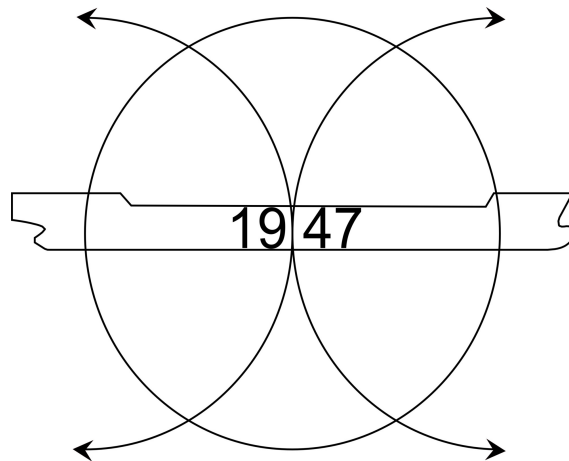


NUL-KRYDS

NTHS Report 2016



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1 Words from the President

The Nordiske Tekniska Högskolas Skibbsbyggare (NTHS) congress has been an annual tradition for Nul-Kryds to participate in since its outset in 1947 – the same year and occasion for the establishment of the Danish organization for students with maritime technological interest, Nul-Kryds.

This year the congress was arranged and hosted by Kongliga Skeppssällskapet from KTH Royal Institute of Technology, Stockholm. Even though Swedish shipbuilding industry is not as big as it used to be during the 20th century, our Swedish friends still managed to put together an interesting program filled with maritime company visits and presentations. Here we got the opportunity to be enlightened in state-of-the-art yacht designs, lightweight materials, underwater craft solutions and alternative propulsion devices, among other exciting technologies.

Another important outcome of the NTHS congress is the strong relationships fostered among the students crosswise of the Scandinavian borders. Relationships that I believe in the future will be beneficial for our professional careers – and for our future employers.

On the following pages you can read the experiences gained by the Danish delegation during the 69th version of NTHS. While I have the opportunity, I would on behalf of Nul-Kryds like to show my gratitude to our sponsors. Without you Nul-Kryds would not be able to participate in and arrange that variety of events for the maritime interested students at DTU. Events that attract and motivate engineering students to aim for a career in the maritime sector.

I hope you will enjoy the reading!

Jacob Rebien Johannesen
Nul-Kryds President

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2 Participant list

Chalmers Skeppsbyggara (Gothenburg)

Emilie Voraa
Esben Kleppa
Jon Asle Jansen
Jonatan Nilsson
Karl Fredrik Vistad
Kjartan Bauge
Morten Aamodt
Peter Angelo Ottersen
Simen Søvre Haukeland
Vidar Myklebust

Laivanrakentajain Kerho (Helsinki)

Santeri Ihalainen
Iina Jokinen
Esa Takkinen
Aleksi Airinen
Ida Maria Aurora Lemström
Otto Koivisto
Timo Huuskonen
Ville Valtteri Heikkilä
Eero Kahva
Valtteri Eronen

Mannhullet (Trondheim)

Aleksander Vold Kristiansen
Marte Shetelig
Jørn Ringvall
Jørgen Rørvik
Tom-Erik Abildgaard
Mari Jensen
Amund Helvik
Simen Diserud Mildal
Hans Jakob Vik
Andrea Aarseth Langli

Kungliga Skeppsallskapet (Stockholm)

Kjell Teepen
Claes Tretow
Egil Gustafsson
Filip Söderling
Carl-Anders Carlsson
Jonas Persson
David Ahlsén
Erik Olsson
Joakim Wallberg
Lucas Parpis

Nul-Kryds (Copenhagen)

Jacob Rebien Johannesen
Franz Hastrup-Nielsen
Philip Holt
Harshit Tripathi
Matilde Hvarregaard Andersen
Christoffer Müller
Stella Goldberg
Mikkel Borup
Frey Gerner Callesen
Christoffer Sigshøj

