Capacity Area A2 Topic 2 Milestone 1

Establishment and demonstration of operation of new optical engine facility

The advancement of innovative combustion types for IC engines (e.g. dual-fuel) is an attractive solution for both the compliance with future emissions standards and optimized efficiency. In order to optimize such modern combustion processes a better understanding of fundamental in-cylinder phenomena at engine relevant conditions is required. Therefore a unique "optical engine" facility "Flex-OeCos" has been developed – the designation indicating its Flexibility regarding Optical engine Combustion diagnostics and/or development of corresponding Sensing devices.

The new optical accessible experimental test facility shown in Figure 1 has been assembled, commissioned and initial operation could be demonstrated. In addition, first application tests of different types of sensors (e.g. pressure, heat flux) were performed by means of an insert equipped with specific devices replacing one of the front windows. Currently, last design adaptions including control adjustment, further commissioning of measurement techniques and testing the operation parameters limits (pressure, temperature) are ongoing.

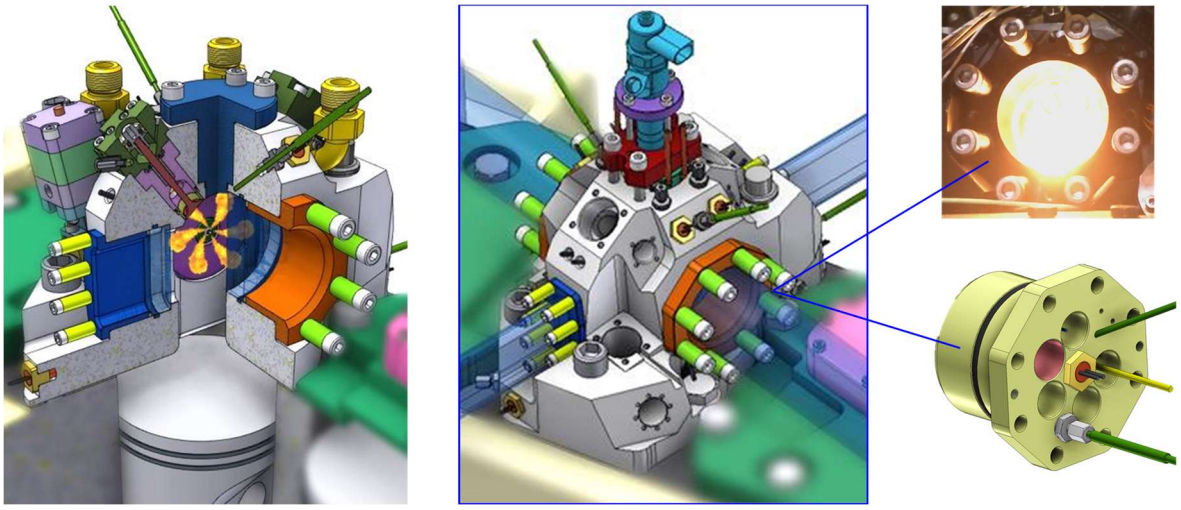

Figure 1. New optical accessible research facility "Flex-OeCoS" for the investigation of modern combustion processes (e.g. dual-fuel) and application, testing and development of sensing devices by an insert replacing one window (lower right).

The new "Flex-OeCos" is now available for use within various research projects. Major topics of investigation are relevant processes for premixed, dual-fuel, and compression ignited combustion systems such as flow and turbulence, mixture formation, ignition and flame propagation. Another essential aspect is the investigation of specific (wall) heat transfer in high temporal and spatial resolution, in combination with the acquisition of operation conditions, preferably with precise in-cylinder pressure measurements. Furthermore, simultaneous acquisition of flow and ignition/combustion with advanced optical and laser-based techniques are intended.