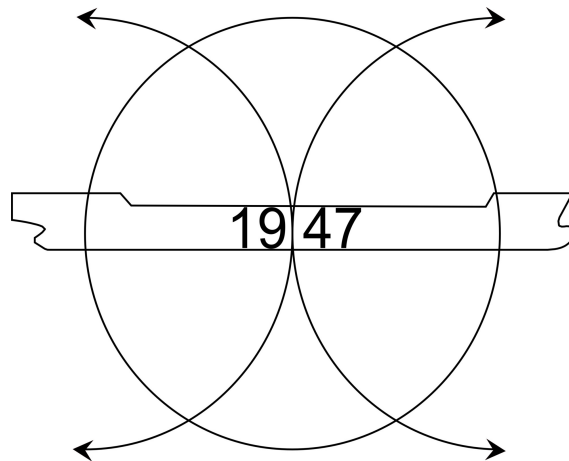


NUL-KRYDS

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# NTHS 2017

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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 to participate in since its outset in 1947. This year the congress was organized and hosted by the maritime student union Mannhullet from the Norwegian University of Science and Technology in Trondheim.

Norway is of course known for their expertise within the offshore industry. The current market depression in the offshore sector however gave rise to discussion of alternative academic topics during the congress. The week in Norway was packed with maritime company visits and presentations. Here we all were enlightened in state-of-the-art coastal fish farming procedures, thruster design and production, diving vessel technologies and offshore simulation and training facilities, among other exciting topics.

No doubt that the Norwegians had managed to put together a memorable congress - also in terms of social gatherings. Strong scandinavian relationships was formed between the students through organized events and competitions. This network is something that I believe both students and our future employers will benefit from in the future.

The report at hand presents the NTHS congress day by day. While I have the opportunity, I would on behalf of Nul-Kryds especially thank all of our sponsors for making our participation in this year's congress possible. The contributions and interests from the sponsoring companies are priceless and I would like to emphasize 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.

I hope you will enjoy the reading!

Jacob Rebien Johannesen  
President of Nul-Kryds

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## 2 Participant list

### **Chalmers Skeppsbyggara**

(Gothenburg)

Jonatan Nilsson  
Robert Sahlberg  
Vidar Myklebust  
Jon-Asle Jansen  
Simen Søvre Haukeland  
Simon Granli  
Emanuel Werner  
Niklas Arhusiander  
Paulo Macedo  
Erik Lengyel

### **Laivanrakentajain Kerho**

(Helsinki)

Iina Jokinen  
Timo Huuskonen  
Jaana Haussalo  
Ville Heikkilä  
Henri Peltola  
Argo Sannik  
Helmi Savolainen  
Lauri Nenonen  
Otso Hakuri

### **Mannhullet**

(Trondheim)

Andrea Aarseth Langli  
Live Forfang Bjørnstad  
Mildrid Sofie Haga  
Peter Tenfjord  
Johanne Tomine Vartdal  
Sondre Thygesen  
Julie Vadholm  
Anders Habostad  
Erland Torje Lundby  
Carl Einar Rasmussen

### **Kungliga Skeppsallskapet**

(Stockholm)

Mads Dahl Helland  
Julian Fraize  
Allison Waters  
Emil Andersson  
Johanna Sunneland  
Markus Johannessen  
Eetu Vilen  
Sofia Gutierrez  
Alex Schumacher

### **Nul-Kryds**

(Copenhagen)

Jacob Johannesen  
Frey Gerner Callesen  
Lina Christensen  
Christoffer Sigshøj  
Philip Holt  
Abhiket Kashyap  
Anna Joensen  
Karl Vistad  
Harshit Tripathi  
Hans Frederik Schwarz



