



PlasTEP

Dissemination and fostering of plasma based environmental technological innovation

Plasma technologies for water cleaning (WP6)

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Aim of work package

Developing a prototype of mobile device for destruction of oil and oil-type leakages in ports of the Baltic Sea

- Oil slicks can be destroyed using plasma
- Mobile plasma-based device can be developed
- The device can be harmless for the environment
 - no hazardous exhausts
 - using only renewable energy source – solar energy



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Implementation

Partners

- WP6 leader:
 - Institute of Fluid-Flow Machinery (IMP)
- WP6 members:
 - Leibniz Institute for Plasma Science and Technology (INP)
 - Lappeenranta University of Technology, ASTRaI (LUT)
 - West Pomeranian University of Technology (TUS)



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Implementation

Tasks

- INP and IMP – development of plasma reactors:
 - INP – dielectric barrier discharge reactor
 - IMP – microwave discharge reactor
- ASTRaL – catalytic material to support pollutants destruction
- TUS – power supply system for the prototype as a whole



Power supply with solar panel



Microwave discharge plasma



Dielectric barrier discharge plasma



Prototype



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Implementation

Procedure

- Technical feasibility and possible solutions of designing plasma device for water cleaning
- Constructing separate modules of plasma device for water cleaning
- First tests of combined and matched modules at simulated conditions
- Optimisation of modules
- Tests of optimised modules at simulated conditions
- Constructing prototype plasma device for water cleaning
- Tests of prototype plasma device for water cleaning at simulated conditions



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Main results of work package

Operational prototype device

- Size: 2.95 m (L) x 1.93 (W) x 1.48 (H)
- Weight: ca. 500 kg
- Components:
 - floating platform made of aluminium
 - microwave plasma module with oil-water drum separator
 - dielectric barrier discharge (DBD) reactor with adsorbers
 - power supply module with batteries and solar panel
 - cylinder with Ar for microwave plasma formation





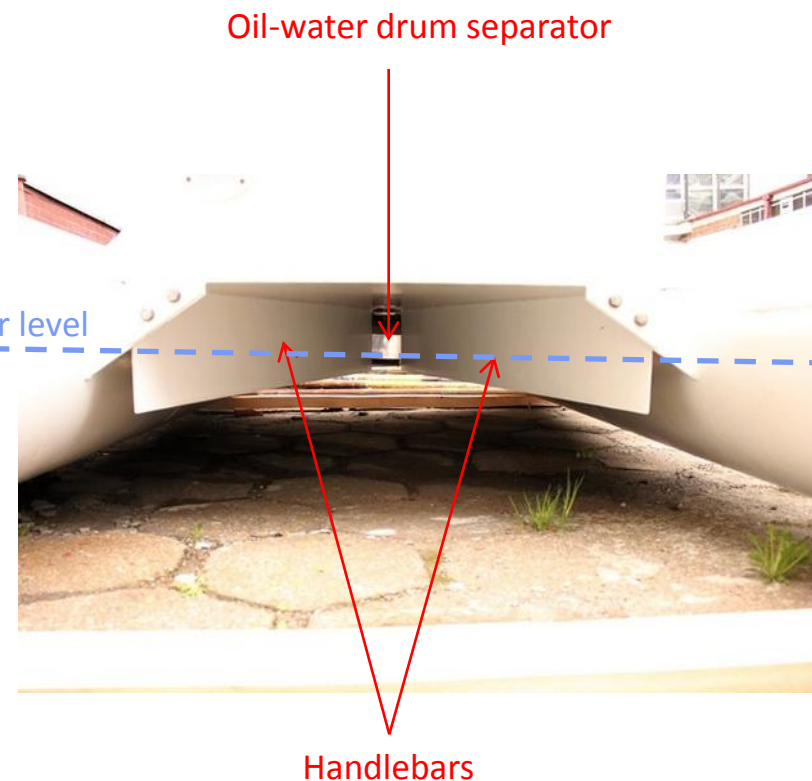
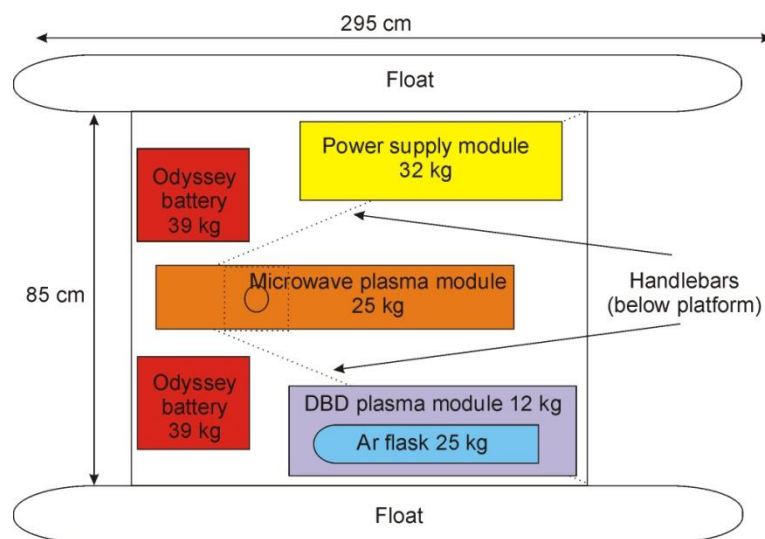
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Main results of work package

