Aalto University

Computational Engineering

SCI-A1010: Research and Academia

Luc St-Pierre

01/10/2020

Academic advising

An Academic Advisor is a teacher in your own field of study who can support you with study related issues by:

- *giving general advice on studies at Aalto,*
- *discussing study and career plans,*
- *sharing their own experience and expertise.*

Academic advising creates a link between students and staff so that:

- *You are recognized as an integral part of the academic community,*
- *We collect feedback about the programme.*

Today

- Learn about the main MSc programmes offered at the School of Engineering.

- Remember that by completing your BSc in Computational Engineering you can automatically continue your studies in one of these MSc programmes.

- More information here: https://into.aalto.fi/display/enbsctech

Program

14.20 MSc in Mechanical Engineering

- *Prof Sven Bossuyt*

14.40 MSc in Geoengineering

- *Prof Wojciech Solowski*

15.00 MSc in Advanced Energy Solutions

- *Prof Ville Vuorinen*

15.20 MSc in Building Technology

- *Prof Antti Peltokorpi*

Aalto University
School of Engineering

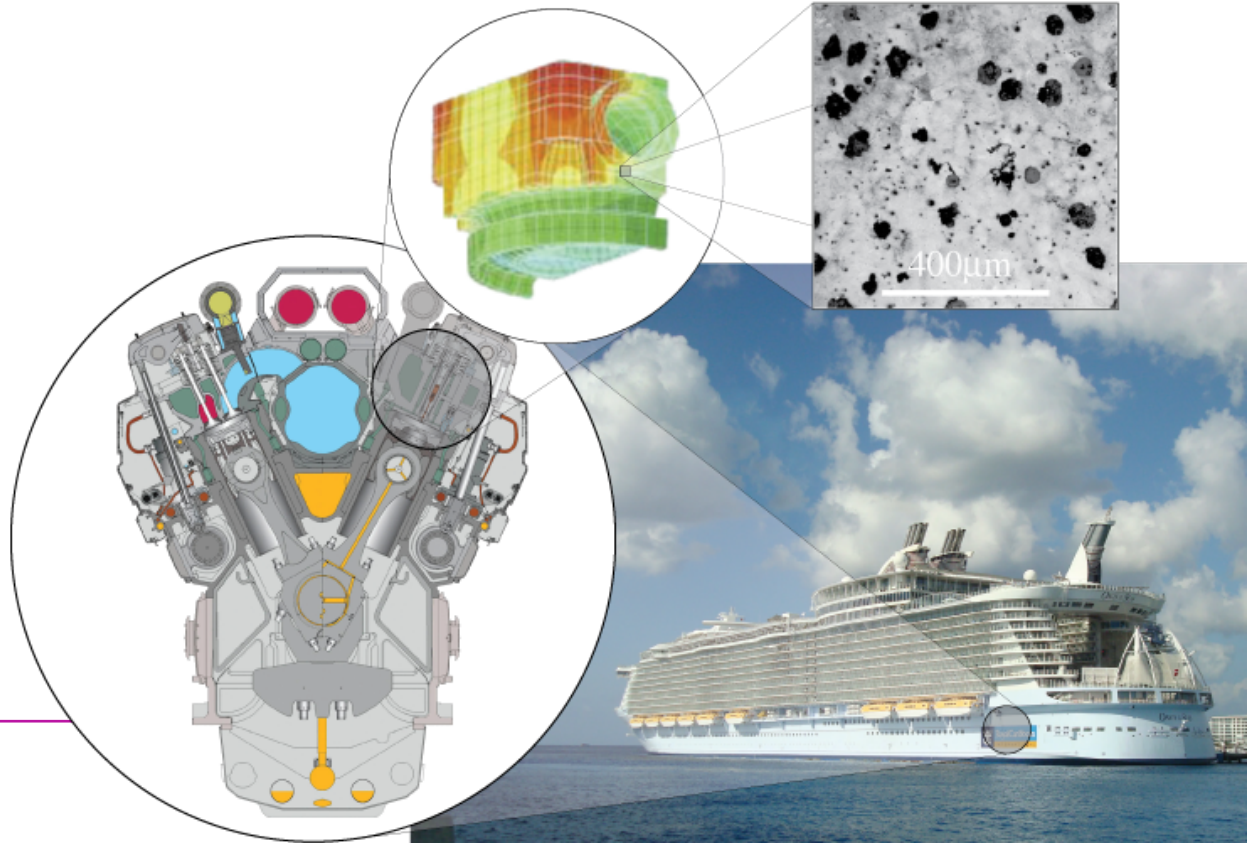
M.Sc. Programme in Mechanical Engineering

Sven Bossuyt

Mechanical Engineering:

mechanics across multiple length scales

- Common studies (30 cr.)
- Advanced studies (30cr.)
- Electives (30cr.)
- M.Sc. Thesis (30 cr.)



Different kinds of engineering professions:

Systems engineers

- understanding and designing complex systems of different scales, from atomic to global

Entrepreneurial engineers

- creating innovative design necessary to develop products, processes and services that are competitive in a global economy

Engineering scientists

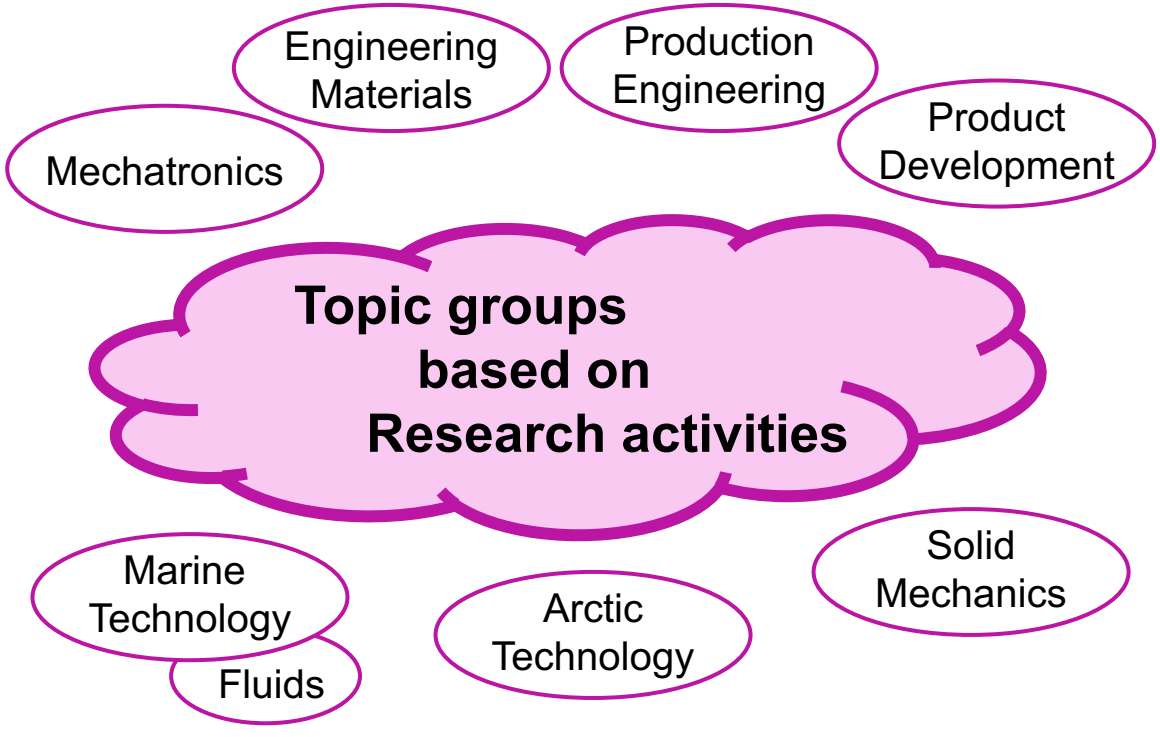
- conducting basic research, which is necessary to address compelling global challenges such as energy sustainability

Engineering managers

- leading global projects and businesses

Mechanical Engineering

- Common studies (30 cr.)
- Advanced studies (30cr.)
- Electives (30cr.)
- M.Sc. Thesis (30 cr.)

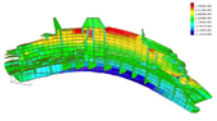


Product Development - Design Factory

Societal impact and new regulations

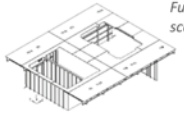
World-class cruise ships
Delivered by Turku shipyard

First LNG fueled icebreaker
Delivered by Arctech in Helsinki



Multi-scale homogenization

Full-scale ice-load statistics



Full-scale

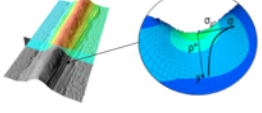
Small-scale

Large-scale

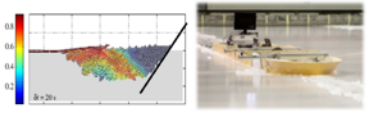
High-performing marine structures

Science-based engineering

Ship and structures in ice



Fatigue and fracture of new materials



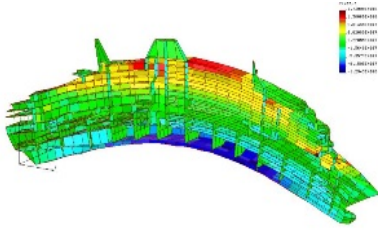
Ice mechanics and model-scale testing

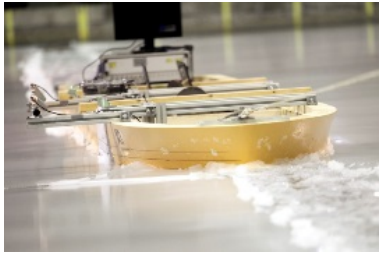
Crack nucleation and growth in polycrystalline materials

Teaching in Marine Technology

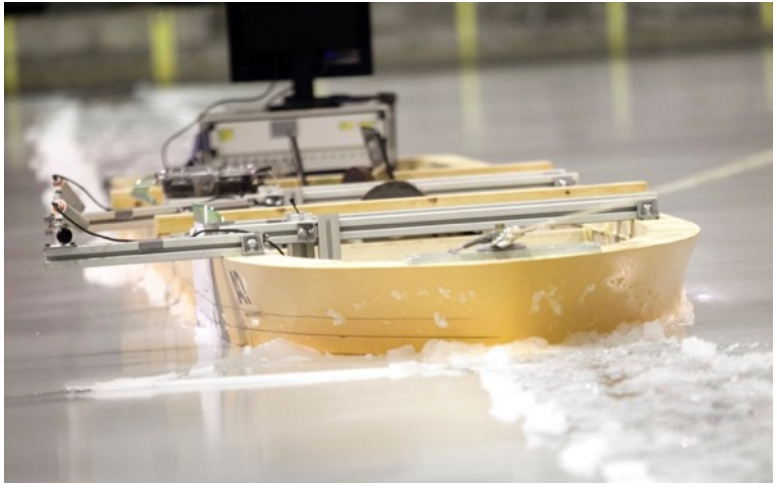
- **In-depth understanding of maritime engineering; principles for design and construction,**
  - Hydrodynamics, loads, structural analyses, stability, risk of marine traffic and winter navigation
- **Problem-based learning; theory is supported by experimental work, computer simulations, and project works**
- **Study path examples:**
  - Naval Architecture
  - Arctic Marine Technology
  - Ship Project Engineer
  - Structural Expert
  - Hydrodynamic Expert

The selected study path can be focused based on student interest by specialisation courses from other Master programme, e.g. cross-disciplinary minor





Arctic Technology

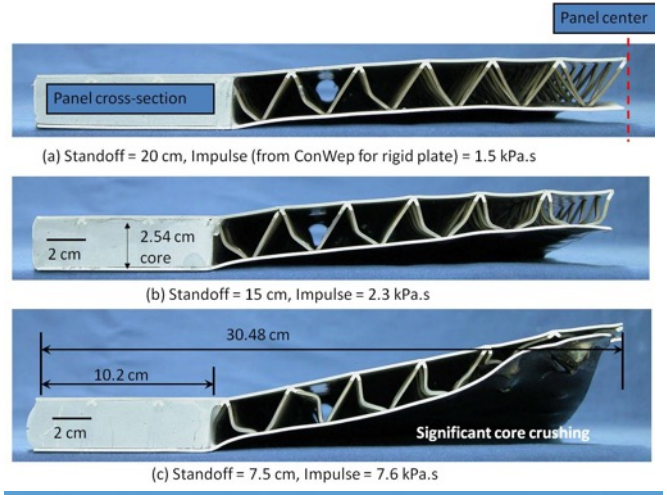


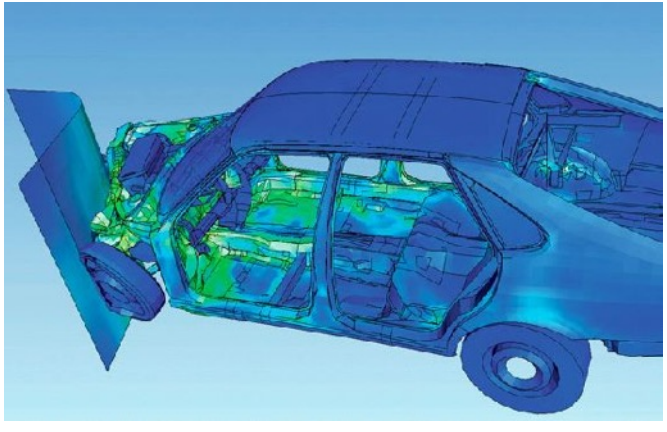
An expert in solid mechanics

- **Studies how materials and structures deform under the action of forces and/or temperature.**