### 3 Schedule of the week

Time	Monday, March 20	Time	Tuesday, March 21	Time	Wednesday, March 22	Time	Thursday, March 23	Time	Friday, March 24
08:00	Wake up	07:30	Wake up	07:00	Wake up	07:30	Wake up	09:30	Wake up
10:00	Seminar with Norwegian Maritime Competence Center, Rolls Royce, Offshore Simulation Center and AKP	09:00	Company presentation at Sperre	08:00	Bus to Molde	08:30	Leave for MTS	10:30	Leave for MTS
12:45	Company presentation by Norwegian Shipowners' Association	12:30	Company presentation at Morenot	10:00	Company presentation at Brunvoll	09:30	Presentation of the Department of Marine Technology, NTNU, and boat building	11:00	Company presentation by DNV GL
14:00	Company presentation at Kystverket	14:00	Vard Shipyard	12:45	Bus to Trondheim	12:00	Guided tour at MTS	14:00	Lunch at Tyholt tower/Chairman's lunch
17:00	Dinner at Hoffmann	17:00	Dinner at Alnes	18:00	Arrival at Thon hotel	13:00	Testing of boats	15:00	Rest and prepare for banquet
19:00	Pub Crawl	21:00	Afterparty at Keiseren	19:00	Dinner and party at the Basement	18:00	Presentation by Mannhullet and dinner	18:30	Banquet at Thon hotel Pirisen
						19:00	Anecdote night		
						21:00	Meet oldtimers at Samfundet.		

Figure 1: Program for the congress.

## 4 Monday

The day and the whole congress started with a visit to NMK “Norsk Maritimt Kompetansesenter”, Norwegian Maritime Competence center in Aalesund. NMK is an office building housing a lot of different maritime businesses from the maritime cluster in Aalesund, including Rolls-Royces European maritime training center, OSC, “Offshore Simulator Centre” and the Campus of NTNU Aalesund.

First a presentation was given about the center and the history behind it and afterwards a presentation on the large maritime cluster in the area of Aalesund including yards as Ulstein og Vard. Naturally there were focus on the development of the Norwegian maritime industry in the post-offshore-golden-age and many questions were asked about what markets the yards and also the sub-suppliers were looking into.

The story of the downturn in the Norwegian offshore industry is best told by the numbers, in the maritime cluster around Aalesund 22.000 people were employed in 2013, in 2015 16.000 and expecting even lower numbers for 2016 – as no new builds of offshore vessels were expected.

### 4.1 OSC

After the presentation the delegations went on a guided tour around the facilities visiting RR’s maritime center, the campus and the OSC simulators. Especially the experience in the simulators were remarkable and one could almost “feel” the six meter waves when standing in the very steady simulator suspended from the building’s roof. Furthermore, the tour gave the group the opportunity to experience on of the real advantages of simulation – training of subsea installation operations, showing the setup Statoil had just left, training for a complete subsea compressor installation.

### 4.2 Kystværket

We left OSC for a short busdrive to Kystværket in Ålesund. When we arrived, the sun was breaking through the heavy clouds and it was quickly decided that it was time for lunch. After enjoying delicious sandwiches in the sun, there was an interesting presentation about the function of Kystværket in Norway. This included how they make sea routes safer with markings and buoys and how they prepare for disasters like oil-spill in the Norwegian coastline. After the well-done presentation, the facility was presented to us. Here we saw different kinds of buoy they had stored up and the warehouse where they keep the measurements for a disaster.



Figure 2: The Danish delegation enjoying a sandwich in the sun in front of Kystværket.

## 5 Tuesday

Tuesday had no less than three company visits scheduled. The first stop was Sperre, which produces air-compressors and coolers for the maritime industry. Before lunch, we visited Mørenot, a company specializing in fish-farms while the afternoon was spent at Vard shipyard and a tour onboard their almost completed diving-vessel. By the end of the day, the participants could enjoy dinner with a beautiful view of the coast at Alnes.

### 5.1 Sperre

The day started with breakfast and presentations at the family owned and operated Sperre which produces compressors and coolers for ships, offshore and the general industry and has its main office along with some production facilities in Ellingsøy. As we arrived at Sperre, we were met by CEO Erik Langseth, VP of Operations Rune Myklebust and HSE&QA manager Stephan Balling, who were all very cheerful and created a very welcoming, casual atmosphere that was to last throughout the presentations and the following tour of the workshops. At first, Erik Langseth gave a presentation of Sperre's history and current situation and briefly touched upon the future for Sperre. With a 20% market share of the compressor and heat exchanger market for the maritime industry and more than 75 years in the market, the technical presentation was brimming with anecdotes from R&D work and the change in production habits. It is estimated the Sperre produces 1500 new coolers annually and currently have 30.000 in service worldwide, this means that a big part of the business is the production, storage, and delivery of spare parts, as a company guarantee, all spare parts will be available 30 years after point-of-sale. Sperre has made it a company priority that they can deliver "any part within 48 hours" and it was pointed out that the neighboring airport was important in the fulfillment of this commitment.