Operational prototype device

- Floating platform





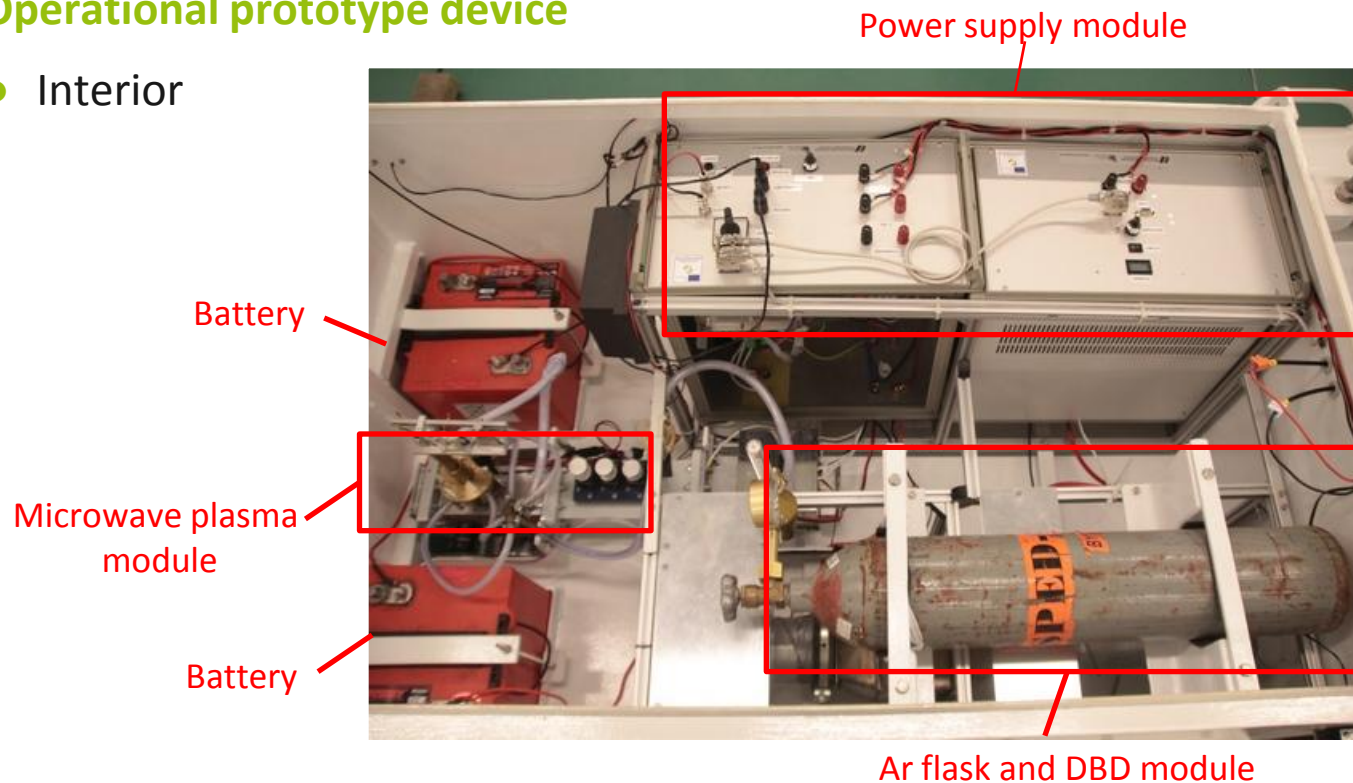
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Main results of work package

Operational prototype device

- Interior



DBD module



Microwave plasma with oil-water separator



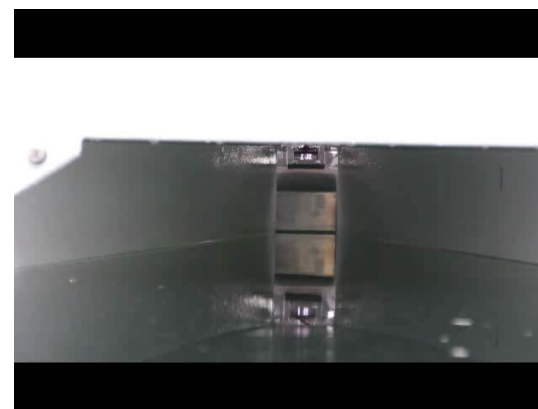
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Main results of work package

Operational prototype device

- Tested successfully November 19th, 2012
- Presented as a model 1:4 at international exhibitions:
 - ACHEMA, Frankfurt, Germany, June 18-22, 2012
 - Technicon, Gdańsk, Poland, October 25-26, 2012
 - Poleko, Poznań, Poland, November 19-23, 2012





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Main results of work package

Conclusions and future actions

- Oil slicks can be destroyed using plasma in a mobile device powered with solar energy
- The device requires optimization (e.g. propulsion, more efficient oil-water separation)
- There is an interest from SMEs and public organizations (e.g. Maritime Search and Rescue Service) in using such devices
- Future actions:
 - R&D project on optimization
 - Attracting oil skimmers producers (like Ro-Clean Desmi, Denmark)



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Thank you for your attention!

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