

WP1: Systems for increased fuel flexibility

Objectives / Expected results

To develop **engines able to switch between fuels**, whilst operating in the most cost effective way and complying with the regulations in all sailing regions.

WP Leader: Andreas Schmid
DWP leader: Kaj Portin

- **Development** of a **fuel injection system** for multi fuel purposes
- **Demonstration** of **fuel flexible engine operation**

WP 1

1.1 Fuel flexible engine

Identify, design, manufacture, test, and validate systems for flexible engine operation

2-Stroke: Winterthur Gas & Diesel

Andreas Schmid



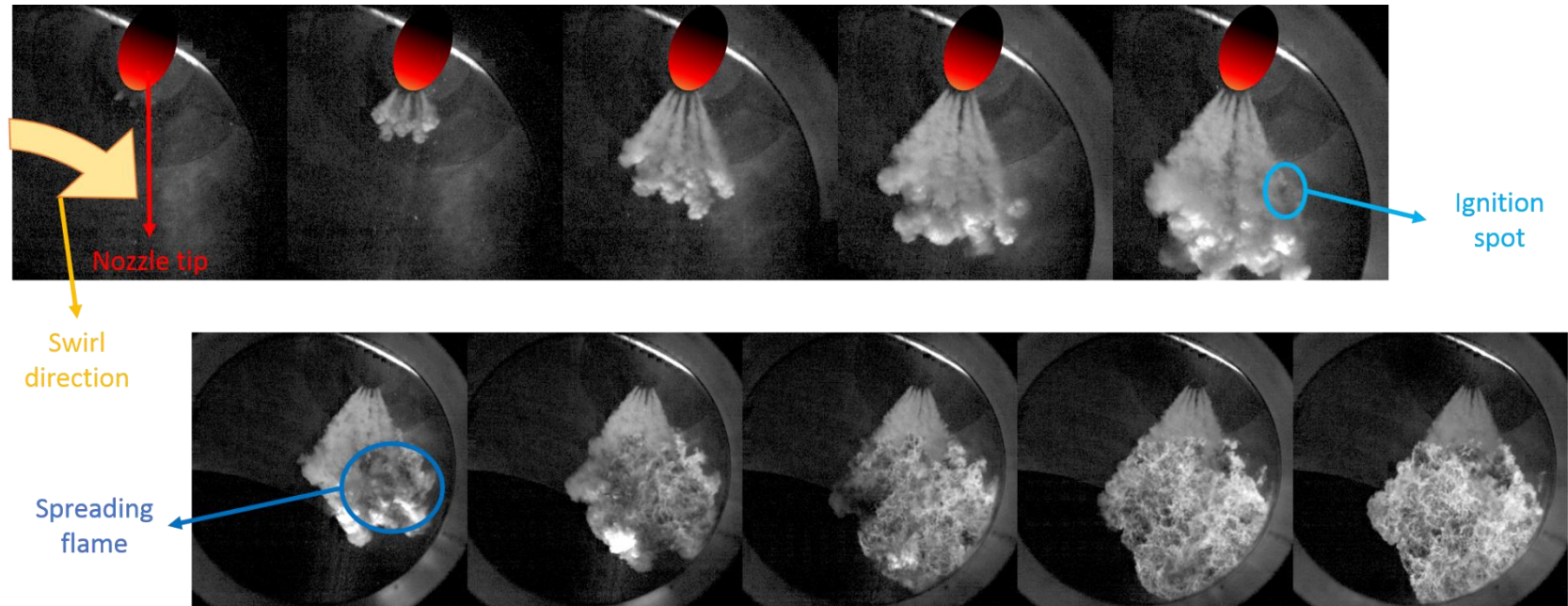
4-Stroke: Wärtsilä

Kaj Portin



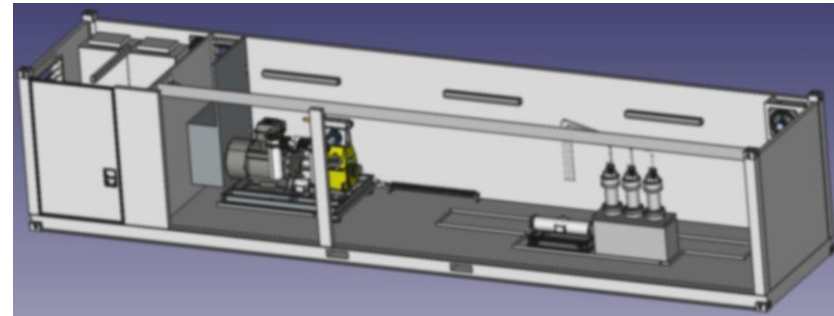
Results & Achievements of Past Period Month 18-24:

- SCC with new injection system commissioned
- Standard fuel systems under evaluation now



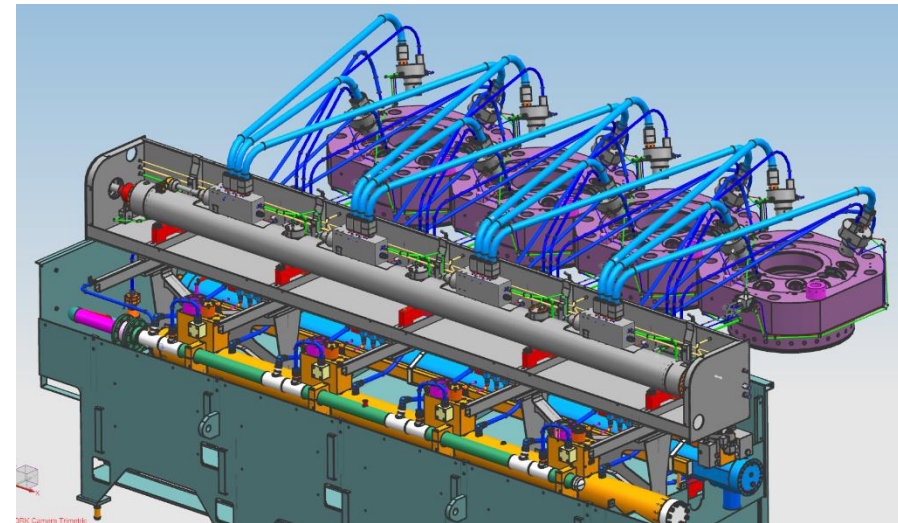
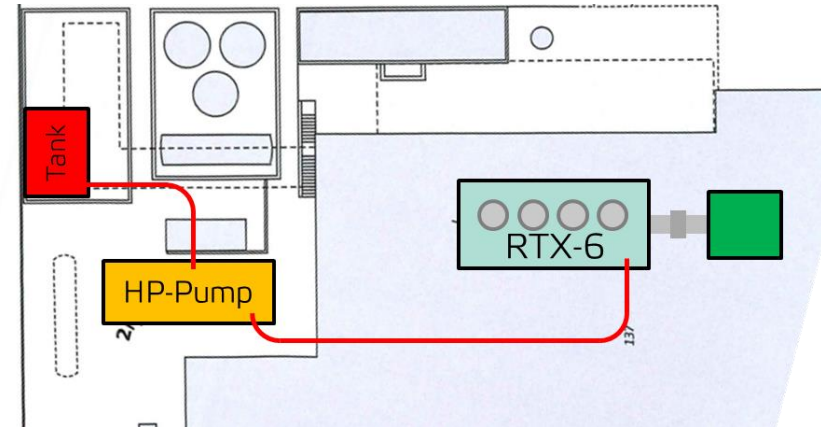
Results & Achievements of Past Period Month 18-24:

- The injectors are currently manufactured at the partner's facilities (OMT, Turin).
- The solenoid valves to control fuel admission have been developed and are being manufactured from supplier.
- High pressure pump and injector test rig under construction (external supplier)
- Safety systems defined in collaboration with SUVA (Swiss Accident Insurance Fund)



Plans Next Period & Future Work:

- Setup and commissioning of injector test rig
- Testing of the injectors on test rig and Spray Combustion Chamber with different fuels
- Conversion of Test engine and installation of new injection equipment
- Commissioning and validation of engine with fuel flexible injection system



Main results achieved during 2nd year

- Different fuels as LFO (for reference), Naphtha, Kerosene, and MGO have been evaluated regarding engine performance and emissions on a high speed off-road diesel engine.
- A new engine testing facility has been built at the University area in Vaasa. Installation and start-up of the medium speed marine engine (Wärtsilä 4L20) is ongoing
- The online gas quality measurement has been installed in the engine laboratory. The results show that the equipment is giving a robust analysis of the real gas quality.



Future Work

- Simulation on combustion for future fuel will continue regarding Methanol
- Combustion analyses for various fuel with different Cetane Index
- The fuels will be tested in VEBIC on the Wärtsilä 4L20 and the focus will be put on engine operation, emissions, and safety aspects on the tested fuels.
- Field testing in a power plant and on a LNG carrier vessel will be performed for online gas quality measurement. The system will analyse the gas quality and new controls will be implemented for optimisation of the engine operation.



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