

2011

Nul-Kryds: Annual report



Nul-Kryds

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Word from the president

The 64th annual NTHS congress was hosted by the Stockholm delegation. The congress was in all aspects a great experience for all of the participating naval architect students. The Stockholm delegation had arranged a week full of interesting company visits and social gatherings with great opportunities to form friendships and networks across the five Nordic participating delegations.

I am sure these friendships will come in handy in future projects being realized by the former NTHS participants.

To be able to participate in a congress with such a great history and tradition has been a great honor. With such a great and dedicated delegation as the Danish I am looking very much forward to having the honor of hosting the 66th annual NTHS congress in 2013.

I would like to thank all of our sponsors who made our participation in this congress possible. All the contributions from all the sponsoring companies mean really much to us. Our participation in the NTHS Congress would simply not be possible without your help.

I hope that the sponsoring companies will benefit from the corporation with Nul-Kryds.

We in the Nul-Kryds board has decided to change our annual NTHS report to an annual Nul-Kryds report including of course the NTHS report as the main content, but we agreed that it is important that the sponsoring companies gets an insight into what other activities Nul-Kryds as student union arranges. So this year's report is including sections regarding all of the Nul-Kryds activities throughout the past year.

Best regards,

Thor Andersen
President of Nul-Kryds

NTHS congress in Stockholm

Intro

NTHS in 2011 was arranged by KTH in Stockholm from Monday 28th March to Friday 1st April.

From Denmark 10 students attended and these were:



The Danish delegation at Stockholm Central Station

See from left J. Hansen, S. Thonesen, C. Holm, L. de Boar, V-P Kåla, M. Rasmussen, J. Uhrbrand, T. Andersen, A. Hamdan and J. Jacobsen

Monday 28th March 2011

Monday morning the congress started by the 5 delegations meeting up at Slottsbacken in Stockholm. We left Stockholm around 8.00 and the destination were the Muskö caves, which is an old naval shipyard dug out of a mountain during the cold war. After arrival around 9 a.m. the day started out with a presentation by Defence Consulting Europe (DCE), who told about their different kinds of wet submarines designed for carrying divers and special units behind enemy lines unnoticed and fast.



CB 90 H troop carrying setup

After DCE, Docksta gave a presentation mostly about their combat/patrol boat CB 90 H which is a very fast vessel there can be fitted in different ways to meet the demands from different clients. The CB 90 H is a fast troop transport boat with a capacity around 20 soldiers and gear and a top speed fully loaded around 20 knots. If the boat is made as a patrol boat the top speed is around 40 knots driven by two water jets which gives a highly manoeuvrable boat. Aside from the CB 90 we got a short presentation about the other types of boats Docksta is building such as life and fire boats and some history of the company.

The last presentation before the guided tour of the caves was given by Kockums who is running the shipyard in the caves for the navy. Kockums gave an overall look of the company and their different types of naval vessels. They talked mostly about a new submarine they are designing for the Swedish navy, but most of the information was classified so the focus of the presentation was the design phase not the specifications of the vessel.

Then we had some lunch before got a guided tour of the underground shipyard which was very impressive to see. At the moment we were there they were having a submarine called HMS Halland to service and building on a catamaran yacht designed by Porsche with an aluminium hull made in Singapore. Finally we were shown the CB 90 H before leaving for our accommodation for the night around 17:00.



Above, the caves



Left, CB 90 H

Tuesday 29th March 2011

After a quick breakfast we departed from Nickstabadets Camping & Vandrarhem around 10 a.m. It was only a short bus ride to Ninashamn ferry terminal, from where the ferry to Visby, Gotland, leaves. After watching the ferry arrive and dock at the terminal we went on board. The trip to Gotland was about 3 hours, so a presentation of the company servicing the route, Gotlandsbolaget, and a tour of the ship had been arranged.