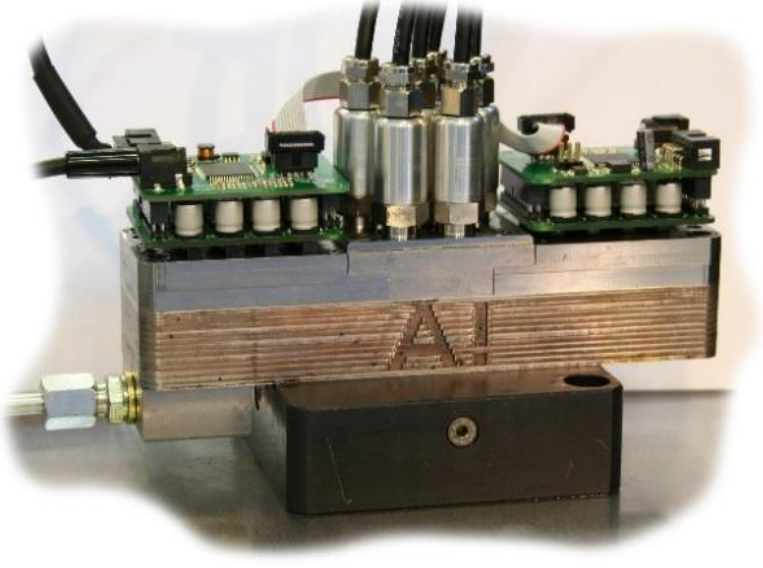
- **Has a good knowledge of:**
  - Elasticity and plasticity theories.
  - The behavior of bars, beams and plates.

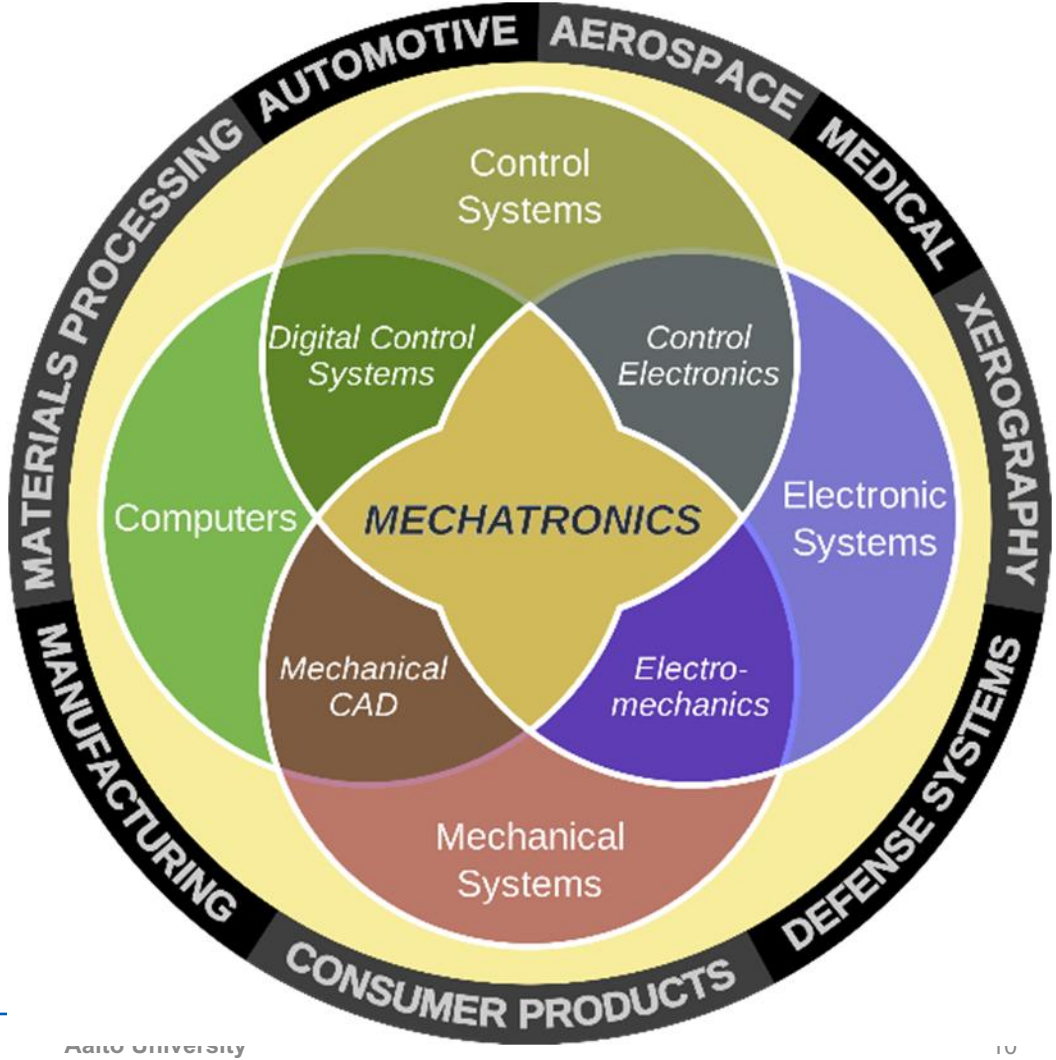
- **Uses analytical, experimental and numerical methods.**
  - Including existing simulation programs.





Mechatronics

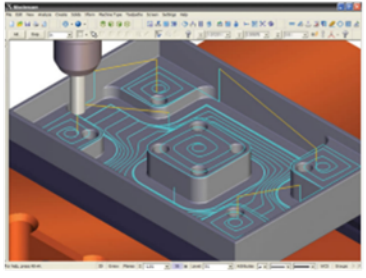
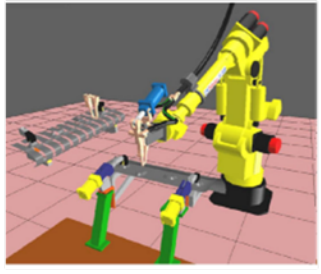


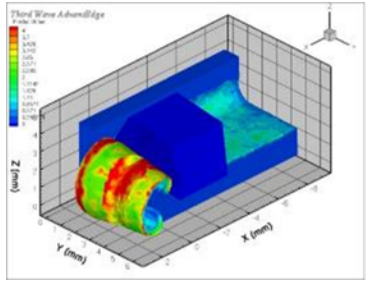


Why **Production Engineering** ?

…because we go ***From Screen to Product Machining***

CAD model → 3D printing → 3D measuring →
→ CAM model → 5-axis machining → End product

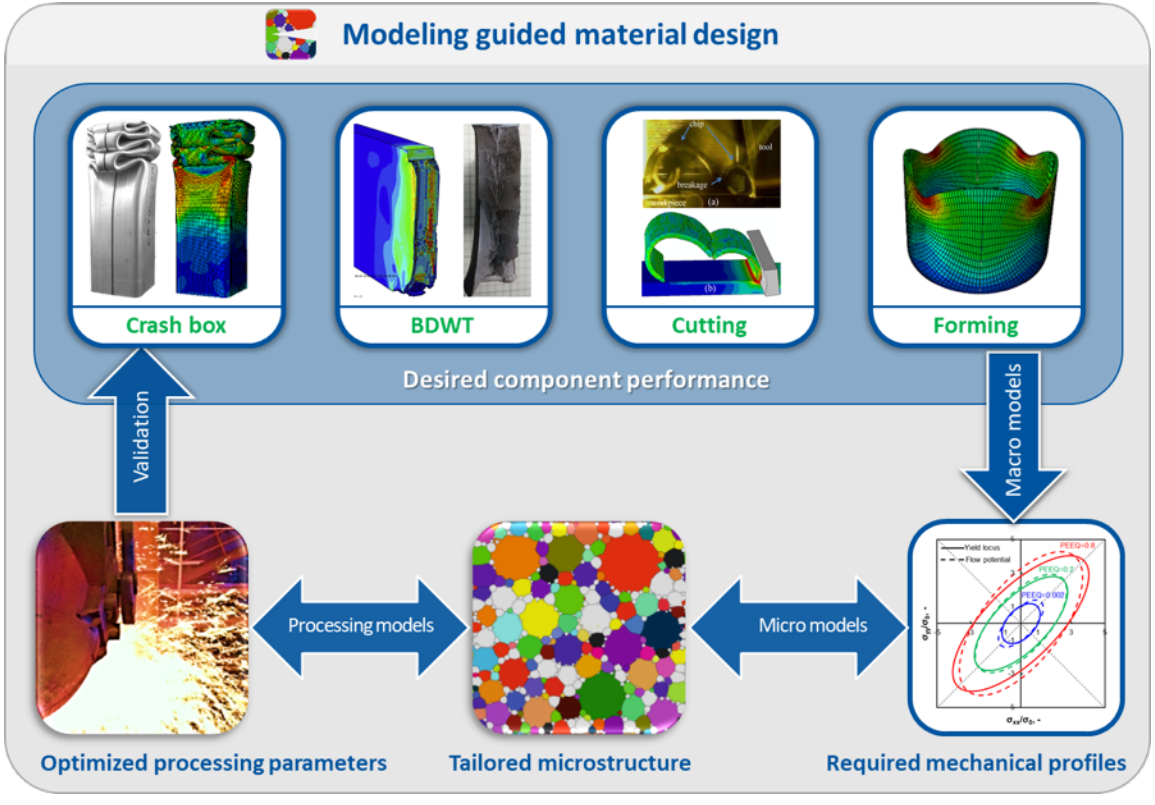



Matsuura

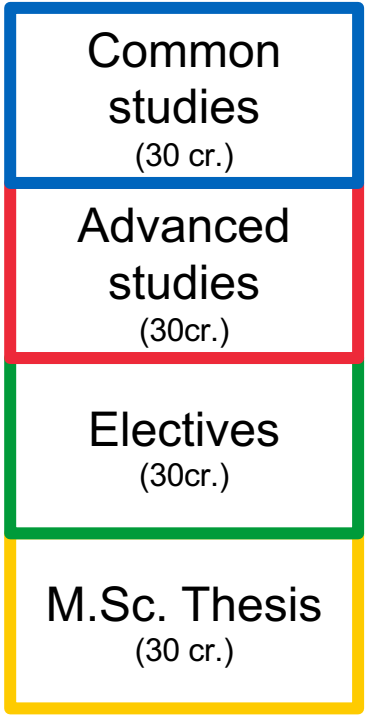
MAXIA

Engineering Materials research

- Digital material design
  - ICME for steels
  - Crashworthiness of DP steels
  - Static and dynamic toughness transition behaviour
  - Forming and machining
  - Plastic anisotropy, instability, damage and fracture
  - Material constitutive modelling
  - Microstructure characterization
  - Synthetic virtual microstructure
  - Microscale testing (nano-indentation)
  - Crystal plasticity modelling
  - Microstructure design
  - Safety of Lithium-ion batteries



Mechanical Engineering:



Starts with a project course

- Common studies are built around this course
- Range of projects with different topics

Every student builds up their own professional identity

- Course combinations are freely selectable
- Individual study paths
- Advising is important

Typical M.Sc. Thesis topics

- Energy efficiency of a digital hydraulic multi-pressure actuator for use in load-lifting applications
- Kasvun haasteet ilmanvaihdon päätelaitteiden tuotannossa
- Detecting Trash and Valuables with Machine Vision in Passenger Vehicles
- Development of rifle suppressor
- Optimization of wastewater treatment systems in passenger ship design
- Learning Partial Differential Equations from Data
- Evaluation of advanced welding techniques applied to structural components in variable frequency drives
- Economic Benefits of Modern ExothermicFeeders in Foundry Processes
- Ball tester operation and measuring accuracy analysis
- Gathering and communicating empathic user understanding in product development

