Objectives

• Develop <u>methods, systems and processes</u> allowing a continuous <u>optimized</u> <u>performance</u> of the power plant <u>throughout</u> <u>its lifetime</u>

How

• Optimized control methods
• Adaptive lubrication system

WP Leader: Jonatan Rösgren
WP Deputy: Matthias Stark

Partners:

Expected Results

• Technology demonstrators at TRL 6
• Max 5% divergence of any performance parameter from "as-new" state
• Advanved lubrication control system
• Optimized lube oil feed rates
• 10% lube oil consumption reduction
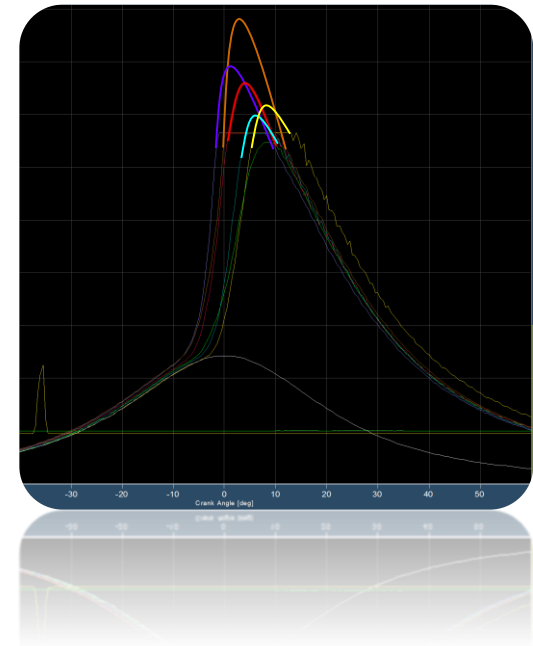
Structure: Subprojects, Activities

- 5.1 Engine control optimization

- 5.2 Offline engine control parametrization tool

- 5.3 Development and simulation of a fully flexible lube oil injection system

- 5.4 Development of an advanced real time tribosystem performance monitoring system

Structure: Subprojects, Activities: 5.1, 5.2

Sub-project 5.1: Engine control optimization
- Optimized control study, algorithm development, simulation, testing

Sub-project 5.2: Offline engine control parametrization tool
- Parametrization study, concept, prototype tool development, prototyping, testing

Progress (5.1, 5.2)

- 5.1 Engine control optimization
  - Rapid prototyping platform under development
  - Different control strategies and different adaptive controllers under evaluation (indirect and direct adaptive control, fixed parameters control)
  - Knock margin control methods under development and testing

