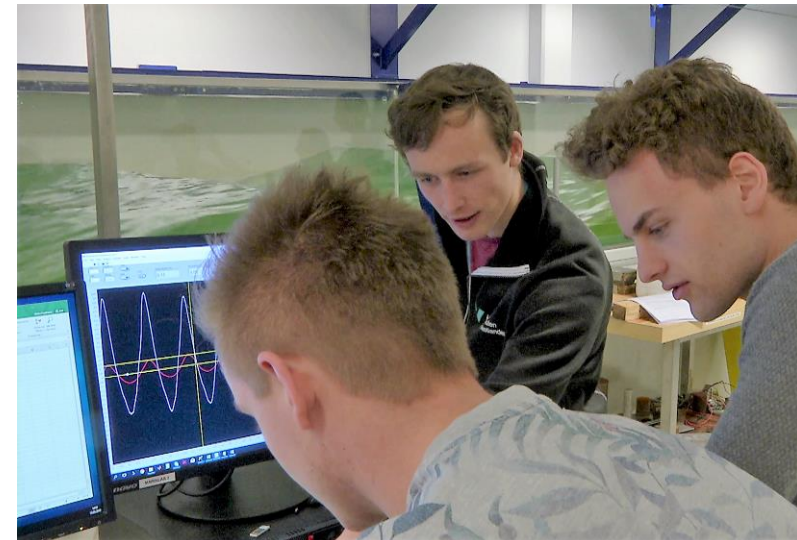




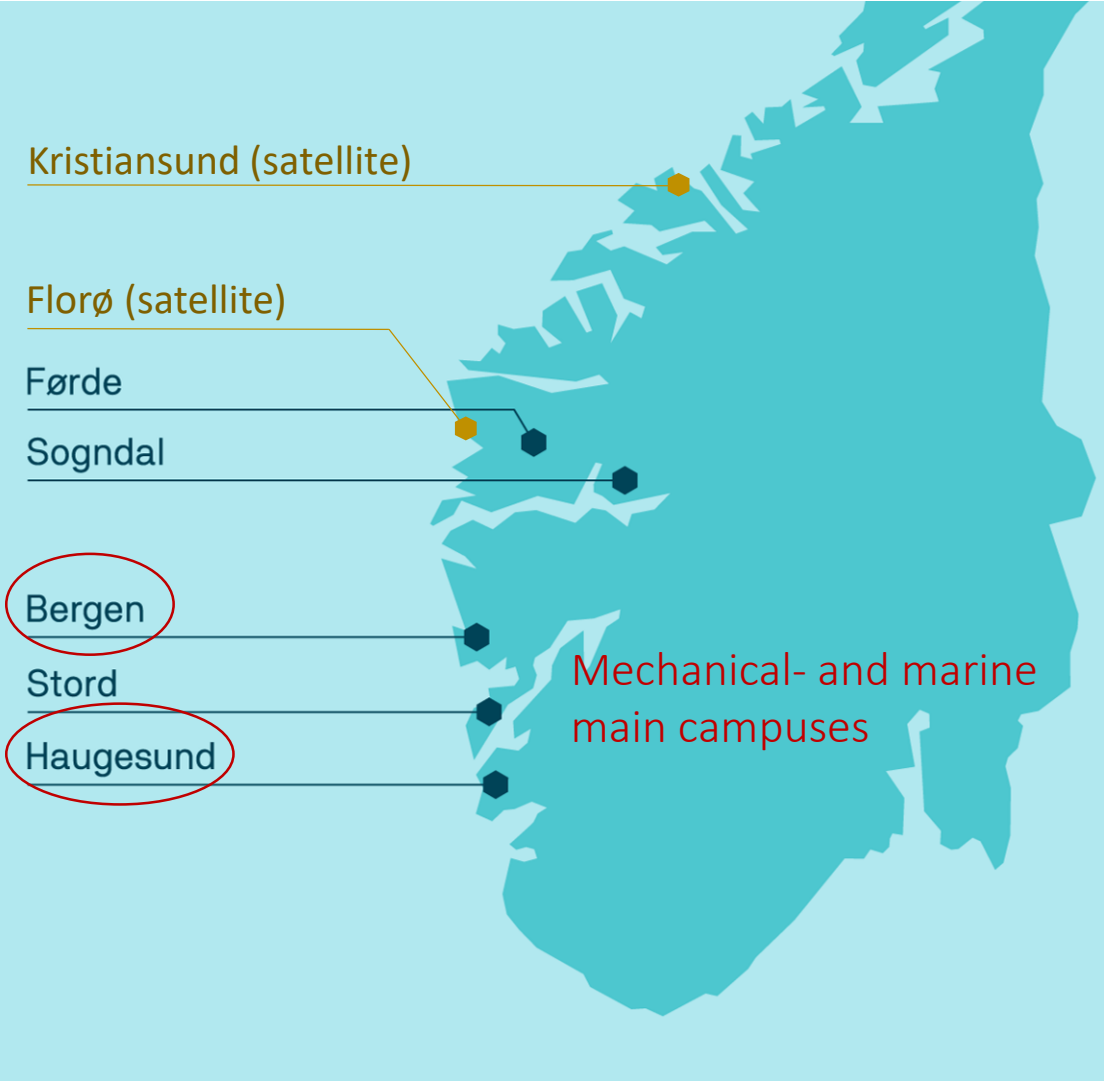
Marine Education, Research and Facilities, HVL Bergen

