gothenburg -</b>	<b>- Stockholm -</b>
Robert Sahlberg	Markus Johannessen
Simon Granli	Jacom Zeidler
Emanuel Werner	Anton Svensson
Paulo Macedo	Sofia Gutiérrez
Erik Lengyel	Misael Goicoechea
Foivos Lemonakis	Filip Wängelin
Javier Llop	Beata Törneman
Gabriel Taquet	Fanny Ekman
Jillian Adams	Johanna Sunneland
Nimal Prabakar	Victor Ekström

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### 3 Planning NTHS 71

The planning of NTHS 71 started in June 2017, about nine months before the congress commenced in February 2018.

The first steps in the planning process was to meet with some of those who organized NTHS 2013, the last time NTHS was in Denmark. Having both organised NTHS before and since participated in numerous congresses, they had a lot of experience to share both of what worked when they were hosting, and what they had seen and liked at other NTHSes as participants.

Following these meetings we had a few brainstorming meetings, where we mapped out which companies we would be interested in visiting, where they were located and what they were working with. This also helped outline the choice of route.

In September 2017 the new Nul-Kryds' board as well as the Danish delegation responsible for organising NTHS 71 was elected at the Nul-Kryds general assembly. Hereafter the planning could get a proper start and meetings were held bi-weekly until Christmas.

Throughout the planning process we have worked in subgroups focusing on company contacts, room and board, information material & presents and the banquet. The subgroups met on their own to work and talk between the meetings.

The bi-weekly meetings was spend partly sharing what the subgroups had worked on so far, to make sure everyone was kept in the loop and most importantly that the work in the subgroups was aligned and working towards the same goal.

The bi-weekly meetings were also the time to discuss and make major decisions such as the choice of route.

Throughout the planning process we have spend a lot of time aligning expectations for the congress. NTHS 70 hosted by NTNU in Norway saw a drastic change in the way a typical congress day was structured on, with clear lines between professional and social activities, and from the very beginning it was our wish to build on this to make NTHS attractive for both students seeking challenging above-average company visits and for companies interesting in meeting the next generation of naval architects. Discussion on how to achive this took place in two fora. Amongst the Danish delegation, a lot of time was spend discussing, how we could achieve this quite ambitious goal. Further, the presidents of the four visiting delegations and the president and vice-president of Nul-Kryds had several Skype meetings. During these we discussed our ambitions for the congress, and discussed how we could achieve this, both by planning company visits, but also by sharing these ambitions with all NTHS-participants prior to their arrival.

The conclusion of these meetings was to make an ambitious and packed program. This was a major factor when choosing to visit the equipment manufacturers and new-building yards in the beginning of the week and then move to Copenhagen with the ship owner and consultants putting each part into a broader picture. It was clear that a lot of the questions asked by the end of the week, were motivated by the experiences at the beginning.

For the last two months before NTHS we met weekly, to get the last things done. This was also the stage where a lot of practical things had to be done, and it was highly motivating to see all our work materialise into everything from presents to companies we were about to visit, to packages for all the participants with their t-shirts, keyhangers and flyers about the coming days.

## 4 Sunday



*The Danish delegation in Frederikshavn*

The Danish delegation met at Nul-Kryds office at DTU, at 7 o'clock on Sunday morning with high expectation and joy for the week to come. We greeted our bus driver Brian, who would be our driver for the whole trip. The first stop was a boarder shop in Germany for provisioning - apart from beers for the evening we loaded up on soft drinks and snacks for the long bus rides. Next stop was Frederikshavn, from one end of Denmark to another! On the way we reviewed the plan for the week and made some final preparations.

We arrived at Danhostel Frederikshavn around 16.00. The plan was to meet the other delegations at restaurant Frida in Frederikshavn for dinner. That gave us some time to check-in at the hostel and take a group picture of the danish delegation in the freezing weather.