M/S Visby arriving at Ninashamn ferry terminal

The presentation was done by the captain of the ship Bjørn Carlsson. The route from Ninashamn to Gotland is serviced mainly by the ship we sailed with, M/S Visby, and the sister ship M/S Gotland, but during the peak season two additional vessels are put into service. During the off-season these two vessels are moored in harbor. The main particulars of the M/S Visby and M/S Gotland are about 176 m between perpendiculars, a breadth of 25.67 m and design draught of 6.41 m. They are designed by the Danish naval architect company of Knud. E. Hansen and are, in the eyes of the captain and also the Danish delegation members, quite beautiful.

After the presentation, the congress members were divided into two groups. One went to visit the bridge and the other the machinery room. Then they would change, so everyone got to see both. At the bridge the captain explained how the ship is operated and we had a detailed look at the drawings of the ship. In the machinery room we saw the four Wärtsilä medium speed diesel engines, each developing about 12,000 kW. According to the captain the ship is heavily overpowered, so the crew has to be careful not to run her too hard.



J. Craft Torpedo in a late production step at CMI Composites

After the arrival in Visby, it was another short bus ride to the former Nimbus factory, where the company CMI Composites is housed now. CMI Composites is a company that produces fiber-reinforced-plastic boats, mainly glass fiber but occasionally carbon fiber too. The main customers are Nimbus Boats and J. Craft, but also sailing yachts and even skis are produced, too. All parts of the production are done locally at the factory and we had an interesting tour around the site. After the tour, one of the company owners and famous yacht designer Haakon Södergren gave a short presentation, about how to become a yacht designer in the modern world in opposition to how it was when he started his career.

After the visit at CMI we went with the bus back close to the ferry terminal, where our accommodation for the night was situated in an old prison. The rooms were, as you might expect, quite small and the doors very solid.

After a quick check-in, we went for a stroll through the town of Visby to the restaurant & bar, Munkkällaren. There, one of the owners of Wisby Breweries, a local microbrewery, hosted a beer tasting before we all enjoyed a nice buffet.

Wednesday 30th March 2011

Wednesday morning we were heading for Västervik. We left Gotland at 7:20, this time we took the ferry from Visby to Oskarshamn. The bus arrived at Marström Composites in Västervik 11.30. The participants were divided into two groups. One group was given a tour through the Marström Composite workshop, while the other group went to Windy Scandinavia. Afterwards the groups switched. The presentation at Marström was a rather short one, but still very interesting. The company was founded in 1983 with the aim of building a boat which was better, stronger and faster than any of its competitors.



Composite hull of a catamaran

Today their Olympic class Tornado catamaran has a hundred percent of the world market. Marström Composites is the only company in the world that mass-produces boats in carbon fiber or fiber glass, using an autoclave-a technique developed by the aircraft industry. During the years the company has expanded into three areas; Boats, Spars and Industry. They are specialists, when it comes to composites materials, especially carbon fibers. During the tour in the workshop we saw some of their lightweight products such as: small boats, catamarans and spars; made in carbon fiber reinforced epoxy. Afterwards the groups exchanged, our group went to Windy Scandinavia only a 5 minutes' walk away. Windy is a Norwegian company with a department in Västervik. We were welcomed with a nice meal followed by a short video presentation. Afterwards we were guided through their big factory, where we saw some of their luxury boats; some of them under progress and some ready for delivery. The visit was very fascinating even though one could see that their potential customers were not students of naval architecture.

After the visit at Windy Scandinavia we were heading to Storebro, which was a short bus ride away. The third visit that day was at Storebro Bruks, again a company which builds smaller boats. We started with a guided tour through their workshop, which was very interesting. Here we really got the impression of an effective company that mass-produces pleasure-cruising luxury boats.



Inside of a luxury boat

To get the production as effective as possible, the production area is divided into several sub-spaces such as: mould hall, carpentry and assembly hall. The reason for this is to get a steady production flow through the building. They are able to work on 5-8 boats simultaneously. After a one hour tour we went to their canteen, where we got some refreshments: sandwiches, fruits and coffee. At the same time the director of the company gave a presentation on the history and future goals of Storebro Bruks. The day ended with a bus party ride to Kristinehamn that took almost 5 hours, but since people were in such a good mood, it didn't seem to bother anyone. All in all it was a very good and eventful day with lots of positive experiences. The accommodation in Kristinehamn was at Lusaskens Vandrarhem, finally we could get some rest after a long and exhaustive day.

