Aalto University

School of Engineering

Integration of knowledge, skills and identity development to

Shipbuilder's Portfolio

Jani Romanoff & Heikki Remes

Aalto University
School of Engineering

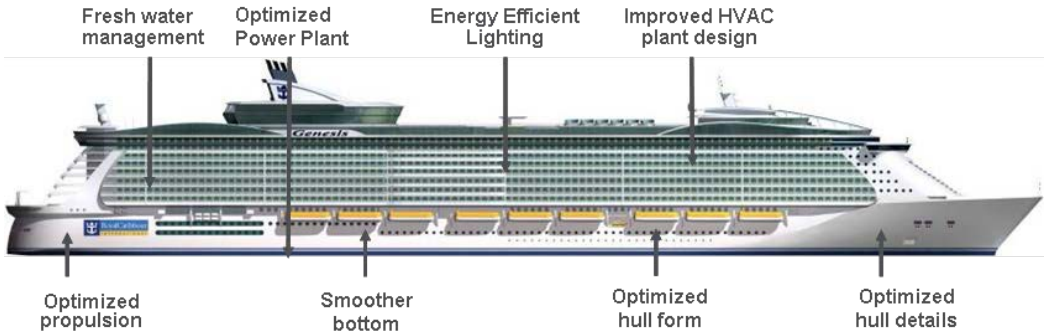
Contents

- Why portfolio?
- How to do it in practice?
- Experiences?

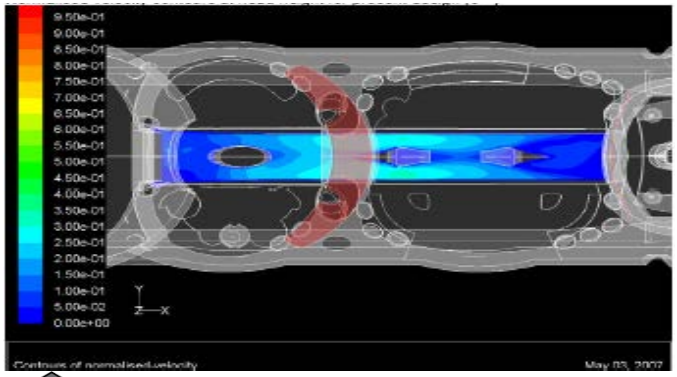
Why Portfolio?

- Student need to:
  - Learn essential knowledge on specific discipline from infinite amount knowledge
  - Learn work-life skills + critical and constructive attitude and
  - Develop professional identity and become creative
- 1.5 years time to take the courses and learn systems design
- World is chancing so one has to identify the strengths and weaknesses and on work on those
  - Life-long-learning
  - Personal development plan

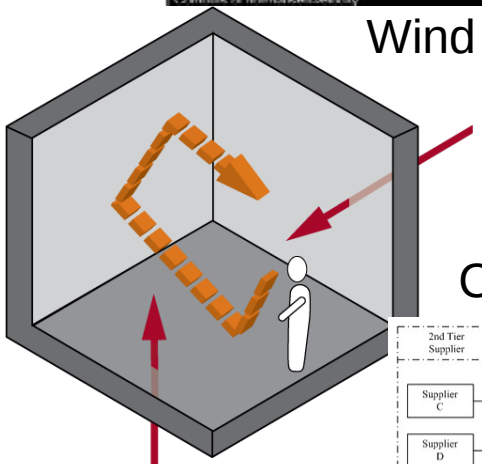
Modern Cruise Ship - Collection of High-Tech