Once all delegations had made it to the restaurant, spirits were high and the atmosphere buzzing with the joy of seeing friends from previous years. Those who had been to NTHS before recognised the mood of sheer excitement and those who participated for the first time got caught up in it as everyone went around shaking hands and hugging each other. We ate some delicious food and soon after the Danish delegation presented the plan for NTHS to all the delegations.

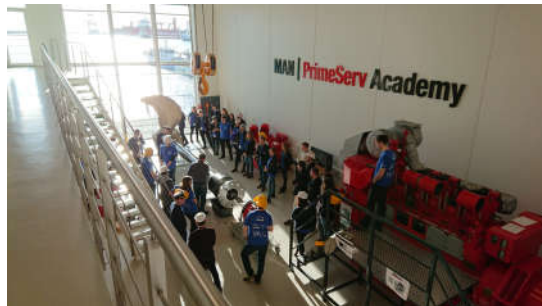
## 5 Monday

Monday was the day with least transportation as we went to local offices and productions in the city of Frederikshavn. The program of the day included visits at MAN Diesel & Turbo, Orskov Yard and finally the Royal Danish Navy.

### 5.1 MAN Diesel & Turbo

MAN Diesel & Turbo was the very first company visit of this year's NTHS Congress. As a start we were introduced to the company's structure and production facilities by senior technology manager Jens Ring Nielsen. Following this four very interesting presentations were given. First by a PhD-student writing his thesis about individually controllable pitch propellers continuously adapting in order to follow the changing wake field behind the ship in cooperation with MAN Diesel and Turbo. The second presentation continued down the path of working with controllable pitch propellers and how the design process were performed individually for every project. The third presentation was by a newly hired employee, who had a background in wind energy, modelling flow towards turbines. She gave a presentation on the flow of fluid around the propeller and thereby demonstrated how multi-disciplinary a field, the design of propulsion systems really is. Finally a post-doc from DTU gave a very thorough presentation on computational fluid dynamics used for the modelling of both propellers and energy saving devices used for optimising these.

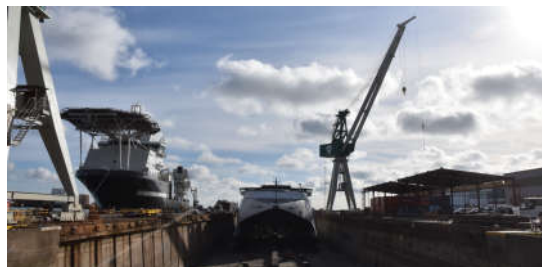
Following the presentations we enjoyed a guided tour into the MAN Diesel & Turbo PrimeServ Academy. The guide gave throughout insight of the mechanics within MAN Diesel & Turbo products focusing on 4-stroke propulsion systems. The visit was rounded of with delicious sandwiches where everyone had a chance to get an informal chat with the presenters about their field of work, and walk around the equipment on display.



*NTHS delegations at MAN PrimeServ Academy*

### 5.2 Orskov Yard A/S

Next stop for the day was Orskov Yard A/S. To be closer to the presenter we were divided into two groups in which we were going to have a walk-around of the Yard and a presentation of current as well as previous projects. As the nature of yard industry in Denmark can no longer compete with the far east in the new-building sector, Orskov has as most other Danish yards changed their focus to repair and retro-fitting. One of the projects in dock was the retro-fitting of a helicopter hangar on four danish navy Thetis-class vessels, the last one were currently under construction. This project gave a good understanding of the value in repeating a project multiple times and there by see the optimisation in processes going from the first to the last project.



*NTHS delegations at Orskov*

Orskov is a prime example of how the Danish Maritime industry has to develop along with the market. The industry remains competitive as the business has gone from new-build to fast track repair work projects.

