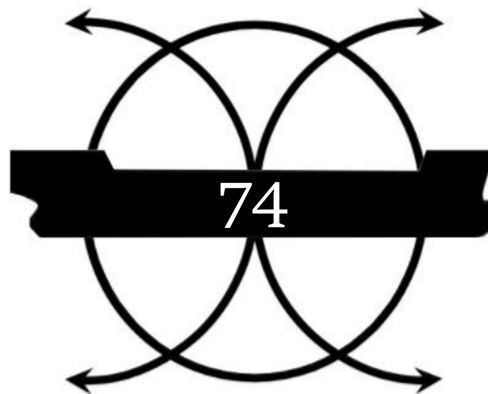


NUL-KRYDS

NTHS 74, Denmark 2023

NTHS



Nul-Kryds



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1 Words from the President

The NTHS Congress (Nordic Technical Universities' Shipbuilders Congress) has been an annual tradition for Nul-Kryds since its outset in 1947. The congress is hosted each year by one of the five partner associations: Mannhullet (Norway, NTNU), Föreningen Chalmers Skeppsbyggare (Sweden, Chalmers), Laivanrakentajain Kerho (Finland, Aalto), Kungliga Skeppsällskapet (Sweden, KTH) and Nul-Kryds (Denmark, DTU). In the year 2023, Nul-Kryds had the honour of being the host. This meant for the Danish delegation that planning started in the summer of 2022, since then we have been looking forward to welcoming 40 students from other Scandinavian universities.

The preparation for NTHS continued into the fall and winter during this time, we contacted sponsors and prepared an interesting program for the participants. The program is going to cover a big part of the Danish maritime industry. Geographically we started our tour in the maritime-shaped town of Frederikshavn in North Jutland. Afterwards, we continued southwards via Aalborg, Aarhus and Esbjerg towards Fyn and Sjælland. Two shipyards, three suppliers, two ship owners, two performance analysts and two design companies were under the visited companies.

We are grateful to have the support of everyone involved in organising and making the 74. NTHS congress a reality. It would not have been possible to arrange all the company visits without the help of the Danish delegation, who supported the organisation of the event. The sponsors made it possible to implement a tour where we could invite students from abroad and host them for one week and show them the maritime industry in Denmark. The Companies showed their warm hospitality and welcomed us at their facilities to present their products and production facilities while answering all our questions. As well as all old participants and Nul-Kryds members who supported with their advice. Thank you for your support!

The week went well, and we managed to stick to our program as planned. During the time of the congress, the students formed new networks with each other, and they had the chance to get in contact with the maritime industry and to experience the real world. In the end, a survey was held to get some feedback from the participants and we are glad that the total average satisfaction was 8.95 out of 10.

The week has been a lot of work for the Danish delegation resulting in a long banquet night for most of us. The success makes us proud and happy to pass on the NTHS presidency to the Norwegian delegation to host the next NTHS in Norway in 2024.

The report at hand presents the NTHS congress day by day. While I have the opportunity, I will on behalf of Nul-Kryds especially thank all of our sponsors for making our organisation of this year's congress possible. The contributions and interests from the sponsoring companies are priceless, and I must emphasise how important the support is for Nul-Kryds' activities. Activities that attract and motivate engineering students to aim for a career in the maritime industry.

Best regards,

Rasmus Ruff,
President of Nul-Kryds
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2 Schedule of the week


Sunday 19.03.23	Mandag 20.03.23	Tuesday 21.03.23	Wednesday 22.03.23	Thursday 23.03.23	Friday 24.03.23
	MAN Frederikshavn	OSK Ship Tech	Tur to Fayard	MAN Energy Solutions KBH	Force Technology
Meeting at stena ferry terminal Göteborg 17:20	Karstensen Skibs Værft	Bus Tur	Fayard	DFDS	Odense Maritime Technology/ DTU
Departure ferry 18:20	Alfa Laval	Viking Life Saving Equipment	Tur to KBH	Coach Solutions	Vessel Performance Solutions/ Cadeler
Arrival Frederikshavn: 21:45	Jom Fru Ana Gade	Staden	Anecdote evening	Oldtimers evening	Banket
 74 NTHS Schedule - Denmark					