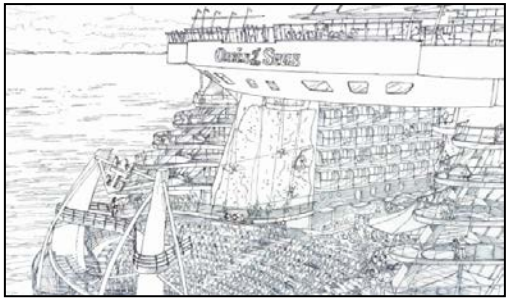
Energy Efficiency



Wind Comfort

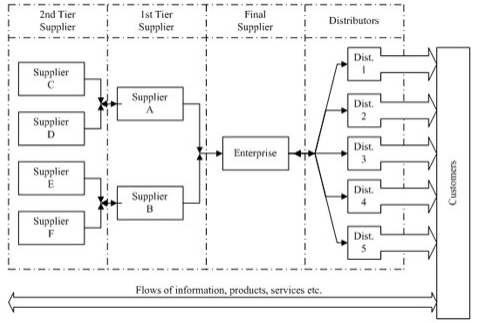


Supply Chain Mngmnt



Architecture & Design

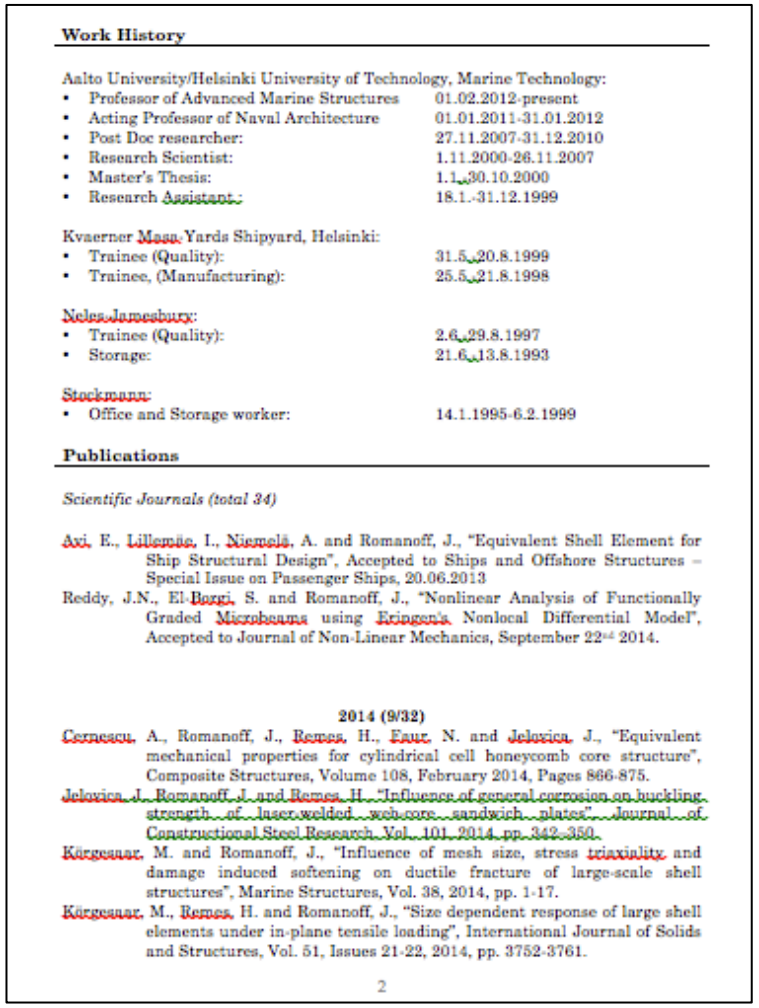
Acoustics



Information Technology

CV vs. Portfolio

- CV is a must for people with academic education
  - Collection of your professional data
  - Creates a profile of you
  - Is a starting point for any process in career: recruitment, promotion etc.
- Portfolio is extended CV which is good to have
  - Self-reflective description of your past experiences and future directions
  - Indicates your strength and weaknesses and actions undertaken
  - Says much more about you than CV
  - Is information needed for any major step in career



Work History

Aalto University/Helsinki University of Technology, Marine Technology:
- Professor of Advanced Marine Structures 01.02.2012-present
- Acting Professor of Naval Architecture 01.01.2011-31.01.2012
- Post Doc researcher: 27.11.2007-31.12.2010
- Research Scientist: 1.11.2000-26.11.2007
- Master's Thesis: 1.1.-30.10.2000
- Research Assistant: 18.1.-31.12.1999

Kvaerner Masa Yards Shipyard, Helsinki:
- Trainee (Quality): 31.5.-20.8.1999
- Trainee, (Manufacturing): 25.5.-21.8.1998

Neles Jamesbury:
- Trainee (Quality): 2.6.-29.8.1997
- Storage: 21.6.-13.8.1993

Stockmann:
- Office and Storage worker: 14.1.1995-6.2.1999

Publications

Scientific Journals (total 34)

Axi, E., Lillemäe, I., Niemelä, A. and Romanoff, J., "Equivalent Shell Element for Ship Structural Design", Accepted to Ships and Offshore Structures – Special Issue on Passenger Ships, 20.06.2013

Reddy, J.N., El-Borgi, S. and Romanoff, J., "Nonlinear Analysis of Functionally Graded Microbeams using Eringen's Nonlocal Differential Model", Accepted to Journal of Non-Linear Mechanics, September 22nd 2014.

2014 (9/32)

Cernescu, A., Romanoff, J., Remes, H., Faur, N. and Jelovica, J., "Equivalent mechanical properties for cylindrical cell honeycomb core structure", Composite Structures, Volume 108, February 2014, Pages 866-875.

Jelovica, J., Romanoff, J. and Remes, H. "Influence of general corrosion on buckling strength of laser-welded web-core sandwich plates", Journal of Constructional Steel Research, Vol. 101, 2014, pp. 342-350.