Outline

- Campus and study programs
- Marine technology education
- Research interests at the department
- Our lab facilities
- Current research in MarinLab



HVL Campuses



Department of Mechanical- and Marine Engineering (IMM)

Bachelor programs in Bergen:

Mechanical Engineering

Marine Technology

Industrial Engineering

Energy Technology

Ocean Technology

Aquaculture

Subsea (Oil&Gas)

Specialisations

IMM locations:



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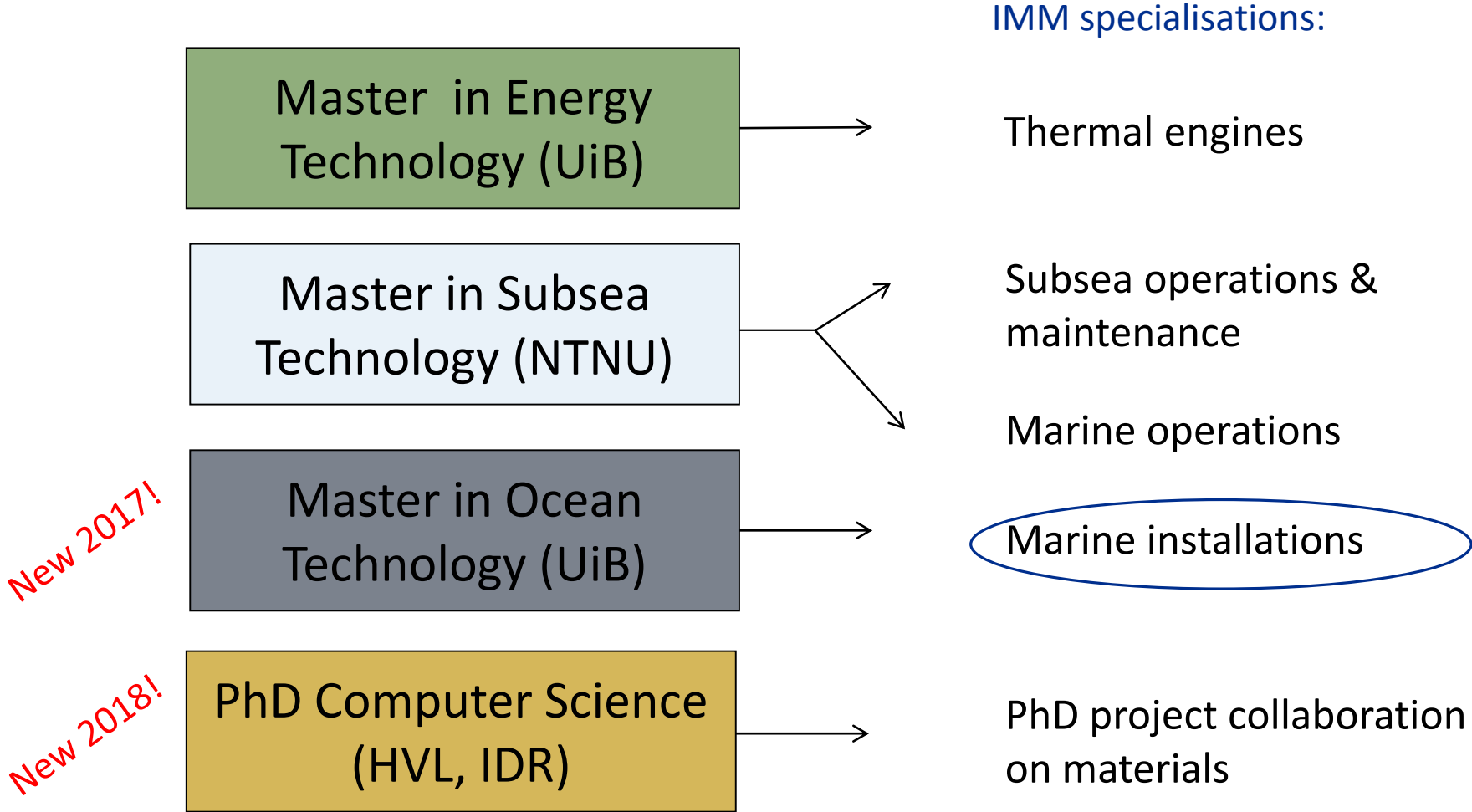
Subsea (Oil&Gas)