Thursday 31st March 2011

Visiting Rolls Royce AB

On Thursday we left the hostel at 9:30 after a very nice breakfast made by the owners. We were now heading off to a company with one of the world's strongest brands: Rolls Royce. When one thinks of Rolls Royce, most people will associate the name with the British luxury car. When something "is the Rolls Royce of" something, it means the best of the best. The company Rolls Royce Ltd was 1973 split up into Rolls Royce Motors (now owned by BMW) and Rolls Royce Plc., in which the Swedish division Rolls Royce AB is a part of.

Rolls Royce Plc. has business areas among civil and defense aerospace, energy, nuclear and marine. The Swedish division which we visited is in the marine business and is mainly into propulsions (water jets and propellers). It was of course this part of the company that we were visiting for the whole day.



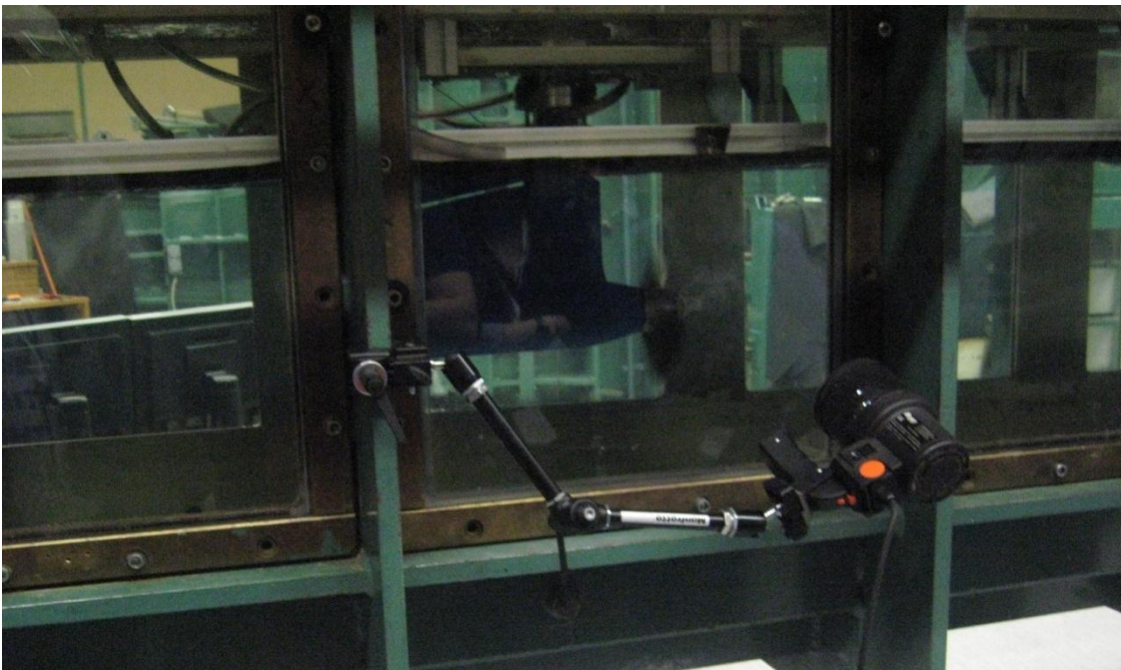
Propeller at Rolls-Royce

The company was only 30 minutes away from the hostel in Kristinehamn. We started off with a presentation of the company and the marine division. The presentation also included several movies about the company and it was all in all very professional. It must be noted, though, that Rolls Royce was the biggest company we visited during the week, which of course makes the overall impression more professional.

After the presentation we split up into two groups of 25-26 people because Rolls Royce has two departments. One department deals with the actual production of the propellers and water jets, whereas the other department has a huge testing facility in which they design and test propulsion systems for their customers.