Kõrgesaar, M. and Romanoff, J., "Influence of mesh size, stress triaxiality and damage induced softening on ductile fracture of large-scale shell structures", Marine Structures, Vol. 38, 2014, pp. 1-17.

Kõrgesaar, M., Remes, H. and Romanoff, J., "Size dependent response of large shell elements under in-plane tensile loading", International Journal of Solids and Structures, Vol. 51, Issues 21-22, 2014, pp. 3752-3761.

2

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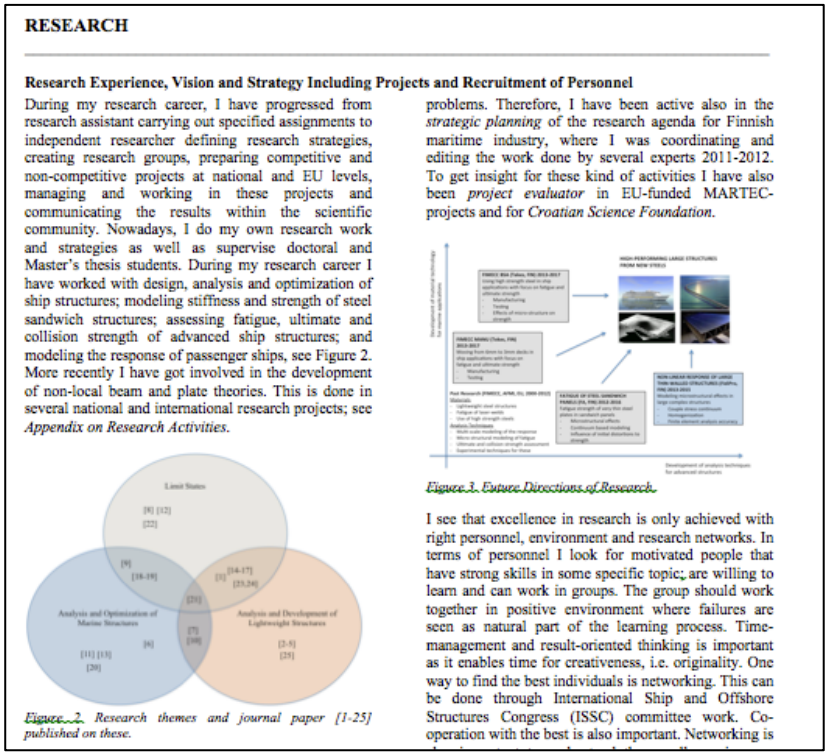


RESEARCH

Research Experience, Vision and Strategy Including Projects and Recruitment of Personnel

During my research career, I have progressed from research assistant carrying out specified assignments to independent researcher defining research strategies, creating research groups, preparing competitive and non-competitive projects at national and EU levels, managing and working in these projects and communicating the results within the scientific community. Nowadays, I do my own research work and strategies as well as supervise doctoral and Master's thesis students. During my research career I have worked with design, analysis and optimization of ship structures; modeling stiffness and strength of steel sandwich structures; assessing fatigue, ultimate and collision strength of advanced ship structures; and modeling the response of passenger ships, see Figure 2. More recently I have got involved in the development of non-local beam and plate theories. This is done in several national and international research projects; see *Appendix on Research Activities.*

Figure 2. Research themes and journal paper [1-25] published on these.

problems. Therefore, I have been active also in the *strategic planning* of the research agenda for Finnish maritime industry, where I was coordinating and editing the work done by several experts 2011-2012. To get insight for these kind of activities I have also been *project evaluator* in EU-funded MARTEC-projects and for *Croatian Science Foundation.*

Figure 3. Future Directions of Research.

I see that excellence in research is only achieved with right personnel, environment and research networks. In terms of personnel I look for motivated people that have strong skills in some specific topic, are willing to learn and can work in groups. The group should work together in positive environment where failures are seen as natural part of the learning process. Time-management and result-oriented thinking is important as it enables time for creativeness, i.e. originality. One way to find the best individuals is networking. This can be done through International Ship and Offshore Structures Congress (ISSC) committee work. Co-operation with the best is also important. Networking is