Following the presentation of the company and a brief introduction of the technology behind compressors and coolers, Rune Myklebust took over and presented a recent case he had worked on. Following the drop in the oil market, Sperre tried to find an additional use of their devices in other niche fields. The fish farms that are currently experiencing rapid growth in Norway urged them to develop a device for salmon lice treatment. The solution to this was to use the cooler/heater technology and develop a "salmon spa", currently a new vessel is being built customized to this purpose. The final presentation of the morning featured Stephan Balling and he presented the Sperre 2020-plan which focuses on digitalization in the preparation of big data in the shipping industry and eventually autonomous vessels. Besides this, a transition to LEAN-production and automation of trivial tasks should enable Sperre to keep most of its production in Norway while doubling the outcome of the same number of man-hours. The visit was concluded with a tour around the production facilities which gave participants yet another opportunity to ask questions, the last of which were answered on the way to the bus.

The bus ride did as always give all participants the opportunity to meet and talk to each other and share stories from their respective countries. Most delegations split up in small groups in the bus, but were united by two things from Scandinavian countries - the NTHS playlist of songs and drinks thus maintaining the fun mood during the ride from Sperre to Mørenot and throughout the day.

## 5.2 Mørrenot

We all arrived at Mørrenot, the group was led into one of the production halls where coffee and snacks were served in one end, while a gigantic fishing net was being inspected and mended in the other. The students gathered where multiple posters had been taped to the wall and the presentation on Mørrenots work with nets and fish farms soon developed into a conversation with questions from the audience ranging from the type of fiber used to number of people required to operate a fish farm and the finer differences between designing a for shallow protected waters or ocean going farms. The presentation ended with the encouragement to design a machine, that could knit nets in 3D and significantly cut costs, a number of participants expressed interest and more than one business card was handed out. Before departure, there was time for a quick tour around the premises and through some of the workshops.



Figure 3: Participants listening to the manufacturing process of fishing nets.

## 5.3 Vard Shipyard

At Vard Shipyard, a Fincantieri company, we were greeted with lunch and a very short presentation of the vessel which we were about to go onboard. The ship was a 3000-ton diving vessel designed to operate out of Borneo. The diving vessel features two diving bells which allow up to four divers to go down to 300 m. Such a dive takes 28 days in total when recovering time in special pressurized capsules are included. The construction of the ship had taken two years from the keel was laid, and the ship had just undergone sea-trial a week prior to our arrival. The only thing left before delivery was the final tests of the diving equipment.

Most of the afternoon was spent on an extended tour of the vessel, in which the group had the opportunity to see everything from tank top to the heli deck. The diving bells being one of the most important parts of the ship. While we had been underdeck it had started raining, and while on the helicopter deck it turned into snow, so we did not spend

much time taking in the view from there. As always it is extremely interesting to get tours of the ships, and this was no exception, for most participants it was the first time to be onboard a brand-new ship.

What's amazing is the fact that in a country where even a pint of beer is so expensive, this company has continued shipbuilding and remains buoyant by uniquely modifying the production methodology of building the ship at some other parts of world and doing the final outfitting at Vard and thereby labeling her as "Made in Norway". As per the company this production style will be continued even after it delivers diving vessels and starts projects for passenger vessels.



Figure 4: Participants listening to the manufacturing process of fishing nets.





Figure 5: A day well spent. Members of Team Nul-Kryds at Dinner.



Figure 6: NTHS 2017 participants. Location: somewhere near the sea.

## 6 Wednesday

### 6.1 Brunvoll

Wednesday morning started with breakfast in the bus and a short bus trip to the town Molde as the company Brunvoll Thrusters has its head office there. The visit at Brunvoll started with a short presentation of the company's history. The company was founded by 2 brothers who produced diesel engines for clients in their near vicinity. From here they moved on to producing thruster that later became their core competence. The company is now a global supplier in thruster for all sorts of vessel types.

The next presenter was a recent graduate who had specialized in propeller blade designs, which allowed for a more technical presentation while also disclosing some interesting first hand experience from starting a job after graduating. He described the general approach when producing a thruster propeller design. Usually the drag and lift produced by the propeller are calculated via flat plate theory to accommodate for the limited complexity of the blade geometry. The limited complexity is utilized as the propeller would operate equal amounts counter clock-wise and opposite and energy optimization is of limited practicality in the thruster design. Further discussions were carried out about scale testing and practical ideas that came to mind.