Figure 1: The Schedule of the 74. NTHS congress in Denmark

3 Sunday

The 74. NTHS Congress of 2023 hosted in Denmark started on the evening of Sunday the 19th of March in Goteborg, where the guest delegations took the Stena Line ferry to Frederikshavn. Upon arrival, the NTHS participants were greeted welcome by the Danish delegation and walked to the hostel. On the first night at the hostel, the delegations got to know each other, as each delegation presented a booklet with all its respective participants. After the 3.5 hours ferry trip, the guest delegations were thirsty, so they started with drinks. while everybody presented themselves with a personal fun fact starting the congress with a social laugh. This was nice, as everyone sat down before heading off to the rooms, and socialised with the other delegations. The casual start ensured the congress participants were ready for the congress to kick off first thing in the morning, and the other delegations were not total strangers.



Figure 2: Aboard Stena Line ferry



Figure 3: late night socialising

4 Monday

Officially the NTHS 74th was kicked off on the 20th of March in Frederikshavn, Northern Denmark, with a 5-minute drive from the hostel to the year's very first company visit, starting at MAN Energy Solutions' Frederikshavn Department.

4.1 MAN Energy Solutions

The Congress was greeted by Anders Ehlers and provided with a lovely breakfast and coffee to enjoy during the company presentation. Anders gave an introduction to MAN Energy Solutions (MAN ES) as a company and then pursued with a very interesting and descriptive talk on their CPP, controllable pitch propellers, when they were beneficial and how they worked. Anders then went on to talk about the use and benefits of CFD, computational fluid dynamics, and how practical but also precise the CFD method is when developing the dimensions and shape to optimise fuel.



Figure 4: Presentation by Anders Ehlers - MAN Frederikshavn

After the presentation, the congress got a tour of their workshops, Where Anders showed the specially designed CPP hub, as well as the live processing of a 10-meter shaft. Another employee, Rasmus, took us into their production line of the high-speed four-stroke engine, 175D, where we got to see the different stages of the engine assembly at the different stations. Lastly came a third employee, Stig, who showed the testing facilities of some of their big two-stroke engines running on different fuels. It was incredible to see many possibilities the testing facilities could provide, to simulate various situations. The trip to MAN ES was a great pleasure and a fantastic kickoff to the congress, and everyone was impressed with the technologies and business which MAN energy solutions provides.

4.2 Karstensens Shipyard A/S

The congress then took the beautiful route to Skagen where Diddan Rahn Karstensen, part of the family owners, welcomed us in their canteen and talked us through the company's development, new buildings and how the shipyard at the moment worked as both a repair yard. Betto VeensWijk, Naval Architect took over and talked us through different projects regarding the new building of ships, a new yard in Gdansk and optimisation. The congress was shown around the shipyard and was allowed on their 368th new building, the 70-meter Trawler Gollones, whilst it was in dry dock. The new building was almost finished with a few weeks until delivery, which meant there were only the last paint and accommodation jobs to be done, as well as testing of alarm systems, which the congress experienced to work in the engine room. Even with the accommodation still needing the last touches, it was clear that the design has the luxury of their 16 crew considered, as well as the dependable technical solutions.



Figure 5: Boarding Gollones



Figure 6: Congress in front of Gollones

It was incredible to experience the excellent quality Karstensens's vessels offer and see several other impressive vessels around the quay. It was super interesting to see how specialized they are in fishing vessels, with more than 100 years of experience in the field, and hearing about their other competencies in ferries and navy vessels as well. After the tour, they were so kind to offer a wonderful hot lunch to the entire congress, which was enjoyed in their canteen.

4.3 Alfa Laval Aalborg

Next on the journey was Alfa Laval in Aalborg. The bus drive was the longest of the day, so the cake and coffee offered by Alfa Laval were much appreciated. We were supposed to get a tour of their facilities, but unfortunately, our group was too large, so we were given five interesting presentations from five different employees of Alpha Laval. First off, Bodil Mosekær Nielsen, Mechanical engineer, took us through the history, from when Aalborg shipyard produced their first boilers more than 100 years ago, to the merging with Alfa Laval, how their long expertise has affected their enormous knowledge and specialized products, where the old technologies are incorporated. Then Mike Luu, mechanical and thermal engineer, went through various of their special products, specifically their many different boilers and burners that fit various demands on different ships. The third presentation was by Bjørn Person, a product application engineer, on generating electrical energy in the E-PowerPacks from waste heat and the benefits and possibilities such systems provide. The fourth speaker was Umesh Badgular, an ME design engineer, who talked about safe gas combustion on LNG tankers, risks connected with unsafe gas discharge, and how they sustainably treat surplus gas. The final presentation was by Søren Mølgaard, technology manager, who took the congress on a green ride and introduced the plan of developing ammonia-based SOFC (Solid Oxide Fuel Cells) and the huge possibilities the SOFCs have in decarbonization.