- 5.2 Offline engine control parametrization tool
  - Engine parametrization conceptualization and modelling
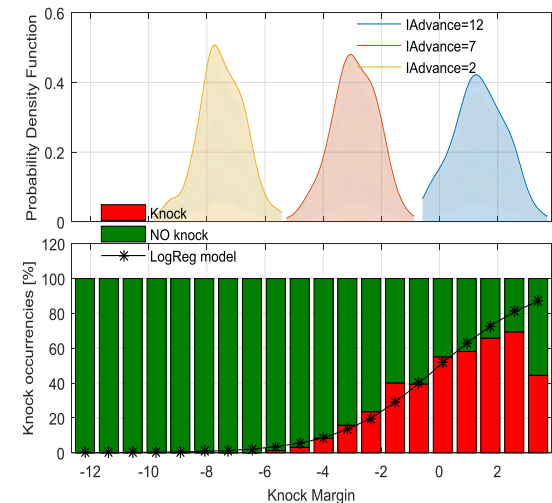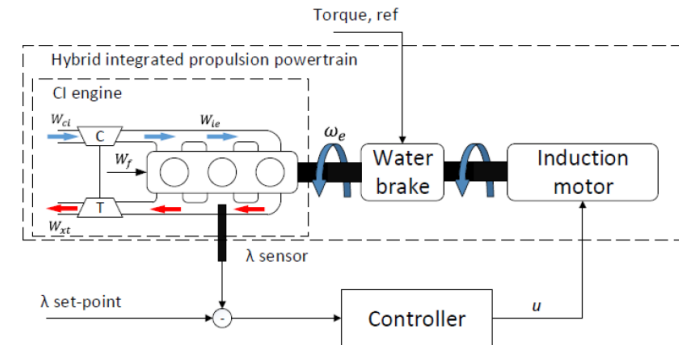
Structure: Subprojects, Activities
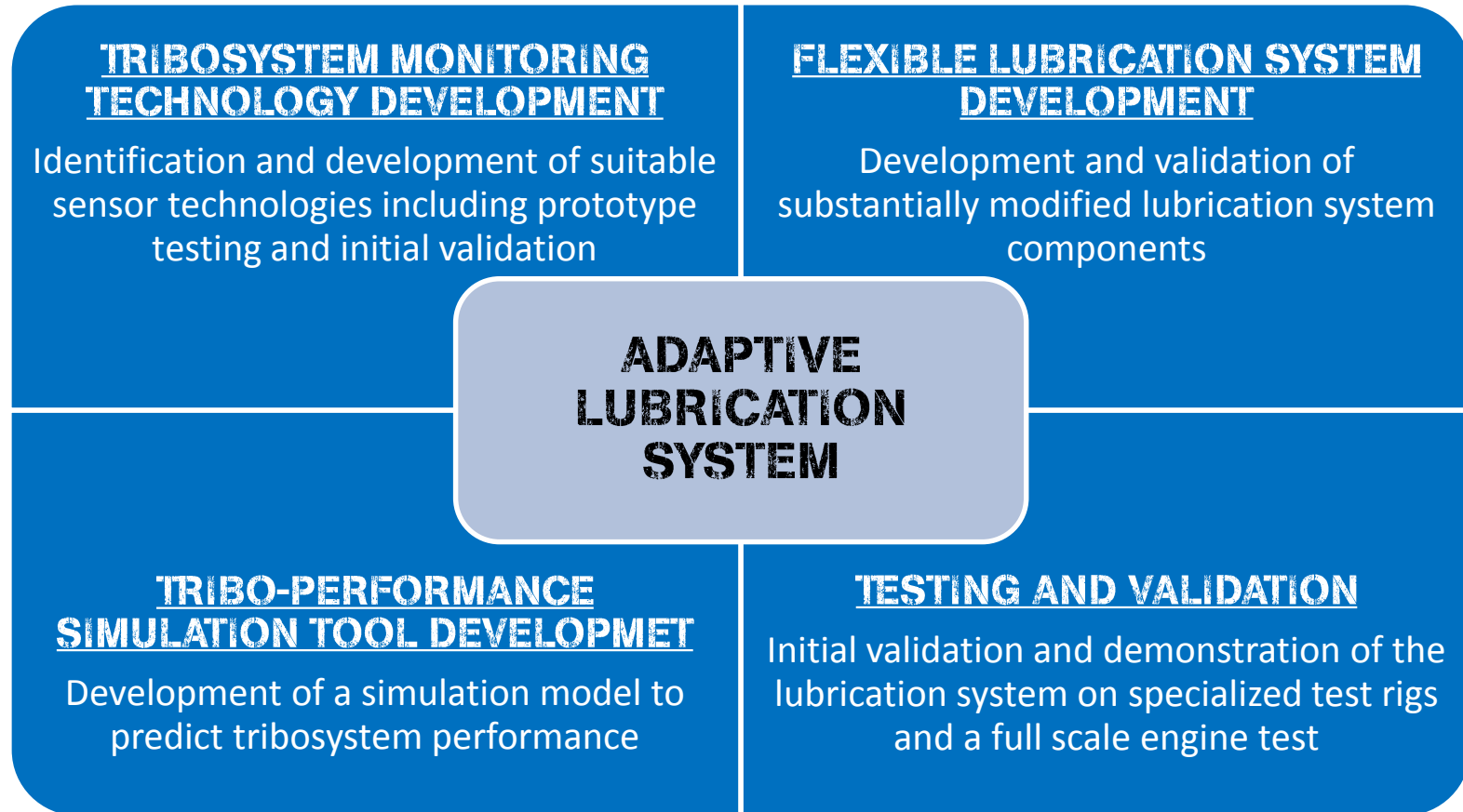
DWP Leader: Matthias Stark

> Sub-project 5.3:
> Development and simulation of a fully flexible lubrication system

> Sub-project 5.4:
> Development of an advanced real time tribosystem performance monitoring system

Objectives / Expected Results

TRIBOSYSTEM MONITORING TECHNOLOGY DEVELOPMENT

Identification and development of suitable sensor technologies including prototype testing and initial validation

FLEXIBLE LUBRICATION SYSTEM DEVELOPMENT

Development and validation of substantially modified lubrication system components

ADAPTIVE LUBRICATION SYSTEM

TRIBO-PERFORMANCE SIMULATION TOOL DEVELOPMET

Development of a simulation model to predict tribosystem performance

TESTING AND VALIDATION

Initial validation and demonstration of the lubrication system on specialized test rigs and a full scale engine test