### 5.3 The Royal Danish Navy, L17 Esbern Snarre

At the end of the day NTHS visited the Royal Danish Navy whom willingly gave a tour around the highly interesting "logistics" ship, Esbern Snarre. The congress was split into two groups, one Scandinavian speaking and one English speaking to the benefit of our Finnish participants. The contact had been established through Captain Lieutenant Oluf Kragbak whom along with the vessel's technical officer gave some exciting and enthusiastic tours around the vessel.

The delegation was happy to be let into the engine room, to be allowed on the bridge and have many details about the operation of such a complex ship explained, along with some tales from the international operations of the vessel. Furthermore, many questions were asked about the implementation of the new Seahawk helicopters, and the Thetis class vessel lying next to Esbern Snarre. As the sky was clear the tour also allowed for a visit on the flying bridge from where a nice view on Frederikshavn could be enjoyed.



*NTHS delegations at The Royal Danish Navy*



## 6 Tuesday

Now it was time to leave the hostel at Frederikshavn and set our sails towards Skagen to pay the local shipyard a visit. First stop was Karstensens Skibsværft before a longer bus ride to Aalborg where Alfa Laval's test center is located. After the visit at Alfa Laval we drove to Esbjerg where a delicious meal, the famous Danish dish "Brændende Kærlighed" waited for us. Quite tired after a long day most participants went to bed and a few went to a local bar to test Esbjerg's night life.

### 6.1 Karstensens Skibsværft

The NTHS congress arrived in Skagen and Karstensens Skibsværft after a short bus ride from Fredrikshavn Tuesday morning. We were welcomed by Diddan Karstensen who is the executive secretary at the shipyard and Knud Degn Karstensens daughter. We were greeted with coffee and a good presentation about the history of the shipyard and their current and future project. After the interesting presentation we got the opportunity to get a tour of their new-building site on the opposite side of the yard. Since it was a cold and windy day we took the bus to the other quay. On the other quay one of their newbuilding projects, number 441, was moored. The 82-meter pelagic trawler, is destined to be delivered to the UK-based owner Serene Fishing Company in Shetland in June 2018. It is rarely possible to see the ship on such an early stage - it was basically just a steel shell and it was therefore very interesting to get a guided round trip on the vessel and to see how the vessel is being outfitted at one of the largest remaining newbuilding yards in Denmark.



*NTHS onboard a very new new-build.*

### 6.2 Alfa Laval

Arriving at Alfa Laval, we were led to the conference room. There, lunch, refreshments and presentations were waiting for us. As we helped ourselves, we were introduced to the company by Søren Hjort Krarup (Site Director): Alfa Laval is specialized in engineering solutions covering many fields, among them the maritime industry. He presented the values of the company, which has a strong focus on sustainability – both social sustainability (human rights), business integrity, and the environment, its history and some

of the products developed by the company. Søren Mølgaard and Bodil Nielsen, two engineers working for Alfa Laval, presented some of the company's current projects: the development of scrubbers and boilers. Due to the new restrictions of SO<sub>x</sub> contained in exhaust gasses from ships, scrubbers have been developed as a way of complying to these restrictions, which are always tighter. Søren Mølgaard (R&D Manager) explained the concept behind a scrubber, how it uses seawater's alkalinity to convert SO<sub>x</sub> to a harmless product. He managed to communicate his passion for his field and was overwhelmed by the number of questions asked to him. Bodil Nielsen, Senior Project Manager, then explained the use of boilers on ships and their principle and answered many questions again.

Afterwards, our group was divided in three and we were shown around in Alfa Laval's test center by Tim Nielsen, Jesper Bak and Lars Bo Andersen, where we really got an idea of the diversity of the company's work. We saw boilers and scrubbers, of which we had heard, but also an exhaust gas burner and a heavy fuel separator among many other components.

## 7 Wednesday

Wednesday was the only day we had to visit companies in Esbjerg. We started out with Swire Blue Ocean, and then had a visit to Viking. After this, it was time to leave Esbjerg and Jutland, and we were on our way to Fayard at Fyn, which is a shipyard that mostly does repairs and retrofitting. After three company visits we set sails for Copenhagen where we held our anecdote night in the auditorium at Clipper House in Nordhavn.