When arriving at the testing facility only 15 minutes away, we were further on divided into two smaller groups of 12-13 people. One group was to have another presentation of the design of propulsion systems. It was very exciting, and we got to see and hear about problems and challenges regarding the design and CFD simulation and calculations of the systems. Again movies were used as illustration. One of the challenges is that cavitation must be analyzed to be sure that corroding and heavy stress of the propellers doesn't occur. All designs made by Rolls Royce are tested before going into production. This of course makes the price higher when buying propulsion systems for Rolls Royce, but the customers will also have a well-tested and well documented product, which will give great certainty to the ship owners before spending millions of dollars on huge propellers.

Next step of the tour was to see the test facility where the propulsion systems are tested to validate the CFD calculations and simulations. The test pieces are of course scaled down, but because of the narrowing of tolerances when down-scaling, a work piece easily costs tens of thousands of dollars. Since every propulsion system for each project is unique, huge lockers with hundreds of work pieces were at displays.



Test at Roll-Royce

By using high frequency flashing lights (not good when epileptic) one could see the motions of the propellers in the huge testing tank, which consists of a big tunnel loop where the test section is visible through glass. The work pieces to be tested are mounted in the glass section, and water streams and flows can be controlled in the tunnel. The visible motions of the propellers caused by the flashing light are used to be able to track the cavitation. The visit to the test facilities was very exciting. The visit ended with a very nice lunch in the cantina before it was time to switch with the other big group.

After lunch it was time to see the production facilities. First a presentation of the electrical systems used on board vessels was given. Then we went off to the production facilities all well-equipped with safety shoes, glasses and earplugs. During the tour we saw the making and finishing of huge propeller blades as well as maintenance of already existing systems. The huge propellers are made from brass, and are very beautiful

due to the milling work, which is also done in-house by a big five axis milling machine with 65 different tools. It was amazing to see how big just one of the four or five blades from a propeller is.

The visit was very well organized and professional and it was without doubt the most interesting company that we visited during the week.

Dinner with J-Craft

After the visit at Rolls Royce we were heading back to Stockholm, which was a bus drive of 5 hours. When we arrived to the hostel "The Red Boat", which is a boat in Stockholm, we had 10 minutes to change clothes and to leave our luggage before we were meeting the people from J-Craft, which sponsored an evening dinner for us. We started with a glass of champagne and a beer while listening to a presentation made by the yacht company J-Craft. After this, two shipbuilders from the big wooden boat "Tre Kroner" gave a presentation of the building of this big sail boat, which we afterwards went inside of, to see the incredible hand work that had been done.

We then went back into the bus and drove into the center of Stockholm to eat dinner on a restaurant boat. Finally we all went to a fancy Night Club, where the man from J-Craft had made sure of every one's free entrance.

The evening was very nice, with good dinner and nice ambience. The day was in total very good, even with the long bus drive of 5 hours.



Model of a propeller at Rolls-Royce

Friday 1st April

On Friday the Danish delegation woke up early to get ready for the exiting lectures held by different companies at KTH, Kungliga Tekniska högskolan. Departure to the university was at 9:00 which did not cause any problems to get everyone up. Danish delegation among other delegations sharing the same accommodation facility headed towards the nearest metro stop, Mariatorget. It took about 15 min with the metro to arrive to the KTH. At the university the plan for the day was to hear some presentation made by different companies.



Accommodation in Stockholm



KTH

Wärtsilä

The first lecture was held by Wärtsilä. Wärtsilä is a global leader in complete lifecycle power solutions for the marine and energy markets. In 2010, Wärtsilä's net sales totaled EUR 4.6 billion with 17,500 employees. The company has operations in 160 locations in 70 countries around the world.

During the lecture, different future scenarios of shipping were presented. Scenarios were made to help Wärtsilä in long-term strategic planning and understanding the customer needs better. Three different scenarios by Wärtsilä were presented. These were: **Rough seas**, **Yellow river** and **Open oceans**.