Specialisations

IMM locations:



Master and PhD collaboration



Marine technology courses

MAS124 Introduction to marine technology

Ship stability
Stability standards
Numerical integration
Inclination test lab
MATLAB introduction

MAS114 Marine steel structures

Bending, tension, torsion, buckling and fatigue
Dimensioning structures
Welding regulations
DNVGL SESAM analysis

MAS121 Marine analysis

Applied RAO and anchoring: Goliat, Trym and floating wind turbine simulations using software DNVGL SESAM

MAS116 Hydrodynamics

Linear wave theory
Resistance and propulsion
Forces on slender bodies
Wave resistance lab
Ship resistance lab
MATLAB for calculations

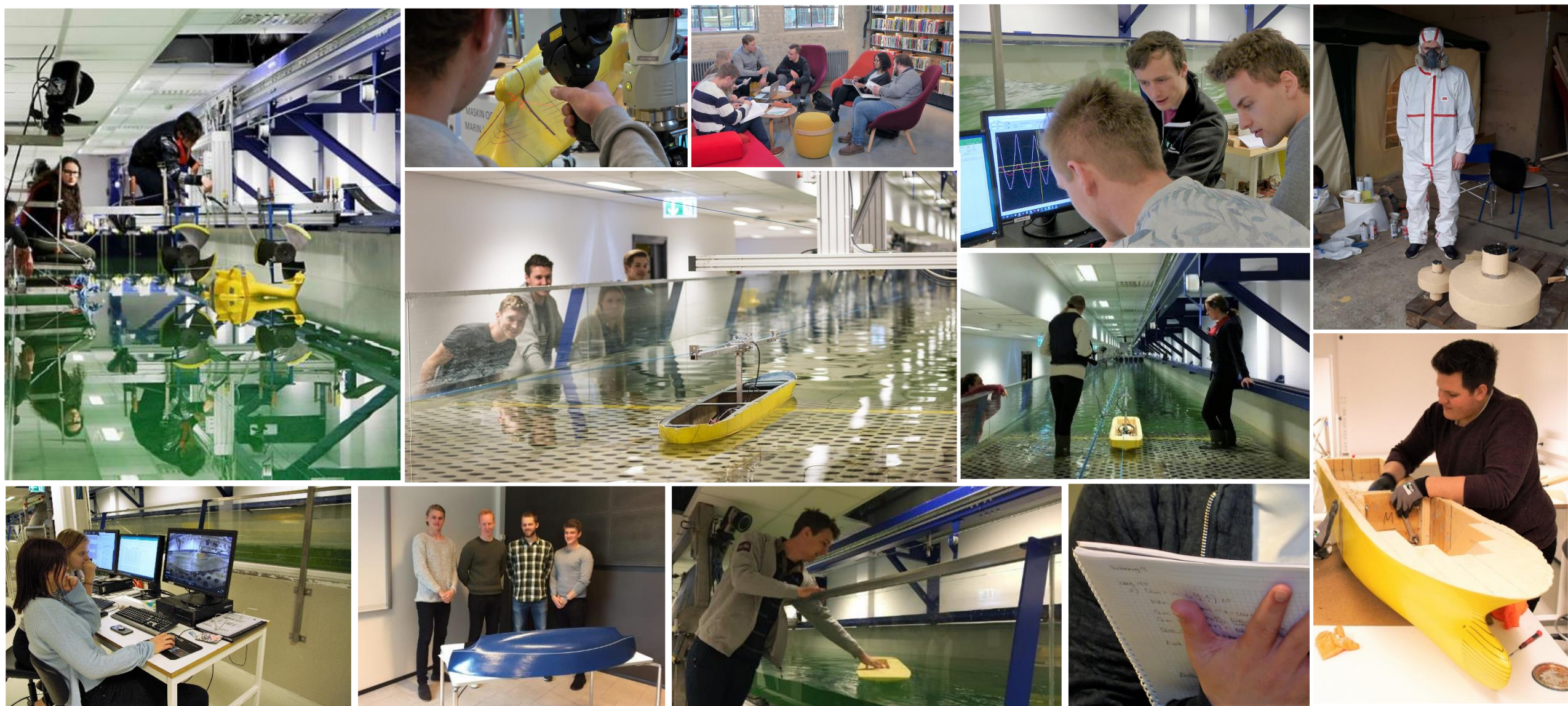
MAS102 Marine technology continued

DNV- and OD- Rules for offshore structures/ships
Anchoring
Hydrodynamic lift
Roll damping
MATLAB for calculations

Future courses on experimental methods and CFD

Ship resistance validation
Response in waves
Foil and turbine testing
Numerical methods
OpenFOAM/Star-CCM+

Students at work



Research interests at our department

OCEAN SPACE

Ship performance
Autonomous control,
positioning
Supply vessel operations
AUV surveillance
Rough weather
simulations

ENERGY

Thermal Engines
Zero emission buildings
Solar energy
Municipal waste heat
Hydrogen

MATERIALS

Pressurized equipment
Stress engineering
Technical integrity
Fatigue testing
Welding technology

Green ships
Floating wind turbines
Tidal turbines
Wave energy

The research should be relevant to
the business and teaching.

In line with this, we build laboratories
for these three areas.

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Foil technology
& shape optimisation

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Laboratories for education and research

- Mechanical workshop/lab
- Materials lab
- Internal combustion lab
- 3D lab *New 2019!*
- Hydrodynamics lab



