This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under Grant Agreement No 730871.

ARIES

Development of hybrid electron accelerator system for the treatment of marine diesel exhaust gases

Project meeting:

PoC Accelerator system for the treatment of marine exhaust gases

Budapest, 9 April 2019

Prof. Toms TORIMS, CERN / Riga Technical University

Objectives for this meeting

- To inform all the Partners on the status of the PoC project
- To get feed-back on the on-going work and to unlock any potential difficulties/problematic issues
- To explain economic analysis part and to commence this endeavour
- To plan further steps and timing

Expected outcome of this meeting

- Common understanding and knowledge of all Partners
- Confirmation of planning and clear understanding of risks
- Common understanding on how economic evaluation will be done
- Common understanding of the technical issues
- Green-light to commence mechanical construction works in Riga

Ultimate practical goal

- Successful tests in Riga – in June/July 2019
- Tests will be witnessed by many stakeholders. It will be a show for:
- EC, IMO, EMSA, Class Societies, IACS
- CERN and ARIES community
- Maritime business – shipping companies
- Is of crucial importance for the HERTIS project

Partners and their roles

1. Riga Technical University, Center of High Energy Physics and Accelerator Technologies – RTU (Latvia)
2. Institute of Nuclear Chemistry and Technology – INCT (Poland)
3. The European Organization for Nuclear Research - CERN (Switzerland)
4. Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology - FEP (Germany)
5. Remontowa Marine Design – Remontowa (Poland)
6. Milgravja Tehnoloģiskais Parks - Riga Ship Yard - RKB (Latvia)
7. BIOPOLINEX (Poland)

Advisros

- Italian Coast Guard – ITCG (Genova, Italy)
- American Bureau of Shipping - ABS (Houston, USA)

Main tasks

- Effective project management, transparent coordination and targeted communication
- Integration of the e-beam accelerator into the marine diesel engine exhaust flow system - in the simulated ship environment
- Investigation of flue gas flow pattern and process parameter influencing on the removal efficiency of NO_x and SO_2 using computer simulation
- Experiment measurements

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Current status

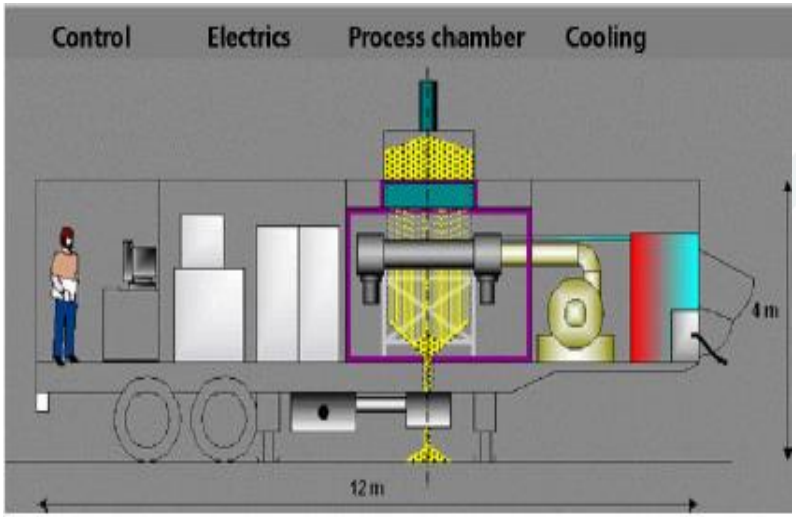
From idea to implementation

- Previous work by INCT
- Previous work by Fraunhofer FEP
- Interest and engagement of the maritime community
- Support of the European Commission and CERN

- Project started in October 2018 with the kick-off meeting in Warsaw
- November 2018 - full 3D scanning of the operation environment – dry-dock engine room and roof platform
- November 2018 – preparations and installation of the outfits of the measurement probes on boar of the dry-dock
- December 2018 - technical meeting in RTU and on board of the dry-dock
- December 2018 – experimental measurement of the off-gases chemistry and flow components
- January-February 2019 – technical consultations. Calculations, simulations and preparation of drawings