In the **Rough Seas** scenario, scarcity of energy, water, and food is predominant. Climate change adds further stress. Cartels and bilateral agreements have overtaken free markets. Wealth is divided unequally among nations, resulting in tension, and indeed, some nations are under pressure not to fall apart. The key words for the Rough Seas scenario are scarcity, tension and bilateralism. The global tension has increased the need for armed escorts, also at sea.

In the **Yellow River** scenario, China dominates the global arena, economically and geopolitically. Labor and resource-intensive manufacturing has moved to Africa and other Asian countries. China has invested heavily in Africa, where local economies take off. Economic growth is significantly slower in the West, and the Western economies have responded with massive R&D investments and protectionist measures. Manufacturing has been moved back to US and Europe. The United States and the EU try to strengthen their relationships with Latin America and Africa respectively. The shipping industry is dominated by China and most of the big shipping companies are Chinese-owned. Trade routes have shifted according to Chinese trade interests and their African allies start to become more independent economically.

In the **Open Oceans** scenario globalism has a strong influence. The centers of economic activities, regions and megacities have gained power over the nation state. These mega-corporations and megacities are the winners in this scenario. Ships no longer have names; they are simply tools in the process. Ultra-efficient, automated ports near the megacities process shipments at high speeds. Most goods are transported between megacities and areas rich in resources, such as clean water, food and energy. Although renewable energy sources are the top priority, oil, coal and other fuels are shipped into regions where production of renewable energy is difficult. Algae are farmed offshore for bio fuel production. Environmental challenges have led to the development of new types of vessels; desalination, waste management and recycling ships are anchored outside megacities, serving their needs.

As it can be noticed from the short description of different scenarios, some of them emphasize protectionism and continuous fight for the last resources available. The most positive scenario would be the **Open Oceans**. In this scenario the world is working together to create fair competition and development. After the students had heard briefing about different scenarios, questions were asked and each student had to select which scenario suited his/her opinion. It was seen that the protectionism related scenario was appealing to many students. A reason for this seems to be the probabilistic way of thinking and the lack of believe in human kindness. Most of these students were still hoping that e.g. water and oil would not have to be exported with armed escorts and we could live more or less in **Open Oceans** world in the future.

Conclusion of our lecture was that whichever scenario would take place, the competencies found among Scandinavian Companies / Naval Architects will attract players globally and generate wealth in our region.



What type of business Wärtsilä do



Group activities

Det Norske Veritas

After the first lecture there was a barbeque arranged at KTH soil. Weather was a bit foggy but it didn't stop the delegations enjoying their break. The following lecture was held by DNV, Det Norske Veritas. DNV is an independent foundation with the purpose of safeguarding life, property, and the environment. Their history goes back to 1864, when the foundation was established in Norway to inspect and evaluate the technical condition of Norwegian merchant vessels.

During the second lecture focus was mainly on offshore oil platforms. Lecturer started by telling his own NTHS experience in Norway and showed some interesting photos. Lecture was describing in detail what is DNV and what do they really do. The most interesting part was to listen to the experiences from the field and see photos during normal survey tasks.