3 Schedule

Time	Tuesday 12/4	Wednesday 13/4	Thursday 14/4	Friday 15/4
06:30	Departure VÄRTAHAMNEN (Finns) T-Centralen (Everyone else)		Breakfast at Lodge32	
06:45	Departure T-Centralen			
07:30	Breakfast on bus	Breakfast at Lodge32	Departure Lodge32	Breakfast at Lodge32
09:00		Departure Lodge32		
09:30			Sandvik	Departure Lodge32
10:00		FMV		
10:45				Ferry to Rindö
11:00	Rolls Royce			James Fisher Defence
12:00	Lunch with Rolls Royce	Lunch at KTH		
12:30			Lunch with Swedish Steel Yachts	
13:00		Wallenius		
13:15				Ferry to Vaxholm
13:30			Swedish Steel Yachts	Departure Vaxholm Chairman's Lunch at Waxholm
13:45		DNV-GL		Lunch at bus
14:00				Arrival af Chapman
14:15				Prepare for banquet
14:45				
15:00	Departure Kristinehamn	DOLPROP Workshop	AGA	
15:30			Alderholmens mekaniska	
16:00			Marine Jet Power	
16:30			Inresol	
17:00			Clockwork	Departure af Chapman
17:30			Dinner with Swedish Steel Yachts	Ferry to Banquet
18:00	Arrival KTH	Dinner at TC w. Anecdote telling		BANQUET
18:15	Dinner at TC with DOLPROP			
20:30			Departure Gävle	
22:45			Meet the old-timers	
LATE	Sleep at Lodge32	Sleep at Lodge32	Sleep at Lodge32	Sleep at af Chapman

Figure 1: The official schedule of the NTHS week 2016.

3.1 Tuesday

Tuesday we went for a 4-hour bus-ride to Kristinehamn, where Rolls Royce has their Swedish production facility. First off was the mandatory presentation about their products and what Rolls Royce does, especially with regards to their marine division. Afterwards we were treated to a nice (and welcomed) lunch at their canteen, and we were off to see their production area.

In Kristinehamn the main focus is on CP-hubs, blades and associated equipment. It was clear that the low oil-price is also affecting them. We saw only a few dozen workers in their huge facility. Despite the low activity it was a good experience talking about the production and manufacturing of especially the blades - something that still requires a skilled workforce to make sure that welding, geometry and finish is done properly.

After the tour, it was off to Rolls Royce test-facility, a 15 minutes drive away. They have two (one big, and one gigantic) cavitation tanks. At the facility we were introduced to the software and technology used when designing propellers at Rolls-Royce and how they achieve better hydrodynamic performance than their competitors. Afterwards we saw the cavitation tunnel in action and got a talk with the engineers working there.

After our visit, Rolls-Royce was generous to hand out different merchandise before the bus headed back to Stockholm. In Stockholm we arrived at the student bar on KTH campus where we got an introduction of the new and innovative company Dolprop. They investigate the possibility to use a dolphin tail for propulsion of vessels. After the presentation, Dolprop sponsored our dinner before the party in the student club started.



Figure 2: Picture of the Nul-Kryds delegation in front of Rolls-Royce propeller test facilities.

3.2 Wednesday

Wednesday, we started the day with a short bus trip to KTH, where we would be spending the rest of the day. As we arrived a little early it was possible to enjoy the magnificent Swedish weather.



Figure 3: The Nul-Kryds flag is swaying in the wind in the KTH courtyard.

3.2.1 FVM

The first to present was the Swedish Defence Materiel Administration (FMV). FMV is responsible for specifying and acquiring defence material for the Swedish army. The presentation was mainly concerned with subsea materiel, meaning submarines and autonomous underwater vehicles (AUV). The first presenter told about her work on the Swedish navy's AUVs. It was described how these are utilised in strategic mapping of the sea bed, naval minefields and coastal water and also how these could be deployed from a submarine and how it returned by itself after performing its assignment.

