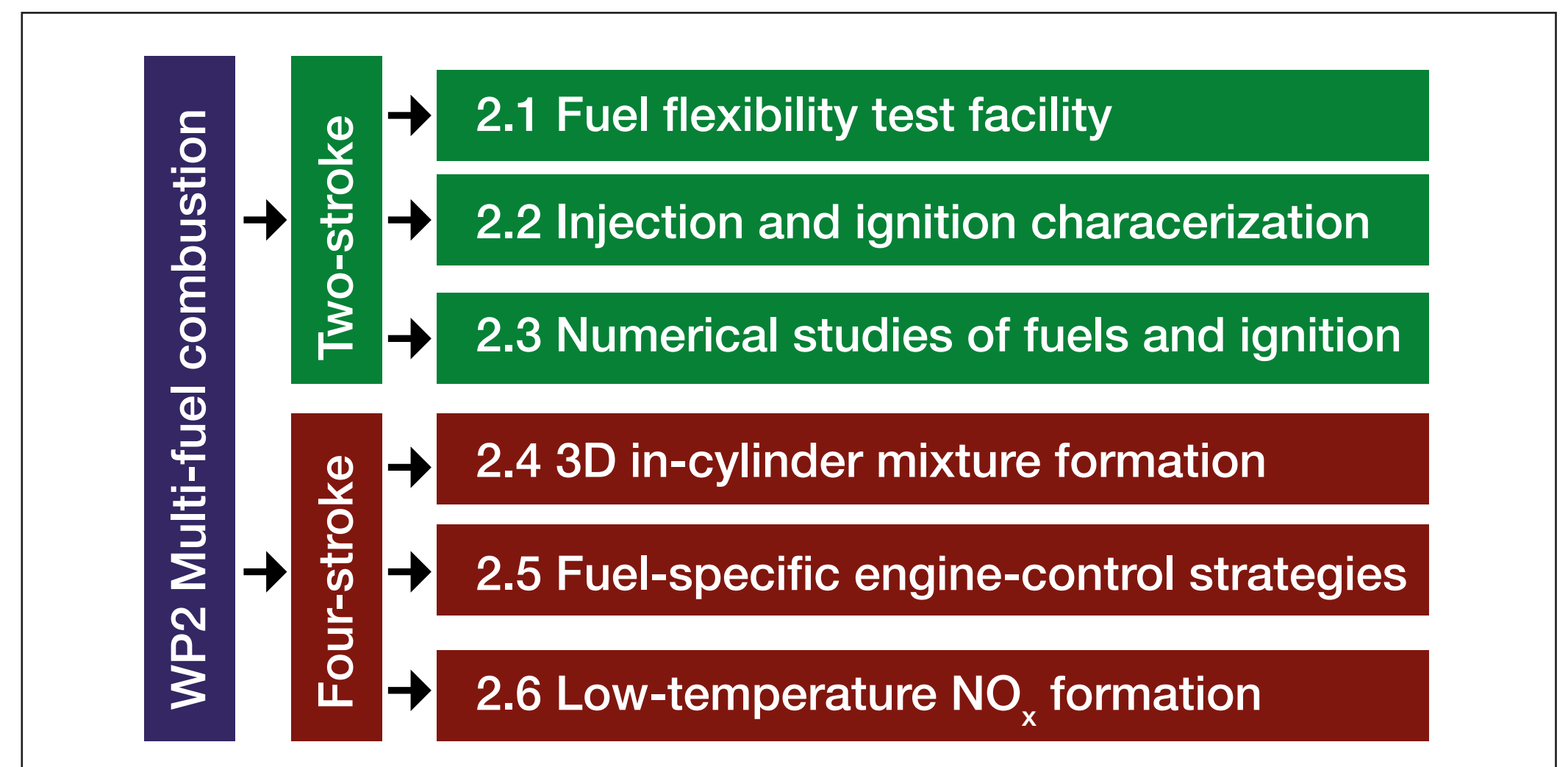


WP2 Multi-fuel Combustion



WP OBJECTIVES

The overall objective is to improve fuel flexibility of marine engines. In order to efficiently exploit a larger variety of fuels, an increased understanding of injection, combustion and emissions formation is required. For this purpose we propose to develop experimental facilities with optical access for tests under conditions relevant for marine engines. For improving the understanding of ignition and emission formation numerical tools will also be developed and applied. Finally, novel engine control strategies will be developed to fully exploit potential benefits of such fuels.

