

# GDANSK UNIVERSITY OF TECHNOLOGY

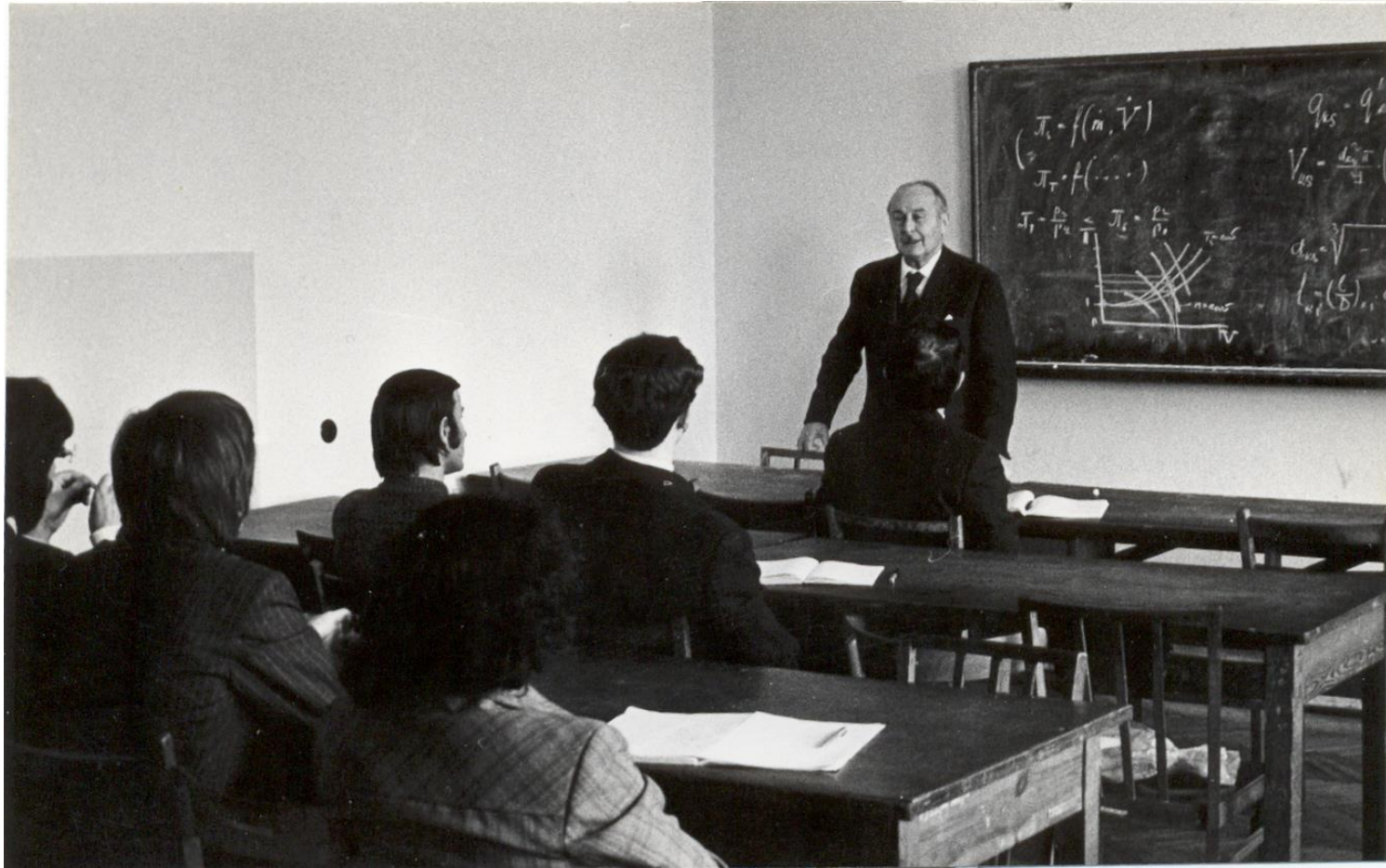
*Ship Technology*

*Janusz Kozak*

Gdansk University of Technology is oldest and biggest Technical University of North Poland. As Königliche Technische Hochschule was established in 6th October of 1904 as first Academy in Gdansk. From the very beginning University was located in new erected buildings designed by Albert Carsten and existed till today. Till year 1945 16 000 students were immatriculated here. After 2nd World War Polish National Technical University was established 24th May 1945 with 6 faculties: Architecture, Naval Architecture, Chemistry, Civil Engineering, Electrical and Mechanical.