Aalto-yliopisto
Insinööritieteiden
korkeakoulu

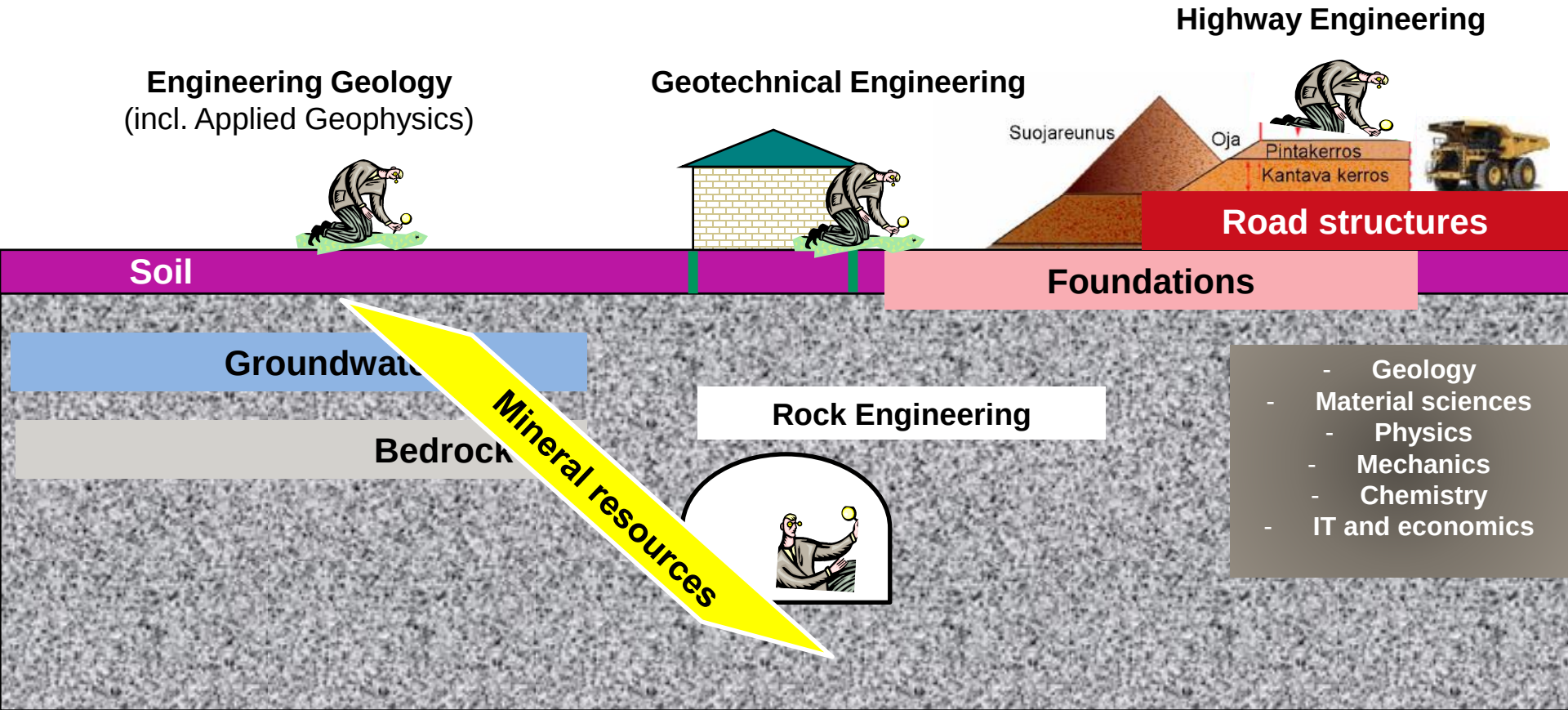
Geoengineering

Wojciech Sołowski

Geoengineering MSc programme

Geoengineering MSc is about:

- **geotechnical engineering (engineering where we use soil in the structure)**
- **rock mechanics and tunneling**
- **highway engineering**



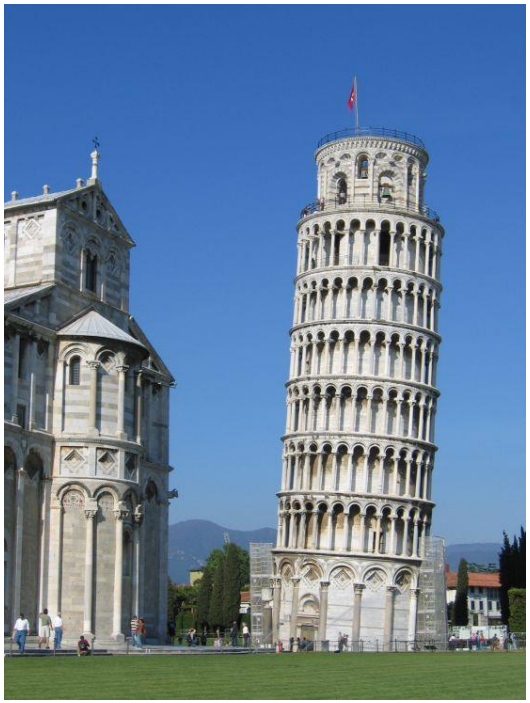
Aalto-yliopisto
Insinööritieteiden
korkeakoulu

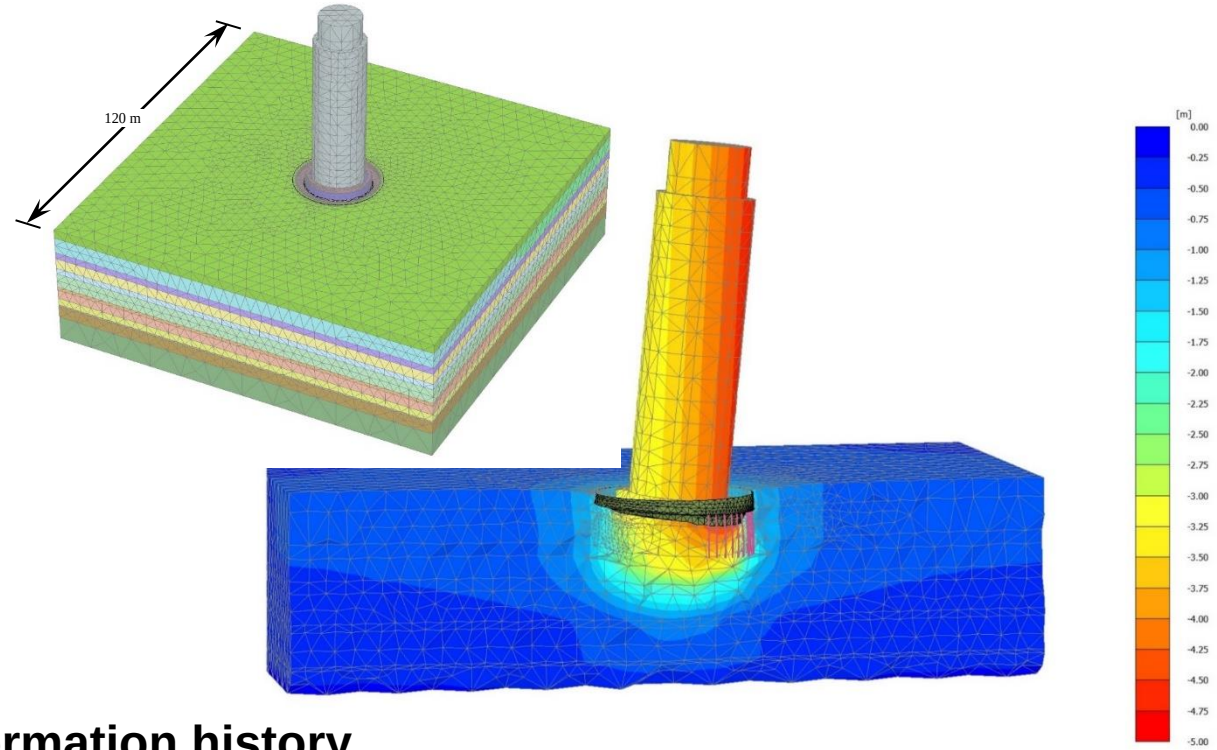
Challenges

Wojciech Sołowski

Geoengineering MSc programme

Prediction of behaviour of complex engineering structures



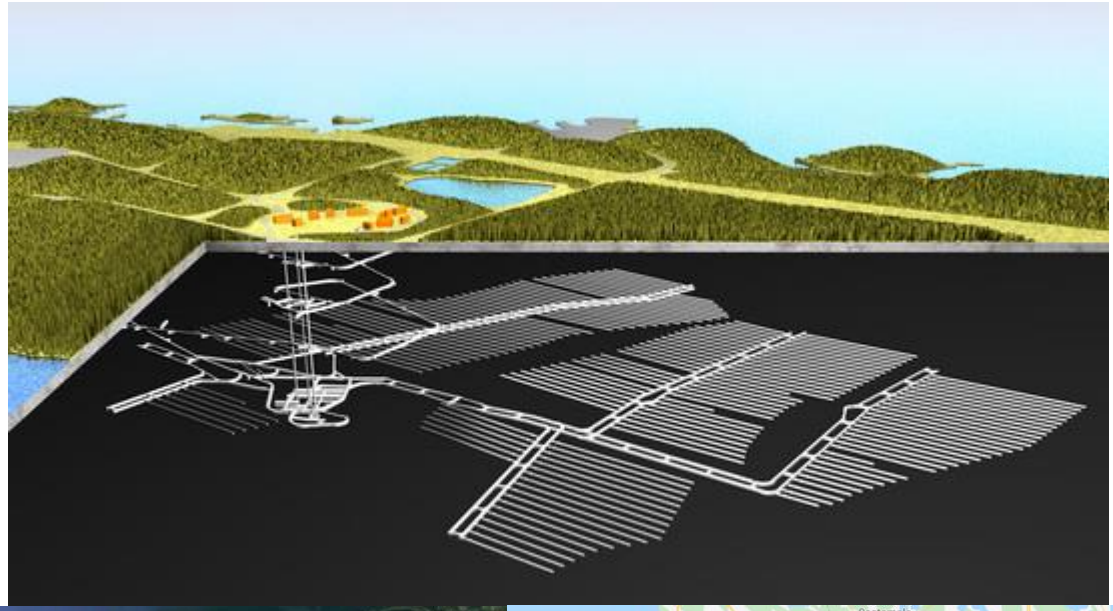


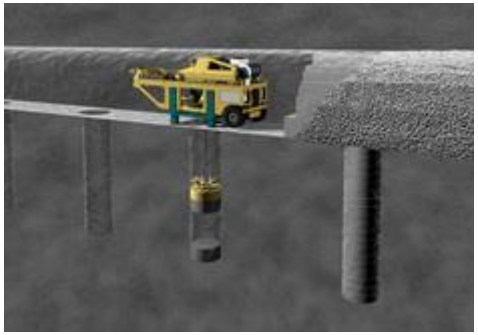
3D modelling of the deformation history of Pisa Tower and future predictions

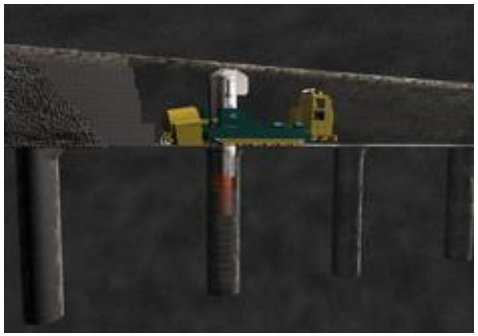
Squeglia, Nunziante, Stefano Stacul**, Ayman A. Abed**, Thomas Benz, and Martino Leoni. "*m-PISE: A novel numerical procedure for pile installation and soil extraction. Application to the case of Leaning Tower of Pisa*." *Computers and Geotechnics* 102 (2018): 206-215.