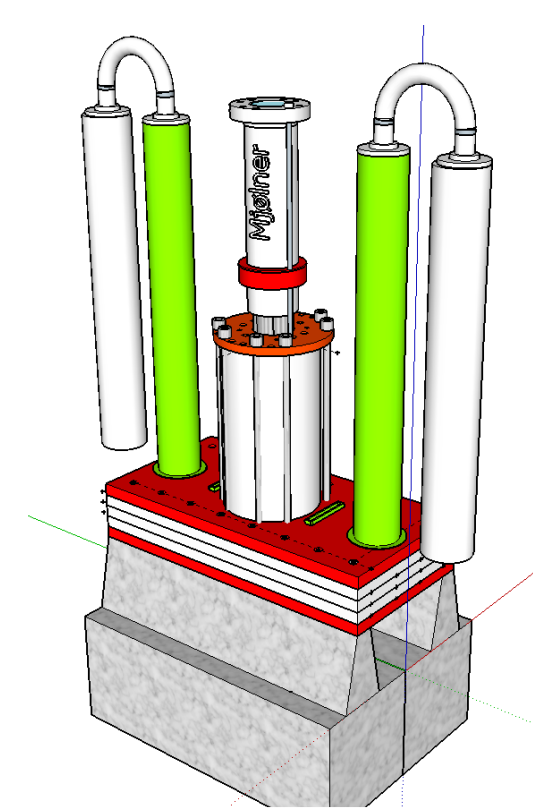


EXPECTED OUTCOME

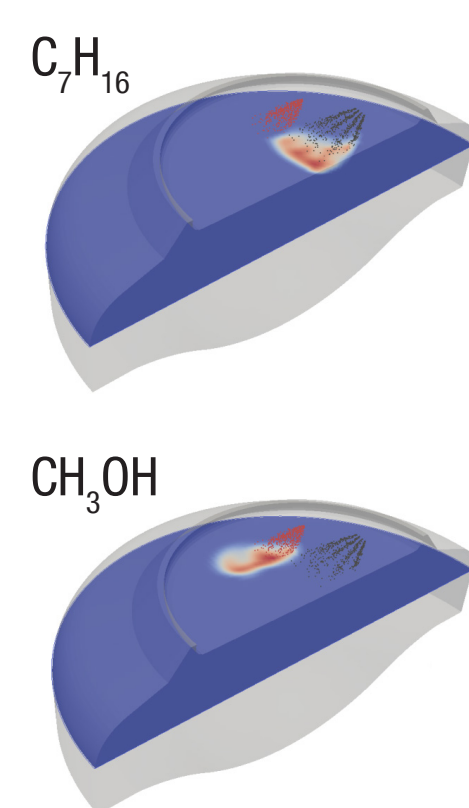
- Further improved fuel flexibility of marine engines
- Increased understanding of injection, ignition, combustion and emissions formation for novel and mixed fuels
- Experimental and numerical tools to enable exploitation of alternative fuels in marine engines:
 - Test-rigs and engines for optical studies
 - Improved CFD capabilities for multi-fuel operation
 - Improved engine control strategies