### 7.1 Swire Blue Ocean A/S

The morning started early with a very nice visit to Pacific Orca, which is one of Swire Blue Ocean's two windmill installation vessels, currently undergoing conversion.

The NTHS participants boarded the vessel and had a presentation by two of the project engineers, Janus Joensen and Karsten Frederiksen in the cinema. The presentation was interactive, and covered some of the more technical details - what do you do as a project engineer, why are the ships designed as they are, what do Swire Blue Ocean need to think about before accepting and going out on a job.

Included in the presentation was a safety briefing from Andy Dixon, the port captain and chief officer. Afterwards the delegates were split in three groups, which were given an hour long tour around the vessel by one of the project engineers or the chief officer.

From Swire Blue Ocean all the participants received a neck warmer, which was very appreciated in the cold weather.



*Janus Joensen and Karsten Frederiksen giving a presentation in Pacific Orca's cinema*



*Senior project engineer giving a tour*

### 7.2 Viking

After a short drive from the harbour in Esbjerg to Viking. At Viking the vice president, Niels Frände, welcomed us and gave us a tour of the facilities, where they do their own production. Through the tour, the vice president answered a lot of questions from the participants, but we were not allowed to take pictures.

After the walk through the production we entered a conference room, and presentations were given by the COO, Allan Østergaard, and Niels Frände. First Allan told about Viking's history and what they do, what their primary customers are and presented a few case stories. Hereafter Niels talked about the newly developed Mass Evacuation System, MES, as well as Viking's present and future. Both presentations were interactive with many questions. In the conference room each participant was given a notebook, pen and a folder about Viking.

Most of the last presentation was used to present the new evacuation system that Viking is working on; LifeCraft. It is expected to be released in 2018 and consists of two main elements, the storing and launching unit and the LifeCraft which is an inflatable vessel with four engines, so it has the capability to manoeuvre in all kinds of situations. Each LifeCraft can take up to 200 people and can be stored on board the vessel, not hanging over the side. This means that there will not be any complications when the ship is passing eg. the Panama canal and the design is more aerodynamic, a lot of work has been put into optimising the design to make it space efficient, so it does not take up too much deck space on cruise ships and similar.

The visit at Viking ended with a visit to their canteen, which offered plenty of both warm and cold, very good food.



*VP Niels Frønde showing the group the production and test facilities.*

### 7.3 Fayard

At Fayard we were welcomed by sales manager Ivan S. Larsen who gave a presentation about the structure of the company, the business partners and the many different projects that they do. He talked about the slogan "Speed is all - quality is everything" and how the organisation work when flexibility is important by hiring people to specific projects. He called their working relationship in the projects "spaghetti-like" because every business case and type of partnerships are possible. The presentation was very interactive, with questions from the audience.



*Sales manager Ivan S. Larsen giving a presentation*

Especially when the subject was about emission reduction and installations of scrubber systems and other eco-friendly solutions. After the presentation we had sandwiches and thereafter we headed for a tour around the yard.

### 7.4 Anecdote night at Clipper Group

We arrived at Clipper House in Nordhavn where we were met by two former Nul-Kryds presidents, Christian Råe Holm and Mathias Nyman Rasmussen. They have both participated in NTHS many times and therefore wanted to feel the atmosphere once again. Before the presentation of the anecdotes they made a brief presentation about themselves and COACH Solutions. COACH Solutions is the performance management department in Clipper Group which has emerged and now deliver services to many different shipping companies. The newest addition to the branch of services is voyage optimisation. The anecdote night was held in the auditorium where we were served refreshments and Clipper T-shirts and luggage straps were handed out. The anecdote night was as always a night with a lot of laughs as each delegation presented their "anecdote", which is essentially a story about why their delegation would always beat the other delegations.