One of first faculties of Gdansk University of Technology  
with tradition started before of 2nd World War





# Ship, offshore and wind farm structure as engineering and art object





## General information:

- *6 Chairs, 130 employed,*
- *56 Professors, assistant professors and doctors,*
- *600 students admitted every year,*
- *300 graduates every year*

- Theory and Ship Design,
- Marine Structures Manufacturing Technology, Quality System and Material Science
- Hydromechanics & Hydroacoustics
- Land and Marine Power Plants,
- Marine Mechatronics
- Automatics and Energetics

**Education & Research**



## Educational profile:

### OCEAN ENGINEERING:

- 7-semester BSc intramural and 8-semester extramural study:
  - Shipbuilding and Ocean Engineering (Ships & Yachts),
  - Machinery, Power Plants & Deck Equipment of Ships & Ocean Engineering Objects,
 and in separate specialization:
  - Management & Marketing in Maritime Economy.
  - Natural Resources Exploration
- 3-semester MSc intramural and 4-semester extramural study:
  - Designing of Special Ships and Ocean Engineering Objects
  - Exploration of Seas and Ocean Resources,
  - Deep Ocean Technology

### POWER ENGINEERING:

- 7-semester BSc intramural and 8-semester extramural interdisciplinary study:
  - Automation of Power Systems,
  - Diagnostics and Operation of Power Systems,
  - Operation Engineering in Electro power Engineering,
  - Pro-ecological Power Engineering Technologies,
  - Turbo machinery,
  - Energy Markets and Power Engineering Systems.
- 3-semester MSc intramural and 4-semester extramural study:
  - Power Engineering Systems & Equipment,
  - Operation of Power Engineering Systems
  - Turbine Propulsion in Land, Ocean and Air Transport,

### TRANSPORT:

- 7-semester BSc intramural study:
  - Water Transport Means,
  - Water Transport Systems.