PROGRESS AND PLANS

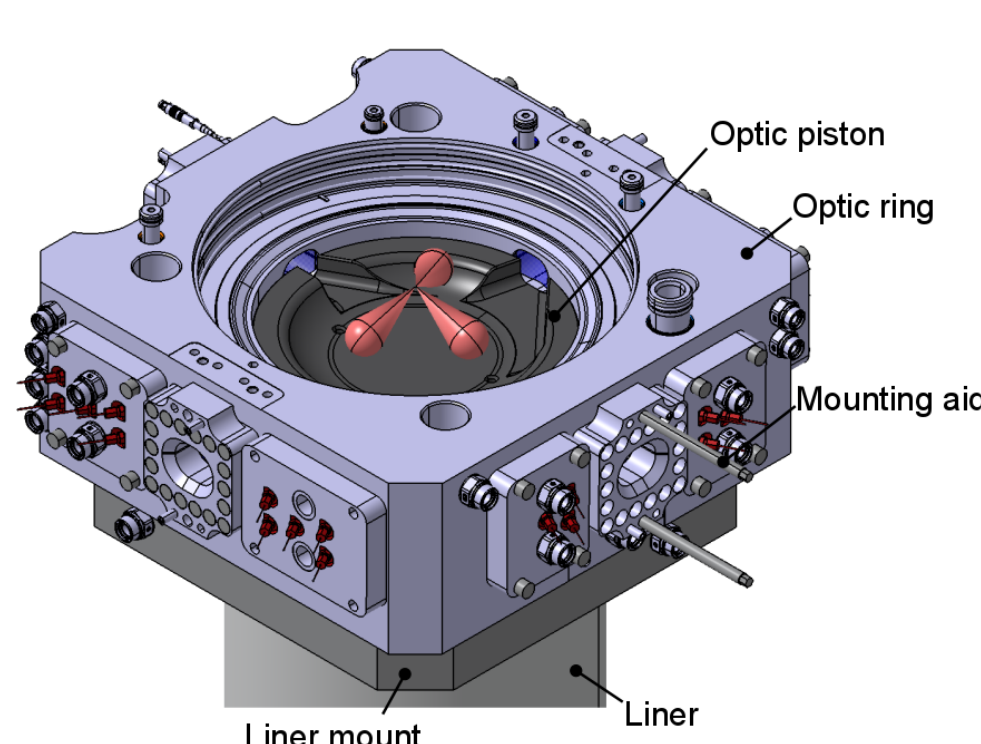
Partner	Activities
MAN CPH	TCC concept design and specifications, multi-camera tests, tabulated chemistry for CFD
Lund	High-speed Schlieren set-up, multi-view imaging, lubrication oil tracers
DTU	Detailed natural gas mechanism, propane experiments and model
MAN AUG	Design of optical accessible cylinder head, engine control tests
TUM LVK	Design of optical accessible cylinder head, fluorescent tracer validation
TUM TD	Low temperature NO _x formation, kinetic studies