## 8 Thursday

By Thursday morning the NTHS group was ready to take on the Danish capital with all its shipowners and consultancies. Copenhagen morning traffic offered a bit of a challenge, but NTHS was ready to bring smiles on most cyclists' faces as hard hats and different sailor hats mixed with business people in suits.

### 8.1 J. Lauritzen

At J. Lauritzen's main office we were greeted by J. Lauritzen's CEO, Mads Peter Zacho, head of performance management, Sverre Vange and HR consultant, Dorthe Olsen who has kindly facilitated the contact between Nul-Kryds and J. Lauritzen.

Mads Zacho was first on stage with a presentation about J. Lauritzen as a company, but started out by asking the audience what was important for them in a company. After a moments silence words like "teamwork", "perspective" and "community" started flowing and as Mads Zacho moved on to the history of J. Lauritzen the standard was set for the rest of the presentation – this was going to be a morning with a lot of interaction.

Mads moved on to describe J. Lauritzen's approach to corporate responsibility, how human rights are a part of J. Lauritzen's strategic and values, for instance through their involvement in the Maritime anti-corruption network but also touched upon how J. Lauritzen works with other industry partners to create intelligent solutions to improve shipping.



*Mads Zacho presenting at J. Lauritzen.*

This led to a number of questions about how good conditions are ensured for those who are hired by J. Lauritzen's sub-suppliers but deal directly with the crew eg. in ports, how the contracting conditions are for the crew working onboard J. Lauritzen's vessels and how J. Lauritzen handles scrapping of their vessels to make sure they do not end up "on the beach".

Assured that J. Lauritzen actually had examples to support their intentions the questions quieted for a moment and Mads had a chance to continue his presentation about the recent work done aligning long- and short-term goals.

We almost had time to see all of the presentation, but in the end Mads skipped the annual report and moved straight on to inform about where J. Lauritzen is present and what kind of people works where. This triggered another question from the audience: "Do J. Lauritzen have graduate programs for engineers?"

Mads Zacho was followed by Sverre Vange who gave the technical part of the presentation concerning performance management. First of some differences between short term charters in the bulk market and long term charters in the gas market were described. As J. Lauritzen both owns and charters a large number of vessels under different charter party agreements different performance strategies are needed.

Sverre then moved on to talk about how they have started using automatically collected data and how this is used to get a dynamic visualisation of different business cases, but also that there are still to many factors that cannot be properly measured, to get a

real-time picture of the performance of the ship down to every minute. This prompted questions about how data is stored and treated and how J. Lauritzen sees the future in this field.

Sverre's talk was completed with an example of how go-pro cameras are used to monitor hull-fouling in a low-tech but very efficient way.

After having thanked for the presentation, a bunch of the participants found time to ask their very final question to Mads, Sverre and Dorte who kindly stayed a little longer.

## 8.2 DFDS

At DFDS the members of NTHS had a lovely time both exploring the ship and listening to interesting presentations. The group arrived at the DFDS terminal at Dampfærgevej at approximately 11.00 Thursday morning. First we were welcomed onboard Pearl Seaways (The Oslo ferry). On board we had a warm welcome from Jacob R. Johannesen, a former NTHS participant and Nul-kryds president, who is now a Naval Architect at DFDS and Jesper Aagesen, the director of the newbuilding department at DFDS. There were also sandwiches and other good stuff for the stomach for the NTHS members.

First Jacob R. Johannesen told us about some projects DFDS has had and some facts about the company and how successful they have been the last couple of years.

Later on Jesper Aagesen made a presentation about the newbuilding department that DFDS has. This was very interesting to see. The focus was put on all the decisions and considerations that must be taken into account building a new ship. The fact that there still is a new-building engineering perspective in Denmark and that the shipping companies are still ordering ships to stay in the hard competitive market is encouraging and indicates a bright future for the shipping industry in Northern Europe. Apart from new-buildings, Jesper also mentioned some other conversion projects, that they have done.