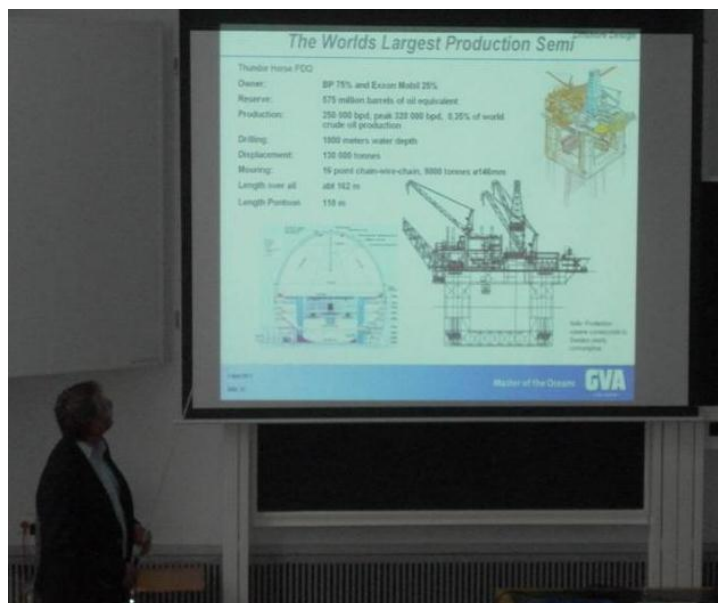


DNV lecturer in his white boiler suit

GVA

GVA is the world-leading marine and offshore design company for semi-submersibles and other floating units. It is a Swedish company and began its present operation 1989. The company has its origin in the GVA shipyard where the GVA series of semi-submersibles was originally developed. Today the GVA Series of semi-submersibles has been further developed and refined and includes a wide range of units with displacements from 13,000 to 130,000 tons. GVA has experience from over 100 projects in more than 20 countries. Based on the experience of more than 100 engineers deployed within conceptual design, naval architecture, structural design, and marine and drilling systems, GVA can provide high-value design solutions to each and every project.

Two lecturers provided insight to the interesting world of semi-submersibles and generally to their business.



Presentation by GVA

Banquet

After enjoying the interesting lectures and delicious barbeque at KTH, all delegations went back to their housings to prepare themselves for the banquet. All delegations were dressed up sophisticated and were indeed presenting a nice image of their university. Banquet started with welcome drinks and a speech from the KTH president. General atmosphere was impressive, food was delicious and many new networks were created between different delegations.



The Danish delegation at the banquet

Events, conferences, and seminars in Nul-Kryds

In 2011 Nul-Kryds have both participated in and arranged a variety of different events. The biggest event is of course the participation in NTHS congress in Stockholm in April, but the network that Nul-Kryds makes possible has also led to new experiences in other seminars and conferences.

Nul-Kryds participation during 2011

Students from Nul-Kryds have frequently been attending conferences, seminars and lectures in the maritime community during the year. Especially the seminar Innovation in the Maritime Industry, The Blue Conference and a number of presentations in the Danish Society of Naval Architecture and Marine Engineering (in Danish: Skibsteknisk Selskab) has been interesting and rewarding. These events benefit towards our education within the maritime technology area, but also give insight into the general maritime cluster, in a way that is not possible at the university alone. Another example is the "Sprechttag" Students meet Industry at Technische Universität Berlin; a seminar with presentations from both students and industry all over Germany. The presentations from the students gave a glimpse of the new things going on at German universities, from contra-rotating propellers to corrosion protecting of offshore windmills. Besides the presentations of diverse maritime companies all over Germany it was possible to speak to the delegations from each company, who all had brought both project ideas and job offers for the attending.

We at the student union Nul-Kryds are happy to get the opportunity to attend these events, often on advantageous economic terms. We feel very welcome at the different events, both national and international.

Internship Onboard Container Vessel Maersk Salina

During the summer break 2011, Thor Andersen and Lasse de Boer, both members of the board of Nul-Kryds, went on a sailing internship onboard the container vessel Maersk Salina.

Our internship started, when boarding Salina in Singapore. From there we continued on the Europe-East-Asia route towards Qingdao, China and then Busan, South Korea – Shanghai – Ningbo and finally Hong Kong where we disembarked.

The purpose of the internship was partly for us to become familiar with the life and work onboard a modern merchant vessel and get some practical understanding of the theory taught at the university. We also had a practical task, which involved inspection of the hull steel structure in the water ballast tanks. It was very interesting to navigate through the small closures and actually see the structure after trying to visualize it from the steel drawings. The tanks can get very hot when the sun is shining and the water is warm too!

In general the weather was quite fine during most of the trip, but we did have to take cover from a Typhoon outside Busan New Port for about two days. We dropped the anchor and woke up to quite heavy rolling due to the swell from the typhoon. After pulling of the anchor and turning the ship the rolling of course diminished again.