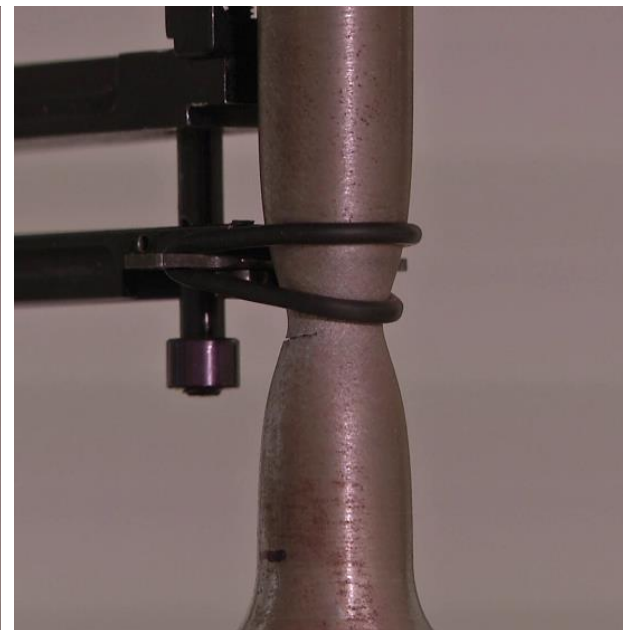
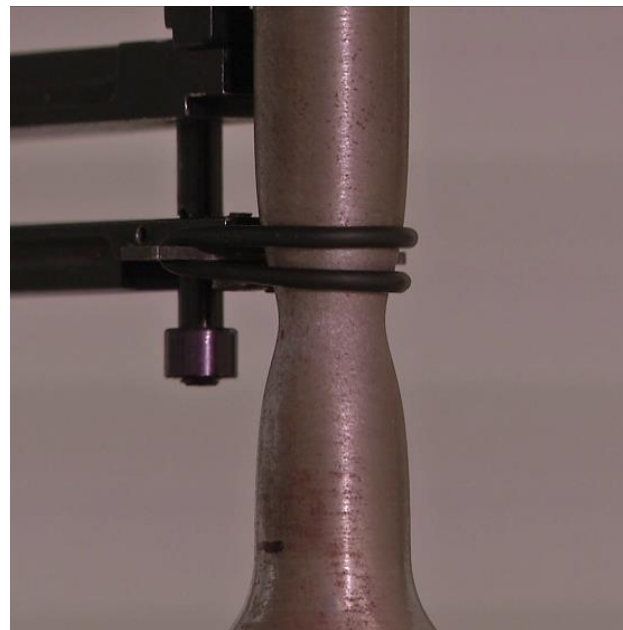
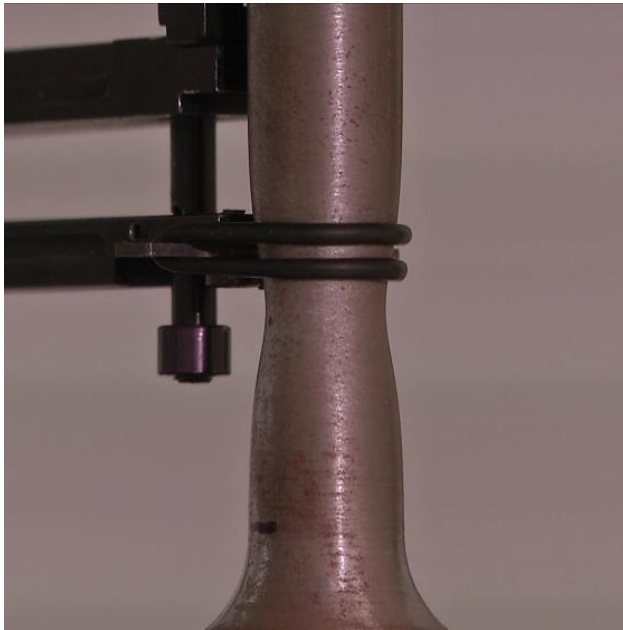
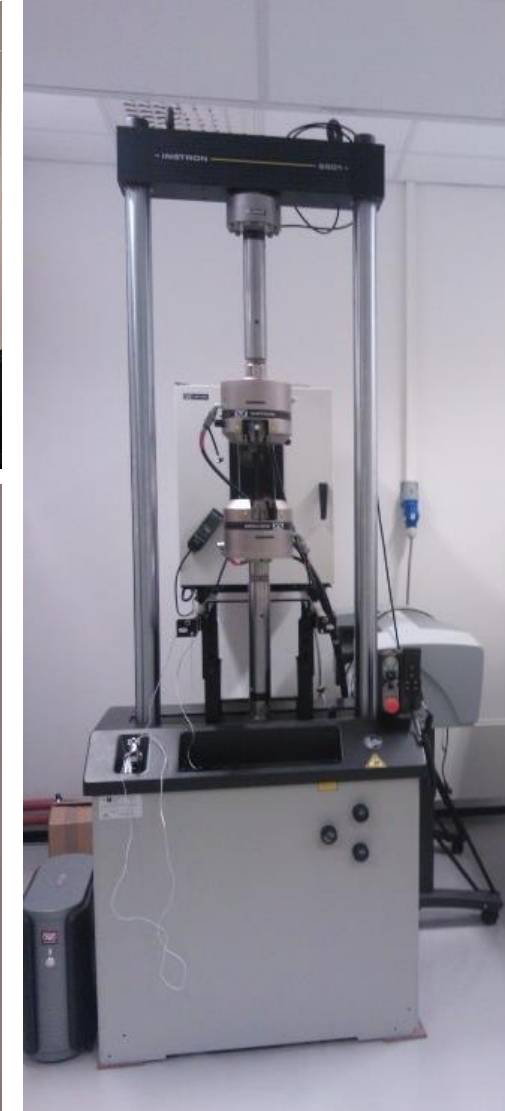
Mechanical workshop/lab

- Welding
 - MIG/MAG/TIG/SMAW
- Plasma cutting
 - max 20mm plate thickness
 - all metals
 - CAD/CAM controlled
- Lathe
 - CAM controlled
- Milling
 - 4-axis
 - Table size 800x1200 mm
 - 24 different tools
 - all materials
 - CAD/CAM (Creo parametrics)