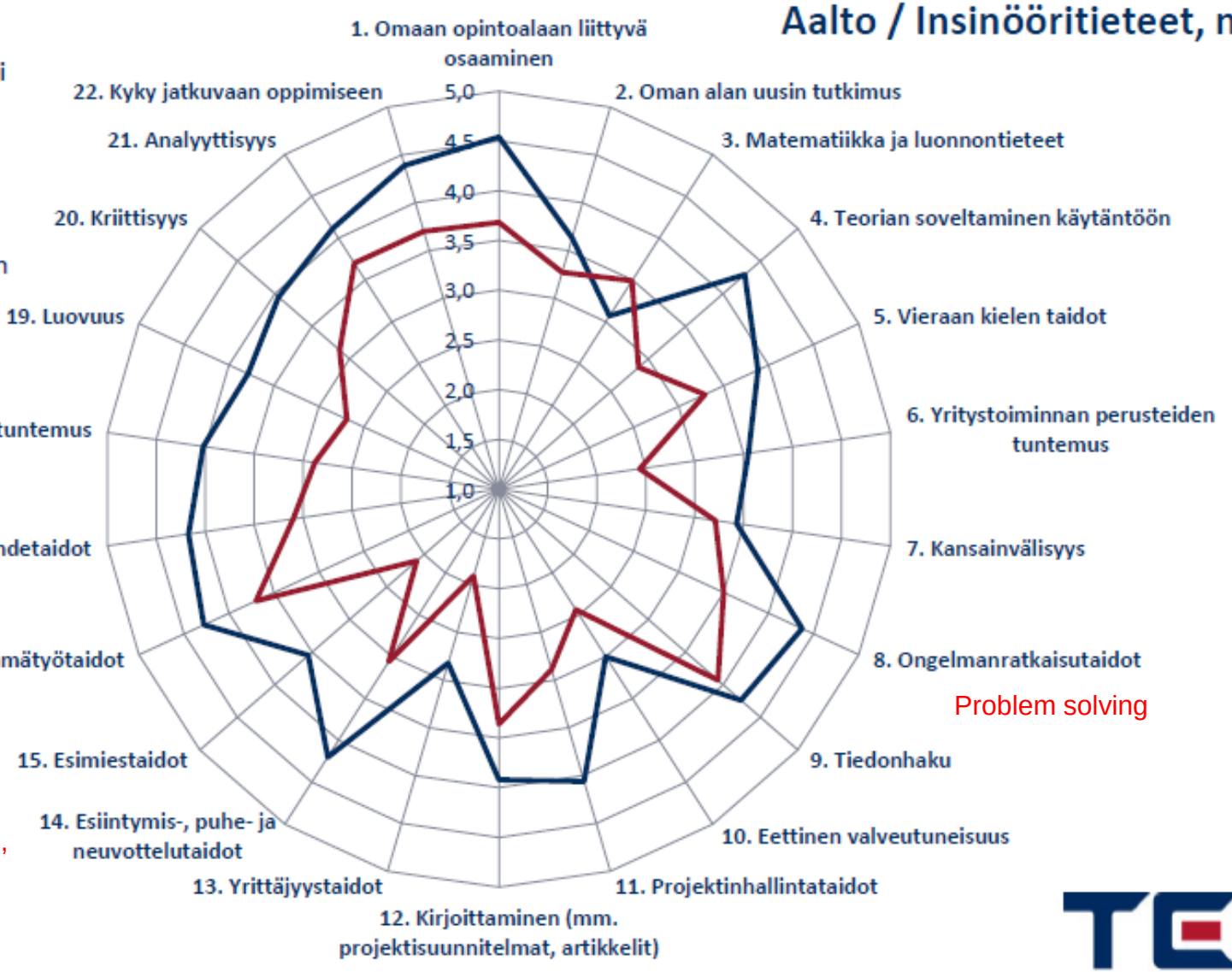
Osaamisten tärkeys ja niiden kehittyminen opinnoissa