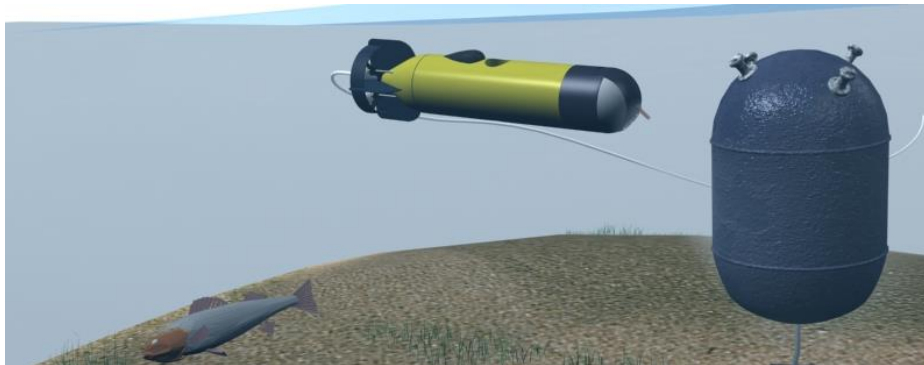


- Post diploma studies
- Short period training courses



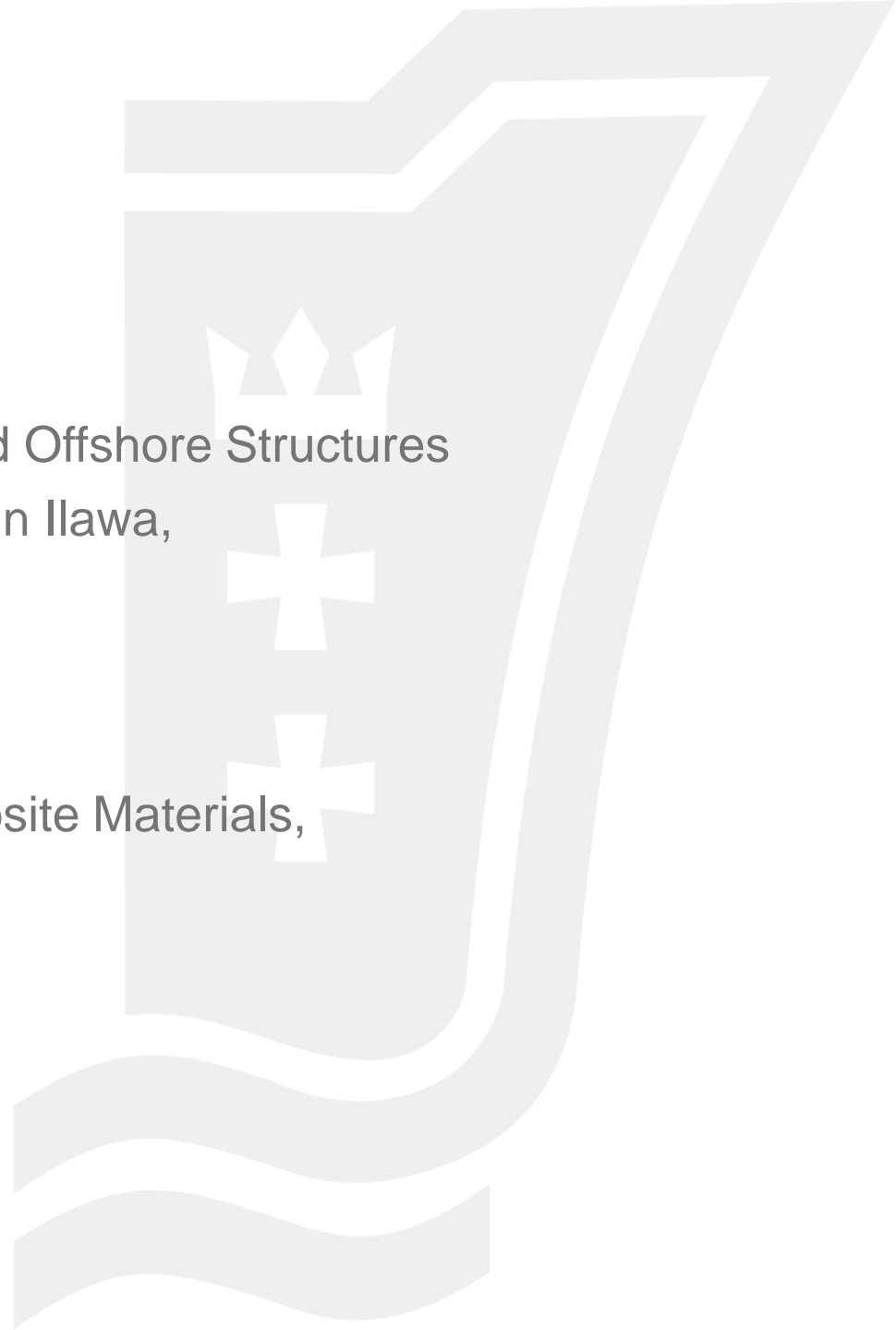
## Research activity:

- Hydromechanics, ship theory, naval architecture, application of composites, underwater techniques as well as hydro acoustic.
- Manufacturing techniques, structural materials and their application, material problems and quality systems.
- Static and dynamic strength of ship structure, risk analysis and safety in emergency states.
- Ship propulsions systems, power plants, diagnosis and reliability aspects.
- Ship systems, machinery and units – in this safety and evacuation systems.
- Steam and gas turbines for stationary and mobile different power systems, dynamics and automation.
- Conventional and Non-conventional energy sources,
- Natural Resources Exploration.