The particle accelerator

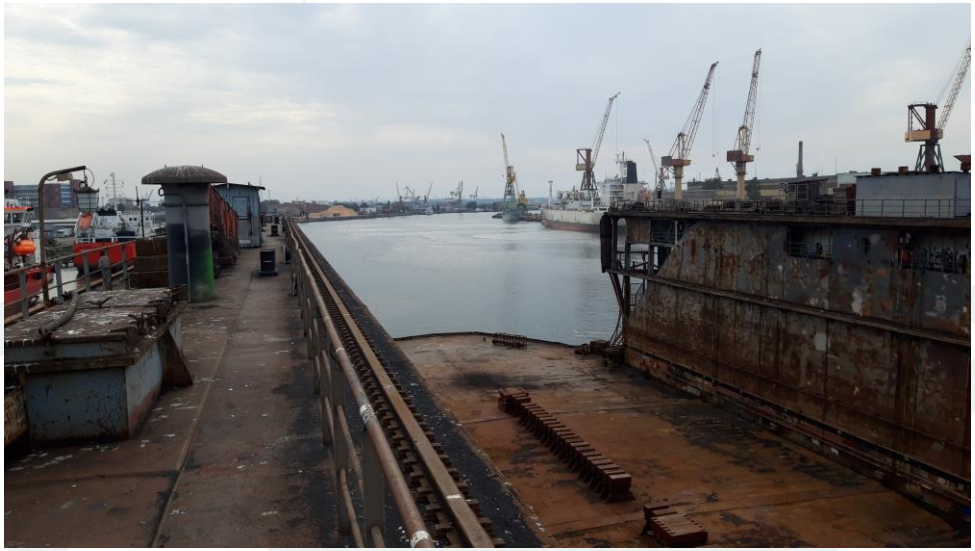
- WESNIT 2 is a mobile irradiation unit.
- Technical Specifications:
  - Weight 30 T
  - Dimensions:12 x 3 x 4 m
- The container is internally divided in 4 section:
  - Control area
  - Electrics
  - Process Chamber (Particle accelerator)
  - Cooling system