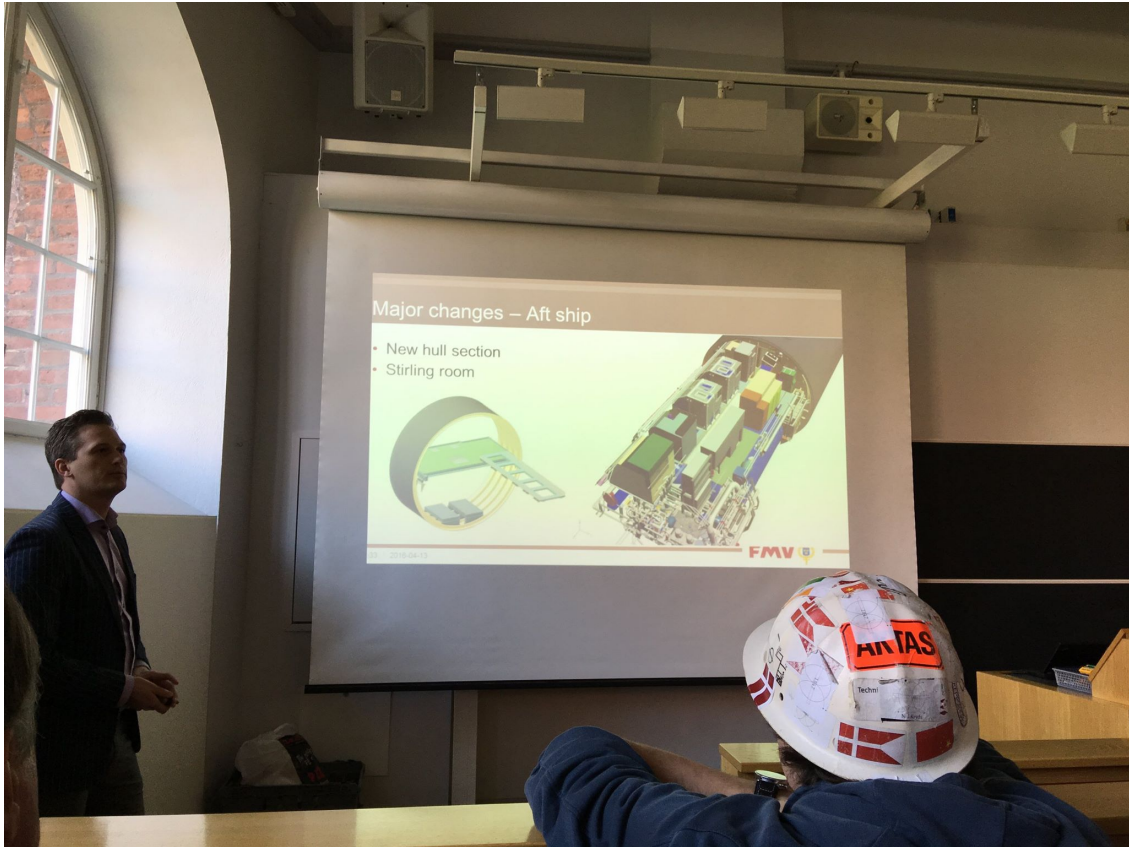


Figure 4: They managed to find a submarine in Sweden.

The next two presenters talked about the development of the Swedish navy's new submarines and a retrofitting project on one of the submarines already in service. The retrofitting project dealt with the elongation of the submarine's hull and upgrading the machinery. This included installing Stirling engines, for producing electricity while submerged and updating the standard of the living quarters. The last presentation from FMV was about the new submarines, which the Swedish Navy have ordered. A lot of improvements were presented, both in terms of the building process and the capabilities of the submarines. In the design process much effort had been put into modularisation of systems and wider torpedo bays to accommodate stealth deployment of divers and AUVs.

3.2.2 Dolprop

Earlier we had been presented with the Dolprop propulsion concept. As this is a product still being developed and potential business cases are still being investigated, Dolprop had arranged a workshop to receive our input regarding their product.



Figure 5: Workshop in technology development and commercialization.

We were split into groups where we had to perform a SWOT analysis of the Dolprop product. After working on the SWOT analysis for a while, one from each group had to present the group's findings. A lot of the presented concerns were focused on vibrational issues and if it would be possible to transfer the horsepower needed to propel typical sized merchant ships. However, a lot of groups also saw a huge potential for developing a business case within small craft. After concluding on the workshop, we left KTH to get dinner, beers and perform our well prepared anecdote.

3.3 Thursday

Thursday morning we took a two and a half hour bus ride to reach the office of Sandvik located in Sandviken, Gavleborg, Sweden. It is a company innovating in material technology with a wide range of products. The main focus of the presentation was to introduce the variety of Stainless steel and special alloys developed by the company. The development and metallurgy of the two main 'Super-duplex' and 'Hyper-duplex steel' was explained. This type of steel has very good properties for shipbuilding applications such as corrosion resistance, strength to weight ratio and fatigue resistance as compared to the mild steel used in industry.



Figure 6: Power point presentations in material science.

After this we walked to the Sanvik canteen where a very nice buffet lunch was organised. After lunch we had a presentation of the weldability and welding process' of their in-house developed steel materials.

We were then taken to the Swedish Steel Yachts, which is a company that has developed a steel yacht prototype produced with super-duplex steel developed by the Sanvik. The steel used has very high strength and no fatigue and fouling as claimed by the owner of the company. It was interesting to hear about the unique features of the yacht design and the market it can potentially capture in near future.