## Facilities:

- Laboratory of Ship Technology and Offshore Structures
- Ship Hydromechanics Laboratory in Ilawa,
- Towing Tank,
- Cavitation Tunnel,
- Machine Laboratory,
- Deep-Sea Technology and Composite Materials,
- Materials Science Laboratory
- Fuel Diagnostic Laboratory
- Engines Diagnosis Laboratory





## Facilities: HYDROMECHANICS Lab

- Towing tank: 30 x 3.0 m, deep up to 1.60 m; towing gantry, wave maker, towing speed to 3 m/s. Measurements: heeling and trim angles, accelerations, speed and wave generated profile,
- Łława open lake reserach centre: speed to 7 m/s, model length to 4 m.



## Facilities: Laboratory of Ship Technology and Offshore Structures



- test stands area – 600 m<sup>2</sup>
- max. load application – 2000 KN – tension, 4000 kN – compression,
- multiaxial load application, multipoint load and supporting facilities,
- fatigue load generators,
- microscopic and fractographic analysis,
- data acquisition up to 200 channels simultaneously

- Digital pressure indicator LEMAG PREMET C,
- video-endoskop XLG3 EVEREST VIT
- digital data recorder and analyser SVAN 956 SVANTEK.



## Last significant research projects:

**SANDWICH** - Advanced composite sandwich steel structures

*V-th Framework Program*

**Baltecological Ship** - Environmental friendly ships for Baltic Area

*Eureka, E!2772,*

**Ecological Dock** - Environmental friendly floating docks

*Eureka E!2968,*

**INCOWATRANS** - A new generation of environmental friendly inland & coastal ships for Polish east-west waterways

*Eureka E!3065,*

**ASPIS** - Application of steel Sandwich Panels Into ship Structure

*Eureka E!3074*

**CORET** - Advance coating of interior of tanks for rising environmental safety

*Eureka E!3614*

**SAND-Core** - Coordination Action on Advanced Sandwich Structures in the Transportation Industry

*VI-th Framework Program*

**De-Light** - Developing lightweight modules for transport systems featuring efficient production and lifecycle benefits at structural and functional integrity using risk based design

*VI-th Framework Program*

**Biobearing** - Bio and slide bearings, their lubrication by non-Newtonian oils and application in non-conventional systems,

*VI-th Framework Program*

**Safecrafts** – Safe abandoning of ships – improvement of current Life Saving Appliances Systems.

*VI-th Framework Program*

**RISPECT** - Risk-based Expert System for Through-Life Ship Structural Inspection and Maintenance and New-Build Ship Structural Design