Figure 7: Group picture at Alfa Laval

It was very fulfilling to hear more specifically about the technologies and necessities of the machinery on board vessels, as well as hearing about Alfa Laval's determination on providing the best environmentally sustainable technologies to the industry. After Alfa Laval, the first day of company visits had come to an end, and the participants went off to socialise at the Canal of Aalborg before they got to enjoy a well-deserved dinner, to charge for the following day of more company visits.



Figure 8: Socializing at Aalborg Canal

5 Tuesday

5.1 OSK | Ole Steen Knudsen

Tuesday was the 2nd weekday the NTHS took place. The day commenced at Ålborg where the team got breakfast and then departed for the first company visit of the day, OSK.

The congress arrived at OSK at 10:00 am as planned, where a two-hour presentation and tour took place. There were two main speakers for what one could name as “main” presentations, the CEO Anders Ørgård and a Technical manager. The two presentations were quite interesting as they gave an insight to the audience about the company’s culture business model, and perspective towards the industrial part of the company as its main activities. The business model the company follows to deliver projects to customers, how important the presentation of a concept to a customer as far as it concerns both design and technical parameters and finally that even good ideas and good concepts may not come to fruition due to other random economic parameters. Furthermore, a presentation of some ongoing operations of OSK, which take part in Africa and Oceania. During his presentation, he gave us an insight into more technical parameters that come into play in different locations according to the client’s demands as he also highlighted that OSK’s activities know no constraints location-wise.

The second part of the company visit demanded we split into three groups. One group stayed in the presentation area where a mechanical engineer gave a dense and interesting presentation about technical details regarding water resistance, and CFD models. Another group were allowed to interact with the virtual reality tool, discuss its importance and realise hands-on how important it is for a ship to be presented to the potential customer. Lastly, group number 3 got a tour with Anders Ørgård on the premises of the company while he gave a short presentation about specific work positions, their duties and their schedule.



Figure 9: OSK Virtual Reality Interaction

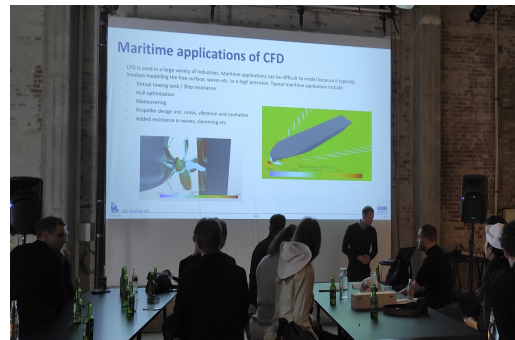


Figure 10: Technical Presentation CFD marine applications

The organization of the 2-hour visit of us was well-planned and executed by OSK since it was rich in content in such a little while we got the opportunity to be there. After a sandwich lunch, a beer and/or some coffee the congress continued to Viking in Esbjerg. The visit to OSK was a valuable experience.



Figure 11: Anders receives the thank you present from the 74 NTHS president.

5.2 Viking

Later, we found ourselves attending a series of presentations in Viking. Initially, there was a warm greeting from the CEO of Viking, followed by a series of interesting and interactive presentations. The fascinating part was the unique opportunity the audience had to interact with Viking's suits through a "fashion" show! After an introduction related to the technical details of the products, such as materials, the purpose of use and design configuration a live show followed. Employees of Viking amid an enthusiastic atmosphere walked in front of us wearing the very suits presented a little while ago and demonstrated them to us. It was highly appreciated by all participants the idea of this demonstration not only because of the innovative way to present the products but also due to the vibrant environment it created. After that quite vibrant experience, a break followed and Viking treated us with sandwiches, coffee, refreshments and candies showing us what good Danish hospitality is.