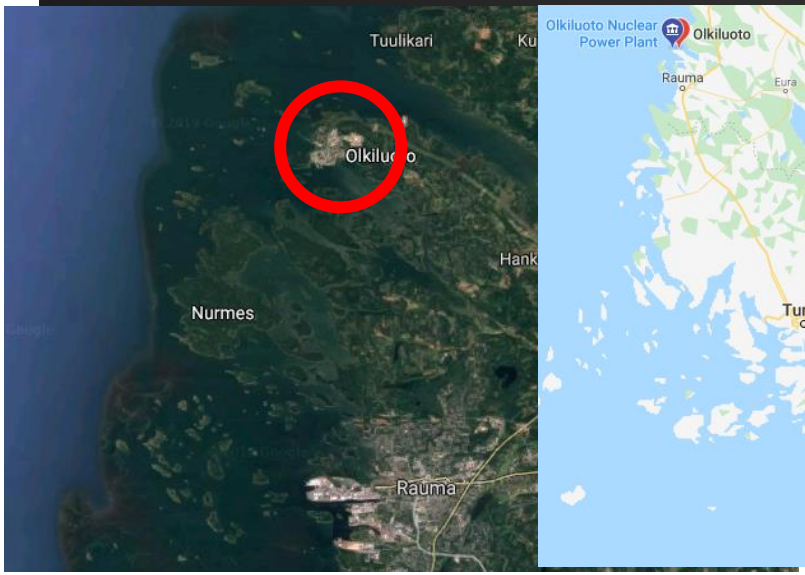
Geoengineering MSc programme

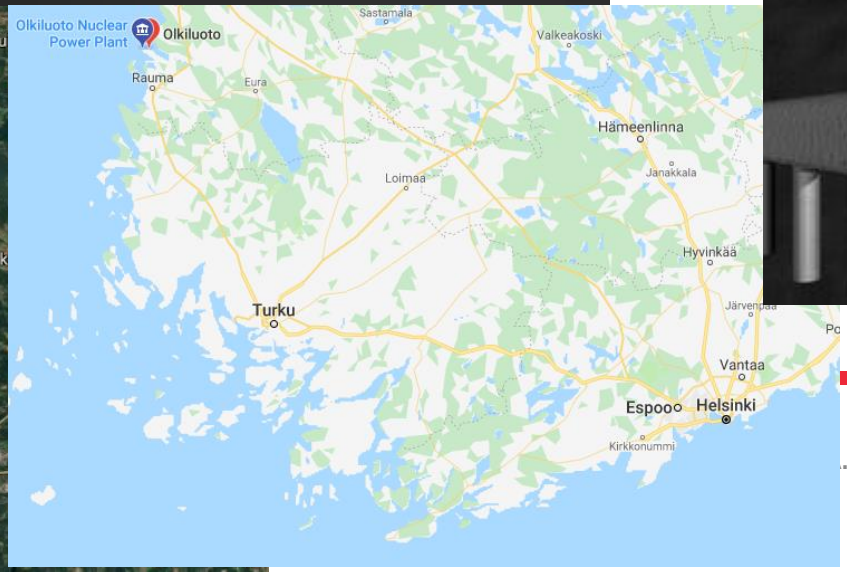
Safety of nuclear waste storage - Olkiluoto









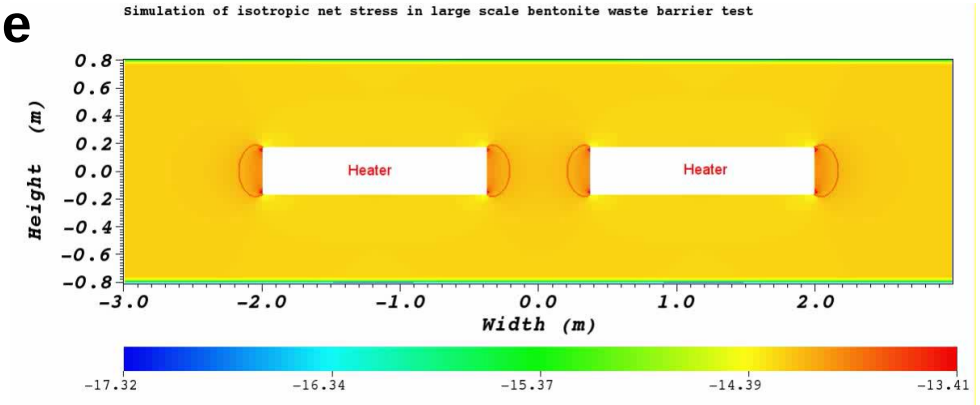


. Prof. Wojciech Sołowski

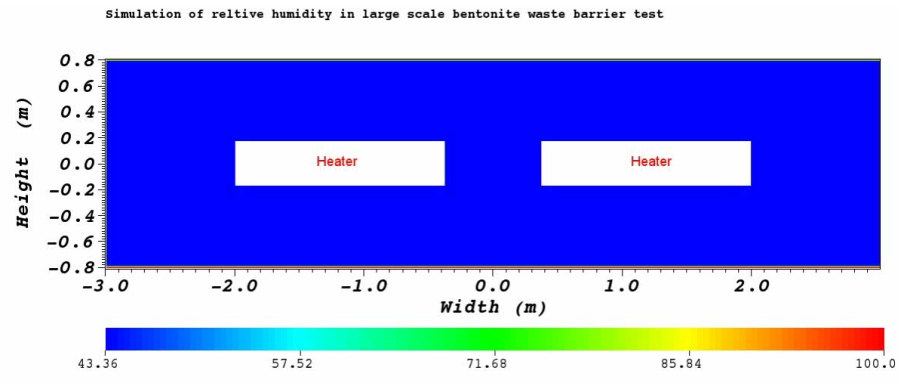
Geoengineering MSc programme

Safety of nuclear waste storage

Simulation of CIEMAT Mock-Up test:
Large-scale experiment that simulates nuclear waste sealing system



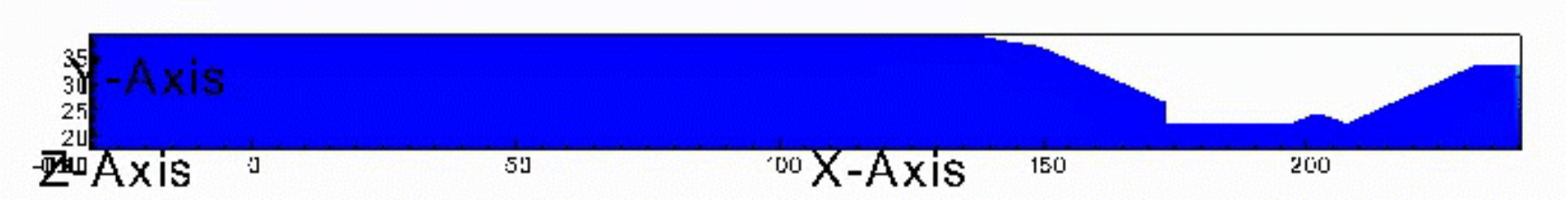
Swelling pressure development



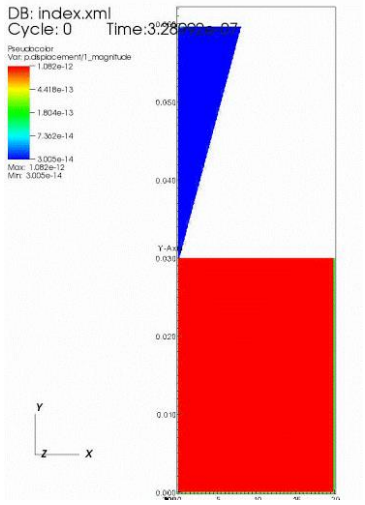
Relative humidity evolution

Geoengineering MSc programme

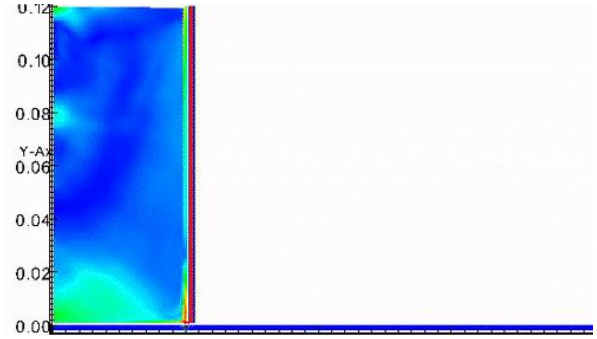
Landslides and large deformations analyses



St. Monique Landslide simulation



Fall cone test



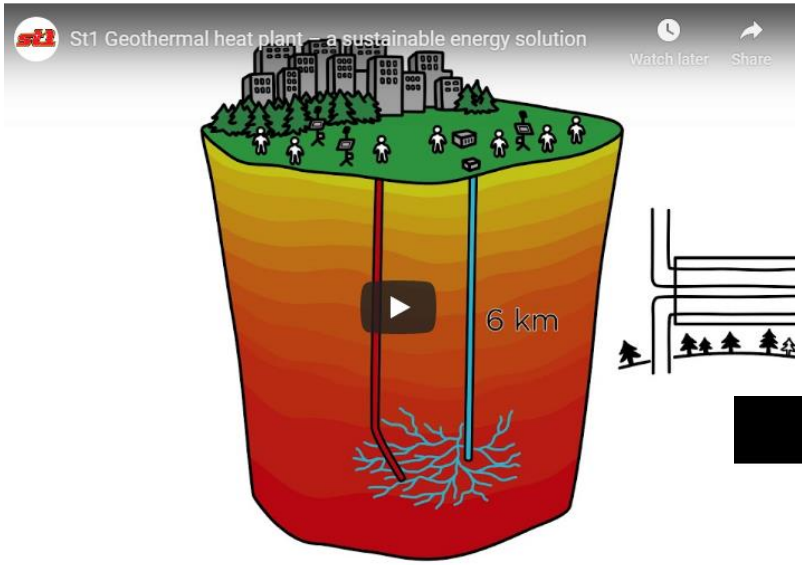
Quickness test

Geoengineering MSc programme

Challenge: Tallinn tunnel

Geoengineering MSc programme

Challenge: Geothermal energy

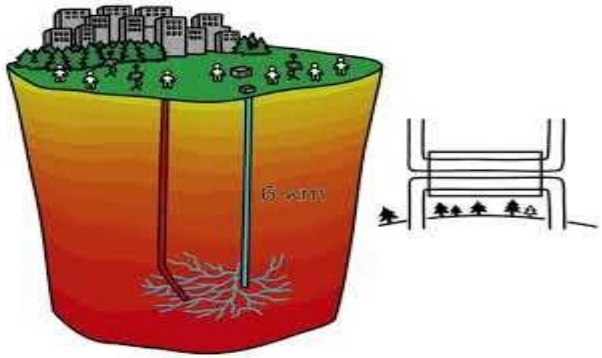


St1 to launch the final phase of drilling the world's deepest geothermal heat wells in Otaniemi

ST1_RELEASE 03.09.19

The final drilling phase of energy company St1's geothermal heat pilot project is about to begin in Otaniemi, Espoo. The first 6.4 kilometre-deep geothermal heat well was completed last year, and the second well to a depth of 3.3 kilometres awaiting the results of water stimulation modelling. The drilling plan for the remaining part of the second well has been determined according to modelling and the actual drilling will start in September. Once complete in 2020, the plant will be the world's deepest geothermal heat production plant, which will produce heat completely without emissions.

[redacted]



[redacted]

Geoengineering MSc programme

Challenge: wind turbines and off-shore engineering

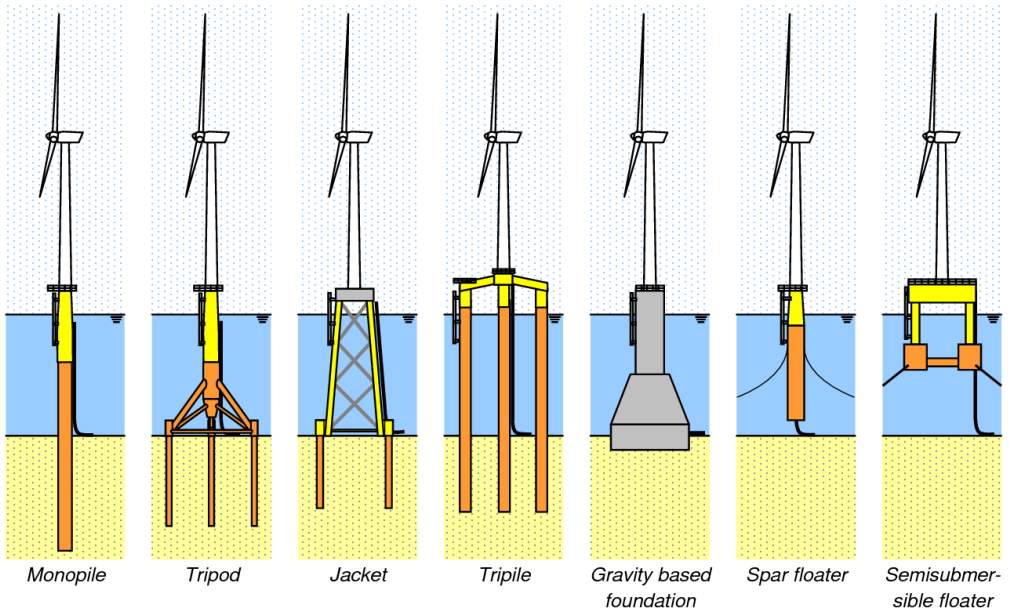
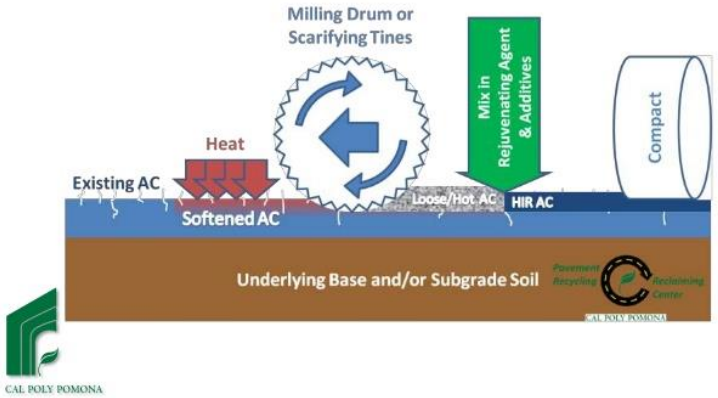


Figure 8: Existing support structure concepts

Geoengineering MSc programme

Challenge: sustainability, recycling and reuse of materials. Maintenance of roads

Hot In-Place Recycling (HIR): Remixing



Lapland firm wins US award for road maintenance tech

The award recognised a joint project involving the Rovaniemi firm Roadscanners and the Finnish Transport Agency.