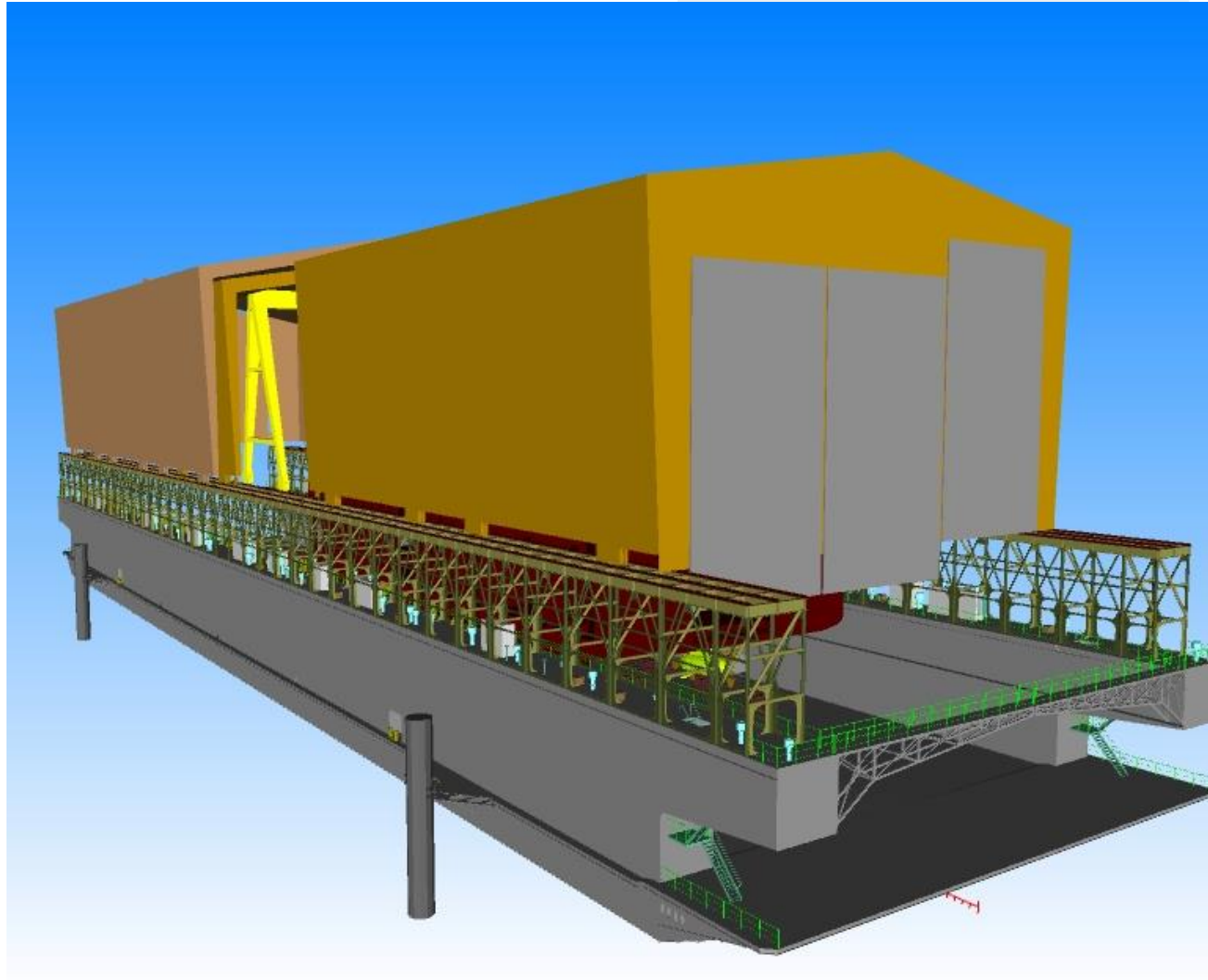
*VII-th Framework Program*

## Environmental friendly fishermen's boat KR-10





# Ecological Dock - Environmental friendly floating docks , *Eureka E!2968,*



## ClosedFishCage (CFC)

Prototype is tested in salmon farm in Norway from IX.2010



## Water Discus Hotel – Under and above water habitat

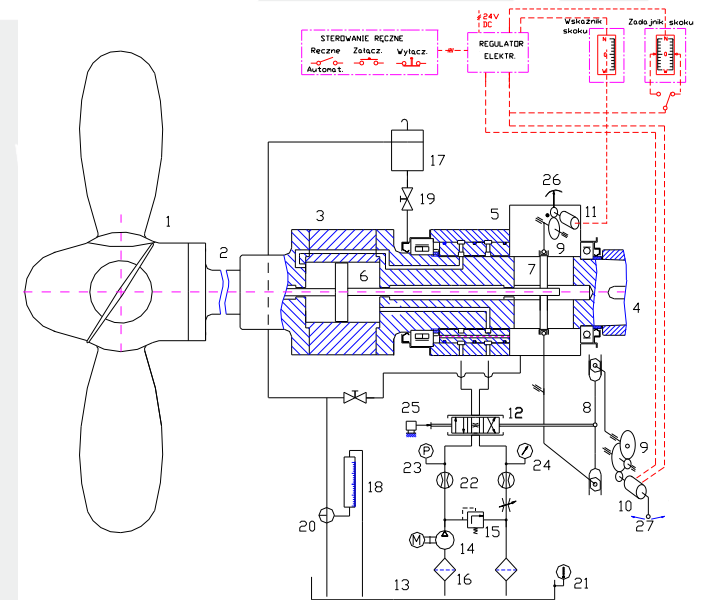
Disc submerged in 10m is located 21 rooms, underwater scuba center and bar. In above surface located disc and satellites is located living room, spa, restaurant and recreation center area







