New Combustion Technology, NCT

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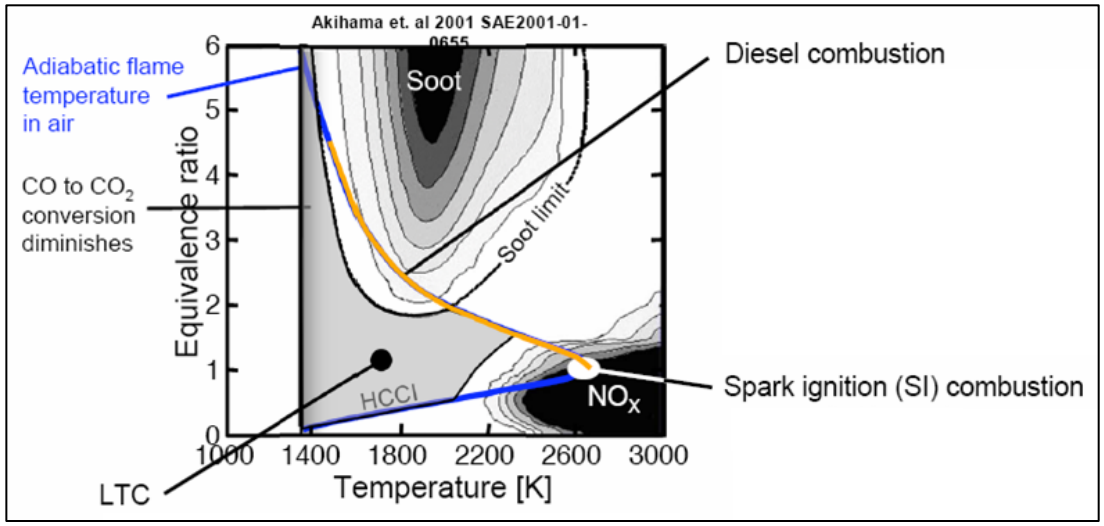
New Combustion Technology, NCT