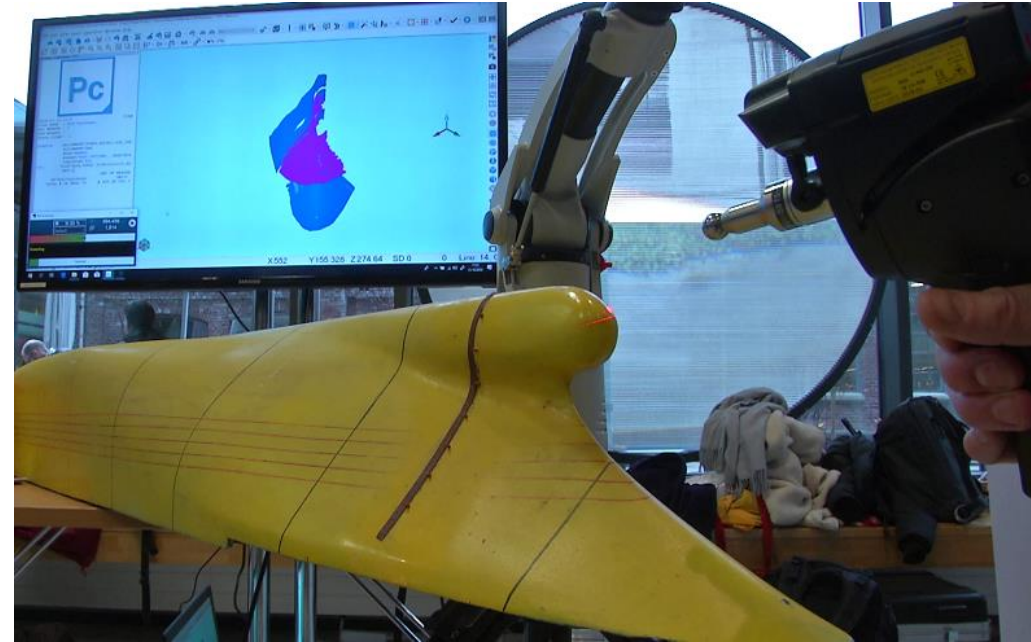
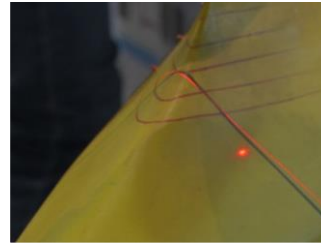
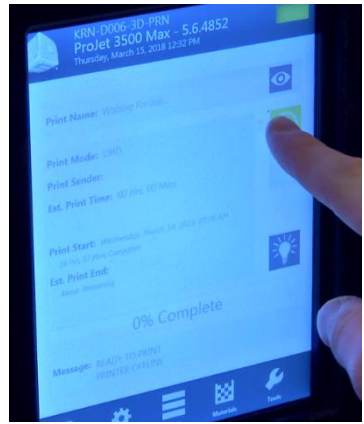


Materials lab

- Instron 8801
- compression, tension and fatigue testing
- 100kN
- environment chamber (temp -70 to +300 °C)