It must be admitted that the shore leave on a modern container ship is not the adventure it apparently used to be. This is of course due to the relatively short time spent in port and the fact that the container terminals often are quite far from the cities. However, we did take some expeditions. One time we went

into the 'small' Chinese town close to Qingdao, where a young Chinese girl showed us around. We have the feeling she took us to all her relatives, who then tried to rip us off – often quite successfully! Back on the ship, the crew had a good laugh on our behalf, but told us that was a part of the experience.

The internship was a very rewarding experience, both personally and professionally. It put the, often very theoretical, work we do at the university into perspective and also increased our motivation for studying naval architecture.

The internship was arranged in cooperation between The Technical University of Denmark and A.P. Møller Mærsk.

Nul-Kryds arrangements

The Paper Boat Competition 2011

Since 2001 there has been a yearly paper boat competition for the maritime students at DTU. The combatants must build a paper boat not heavier than 10 grams with the highest deadweight (carrying capacity), and the winner is the boat with the highest ratio of deadweight to lightweight (boat weight).

The only material that can be used to make the boat is paper and glue. Some restrictions to the design apply to limit the size and so that it will have the appearance of a boat.

- The lightweight boat must be less than 10.00 grams
- The ratio of length to breadth must be larger than 2
- The midship section coefficient must be less than 0.95 for all draughts
- The half angle of entrance of the bow must be less than 30° at all draughts

The competition is for all level of students and it is not always a master student who wins the competition, as it happened in 2011, where Thor Peter Andersen won the contest with his boat. The boat weight was 4 g and could carry 707 g (ratio 176.75). This gave him a 1st place, where the 2nd place had a ratio of 85. The prizes for the winners were some bottles of nice Danish liquors.



Examples of paper boats, one is still floating

The professors from DTU have not yet competed against the students, and we are still waiting for the day, where a professor will be a combatant.



Seen from left: Mathias Rasmussen, Aleksander Hamdan, Christian Holm, Michael Nylykke, Jonas Stefansson and Hans Otto Kristensen

Christmas lunch and summer party

The two main social events Nul-Kryds is hosting for the present and former members throughout the year is the Christmas lunch, usually in November, and the summer party in June. These events serve the purpose of making friendships and connections between former and present members of Nul-Kryds and thereby between the maritime industry and the marine engineering students. A tradition of visitors from the other NTHS delegations at our summer party is starting to form. Around five NTHS participants have participated at each of the last couple of summer parties. This is a great way to keep the connections established at the NTHS congress. These social gatherings also serve as a great opportunity to get to know the relatively large amount of exchange students studying naval architecture here at DTU.

The Christmas lunch is a more or less traditional Danish Christmas lunch where we usually are around one third former members and two thirds present Nul-Kryds members. This combination of participants provides a great opportunity for all to expand ones network, both social and professional.

At the summer party it is tradition to watch the good old SS Martha movie, of cause with subtitles, and barbequing at DTU. The former/present ratio is like at the Christmas lunch and then, as mentioned before, we are usually joined by around five of the NTHS congress participants.

Both of these events went very well this year and we were so lucky to get sponsored some snaps from OSK Shiptech which we did not expect and we would like to thank them for the gift.

Projects in Nul-Kryds

As an organization of maritime engineering students there is of course a continuous stream of projects going on. Descriptions of some of these projects are seen below.

Propulsive Coefficients for ships

By: stud. ing. Peter Berg Ammundsen & stud. ing. Jon Jacobsen

In this project it is investigated how the propulsive coefficients (wake fraction, thrust deduction and relative rotative efficiency) depend on a selection of relevant parameters, such as; propeller diameter, longitudinal position of propeller, the propeller loading and the radial load distribution. The investigation is done using the CFD RANSE code SHIPFLOW. The project is carried out in cooperation with MAN Diesel & Turbo in Frederikshavn.