Knowledge of own field

Aalto / Insinööritieteet, n=169

Tärkeys työelämässä; 1=ei lainkaan tärkeä, 5=erittäin tärkeä

Kehittymisen mahdollistuminen opinnoissa; 1=huonosti, 5=loistavasti



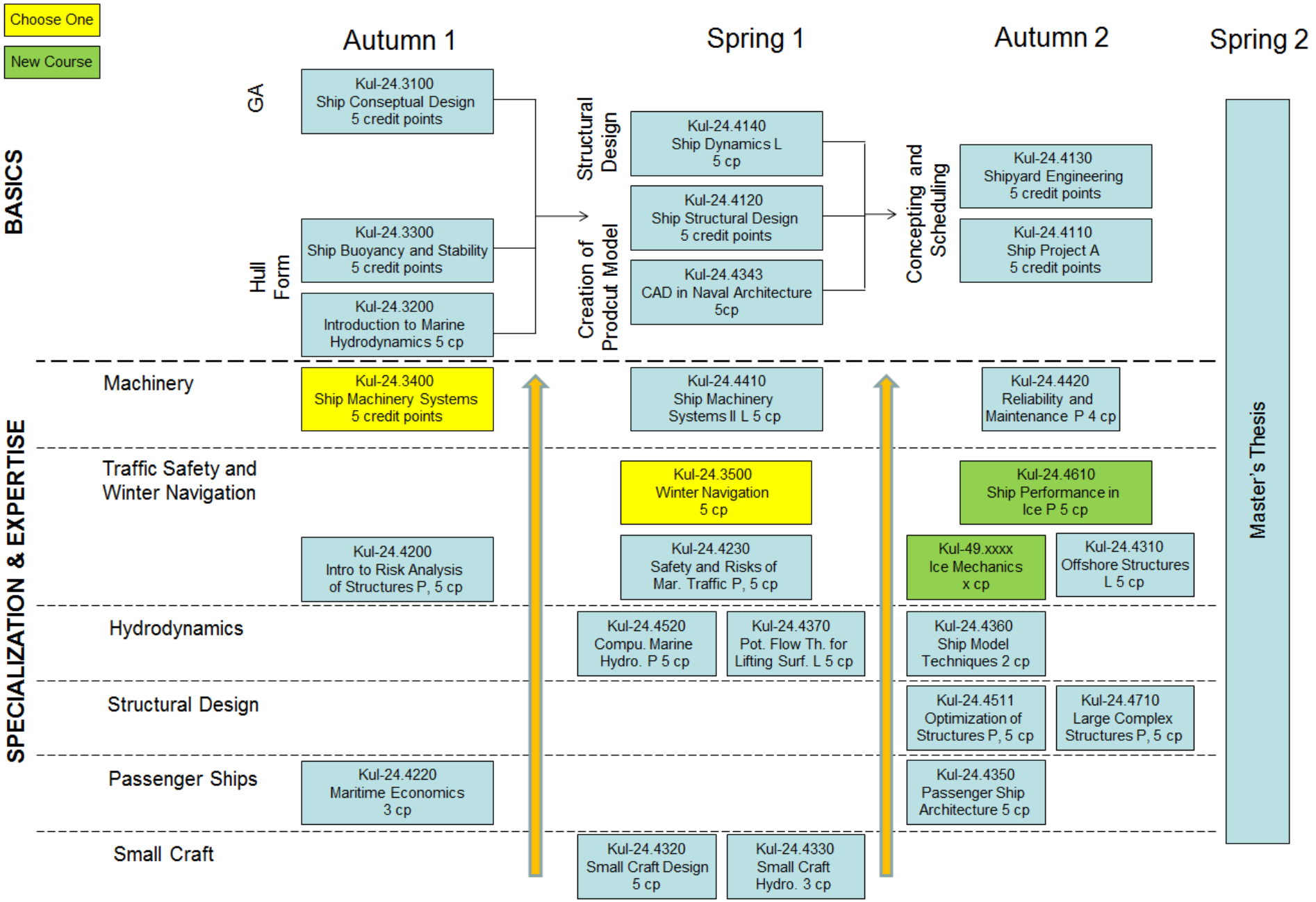
Problem solving

Presentation, communication, negotiation

Writing proposals and articles

TEK
TEKNIIKAN AKATEEMISET

Critical Path for Naval Architecture (2 years)



Lecture Topics (1 lecture = 2 * 45 min.)
Period I Main dimensions and hydrostatics