- Extremely low emissions with new combustion technology



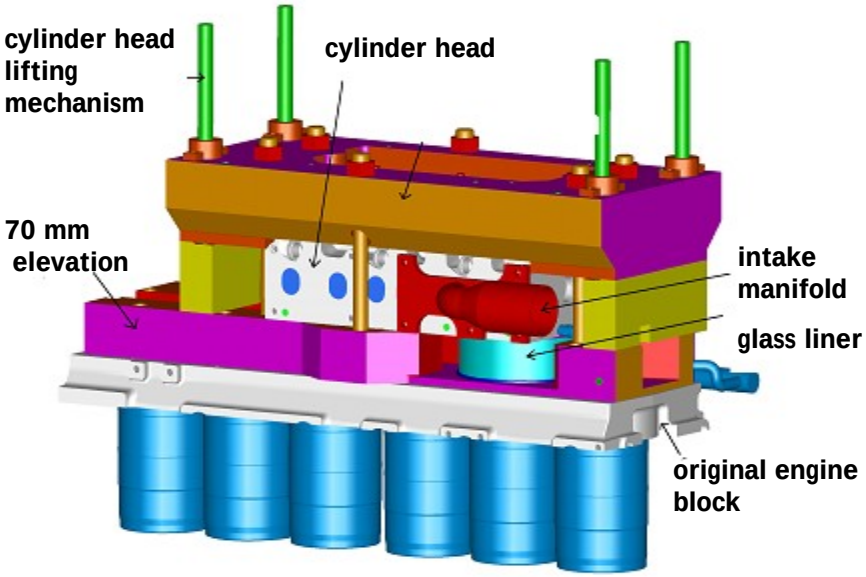
New Combustion Technology, NCT

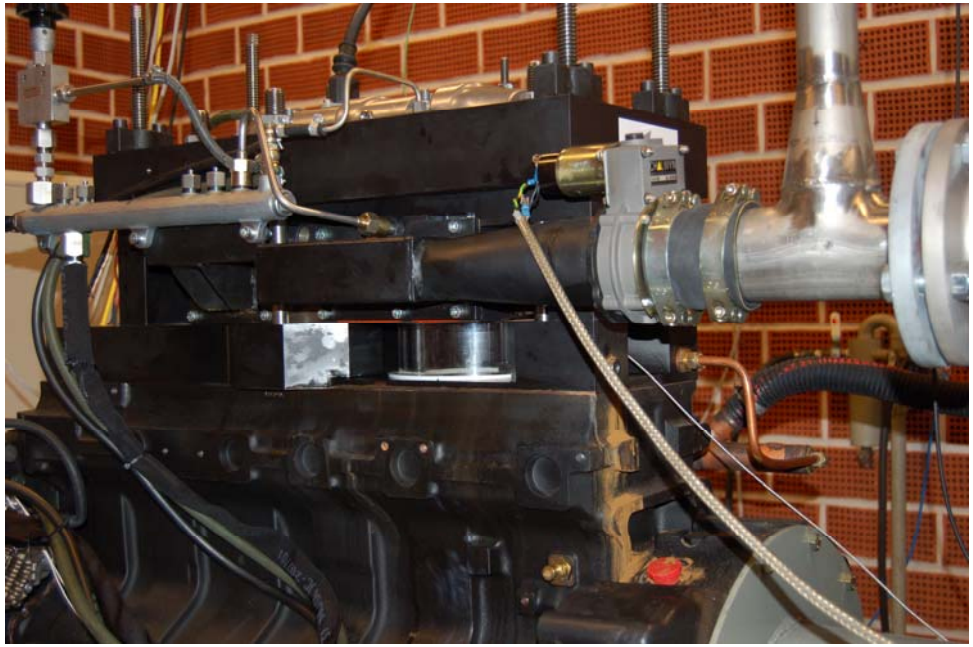
- In the first stage, research with the existing optical engine, later fully optical version (optical piston)
- Fast engine cycle control
- Optical diagnostics and CFD (RANS, LES, 1-D)
- International Networking
  - USA, Sweden
  - IEA
- Internal Networking
  - 3 laboratories from TKK
- Researcher exchange
  - USA, Sweden
- 2 + 2 years, 800+ k€
- Decision if approved December 2008

Optical Research Engine

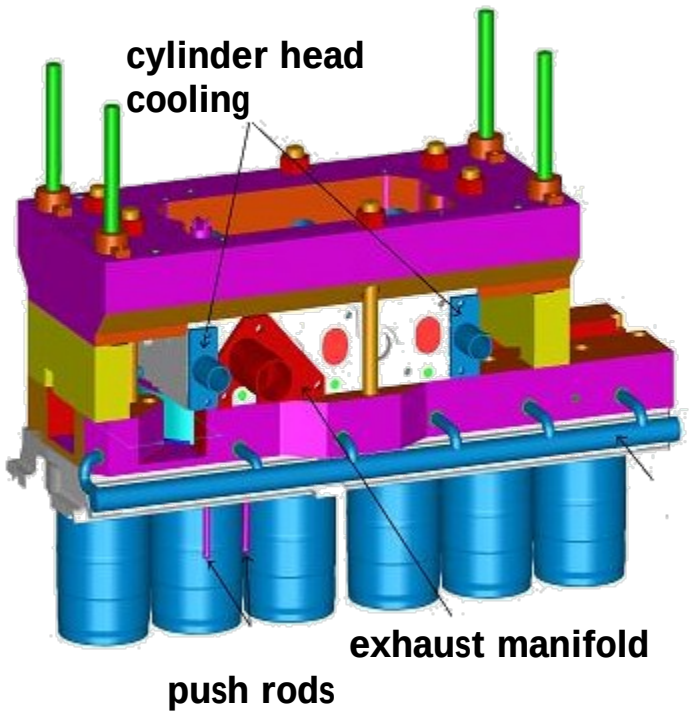
- Bore 111mm, stroke 145mm
- Rotational Speed 1000 - 1400 rpm
- Compression ratio 14
- Charge pressure 0 - 3bars
- Charge air temperature 30 – 90C
- Adjustable EGR (nitrogen)
- Common rail injection
- Adjustable exhaust backpressure
- water cooling circuit with possibility of heating or cooling