Figure 12: Viking Presentation Hall

Later, two more presentations followed. There was one regarding the interaction between IMO (international maritime organisation) and Viking for Viking to comply with the standards IMO defines or even how Viking participates in discussions to establish these safety standards. Lastly, a more interactive presentation was the visit of NTHS 74 attendees to the production facilities of Viking and their embarking on one emergency evacuation boat. The boat we got in was Viking's biggest designed to host more than 200 people in case of an emergency, equipped with multiple utilities for people to receive first aid and survive while rescue vehicles will be coming. It was a unique opportunity that visits because it provided the attendees with the experience of living and realising what was presented earlier, as well as asking a lot of questions to the people who were giving us the tour.



Figure 13: Viking Saving Boat Tour

The whole experience was very well orchestrated and executed by Viking's people, a fact that makes Viking worthy of the NTHS 74 certificate handed to them along with our deepest gratitude. This three-hour visit was the last one of the 2nd day as we found ourselves leaving from Viking premises around 18:00.

6 Wednesday

On Wednesday, the NTHS delegation travelled a long way across Denmark. We started early in the morning in Esbjerg to pay a visit to the Fayard shipyard in Munkebo and eventually arrived in Copenhagen in the late afternoon. Unfortunately, we were only able to see one company that day. However, the bus ride was highly appreciated by the members of the delegation to recharge their batteries for the remaining program for the rest of the week.

6.1 Fayard A/S

At Fayard A/S, we were welcomed by sales & marketing manager Ivan Larsen who is no stranger to NTHS as he had already introduced the shipyard to the NTHS delegation during their last visit to Denmark in 2018. After handing out PPE to the participants, we toured the shipyard in our bus towards the various drydocks and berths of the yard to get an impression of their ongoing projects. The first stop was at the Color Line cruise ferry from Kiel to Germany. The vessel was undergoing some regular maintenance tasks including hull painting and antifouling which takes place every two years. Afterwards, we went on to see an LNG carrier moored in the berth of the port of Munkebo. At last, we got an impression of the production facilities of Fayard shipyard. We saw some of the steel manufacturing and outfitting halls. As well as two other vessels undergoing similar maintenance tasks in the dry dock.

After leaving Fayard A/S, the delegation drove onwards to Copenhagen where they arrived at their accommodation in the late afternoon. After settling in, we headed to a restaurant and enjoyed our great atmosphere over dinner.



Figure 14: The NTHS delegation at Fayard Shipyard

7 Thursday

After quite some distance was covered on Wednesday the 22nd of March, we woke up in Copenhagen and spent the whole day visiting companies within the city. The bus picked us up in the morning to visit MAN Diesel House as the first stop, next visit was DFDS' Oslo ferry, Crown Seaways, and the official schedule ended with a visit to Coach Solutions only a small from the quay.

7.1 MAN Diesel House

The NTHS Congress arrived at MAN Diesel House at 9 AM. The visit started with coffee and cake before the company presentations from MAN Energy Solutions covering ongoing projects, new engine designs and layouts considering future aspects presented by Dionysios Neofytos and a coworker.

After the presentations followed a guided tour by the daily operators of the Diesel House, where the history of B&W from a one-man workshop to one of Denmark's biggest workplaces was told later known as MAN Energy Solutions. The diesel engine principles and the innovation's significance to society, as well as the future perspectives for the diesel engine. Unfortunately, due to our early visit, we did not see the B&W2000 engine in operation.



Figure 15: Tour of MAN Diesel House

7.2 DFDS A/S

After the visit to MAN Diesel House, the bus drove the NTHS congress to Dampfærgevej 30, 2100 Copenhagen, where the Oslo Ferries dock and Crown Seaways were the next destination. The NTHS Congress members were divided into 2 groups, to see the Bridge and get a tour of the engine room. A chief officer presented the bridge and the engine room was presented by the chief engineer.



(a) The NTHS congress in the engine room



(b) The NTHS congress on the Bridge

Lunch was served in the conference room, where the first presentation about the shipbuilding projects within DFDS the last 10 years, among others the 6700 lm RoRo vessels and the newly launched RoPax vessels, Luna and Aura Seaways, was presented by Christian Nielsen from Sustainable Fleet Projects.