Start: Ultimo August 2011

Finish: Ultimo January 2012

Pre-Swirl Stator Blades for Ship Propellers

By: stud. polyt. Lasse Normann de Boer & stud. polyt. Scott Jespersen

In this project it is investigated whether it is possible to improve the propulsive performance of a medium-sized container ship by applying pre-swirl stator blades. Stator blades are means for improving the inflow to the propeller and reducing the rotational loss in the slipstream. The CFD code SHIPFLOW is used for the investigation of the flow around the hull of the so-called Hamburg Test Case, a previous CFD validation case. The wing like blades will be fitted to the hull upstream of the propeller and by a manual iterative process of twisting and turning the blades an optimal configuration will be sought. By a simple estimate using airfoil theory it was found that 6 stator blades with NACA-0012 sections and cord lengths of approximately 0.8 m, should be able to eliminate the slipstream rotation. The RANSE results also indicated that a reduction of the propulsion power is possible, but the current configuration of the stator blades is not sufficiently optimized. Hence, it is concluded that a more advanced optimization procedure than used in this investigation, is necessary to obtain an actual increase in the propulsion efficiency.

Start: Ultimo August 2011

Finish: Medio December 2011

Development of a Mathematical Ice Module for Simulating Ship-Ice Interaction in Real-Time

By: stud. polyt. Jonas Smith Frederiksen & stud. polyt. Christian Holm

A Mathematical Ice Model (MIM) is presented, having been developed with the purpose of real-time interaction with the Mathematical Ship Model (MSM) DEN-Mark1 developed by FORCE Technology. The developed MIM calculates the ice forces in 6 degrees of freedom (DoF) exerted on the ship as it sails through a continuous sheet of level ice. The MIM is based on the semi-empirical model developed by Su et al. (2011), but expanded from 3 DoF to 6 DoF and made time step size independent. The developed MIM has been validated against data from the ice trials of the Swedish multipurpose anchor handling/ice breaking tug (AHTS/IB) Tor Viking II in which resistance and turning circle tests were performed. Further,

the MIM has been thoroughly validated against the average ice resistance formulae derived by Lindqvist (1989) to uncover its sensitivity to changing ice thickness and ship speed. The results are fair but due to adequate tuning not being possible, the prediction of resistance at some ship velocities and values of ice thickness is poor. The interaction between the MIM and the MSM is found to be good, but because of poor tuning and limits to the MSM, the simulations do not yield acceptable results for all combinations of ice thickness and ship speed. The real-time capabilities of the MIM are questionable in the present implementation, but a number of proposed solutions are presented which are believed to be able to improve the MIMs use as an external module in a real-time ship simulator.

Start: March 2011

Finish: September 2011

Nul-Kryds in 2012

The new year is becoming very interesting for our organization as a lot of new initiatives are started. As Denmark is hosting NTHS in 2013 time and resources will be spend planning this. We will also try out a new concept with presentation evenings, where students at DTU can get to know some of the things that are going on in the Danish maritime industry right now. Along with our participation in the Tech Event hosted by Det Blå Danmark this will hopefully help young future engineers get to know more about the possibilities in the maritime industry.

January	One or two students will enter the education congress, where people can come and hear how it is studying a DTU and especially what naval architecture is.
February	Presentation evening, where three companies will present their companies and projects that are undergoing or have been done, and what a naval architect can do in the companies. This event is open for both members of Nul-Kryds and other students at DTU who would like to know more about the maritime industry in Denmark.
March	The Tech Event at Force Technology, where Nul-Kryds will be present and help Det Blå Danmark by explaining how it is to study naval architecture at DTU. As opposed to earlier years, where this event was strictly for high school students, part of the event will be arranged to give people already studying at DTU a chance to find out what it is to be a maritime engineer.
April	NTHS in Norway, where 10 members from Nul-Kryds will go to the congress.
June	Martha and barbecue, where currently member and former members will see the movie "Martha" together and after the movie there will be barbecue, where people can make new personal connections during the day and night.
September	The Paper Boat Competition, where students make a paper boat, no more than 10 grams and only using paper and glue that have the highest ratio between dead weight and light weight.
October	The General assembly of Nul-Kryds.
October/November	Presentation evening. Different companies present their companies, on-going or newly finished projects, and what a naval architect can do in their company. If the event in February becomes a success this will be a new event of the same kind.
November	Christmas lunch, where people can make new personal connections during the night.

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