Geoengineering MSc programme

Challenge: High speed railway

Finland to establish new companies to manage major rail projects

FINLAND's Ministerial Economic Affairs Committee has given the Ministry of Transport and Communications approval to establish new companies to manage the implementation of two major rail projects.

David Gubler

Aalto-yliopisto
Insinööritieteiden
korkeakoulu

Studies

Wojciech Sołowski

Geoengineering MSc programme – 1st year

Master's Program in Geoengineering timetable 2019-2020

1. autumn I	II	1. spring III	IV	V
GEO-E1020 Geotechnics	GEO-E1030 Structural Design of Roads	GEO-E1040 Rock Excavation	GEO-E1010 Engineering Geology	GEO-E2020 Numerical Methods in Geotechnics
CIV E1010 Building Materials Technology	GEO-E1050 Finite Element Method	GEO-E2050 Bituminous Materials and Mixtures	GEO-E2010 Advanced Soil Mechanics	GEO-E2040 Rock Construction
CIV-E1020 - Mechanics of Beam and Frame Structures	GEO-E2080 Foundation Engineering and Ground Improvement	CIV-E4040 Reinforced Concrete Structures (CIV)	GEO-E3040 Geometric Design of Roads (Even years)	GEO-E3030 Road Maintenance and Rehabilitation (Odd years, Not in Spring 2020)
	CIV-E1030 Fundamentals of Structural Design (CIV, Recommended prerequisite: CIV-E1020)			

ENG-E1010 - Practical Training V (Eg. Summer job; 10 weeks=5crs. Introduction lecture 6.11.2019 14-16- U149)

Common studies (Compulsory)	Advanced studies (Select at least 6 courses)	Elective Studies

Geoengineering MSc programme – 2nd year

ENG-E1010 - Practical Training V (Eg. Summer job; 10 weeks=5crs. Introduction lecture 6.11.2019 14-16- U149)

2. autumn I	II	2. spring III	IV	V
GEO-E2060 Seminar in Geoengineering		Master's Thesis 30 op		
GEO-EV - Kiertotalous Infrarakentamisessa (UKI II), L (Not lectured 2019-2020)			GEO-2090 Georakentamisen projektikurssi	
GEO-E2071 Special Assignment in Geoengineering 1-10cr				
GEO-E2030 Rock Mechanics	WAT-E2140 Sustainability in environmental engineering	CIV-E2050 Operations management in Construction	WAT-E2150 Environmental Risk Analysis (Not lectured 2019-2020)	WAT-E2170 Circular economy in environmental engineering (Not lectured 2019-2020)
SPT-E1020 Transport Systems Planning				
	CIV-E1040 Construction management			
	CIV-E2010 Building Information Modelling in Construction (Not lectured 2019-2020)			

Common studies (Compulsory)	Advanced studies (Select at least 6 courses)	Elective Studies

Geoengineering MSc programme: welcome!

Professor Wojciech Sołowski
Geotechnical Engineering
Director of Geoengineering

Professor Mikael Rinne,
Rock Mechanics

Professor Leena Korkiala-Tanttu,
Geotechnical Engineering

Professor Jussi Leveinen,
Engineering Geology

Study Geoengineering and specialise:

- **Geotechnical Engineering**
- **Rock Mechanics / Tunneling**
- **Highway Engineering**

Close links to industry:

- **high salary!**
- **lack of monotony!**
- **new technologies!**

Be part of:

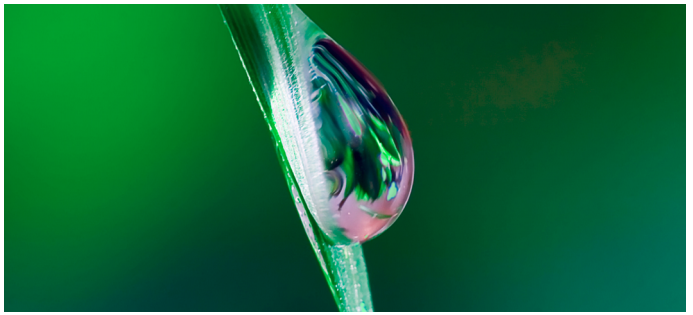
- **Tunnel to Tallinn design**
- **High speed railway update**
- **Wind turbines foundations**
- **Large infrastructure projects**

Study Geoengineering and lead the change for the sustainable future in construction!

Aalto-yliopisto
Insinööritieteiden
korkeakoulu

Thank you!

Wojciech Sołowski



Program: Advanced Energy Solutions

Example major: Sustainable Energy Conversion Processes

Prof. Ville Vuorinen, Professor in Charge for SEC major
Aalto University, School of Engineering
Oct. 1st 2020
ville.vuorinen@aalto.fi

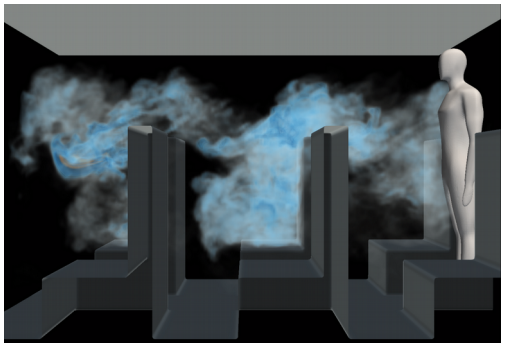
Aalto University
School of Engineering

The EU is committed to a carbon neutral Europe by 2050, while Finland's respective target is already in 2035.

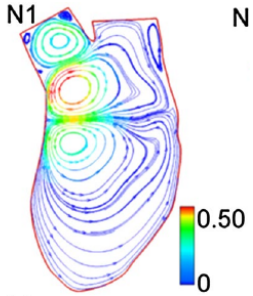
To reach this goal, energy conversion processes need to be designed, re-designed or improved and understood ***based on natural sciences and interaction between different disciplines***.

Fluid flows and computational fluid dynamics (CFD)

Biomedical flows and safety



Vuorinen, Kahila (2020)

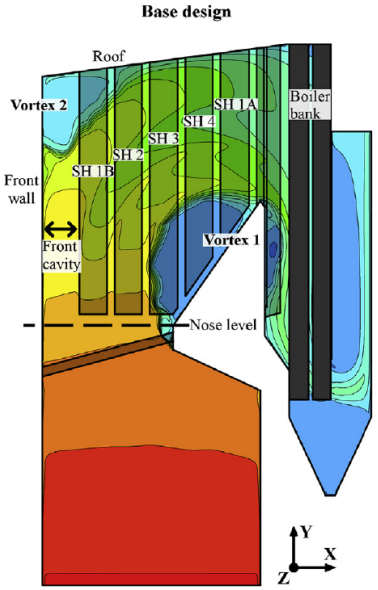


Doost et al., (2016)

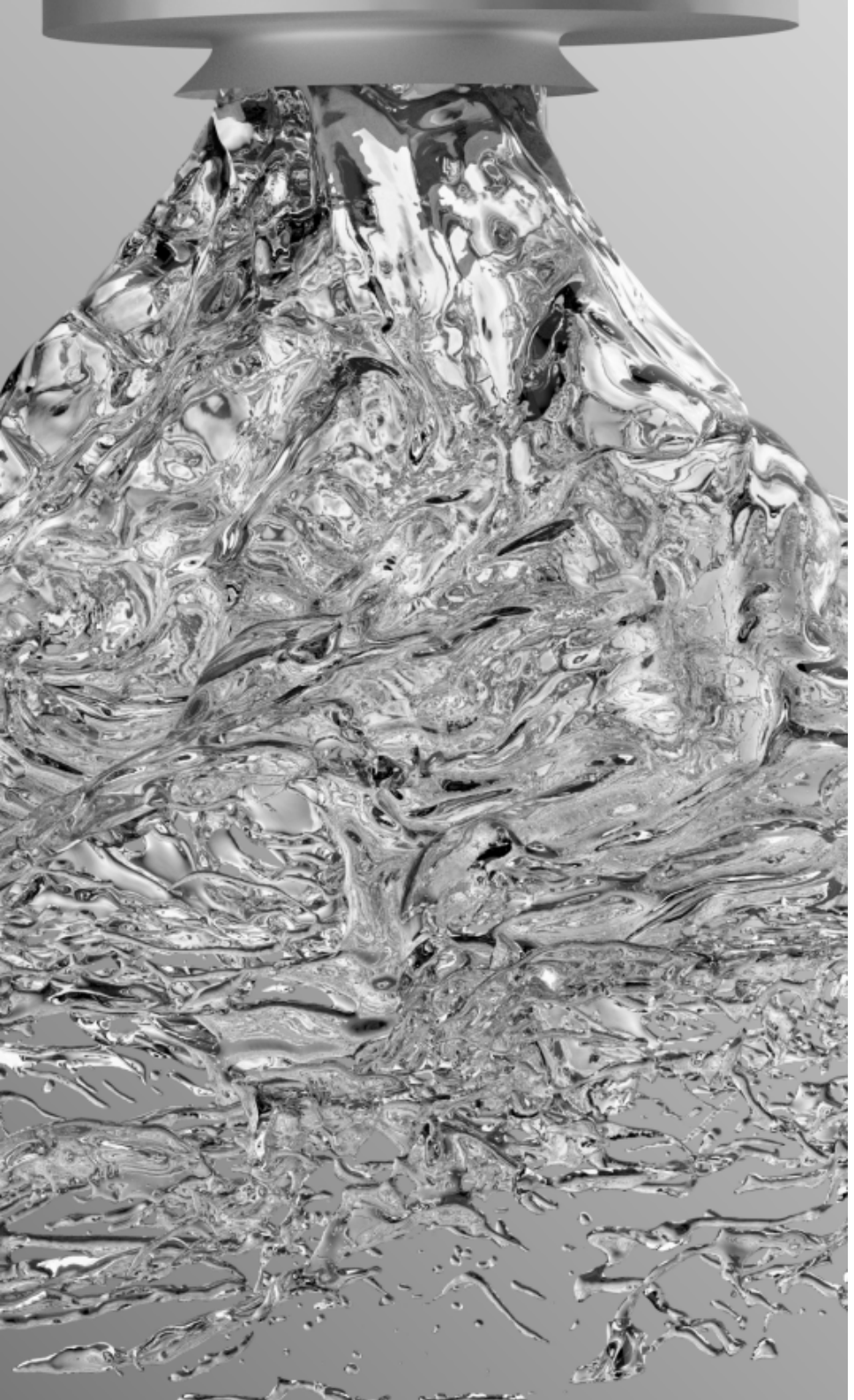
Generic liquid and air flows

Energy

Wehrfritz, Vuorinen et al. (2015)



Maakala, Järvinen, Vuorinen, Energy, 160, 361-377, (2018)



Focus of the Energy Conversion Group at Aalto University:

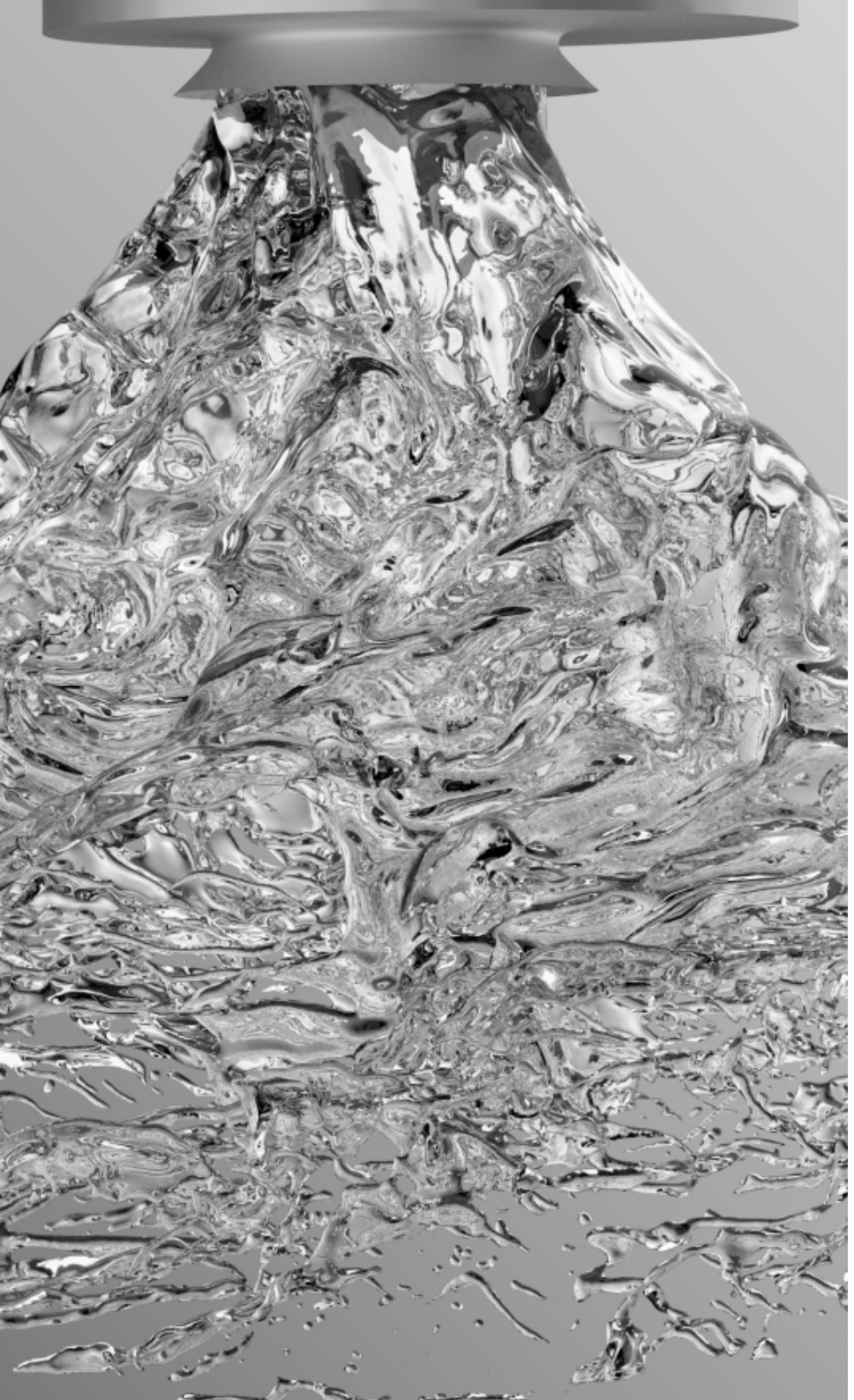
1) Carbon neutral clean energy conversion

2) Storage of energy into fuels and chemical compounds

3) Interactive combustion of fuel blends

4) Advanced **3d CFD simulation** and **modeling**

Figure: Simulation of biofuel injection
E.Laurila, V.Vuorinen et al. Int.J.Multiphase Flow (2019)



Energy Conversion Group

Prof. A.Santasalo-Aarnio

Prof. M.Larmi

+ 35 researchers

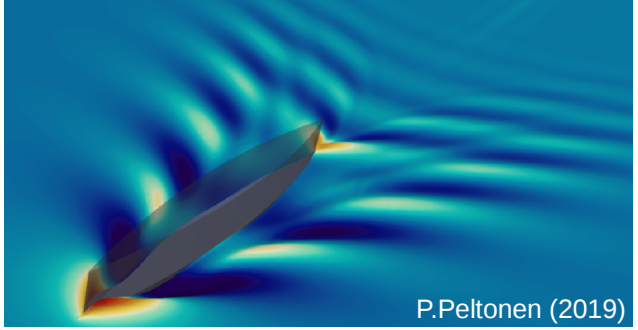
Prof. M.Järvinen

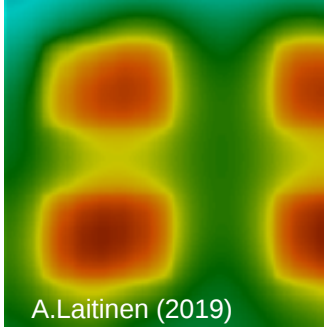
Prof. V.Vuorinen

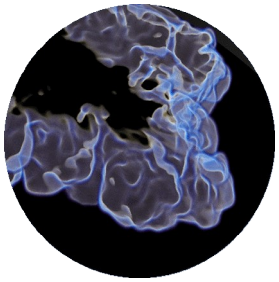
Figure: Simulation of biofuel injection
E.Laurila, V.Vuorinen et al. Int.J.Multiphase Flow (2019)

My CFD team on computational fluid dynamics modeling

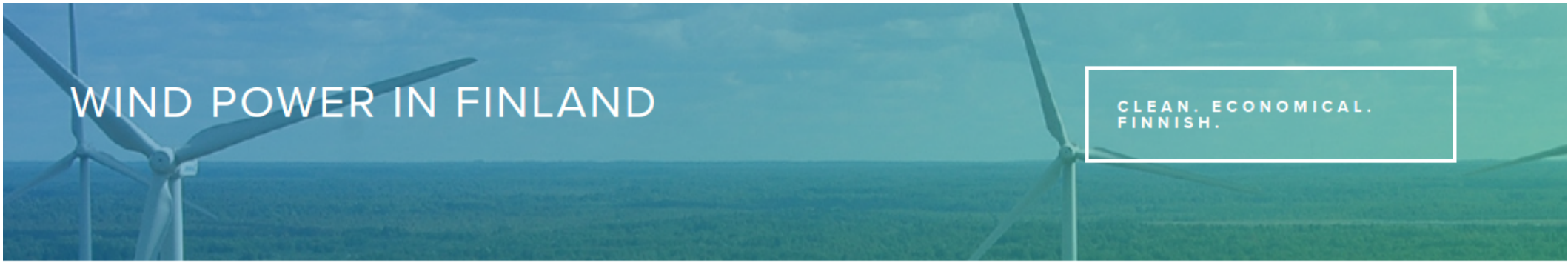

A.Artman (2018)


P.Peltonen (2019)


A.Laitinen (2019)


Ghaderi, Vuorinen et al.
Appl.Energy (2019)

~700 wind parks in Finland producing ~2000MW and the numbers are growing rapidly!



About wind power in Finland

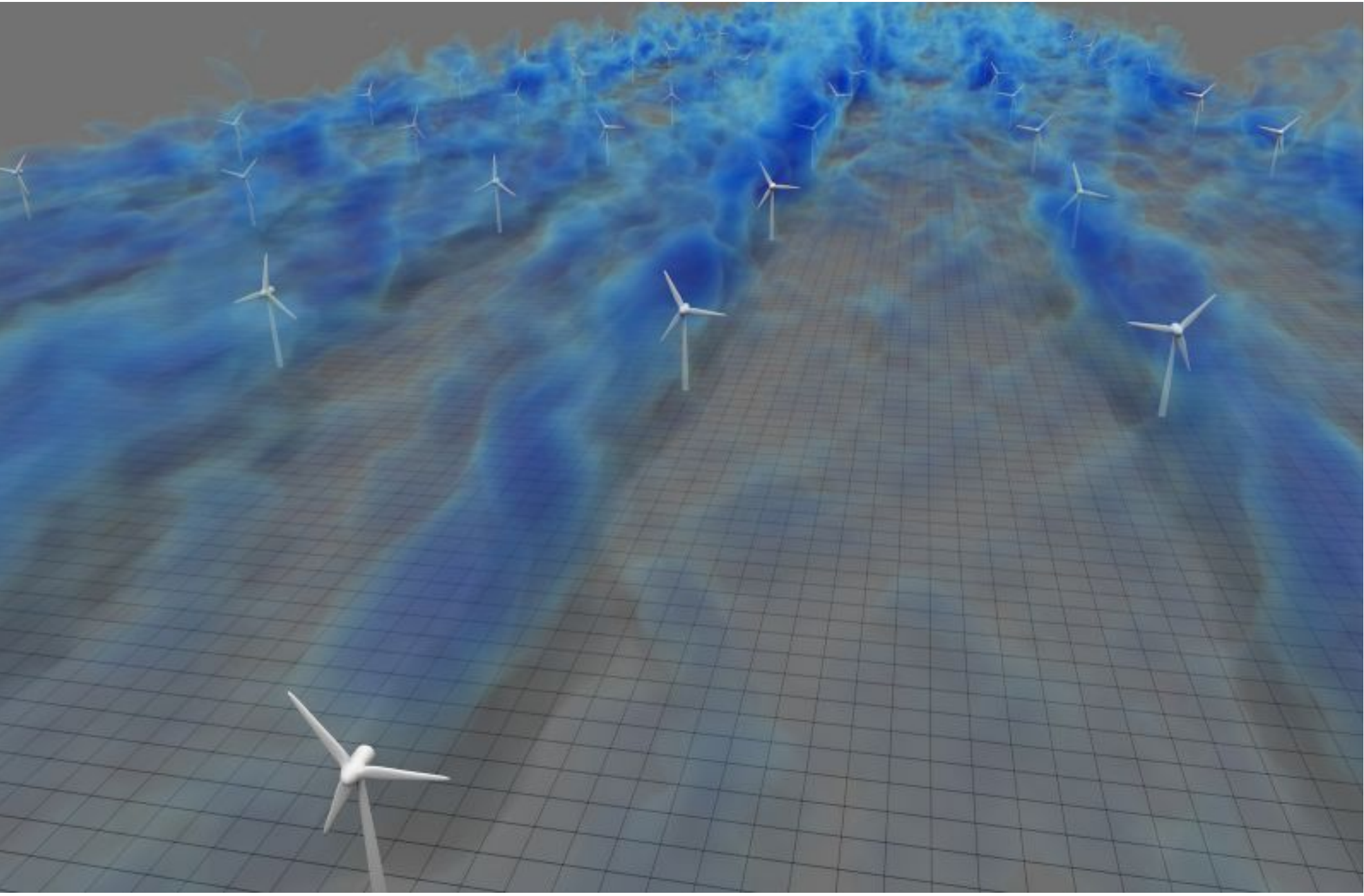
In Finland, wind power construction began later than in many other European countries. However, from 2012 to 2013, wind power construction has gained momentum and national construction and production statistics have been broken year after year.

At the end of 2018, there were 698 installed wind turbine generators, with a combined capacity of 2041 MW. They generated 6,7% of Finland's electricity consumption in 2018. No new wind turbines were built in Finland in 2018, but annual wind power production increased by more than 20 per cent to 5.8 TWh.

Finland has the potential to increase wind power capacity considerably. The objective of the wind power industry is to achieve at least 30 TWh of annual wind power production in Finland in 2030, which corresponds to approximately 30 per cent of Finland's electricity consumption at that time.