*Jacob Johannesen presenting for one of the groups before they head out to see the engine room and the bridge.*

After these two interesting presentations it was time for some "sight-seeing" on the ferry where the bridge and the main engine rooms were visited. Both of these visits were guided by experienced people onboard the ship, as both marine engineers and captains were present.

When the tours were finished, Jacob had yet another presentation ready. This time Jacob put his focus on the Technical Organization at DFDS, also named "T.O Projects", where they are doing some projects as well. Jacob showed us how the fuel consumption has lowered the past couple of years, due to regulations for the fleet and also showed us a bit about fouling on the hull and other projects they had going on. Jacob ended the DFDS-tour with a quiz, where the winner got a gift. The quiz was based on numbers from the presentations through the visit.

### 8.3 Diesel House - MAN Diesel and Turbo

Diesel House was the last stop of the day and as the group entered the second floor from where the old main engine is visible the surprise was apparent in most participants' faces. After a short introduction to the engine and Diesel House, the engine was started and simultaneously the look on the NTHS participants faces turned to pure excitement. While the engine worked steadily 50 engineering students could be seen running around photographing and filming, trying to take in the size and sound of a full-scale main engine, not hidden in a engine room or reduced to illustrations in a textbook. Having spend the day hearing about the efforts put into fuel efficiency at the shipowners, the fact that the engine had burned around 90 L. of heavy fuel oil without generating anything was met with laughter.

After this experience the group moved downstairs where chairs had been set up for the following presentation.

The presentation was given by Bent Ørndrup Nielsen, Head of Marine Project Engineering in MAN Diesel and Turbo and focused on the light-running margin and issues with having installed sufficient engine power on-board once the requirements for EEDI are sharpened in the coming years. The presentation also included an introduction to the dynamic limiter function that has been developed as part of MAN's advanced engine control portfolio.



*NTHS participants in front of the engine just after it stopped running.*

## 9 Friday

Friday was a mix of technical presentations by various companies at the DTU Lyngby campus and a company visit to Force Technology which is also nearby. The purpose was to focus on technological developments and recent trends in the technical departments of the shipping companies in Copenhagen and get the most out of the day by inviting the companies to give their presentation in one location instead of visiting each one individually.

### 9.1 Maersk Line-Fleet Technology

The first in the morning to present was Ole Bastholm Jorgensen from the Naval Architecture department in Maersk Line, Fleet Technology. He explained about the role of naval architects in the new buildings projects from initial concept to yard selection, plan approval and site support. Naval architects are also responsible for monitoring and improving the vessel performance and increasing cargo intake for the existing ships in Maersk Line fleet through a variety of conversion projects. He also explained some of the crucial challenges in designing an ultra large container ship to achieve maximum cargo capacity and high performance through optimised ship design for the 2nd generation of their triple-E ships.



*Ole Bastholm Jorgensen from Maersk Line presenting at DTU Lyngby campus.*

### 9.2 OSK-ShipTech

The presentation was given by Henrik Mikelsen about the role of OSK as a consultant to ship owners in improving the ship design from initial to final stages using advanced tools in CFD, FEM and 3D scanning etc. He also shared his interesting journey from being a recent graduate from DTU to facing his first challenging project in the industry. It was impressive to hear about how Henrik and his colleagues managed to achieve the stability compliance of an old passenger ferry to IMO regulations which had become unstable because of too many installations on board which changed the original center of gravity. Henrik and his team installed a hollow flat structure at the aft of the ferry after performing a hydrodynamic and structural analysis of the same and managed to get the ferry to sail again.

### 9.3 Force Technology

After the morning talks at DTU by Maersk and OSK it was time for the students to visit Force technologies. Technical presentations and the rough snowy weather could not lighten the spirits of students who manoeuvred their way walking amid friendly fun frolic. FORCE Technology is a leading technological consultancy company which offers consultancy and services within energy, oil and gas, the maritime sector etc.