0 Course info

1 Ship classification

2 Definition of a ship and mission

3 Main dimensions

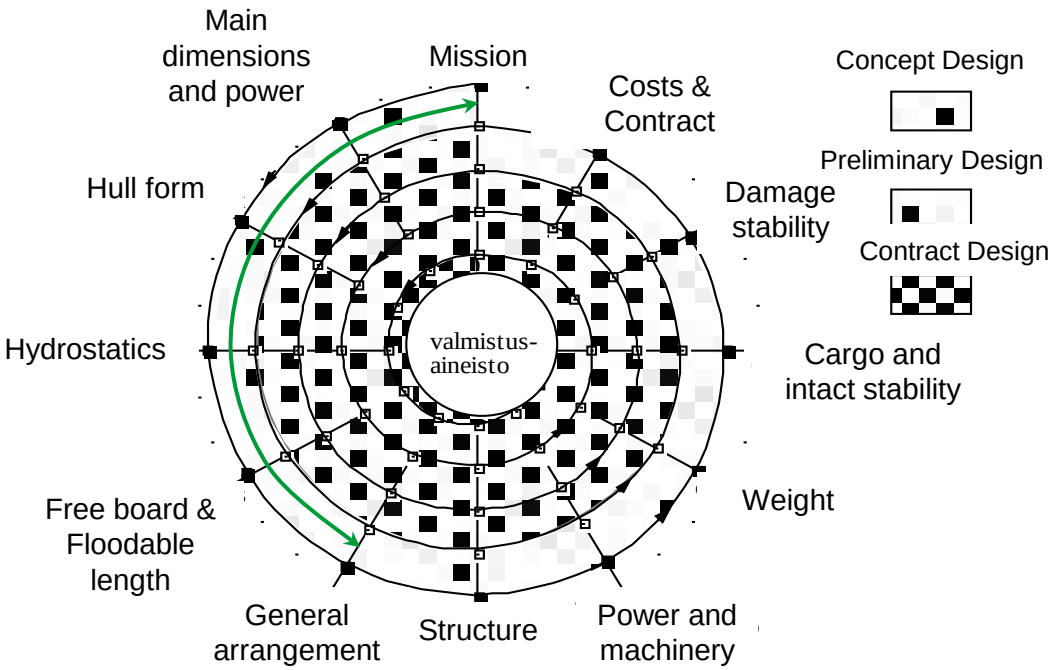
4 Selection of main dimensions

5 Performance

6 Hull form

7 Numerical integration of hull

8 General arrangement and cargo



Period II
Ship design disciplines and new building

9 Hull structure

10 Machinery

11 Equipment

12 Weight

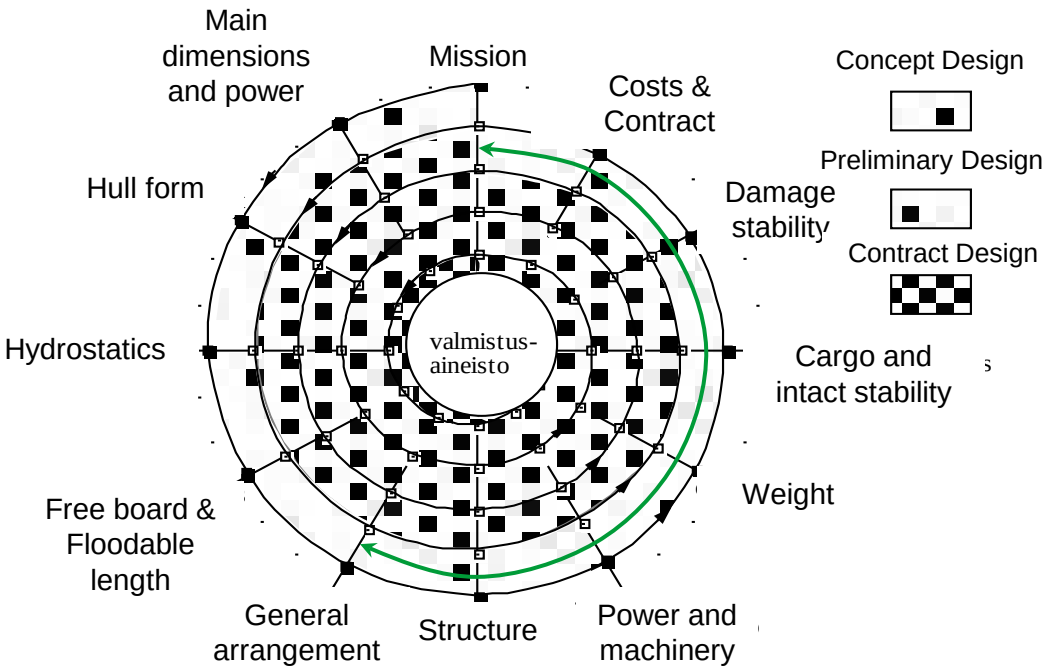
13 Prototype problems

14 Ship safety

15 Modern shipbuilding method

16 Ship contract

Exam, lectures 1-16



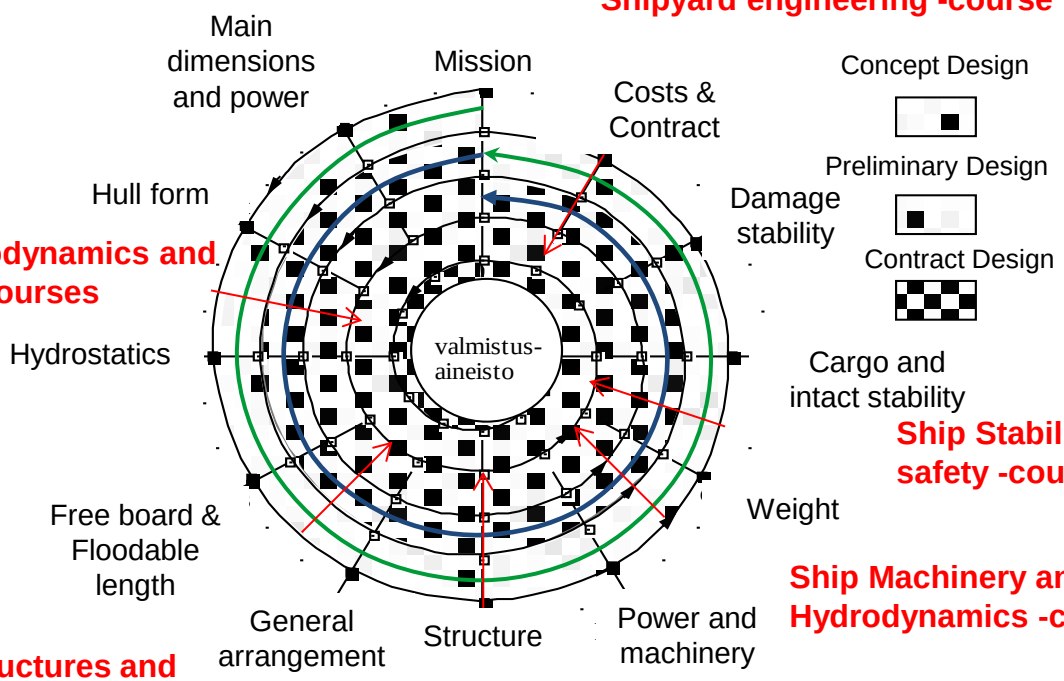
Link to Other Courses – Examples

Creation of the Portfolio

Ship Conceptual Design -course

Ship Project -course

Shipyard engineering -course



Ship Hydrodynamics and Stability -courses

Ship Stability and safety -courses

Ship Machinery and Hydrodynamics -courses

Ship Structures and Stability -courses

Ship Structures and Shipyard Engineering -courses

Assignment - Ship projects for 2014

- The assignment is carried out in groups of three or four students. These have tasks:
  - Leader & coordinator: responsible of scheduling the work and delivery on time
  - Algorithm developer: responsible of development of the spread sheets, algorithms and check their correctness
  - Data collector: responsible of the required data to do the job
  - Reporter: responsible of reporting the work in clear and understandable way