After the presentations we were lead on a tour through the production and storage facilities of Brunvoll. Here it was possible to get an idea of the different thruster concepts and the scale of the final products.



Figure 7: The first produced thruster (1965) - still in demo operation.



## 6.2 Aalesund - Trondheim

After a nice lunch in the cafeteria at Brunvoll, we headed for the bus for another four-hour drive from Molde to Trondheim. In these 4-hours was also included a nice 35-min ferry trip between Halså and Kanestråum. The participants enjoyed the Norwegian landscape, which was covered in snow and looked like something from a fairytale.

At around 18.30 we arrived at the hotel, that we were going to stay the next days in Trondheim. Thon hotel is mid centrum in Trondheim and a nice hotel. There was only time to bring the luggage up to the room and change clothes.

At around 19.00 we left for NTNU, where we would eat dinner (pizza) at the Basement (Kjelleren). The warmest welcome was at NTNU that evening. The students were singing and waving with flags! After we had eaten pizza and mingled a bit, the lights were turned off and a lot of people started to run in the Basement while they sang. This was Tåkeluren. That is Mannhullets quire. They gave a nice presentation and stayed to mingle with the NTHS participants with some other NTNU students.



Figure 8: Cheerful delegates arriving at NTNU.



Figure 9: Mannhullet gave us a warm welcome at their student society.



Figure 10: A festive night at Mannhullet's student bar Kjelleren.

## 7 Thursday

### 7.1 NTNU

In the morning we took the bus to Marine Technology department, NTNU where the Head of Department presented about the education and current research focus which included interesting projects like ‘Autonomous ferry’ and ‘Flip foil hydrofoil’. The ‘Ocean space center’ which is to be established at the department in the near future will contain extensive laboratories, Sea keeping basin, deepwater offshore basin and other departments such as structure, cavitation and energy which will cater to the enhanced research plan in the maritime and better collaboration between the stakeholders.

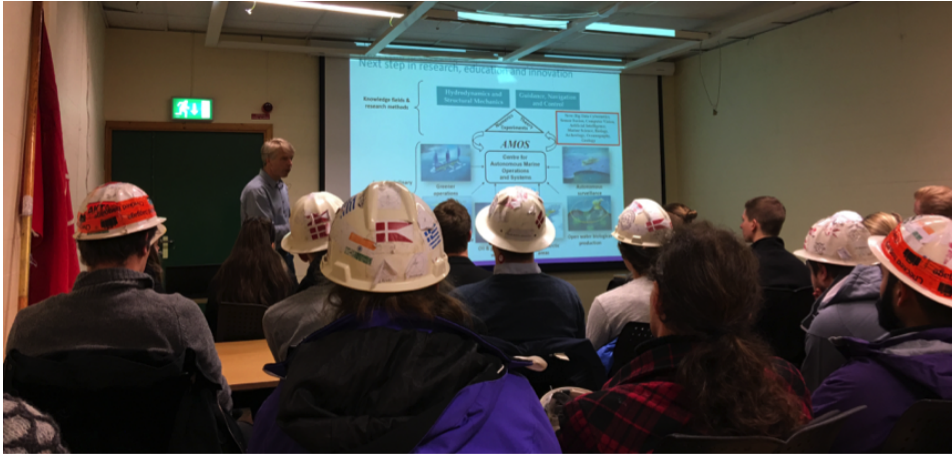


Figure 11: Presentation by Head of Department, Sverre Steen.

After this we were given an interesting task of designing and constructing a boat from scratch and use our naval architectural skills to come up with a design which can take the given loads and has minimal resistance with maximum directional stability. It was challenging yet fun filled to come up with such a design in a short span of time.



Figure 12: One of the constructed boats.

Later in the afternoon, we were given a guided tour around the facilities and laboratories in the department. The facilities are impressive and something different than we are used to at DTU. The tour included a presentation of a marine LNG engine for research, marine cybernetics lab and ocean basin lab and a huge towing tank. It was surprising and a bit envious to know that the department has a separate towing tank just for the use of students. Later we tried the actual performance of the boats designed by different teams.

At the night the traditional Anecdote Evening was conducted. Each delegation has prepared a maritime related anecdote to entertain the other delegations with. Later that night we also met with the NTHS Oldtimers.