*NTHS delegates with the FORCE TECHNOLOGY presenters*



Due to the large expanse of facilities the NTHS team was divided into 3 groups and taken on a guided tour which included the towing tank, wind tunnel and the simulation room. In the simulation room some of the students received an opportunity to test their sailing skills whereas some onlookers started feeling sea sick and turned themselves away from the action. Along the way the students also saw the huge store room for models of various kinds of ships, oil rigs, contours used in towing tanks and wind tunnels. At the end of the tour, FORCE was kind enough to provide all the delegates with enough bunkers “Tuborg” before departure in the form of a team competition, Pablo, an old Nul-Kryds member presided as referee.

#### **9.4 Lloyd’s Register**

After coming back to the DTU campus from FORCE, there were sandwiches waiting in the auditorium. The technical talks resumed with the first being from Aleksander Hamdan from Lloyd’s register on the topic - “LR services - Noise and vibration onboard”. Using the anecdotes from his times during NTHS, Aleksander knew the best way to capture everyone’s attention. Within a few initial slides, the students were back in their attention asking questions, interrupting the talk and making it a healthy discussion. The talks mainly consisted of different roles that LR plays ranging from newbuilding projects for DFDS to consultancy works for vibration and noise control.

#### **9.5 Knud E. Hansen**

The presentation from Knud. E Hansen was given by Kenneth Skafte about the services provided by this classical ship designer and consultant to ship owners. There is a wide variety of ship types the company can provide its expertise to the the clients. Kenneth also introduced the company’s new virtual reality (VR) tool for ship designers called ShipSpace. Its the latest innovative tool developed by the company in a step towards creating improved ship design by enabling stakeholders to walk around the vessel while it is still on the drawing board and thus communicating and developing ideas for better designs.

#### **9.6 Norden**

The last and final talk for the Congress was given by Thomas K Lindberg. Norden has been the oldest internationally operating shipping companies of Denmark. The talk was rather unconventional from a shipping company not being focused on work in data monitoring and performance improvement, the talk was slightly off the course as “Daily performance evaluation in global tramp shipping”, a rather unheard topic by many of the students. Thomas explained how tramp shipping has no fixed routing, itinerary or schedule and the ship is available at short notice to load any cargo from any port to any port. This ensures that the ship is never ‘empty’ but also make it prone to unusual fouling at different ports as it remains unclear how long she will stay in port . The impact of self polishing, low friction anti-fouling paint is only when the ship is sailing but is of no help once she is moored at a port. Thomas highlighted the challenges in ship efficiency lies not only in the design of ships but a major impact is also made by the hull condition. Depending upon the severity of fouling, a company can easily burn out 150 percent of the designed fuel oil consumption. Owing to the severity of fouling and its impact on capital, cleaning is done either by underwater divers or using some kind of remotely operated machines. The talk ended with a thunderous applause from the students as it also marked the end of technical presentations of a week long congress.

## 9.7 Banquet Party

After a week of knowledge sharing and insight into the Danish maritime industry by a variety of company visits and technical presentations, the banquet party was the perfect summit of the congress filled with sharing experiences of the week with fellow delegates and old timers. It started with the speech of Poul Andersen, the esteemed faculty member of DTU maritime and a former NTHS congress attendee himself. Poul shared his experiences from the ole times and also motivated the young generations of naval architects to create ship designs by considering not only high performance but also environment. The party lasted until late night and the delegations returned to their respective countries the next morning.



*Poul Andersen from DTU-MEK in all his jazz addressing the delegates at the banquet.*

## 10 Sponsors



## 11 Financial

We are extremely grateful for the financial support we have received and very happy that both funds and the maritime industry see the value in NTHS. Without the generous help of our sponsors it would not have been possible to carry out NTHS with participation fees suitable for a student budget.

The financial report is currently sent to the department of Mechanical Engineering at DTU for third party revision and final approval. Upon request, we can send the financial report once it has been approved.