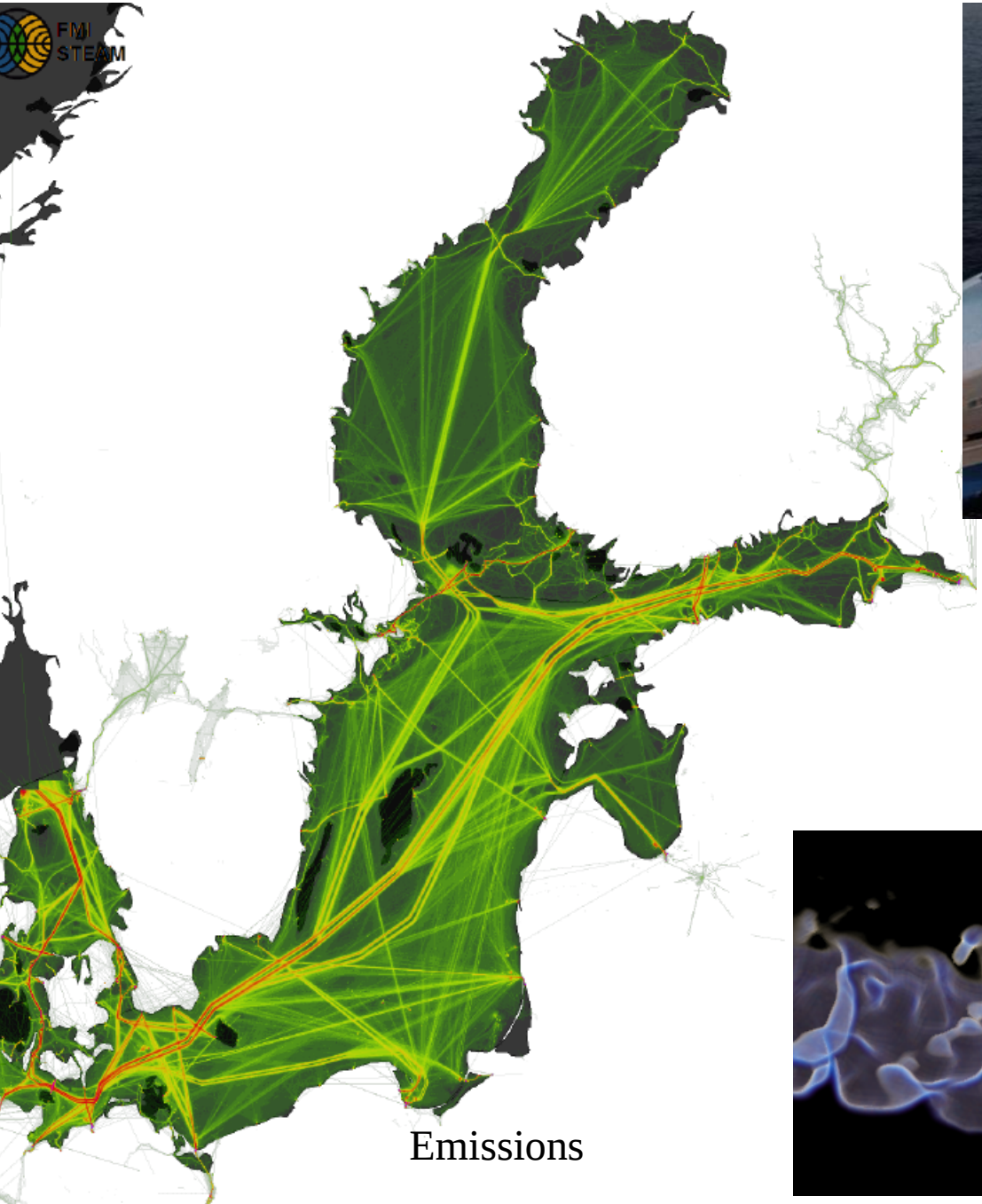
Fluid dynamics: CFD simulation of a wind park

Reference: https://pof.tnw.utwente.nl/research/turbulencebubbles/windles



Wärtsilä Smart Technology Hub, next-generation innovation and production centre, to implementation phase in Vaasa

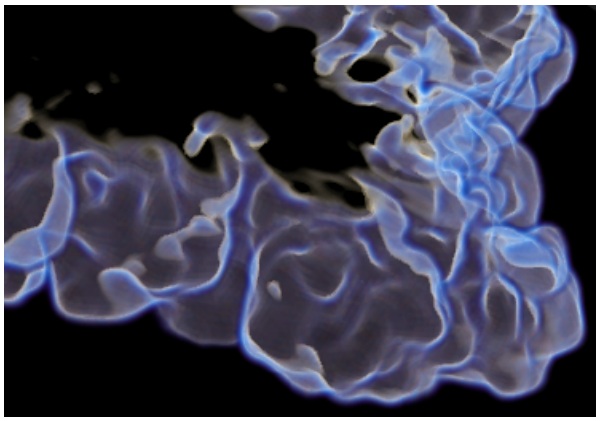
Fluid dynamics & thermodynamics & heat transfer & chemistry: Clean combustion and alternative fuels

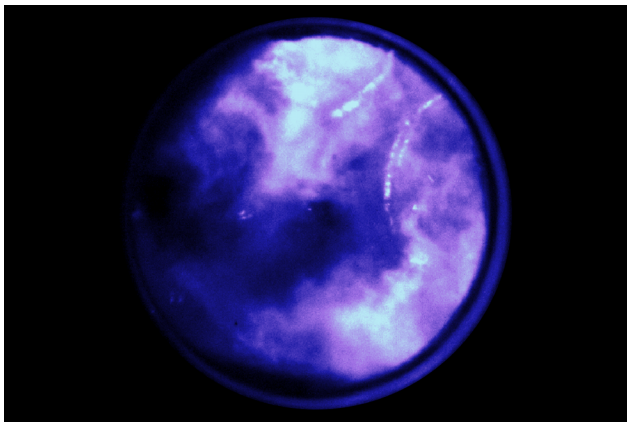


Emissions

Autonomous shipping

Cleaner combustion

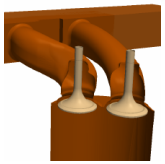


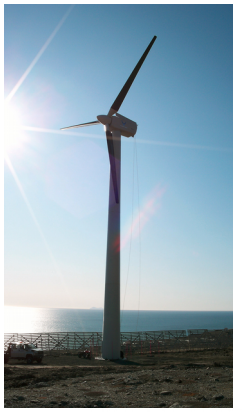


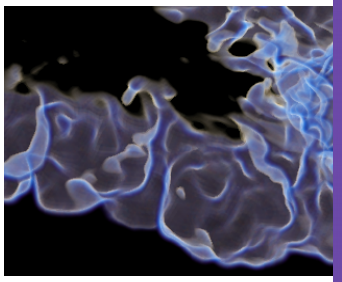
Sustainable energy conversion processes – processes developed based on **science** offering long term solution to energy challenge

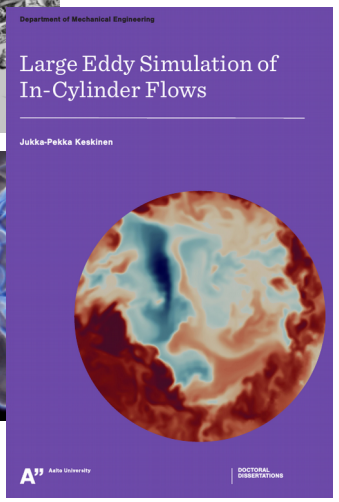
$H=U+pV$

$pV=nRT$

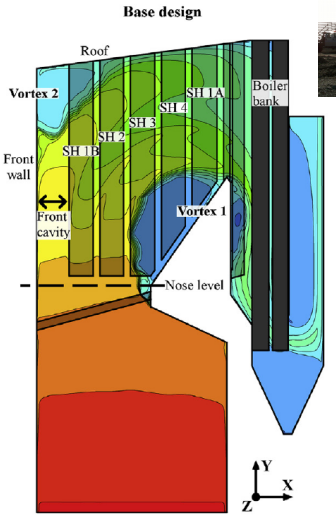


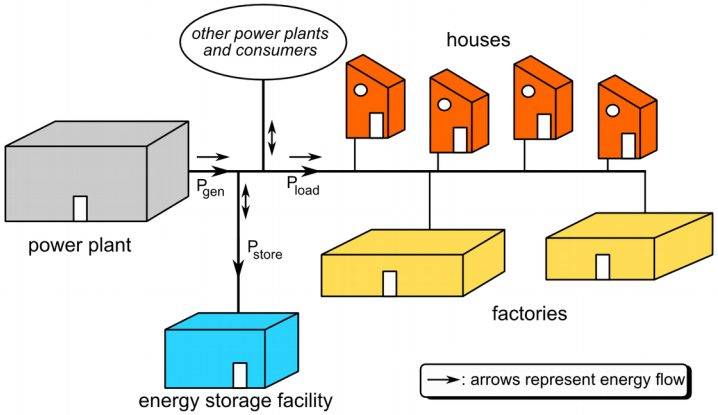






Ghaderi-Masouleh, Vuorinen et al. Applied Energy, (2018)





Maakala, Järvinen, Vuorinen, Energy, 160, 361-377, (2018)

10^{-6} m - 10^{-2} m | 10^{-6} m - 1 m | 10^{-6} m - 100 m | 10^{-6} m - 1000 km

Science based solutions:
Mathematics, Physics, Chemistry, IT →
Fluid Dynamics, Thermodynamics, Heat transfer →
Computational Fluid Dynamics, Process Simulation, Modelling, Experiments, Optimization, ...

Rough outline of SEC major

The major studies (66 cr) are divided into:

Compulsory: programme common courses (16 cr), major common courses (20 cr)

Advanced studies: (30 cr).

Example study paths:

1) Conversion and Storage, 2) Methods and 3) Systems and Technologies.

Learning outcomes

1) Natural phenomena and energy

2) Holistic view on energy systems

3) Analysis and evaluation skills

4) Use science for sustainability

The idea of the study paths is to show the students what kind of career options would be possible from this major, and what kind of courses would be useful in obtaining the required core competence. For all study paths, all AAE students will take the following courses, in total 16 credits.

AAE-E1000	Introduction to Advanced Energy Solutions	I-II	1. year
ELEC-E8422	An Introduction to Electric Energy	I-II	1. year
31C01300	Energy and Environmental Economics	V	1. year

The following Major Common courses, in Sustainable Energy Conversion major are mandatory for everyone, 20 credits.

MEC-E1020	Fluid Dynamics	I	1.year
EEN-E1020	Heat Transfer	II	1.year
EEN-E1030	Thermodynamics in Energy Technology	I-II	1.year
AAE-E2005	Thermochemical Energy Conversion L	III-IV	1.year

These above-mentioned courses form a solid basis for three different study paths, introduced below.

Study path: Conversion and Storage

The Conversion and Storage study path is aimed at students who are keen on understanding different processes in energy conversion and storage technologies, especially renewable energy. Students who study this path will become experts able to work in the energy and process industry as technical experts. This study path provides a deep understanding of the processes and gain an ability to improve process operation, maximize process efficiencies and to understand theoretical limitations. A typical job in Finland would be in energy companies such as Fortum, ST1 or Helen.

AAE-E3090	Renewable Energy Engineering	III-IV	1. year
CHEM-E4255	Electrochemical Energy Converion	II	1. or 2. year
AAE-E3100	Energy Carriers L	I	2. year
AAE-E3070	Electrical Energy Storage Systems L	IV-V	1. year
AAE-E3080	Thermal Energy Storage Systems L	I	2. year
AAE-E3120	Circular Economy for Energy Storage L	I-II	2. year
EEN-E1040	Measurement and Control of Energy Systems	I-II	1. or 2. year
EEN-E3002	Power Process Simulation	I-IV	1. year
EEN-E3005	Exercises in Energy Technology	I-V	1. or 2. year
AAE-E3000	Advanced Energy Project	I-II	2. year

Study path: Methods

The Methods study path is aimed at students who are motivated in learning concrete R&D design using experimental and/or simulation methods. The students learn various measurement and simulation methods applying fluid dynamics, heat transfer and thermodynamics in practice. The study path enables R&D work in industry or research. For example, the path offers a possibility to become an expert in the emerging R&D topics involving energy process simulation and CFD modeling. A typical career opportunity in Finland would be in simulation companies such as Elomatic, Universities, VTT, and boiler and component manufacturers such as Andritz, Valmet, Oilon and Sumitomo Foster Wheeler.

EEN-E1040	Measurement and Control of Energy Systems	I-II	1. or 2. year
EEN-E3002	Power Process Simulation	IV-V	1. year
EEN-E2001	Computational Fluid Dynamics	III-IV	1. year
AAE-E3030	Numerical Modelling of Multiphase Flows	IV-V	1. year
MEC-E2010	Computational Fluid Modelling L	I-II	2. year
EEN-E2004	Mass Transfer	III-IV	1. year
CHEM-E7190	Process Dynamics and Control P	II	2. year
CHEM-E6115	Thermodynamics of Modeling and Simulation	III-IV	1. year
EEN-E3005	Excercises in Energy Technology	I-V	1. or 2. year

Study path: Systems and Technologies

The Systems and Technologies study path is a perfect fit for a student who wants to work on developing and analyzing renewable technologies, and understand the operation of power plants, factories and energy systems as a whole. It is possible to become an expert in wind, solar or bioenergy applications. A typical job in Finland would be in renewable energy companies such as ST1 or Helen. There is a high demand for R&D experts on wind and solar power installations in various SME's. Also, developers for other sustainable bioenergy applications are constantly needed.