- The responsible persons for each round must be identified
  - Circulate the roles
  - Can affect the individual grades in case of problems, however try to have Win/Win-attitude

Weekly schedule

- Assignment out
- Lecture about the topics of weekly assignment
- Delivery of weekly assignment
- Feedback from weekly assignment
- Repeat 11-12 times for single course
- In the end polish the whole report and reflect

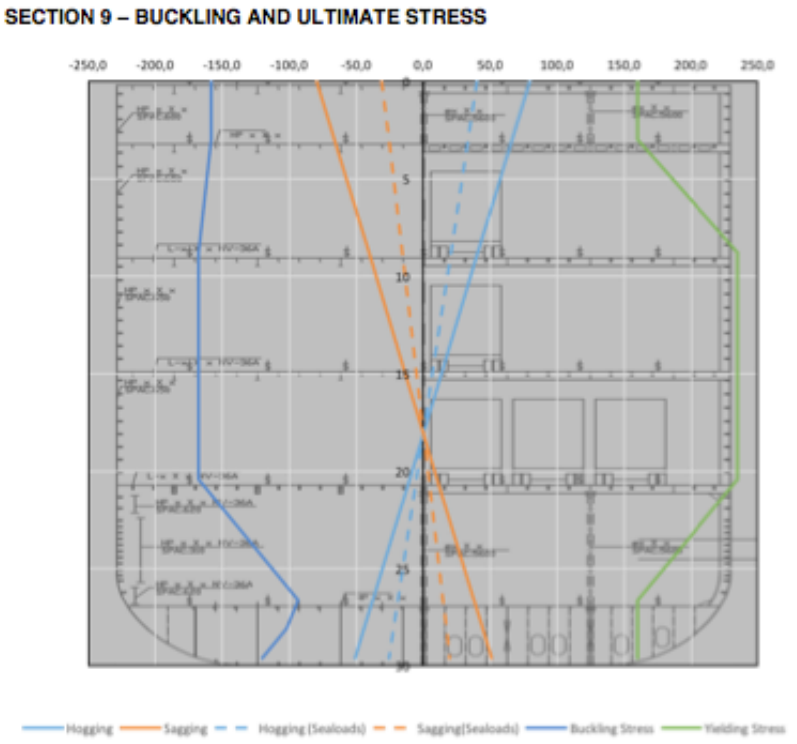


Figure 1. Latest buckling and yield strength for each deck

In Figure 1 the latest results for buckling and yield strength are presented for each deck. As can be seen the calculated buckling strength is feasible. Additionally in this section buckling was assessed for plate panel in uniaxial compression (results are presented in the figure above for deck plates), plate panel in shear and the lateral buckling mode of longitudinal stiffener elements as well as their torsional buckling mode. Additionally also Web and Flange buckling has been calculated. This means that the first fiber failure occurs at a sagging/hogging moment with the absolute value of 2640 MNm. The most critical deck is deck 6. There the lowest safety factor is found. In both cases sagging and hogging the safety factor is 2 and therefore high enough, so no actions have to be taken in order to increase the safety.