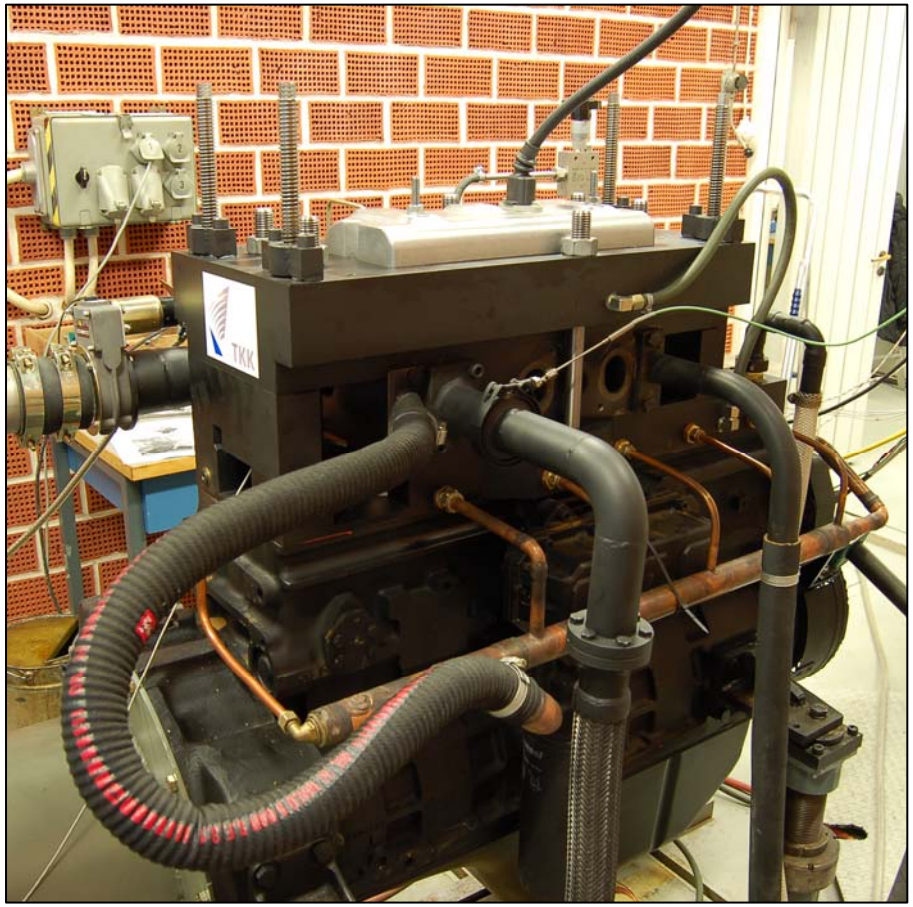
Optical Research Engine - cylinder head configuration