Figure 7: The first prototype made entirely out of stainless steel.

After this we had a presentation from AGA, a Swedish industrial gas company which is also a shielding gas supplier for Swedish steel yachts required for the complicated welding of super-duplex steel. The following presentation was made by Alderholmens Mekaniska, a small company that has specialized in laser cutting of industrial steel. They supply the steel parts for the yacht ready to be welded together. We were handed a small bottle opener, which made a good example of their precision. Marine jet power introduced their line of water jet propulsions with some insights into the hydrodynamic design of engines. Inresol stirling, gave an interesting presentation of their stirling engines and the opportunities of integrating this into various fields of the maritime industry. Finally we were introduced to the company Clockwork, which introduced us to the importance of networking and looking into the future to be able to reach our goals.



Figure 8: Relevant presentations from sub-suppliers.

The dinner was organized by the SSY in their premises accompanied by some interesting discussions with the presenters from all the companies. We also received nice souvenirs from the companies.



Figure 9: Dinner and socializing in the old production hall.

We then head back to Stockholm where the night was awaiting to be enjoyed with all the old timers. The memories of the earlier NTHS events were shared while getting acquainted with the new members of this year.

3.4 Friday

In the last congress day, Friday, it was time to visit James Fischer Defence located at the island Rindö near Stockholm. After a short bus ride and a five minutes' ferry trip we went ashore on the island. The company presented themselves and gave a short introduction to the products which were designed and tested at the company in Sweden. The product assortment includes three types of underwater vessels meant for special military operations. The Seal Carrier, the Sub Seal and the Torpedo Seal. After the presentation we got a tour in the company's workshop, where we saw the special projects in their construction phase.



Figure 10: Visiting James Fischer Defence.

The culmination of the visit was the following demonstration of the Seal Carrier, which is a vessel that can operate in three different modes; surface, semi-submerged and submerged. The Seal Carrier serves different military purposes such as transporting of elite combat teams and acting as a patrol vessel. The employees presented all the technical systems aboard and afterwards took the boat to sea, so we could see how the vessel performed. The visit at James Fischer Defence was very interesting, as it showed a different part of the maritime industry and illustrated what our education as maritime engineers also can lead to.



Figure 11: The Seal Carrier in semi-submerged mode.

Following the visit at James Fisher Defence we were transported to our new hostel, Af Chapman, named after a big bark anchored just next to the hostel. Here lunch was served at the harbor front and the afternoon was used to get ready for the big banquet beginning at 18.00. The banquet took place in impressive surroundings at the aquarium placed at the harbor in the middle of Stockholm. The evening comprised of a delicious three course dinner, various speeches and presentation of presents for the hosts. Afterwards the formal part of the banquet was over, and the participants and old-timers partied the rest of the evening, which then concluded the 69th NTHS congress.



Figure 12: The Danish delegation and Danish oldtimers at the NTHS banquet.

4 Accounts

Income	Budget	Accounts	Note
Student payment (10 x 750 DKK)		DKK 7500	
Skibsteknisk Selskabs Fond		DKK 10.000	
DFDS A/S		DKK 6000	
Odense Maritime Technology		DKK 5000	
FORCE Technology		DKK 5000	
OSK-ShipTech		DKK 5000	
DNV GL		DKK 3000	
Karstensens Skibsværft A/S		DKK 3000	
Lloyds Register Consulting		DKK 1000	
Total income		DKK 45500	

Expences	Budget	Accounts	Note
Conference fee	DKK 22500	DKK 24365	1
Transport	DKK 10000	DKK 7676	
Hostel		DKK 1404	2
Meals during preparation meeting		DKK 928	
Meals during trip	DKK 1500	DKK 1437	
Miscellaneous (Gift for host, etc.)	DKK 1000	DKK 669	
Total expences	DKK 35000	DKK 36478	

Result		DKK 9022	3
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- 1 The conference fee was more than usually due to miscommunication from the Stockholm hosts.
- 2 The Danish delegation needed an overnight stay in Stockholm as the conference started in the early morning on Tuesday.
- 3 More funders than expected showed their support for which we are very grateful. The surplus from the NTHS conference is transferred to cover other Nul-Kryds activities for the benefit of the students. This include shipyard visit in Germany and maritime study trip to Singapore later this year. However, funders are welcome to write to nul-kryds@mek.dtu.dk in case of a wish of reimbursement of the proportionate part of the surplus.

Thanks to our sponsors