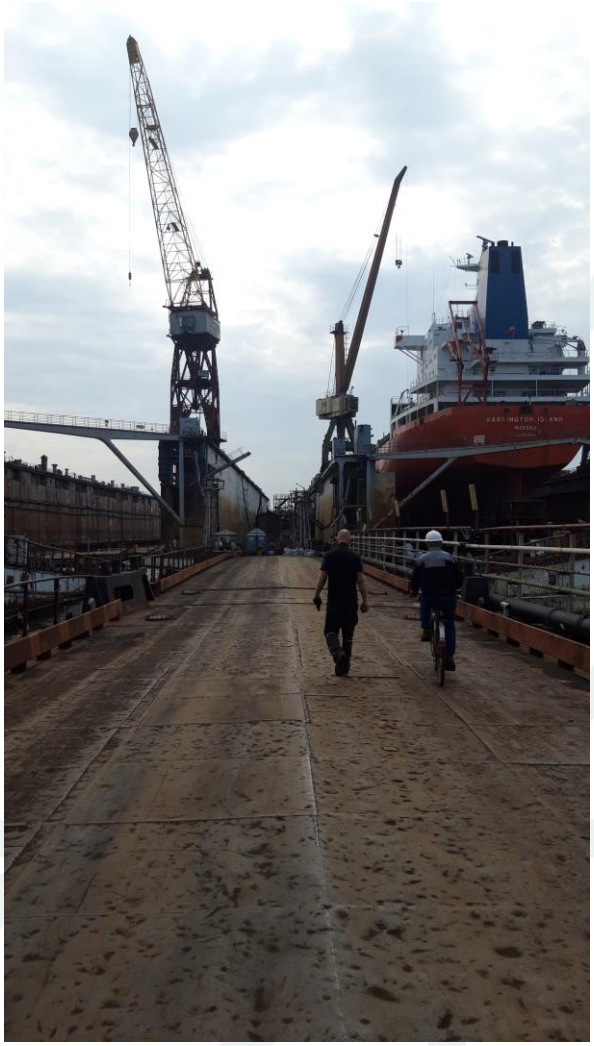


Pictures from Fraunhofer FEP

The Riga Shipyard

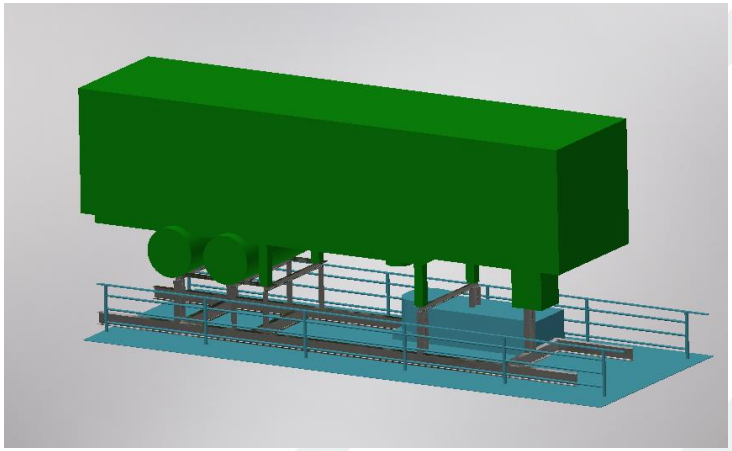
- The container needs to be placed on the roof of the drydock.
- Technical challenges:
  - Obstacles
  - Safety
  - Access to the container

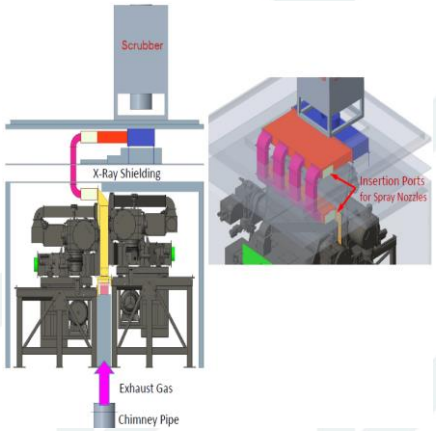


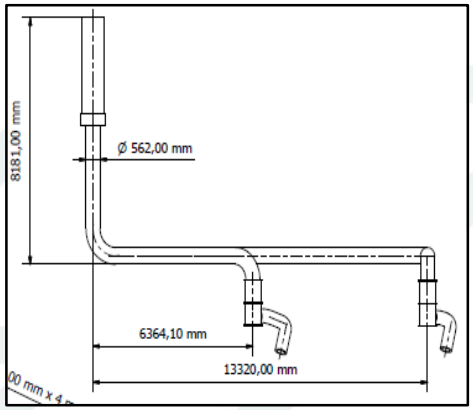


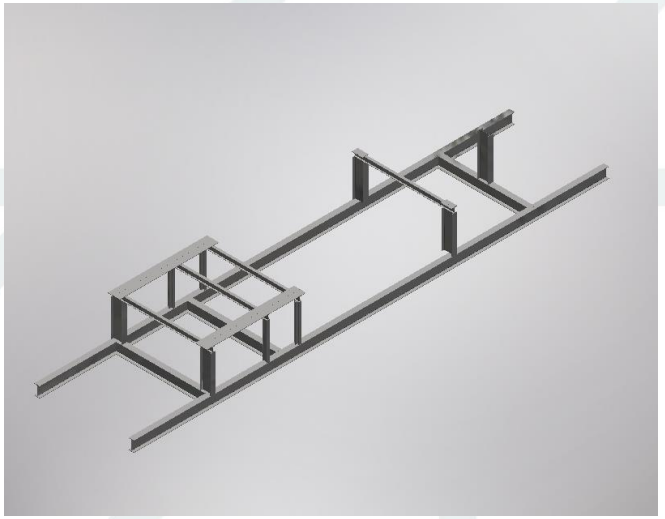
Currant Technical State

- Laser scanning measurements where done in-situ.
- The environment has be digitalized.
- First implementation strategies are analysed with computer simulations
- Gas flow measurements to design the scrubber unit.









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Thank you!