The Second presentation was held by Frederik Berthelsen from Technical Organisation covering vessel performance and data handling of DFDS's operating fleet. The last presentation at DFDS considered the green transition covering procurement and consideration according to alternative fuels, this was presented by Sif Lundsvig from Sustainable Fleet Projects.

The visit at DFDS ended with an NTHS-inspired quiz since all the presenters are previous members of Nul-Kryds and NTHS.

7.3 Coach Solutions

After the visit to DFDS, the congress walked a short distance to Coach Solutions. At Coach Solutions, Christian Holm and James Undén performed a company presentation as a sketch of the work at Coach Solutions.



Figure 17: The NTHS delegation at Coach Solutions

The afternoon's focus was socialising due to a change of schedule, anecdote evening was moved to the visit at Coach Solutions with their acceptance, so each delegation performed their prepared anecdotes and the NTHS tradition was preserved.

Afterwards, a successful presentation of all the anecdotes performed by both Coach Solutions and the delegations, everyone was pleased with a good afternoon.

In the night we celebrated with dinner at Rio Bravo, where the NTHS participants were introduced to the Danish dish "Stegt Flæsk med Persillesovs", The evening continued in company with NTHS old-timers, previous NTHS participants taking part in the Banquet Friday.

8 Friday

8.1 Force Technology



Figure 18: Presentation about Force Technology

On Friday, the congress visited Force Technology at 8.30. The company gave presentations from John Koch and colleagues. Afterwards, the group was split into three groups. The groups were guided through the different areas of Force technology in Lyngby. Here the participants had the chance to see Force's towing tank, the Bridge simulation room as well as the wind tunnel. The students had the opportunity to talk with the employees and hear more about their work at Force.

8.2 Company Coffee

Afterwards, all delegations went to DTU in Lyngby. Here The congress invited Odensee Maritime Technologies (OMT), Vessel Performance Solutions (VPS), Cadeler and DTU. During the coffee, each representative had the chance to present their expertise. OMT told us about their leading role in ship design, Jacob Buus Peters presented both his career to show, how diverse the future of the participants can be as well as his company VPS. VPS is a leading company in the field of vessel performance. Cadeler presented their new wind turbine installations vessel and gave a chance to the student to ask about the growing wind industry and the difficulties of handling offshore wind turbines. Ulrik Dam Nielsen is an associate professor at the Department of Civil and Mechanical Engineering at DTU. His focus area is the assessment of ships and ocean structures with a focus on safety and energy efficiency during operations in waves. Ulrik presented the different research areas at DTU in the maritime field. The coffee allowed us to hear about many different companies and fields. Thank you to everyone who supported the event.

8.3 The Banquet

Friday and the official NTHS Congress were wrapped up with the annual NTHS Banquet. As a tradition, all NTHS oldtimers were invited to join the evening. The banquet is a great opportunity to build and maintain a maritime network in Scandinavia. In total 111 naval students and professionals participated in the 74 NTHS banquet. It was a great evening and everyone who participated had a great time. For those who participated

earlier in NTHS, it was a great opportunity to maintain friendships and share updates about the maritime industries in other Nordic countries. The evening included a 3-course dinner and the traditional presents from each guest delegation. The Norwegian delegation was handed the NTHS presidency, and they look forward to organising the next NTHS in Norway next year.



Figure 19: Group picture from the 74. NTHS Banquet

9 Financial

We are extremely grateful for the financial support we have received and very happy that both funds and the maritime industry see 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.

Upon request, we can send the financial report once it has been approved.

10 Sponsors

Nul-Kryds is grateful for all the support from founds and the industry. We would like to say thank you to all our sponsors:

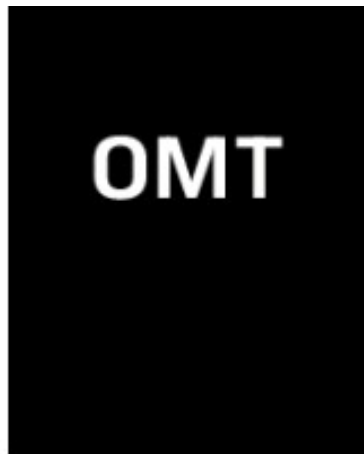


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