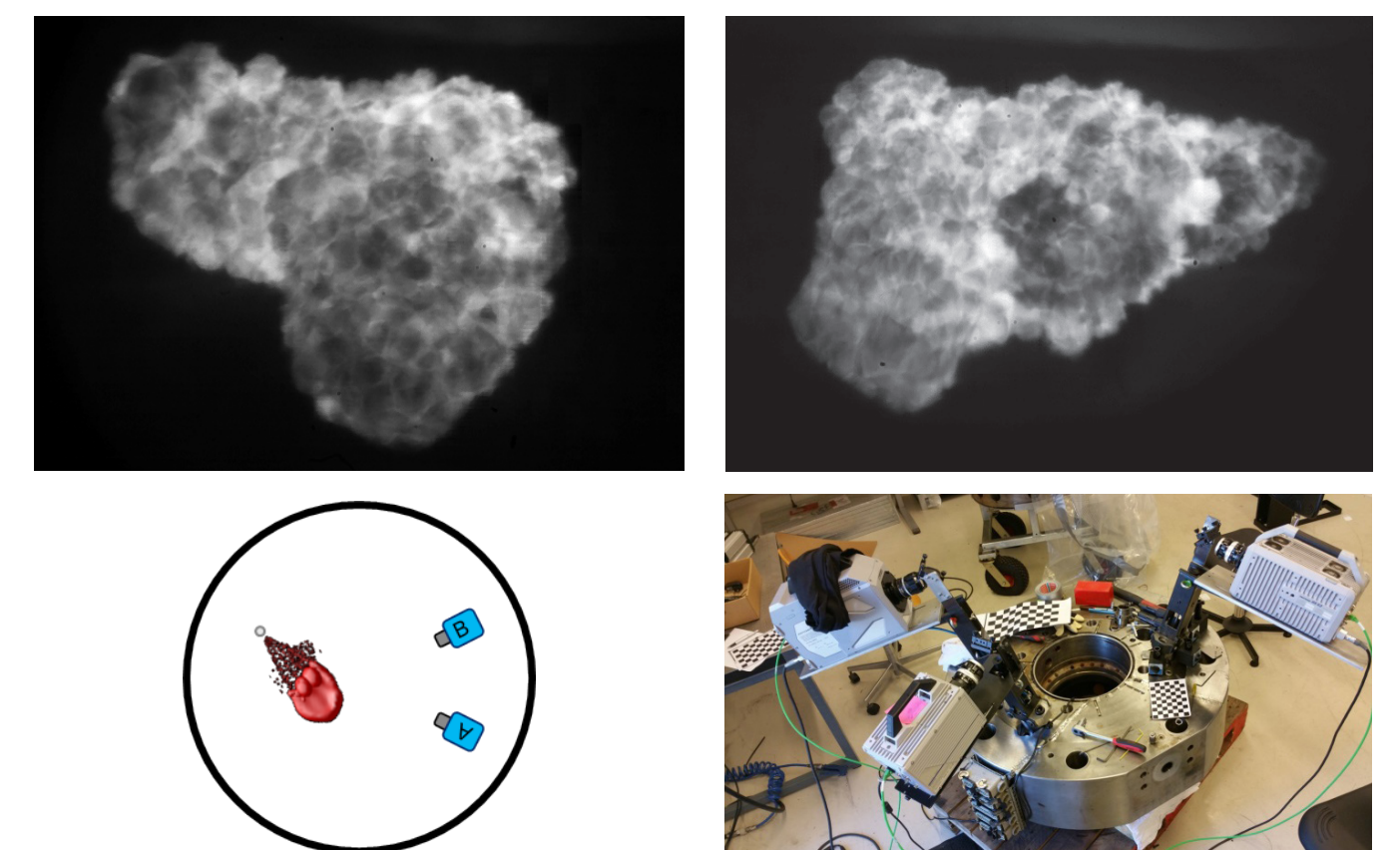
Proposed design for test combustion chamber (MAN CPH)



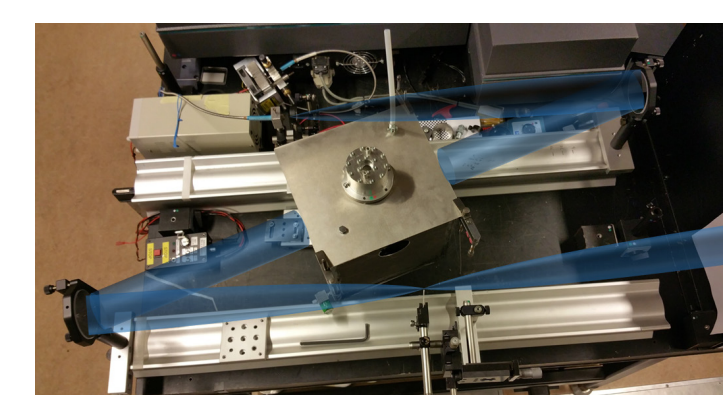
Multi-fuel CFD test (MAN CPH)



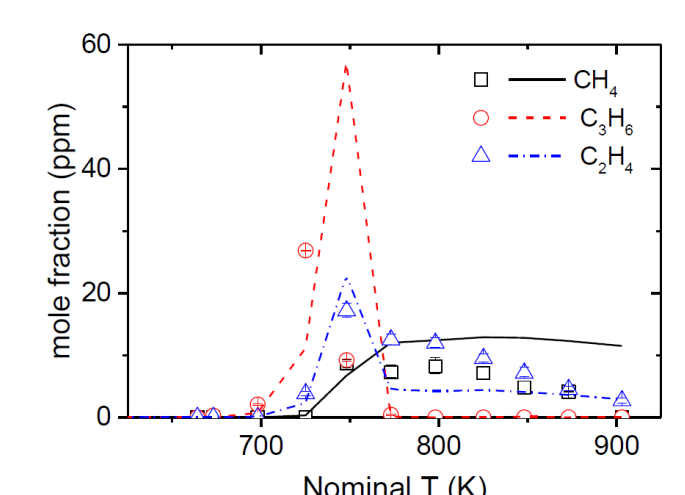
Optical engine access (MAN AUG + TUM-LVK)