AAE-E3090	Renewable Energy Engineering	III-IV	1. year
CHEM-E1100	Plant Biomass	I-II	2. year
EEN-E1010	Power Plants and Processes	I-II	1. or 2. year
EEN-E3006	Energy Markets	I	1. or 2. year
PHYS-E0483	Advances in New Energy Technologies	III-IV	1. year
PHYS-E6570	Solar Energy Engineering	III-IV*	1. or 2. year
PHYS-E6571	Fuel Cells and Hydrogen Technology	III-IV*	1. or 2. year
PHYS-E6572	Advanced Wind Power Technology	I-II*	1. or 2. year
21E16100	Energy Business and Innovation	V	1. year
EEN-E3005	Excercises in Energy Technology	I-V	1. or 2. year
AAE-E3000	Advanced Energy Project	I-II	2. year

Aalto University
School of Engineering

Building Technology – Master's Programme

1.10.2020
Antti Peltokorpi
Assistant Professor

Buildings and Structures in Society

- **Built environment in Finland:**
  - 18 % of GDP
  - 20 % work force
  - 70 % investments and 73 % national wealth
  - 38 % CO_2 emissions
  - 42 % energy consumption
- **We use 90 % time in indoor environment and 99 % in built environment**

Plenty of opportunities for disruptive innovations

1. **Big data, situational awareness, algorithmic design and engineering**
2. **Sustainability as competitive advantage**
3. **New materials and production methods**
4. **Platform-based business models**
5. **Integrating science with human and knowledge management**

Building Technology Master's programme (CIV)

- *Creating safe and healthy built environments*

- *Combining the global needs for energy efficiency and sustainability with the characteristics of a good living environment*

Building Technology –programme

The programme deals with

- Design
- Construction
- Use and maintenance

of civil engineering structures, such as buildings and bridges

Study paths:

- Aging Management of Structures
- Analysis and Simulation in Civil Engineering
- Bridge Engineering
- Building Physics
- Construction Management
- Design of Concrete Structures
- Design of Steel Structures
- Design of Wooden Structures
- Fire Safety Engineering
- Indoor Environment

More: https://into.aalto.fi/display/enciv

Curriculum: Academic year 2020-2021

1. autumn		1. spring			
I	II	III	IV	V	
Common studies 30 cr (compulsory)		Advanced / Elective 30 cr			
Mechanics of beam and frame structures **Baroudi**	Engineering computation and simulation **Niiranen**	Reinforced Concrete Structures **Puttonen**	Steel Structures **Wei Lu**	Strategic management in construction **Peltokorpi**	
Heat and mass transfer in buildings **Xiaoshu Lu**	Fundamentals of Structural Design **Markou**	Operations management in construction **Seppänen**	Finite element methods in civil engineering **Niiranen**	Applied building physics and design **Xiaoshu Lu**	
Building materials technology **Al-Neshawy**	Construction management **Peltokorpi**	Fire dynamics and simulation **Hostikka**	Indoor air quality **Salonen**	Material modelling in civil engineering **Baroudi**	
		Mechanics of plate and shell structures **Niiranen**	Stability of structures **Baroudi**	Experimental methods in building materials **Punkki**	
		Concrete Technology **Punkki**	Production technology of concrete structures **Punkki**	Timber Engineering **Fink**	
		Geometry & Lightweight **Filz**	Parametric Engineering **Filz**		
15	**15**	**10-15**	**10-15**	**10-15**	**60**

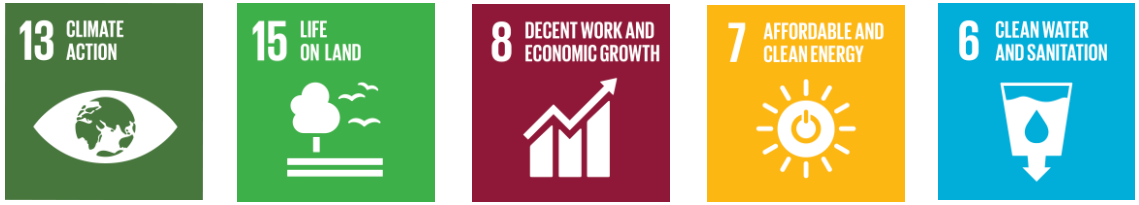
2. autumn		2. spring			
I	II	III	IV	V	
Advanced / Elective 30 cr					
Presteressed and precast concrete structures **Puttonen**	Design of bridges **Weiwei Lin**	Master's Thesis 30 cr			
Timber structures **Fink**	Engineering design exercises **Wei Lu**				
Composite steel structures **Wei Lu**	Design of energy efficient buildings **Bordbar**				
Fire risk and evacuation analysis **Hostikka**	Maintenance and repair of structures **Sistonen**				
Indoor environment technology **Salonen**	Design process management **Seppänen**				
Informed Structures **Filz**					
15	**15**	**30**			**60**

MSc thesis topics in August 2020

- Wood engineering as an expert service to increase sustainable construction
- Evaluation of bending stiffness for reinforced concrete beams supporting the raised base floor of a tall building
- Effect of non-uniform temperature field on the behavior of a steel member exposed to fire
- Analysis of Lateral Load Transfer from Intermediate Floor to Shear Walls in Multi-story Timber Modular Buildings
- Analysis of a hybrid energy system for a new neighborhood
- Cylindrical post-tensioned concrete tanks: Structural analysis utilizing a parametric design model
- Managing Complex Construction Projects Using a Big Room Environment
- Freeze-thaw durability of microsphere concrete
- Using bathroom modules in high-rise construction in order to reduce construction lead time
- Comparison between traditional and outsourced logistics on construction site

Sustainable development goals (SDGs)

Closest to CIV Building Technology



Working life skills

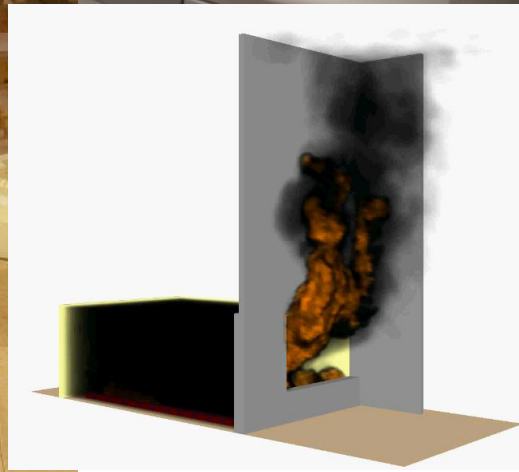
- **Analytical, logical and critical thinking,**
- **Creative problem solving,**
- **Multidisciplinary teamwork and collaboration, and**
- **Communication for scientific and technical professionals**

The aspects of **professional ethics** and **social and environmental responsibility** are integrated into the education of the programme.

Professional knowledge and skills in civil engineering

… for the future careers in industry, research, education or authority.
Based on the individual selections, the students can learn to

- **identify** physical phenomena, and **use** experimental, mathematical and computational methods to **examine and model** them,
- **assess** the structures and indoor environments with respect to their performance regarding the context-specific loads and physical phenomena,
- **comprehend** the fundamental theories and concepts of structural engineering and building physics, and use them for **designing** steel, concrete and timber structures and buildings,
- **apply** the appropriate experimental methods for the analysis of mineral-based materials, and
- **describe** alternative management methods and use them for **planning** and **controlling** construction processes.



The construction sector looks forward to 2030

Building 2030 is a consortium that develops a vision for the Finnish construction sector in the year 2030 and to work toward implementing it. This is undertaken to prepare for future changes in the field of construction – digitalisation, rapid urbanisation, climate change and more – and to ensure a sustainable foundation for business in the sector going forward.

The work going into Building 2030 is built on international benchmarks, adopting best practices from other fields and the transformation of operations brought on by digitalisation and new technologies.

The consortium funds research that advances the vision. The consortium consists of Aalto University and 16 companies from the construction sector: A-Insinöörit, Amplit, Fira, Granlund, Haahtela, Jatke, Lujatalo, M.R. Partners Oy, Parma, Pohjola Rakennus, Ramboll, Rakennusliike U. Lipsanen, Ramirent, Skanska, SRV, Stark, Tocoman, Trimble and YIT.

The Building 2030 project is open by nature and welcomes all organisations interested in the development of the construction sector.

News

See all

Research & Art
Published: 20.4.2020

How to Make High-Rise Construction Perform Better

Research & Art
Published: 13.2.2020

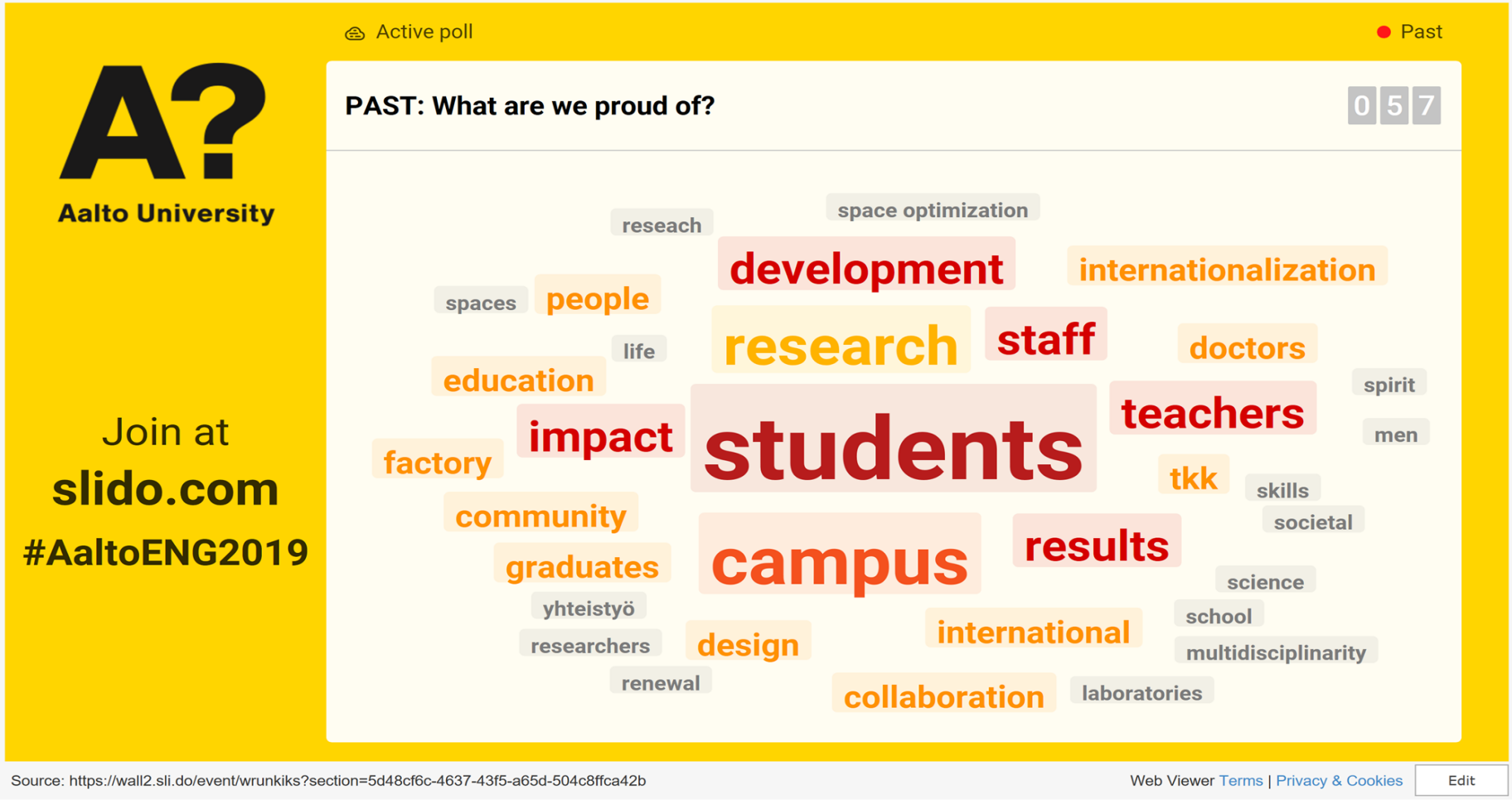
Reality Capture: Automated Construction Site Productivity and Quality Monitoring

Research & Art
Published: 7.11.2019

Four views of construction process Waste

Research & Art
Published: 24.4.2019

Solving the construction productivity puzzle with digital situation awareness



More information:
https://into.aalto.fi/display/enciv/Building+Technology