## New design of variable pitch propeller



## Polyethylene as structural material

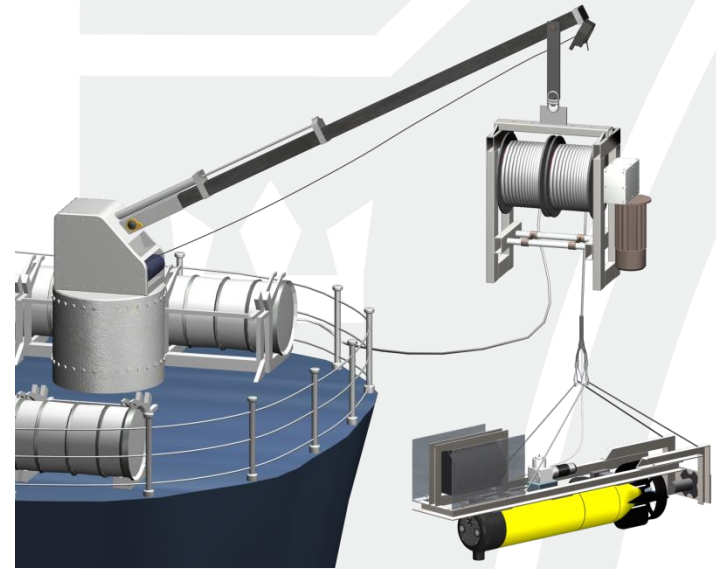


- Boat fully made of polyethylene:
  - light,
  - unsinkable,
  - failure resistant