3D Laboratory



- **3D Printer**

Creates functional prototypes

Volume size $\approx 300 \times 180 \times 200$ mm

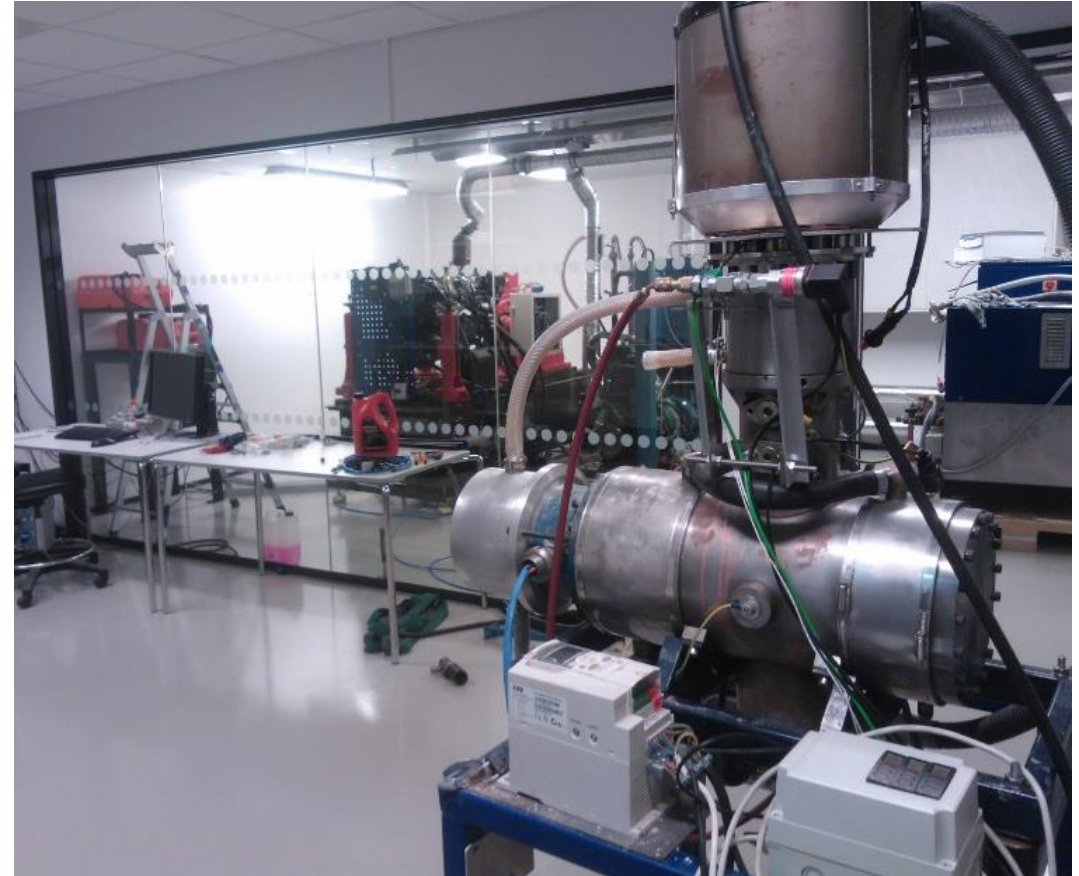
Material cost ≈ 3000 NOK/kg

- **3D scanner**



Internal combustion engine lab

- Volkswagen 1.4TSI, bio fuel projects
- “Thermal Engines” Master program, many projects