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Jani Romanoff 21 Feb 2015 08:18
Hide Details
Students names 1
Cc: Jasmin Jelovica
Re: Ship Dynamics P; Ship Structural Design P - Exercises 6

Hi,

For ship structures 50%. Weight calculation is very good and number mostly make sense. The picture illustrating the representative unit of which calculations are done would be preferred as part of the report. The huge mistake is that effective breadth was not considered at all in the calculations. As the point of the lecture was to account this, there is this heavy reduction of points. As you have tried, you will pass, but I cannot give you more points. You have still time to correct until the deadline.

For ship dynamics 50%. The good thing is that the RAO's have been computed. The reporting is however incomplete as the method is not clearly described (Strip, linear or non-linear), the equations you present are not equations of motion (these should be in total 6 with lots of parameters) but something else - what? The motion RAO's could be used with wave spectra to demonstrate what happens with one motion component, as in the exams - 1 component is enough. You have still time to correct until the deadline.

I understand that you had two exams last week and perhaps these two courses are not in the focus of your studies. However, the decreasing trend of you performance is alarming and I am encouraging you to make the corrective move. Group of this size should be able to produce more better quality text, tables and figures that make sense. Similar as last autumn in Conceptual Design course.

With best regards,

Jani

Grading

- Grade consists of (check curriculum for weights)
  - Weekly Assignment 30-40%
  - Assignment work and presentation (Final report) 5-20%
  - Exam 50-60%
  - On weekly assignments you get 25% on the delivery, 25% on algorithms, 25% on data, 25% on report
- Key issue is to demonstrate learning in the report, i.e. PDCA
  - Identify the strengths and weaknesses of everyone by reading the reports
  - Work to fix the defiencies by stating what is good and what needs improvement
  - Check and reward if one develops
- Passing limit for each part is half of the maximum points
- Delay reduction for weekly exercise points
  - 25% / every coming week
  - Extensions are granted when you have good reason and notify well in advance, consider teachers as customers who can accept delay if properly communicated and new deadlines being given and followed

Experiences

- Requires dedication
  - Student
  - Teacher
  - Stakeholders
- Student motivation
  - Real life projects
  - Learning by doing
  - Be part of a learning team: student-postdoc-professor
- Win-Win situation
  - Better results in exams
  - Fresh ideas
  - Help on filling knowledge gaps
  - Every lecture is different as people are different

General arrangement

The ship's main large compartments are located in pretty common places for a ropax ferry. Heavy machinery systems and batteries are placed to the bottom of the ship in order to increase stability.

960 meters of car lanes

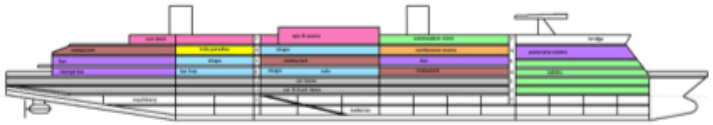
The car and truck lanes are located above the machinery systems. The cars will be loaded into the ship by using the wide stern ramps. There are two car lanes on the top of each other and two higher truck lanes side by side. This configuration with 120 meters of car deck yields 480 meters of both car and truck lanes.

Battery transferring

The ship is powered with self-driving battery units which are also loaded through the stern ramp. After all transported vehicles have driven out from the car decks, a ramp will open in the middle of the car deck, revealing a passage to the battery hold located on the bottom of the ship. Now the batteries can be changed, and the whole operation takes no more than 10 minutes after which the hatch will close and cars may be loaded in again.

Energy efficient solutions

The whole electric system is executed as energy efficiently as possible in a way that emphasizes ecological values, and makes the ship more efficient. Illumination in the ship is implemented with LED lights, elevators are energy recovering and all pumps are highly efficient.



Experiences & Media

UUTISET > KOTIMAA

Kotimaa 28.1.2015 klo 12:25 | päivitetty 29.1.2015 klo 9:06

Tulevaisuuden risteilijä vetoaa ulkonäöllä ja tunteella

Aalto-yliopistossa visioidaan ahkerasti sitä, miltä tulevaisuuden matkustajalaivat näyttävät ja mitä ne ulkonäöllään viestivät. Kerrostalomaisten laatikoiden tilalle halutaan kauniita laivoja, jotka huokuvat luottamusta.

Suosittele 360 henkilöä suosittelee tätä. Ole kavereistasi ensimmäinen.