## 8 Friday

### 8.1 DNV GL

Friday and the last day of NTHS 2017, started off with another trip to Tyholt and the campus for Marine Technology for a presentation from DNV GL. Mike Irvine presented the company briefly, before moving on to talk about sustainability and specifically the greatest spaceship in the world, planet earth. This led us to DNV GL's sustainability development goals, which is the result of a massive global research conducted to try and predict the future for the planet based upon the goals set by the UN. There are 17 goals in total, including among others: no poverty, zero hunger, clean energy, sustainable cities. A so-called frontier company represents each of the 17 goals, committed to lead the progress towards fulfilment of the SDGs. Unfortunately, as we learned from DNV GL, their report concluded with the fact that we will most likely not be able to reach any of the SDGs by 2030, if we continue in the manner that we are. As always, DNV GL pointed out that it was up to us to come up with ideas to solve the global issues at hand.



Figure 13: DNV GL presenting sustainability and development goals..

After the very interesting presentation, we moved on to the workshop. Here we were divided into 8 groups, each group consisting of a mix of the various delegations. Each group were given 4 questions to choose from, relevant to the topic sustainability and naval architecture. The goal of the workshop was to come up with an idea or solution to the selected problem, relate them to some of the SDGs and then present it to the rest of the groups and DNV GL, upon which they gave solid feedback on each presentation. That led to good discussions about the feasibility and other aspects that weren't included. The workshop was really interesting and it was fun to see that many of the different groups came up with ideas that were pretty similar, great minds think alike. Some of the ideas included an extensive use of changeable battery modules and charging stations at various points along a route, organic ballast treatment producing a biomass end product for use as fuel or food and a super green ship utilizing all available green technology such as wind power, solar power, electric power, crops on deck etc.

After the workshop, lunch was on the menu. The group split up as the NTHS board conducted the annual board meeting during the lunch. The rest of the delegates went to the Tyholt tower, at Egon's. A rather spectacular restaurant situated 76 meters above ground, with the whole restaurant rotating 1 round per hour, which gives you a complete view of Trondheim in any direction while eating, a wonderful ending to a great day and a good preparation to the banquet.

## 8.2 Banquet

The afternoon was reserved to preparations for the banquet. Per tradition the NTHS congress ends with a festive banquet. This year it was situated at Thon Hotel & Congress Center in Trondheim City Centre. The evening started with a welcome drink in the lobby. Here we got our first surprise of the evening. Alcohol is apparently that expensive in Norway so it was necessary for the host to hand out ration coupons for the delegates. However we got back into great mood when the doors to a well decorated dining room opened. Here we had the next surprise of the evening - this time a positive one. The Norwegian delegation had organized dinner partners for all of us to accompany us for the evening. The toast master of the evening welcomed us all and dinner was served. During the night toasts were proposed and cheers made. The maritime student choir entertained us with some festive songs. The delegation gifts were handed over to Norwegian hosts to appreciate the great work they have done to plan a fantastic week for us. At last the infamous 'Drukkenbolt' title had to be selected by the former Drukkenbolts. As expected our very own Dane Christoffer Sigshøj was awarded the title. A great ending of festive banquet. Therenext we were all transported by busses to the afterparty at their very own student bar. Here we spent the rest of the evening accompanied by the local rock-band.



Figure 14: Danish delegates and Oldtimers prepared for a festive night at the banquet.

## 9 Accounts

<b>Income</b>	Budget	Accounts	Note
Student payment (10 x 850 DKK)		DKK 8500	
DFDS A/S		DKK 10000	
Skibsteknisk Selskabs Fond		DKK 6000	
COACH		DKK 6000	
Lloyd's Register		DKK 6000	
Karstensens Skibsværft A/S		DKK 5000	
Odensen Maritime Technology		DKK 4000	
DNV GL		DKK 3000	
Total income		DKK 48500	

<b>Expences</b>	Budget	Accounts	Note
Conference fee	DKK 22500	DKK 22360	1
Transport	DKK 18000	DKK 21234	2
Meals during prep. meeting		DKK 449	
Meals during trip	DKK 2000	DKK 1862	
Miscellaneous (Gift for host, etc.)	DKK 1000	DKK 2820	3
Total expences	DKK 43500	DKK 48725	

<b>Result</b>		DKK -225	4
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1. The conference fee was a bit lower than expected due to NOK valuta drop.
2. Transportation expenses increased as plans had to be changed from ferry to flight in last minute.
3. Freight of gift to Norway was more expensive with flight than ferry.
4. The deficit will be covered by Nul-Kryds' internal accounts.

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