- 1-cylinder diesel engine, student lab on energy efficiency, planning to upgrade to common rail
- Stirling engine
- Portable gas analysers/emission testing
 - HORIBA PG-350
 - Testo 350



MarinLab

Tank dimensions:

50m Length

3m Width

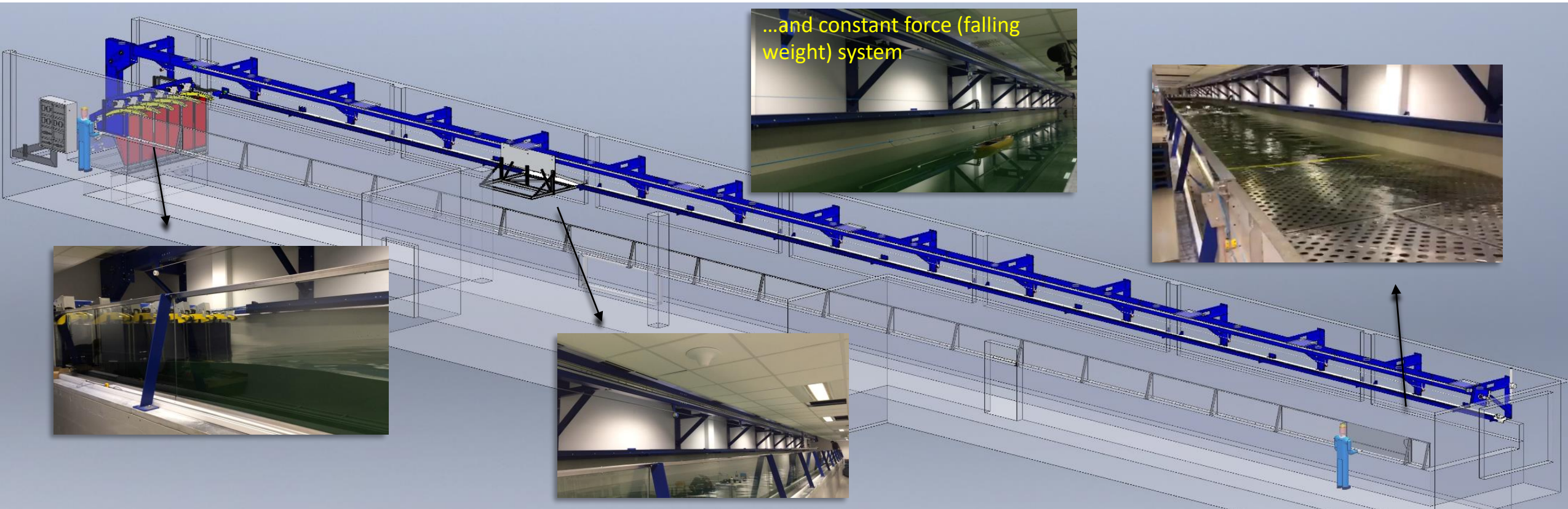
2.2m water Depth

Main features:

0.5m maximum wave height

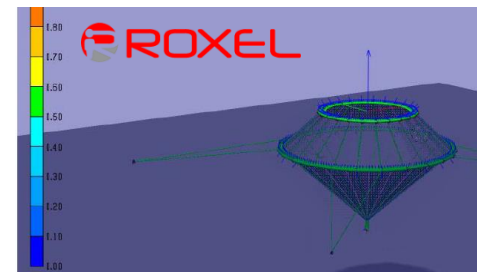
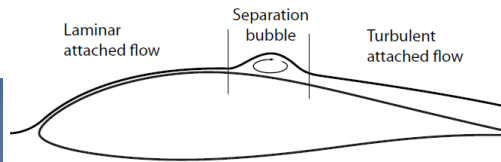
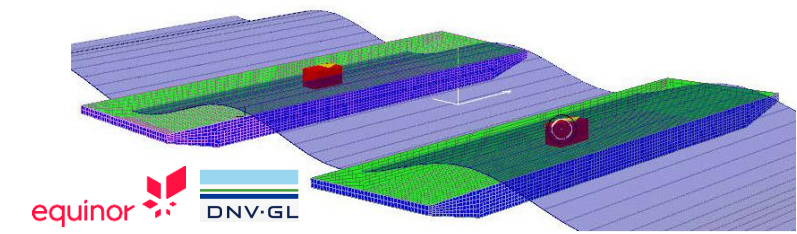
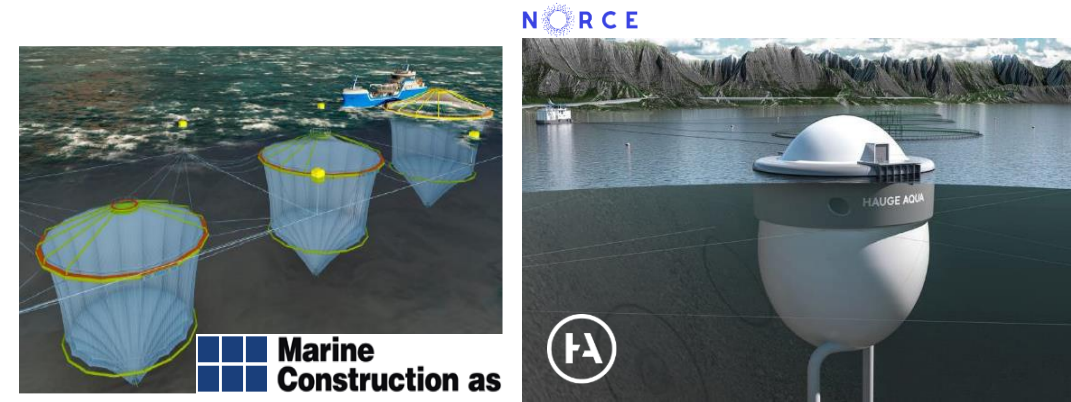
6 flaps to absorb steep wave angles

5m/s carriage speed & 1.2m/s^2 acceleration



Bachelor and Master projects connected to research & development

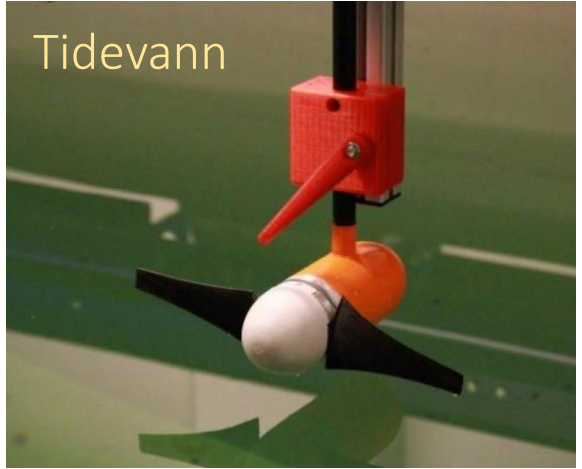
- Vortex induced motion (Equinor)
- Installation and maintenance HYWIND (Equinor)
- Resistance and motion testing ships (many companies)
- Battery ferries (GS Design, MDC, Marine Construction, etc)
- Breaking wave loads on GraviFloat (LMG)
- Two-body motion interaction, SESAM validation (Equinor, DNVGL)
- Offshore fish farming (Roxel, Hauge Aqua, Marine Construction, etc)
- Foil technology, for hydrofoils, turbines, AUV (HVL, Maritime Engineering)



Bachelor and Master projects connected to research & development



Hywind vortex induced motion



Tidevann



Hywind innstallasjon



Redusere skipsmotstand

Close contact with industry and research partners



Contact information



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www.hvl.no/imm

www.hvl.no/marinlab

“How inappropriate to call this planet **Earth** when it is quite clearly **Ocean**.”

Arthur C. Clarke



Thank you for your
attention!