## Anti-mines system „Głuptak”





## Solar powered sight-seeing ship



## Electrical powered small city ferry



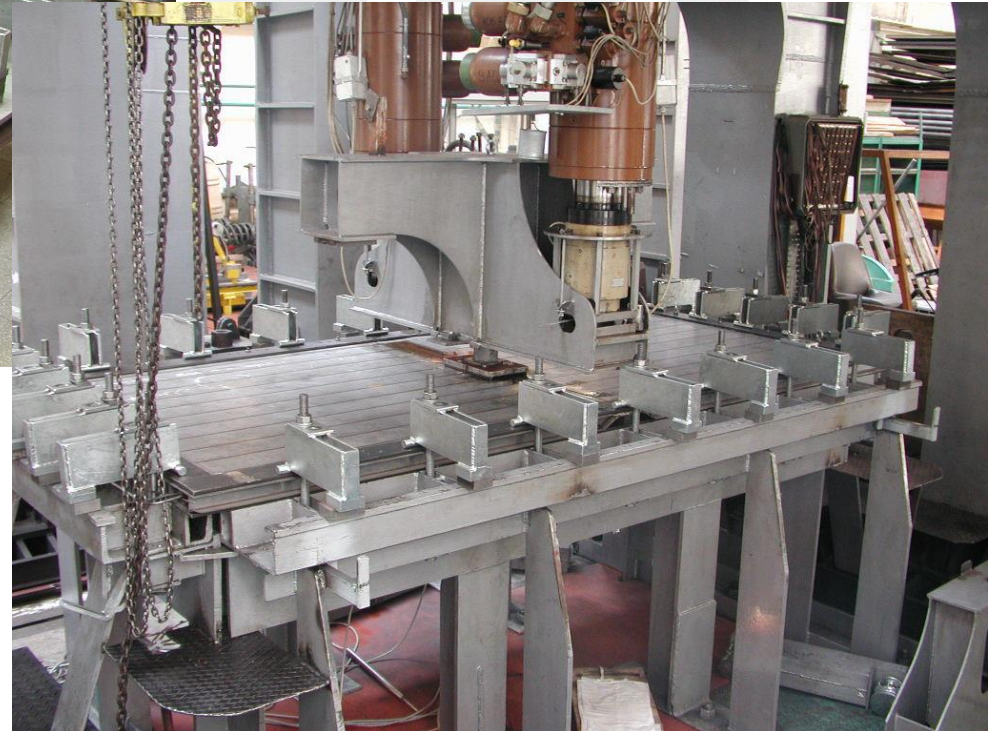


## Trimaran research vessel

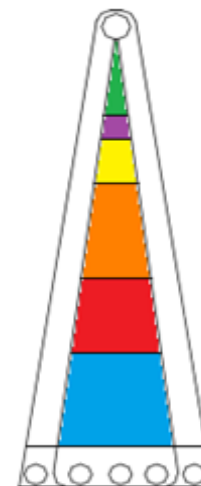
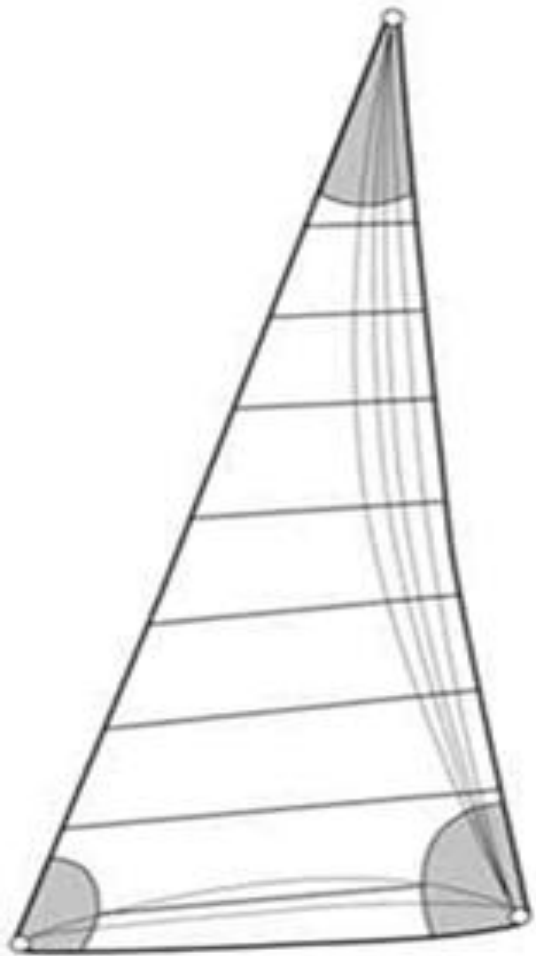




## New structural materials:



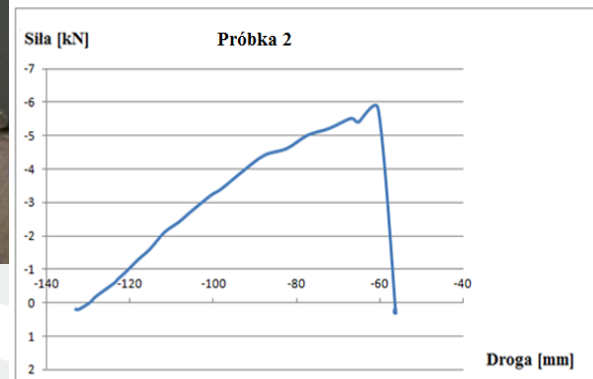
## Students research



Maksymalna siła  
5,8 kN

Wydłużenie przy max sile  
7,2%

Wydłużenie całkowite  
7,6%





## Students activities:

Human powered water bike



Solar supplied experimental water craft



# POLISH MARITIME RESEARCH

Quarterly issued by Faculty