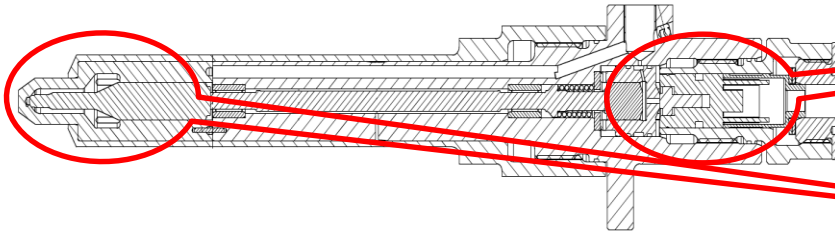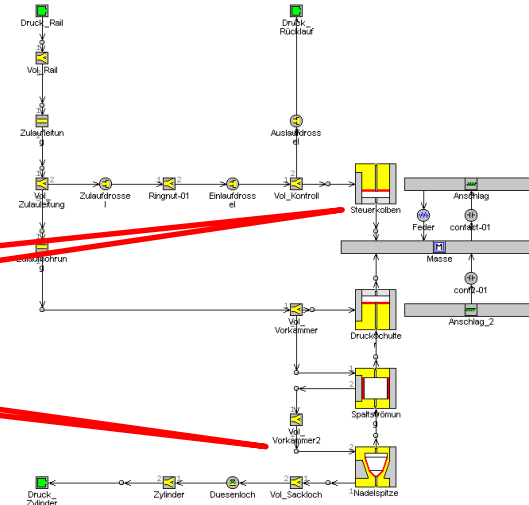Partners: WIN GD Winterthur Gas & Diesel   UNIVERSITÀ DEL SALENTO   The University Of Sheffield.

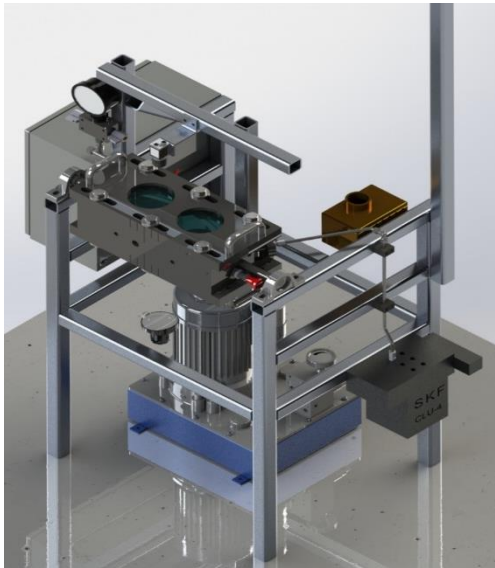## Sub-project 5.3: Development and simulation of a fully flexible lubrication system

Pre-Design of the new lube oil injector

Hydraulic simulation optimization

Lube oil injector design optimizations on basis of a 1D hydraulilc simulation
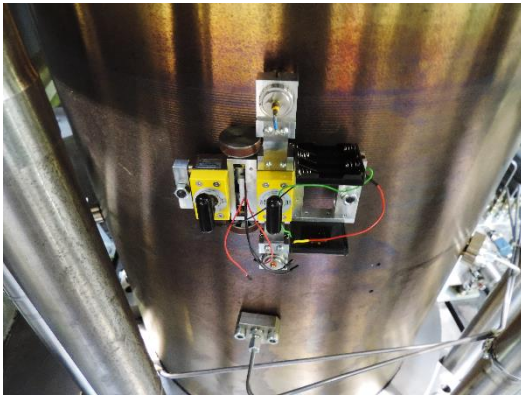
Sub-project 5.3: Development and validation of a fully flexible lubrication system
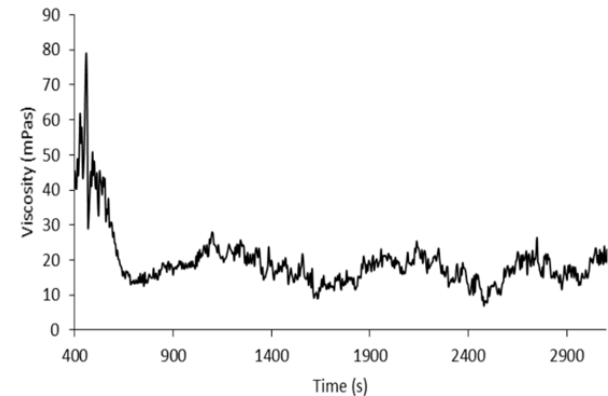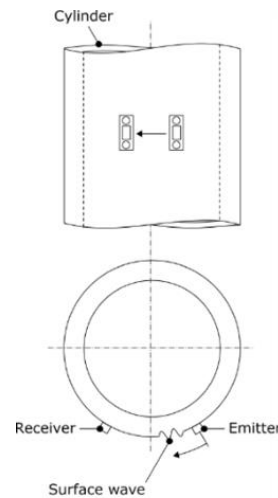

Initial testing on lube oil injection spray pattern

Experimental setup of a test cell to investigate on lubrication system performance

Sub-project 5.4: Development of an advanced real time tribosystem performance monitoring system

Sensor application

Ultrasonic viscosity measurements

In-situ ultrasonic viscometry and cylinder wear measurement