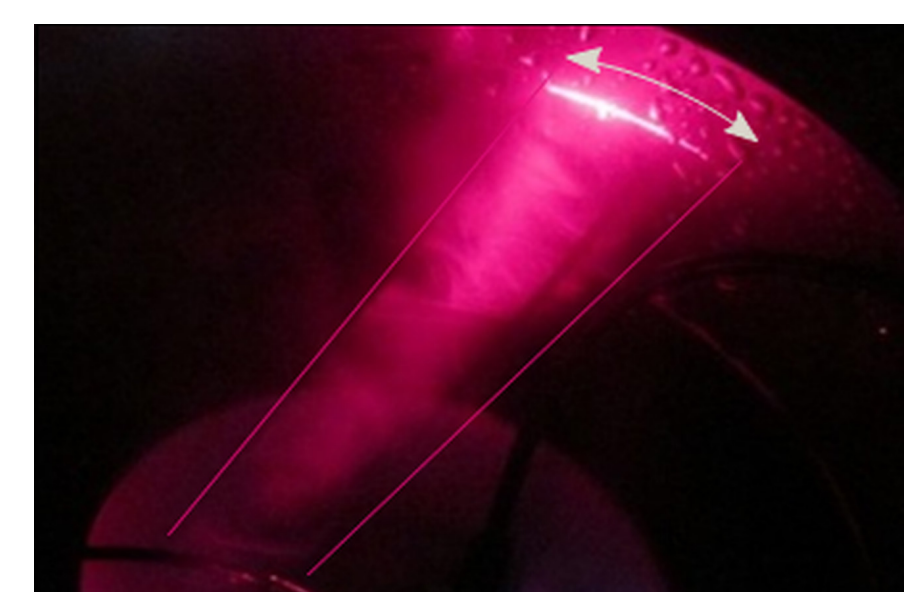
Multi-camera flame imaging (MAN CPH + Lund)



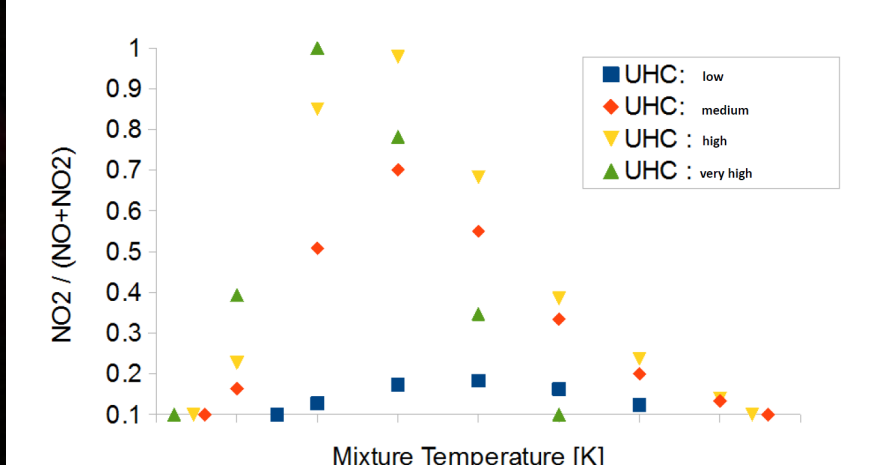
High-speed Schlieren (Lund)



Propane oxidation (DTU)



Tracer investigations (TUM-LVK)



Conversion of NO to NO₂ (TUM-TD)

WP PARTICIPANTS

MAN Diesel & Turbo: Copenhagen (two-stroke), Augsburg (four-stroke) • Technical University of Denmark: Department of Chemical Engineering (Prof. Glarborg) • Lund University: Division of Combustion Physics (Dr. Mattias Richter) • Technical University of Munich: IC Engines (Prof. Wachtmeister), Thermodynamik (Prof. Sattelmayer)