Optical Research Engine - cylinder head configuration

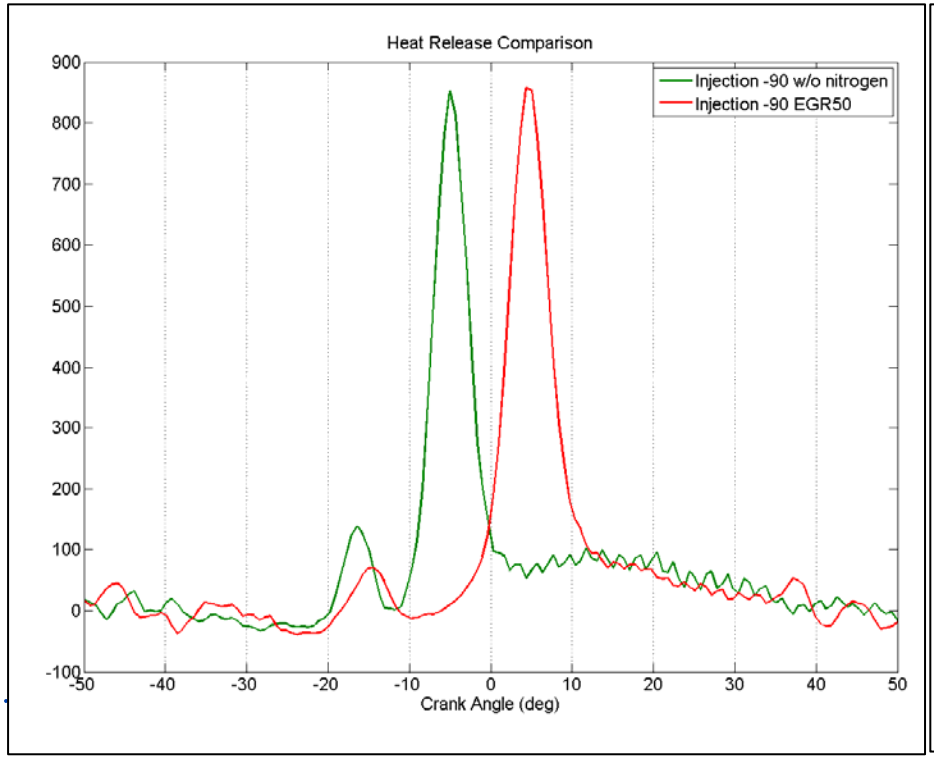


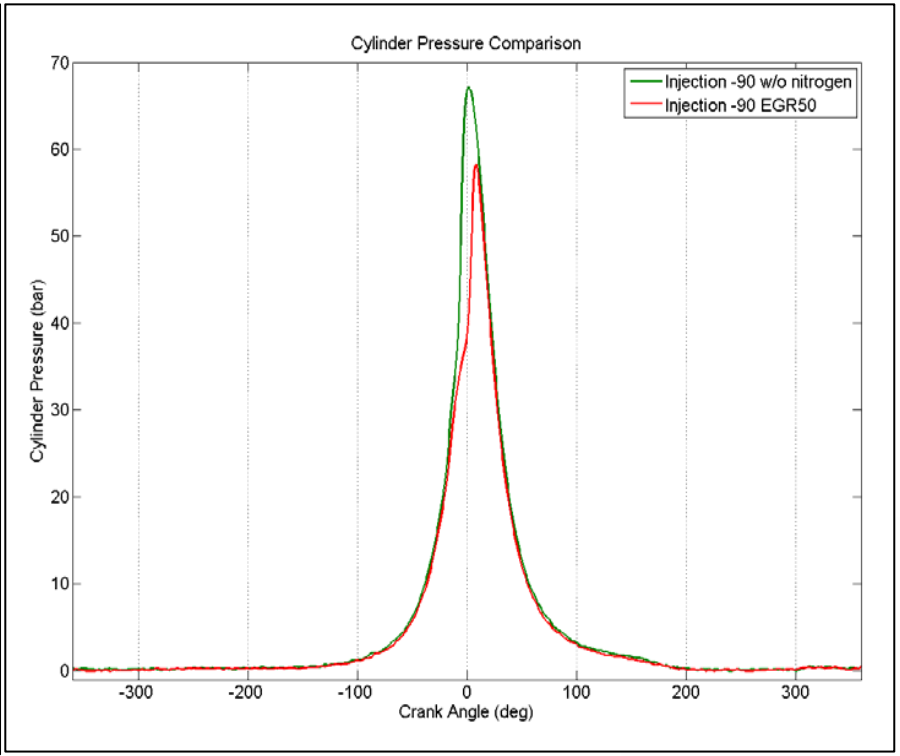


HCCI Operation

First HCCI measurements

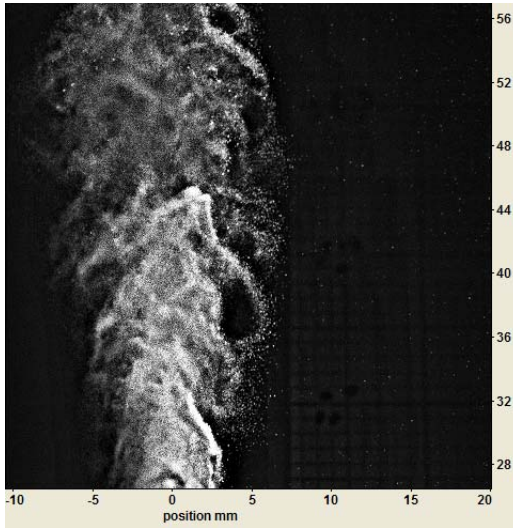
- SOI -90 CAD
- EGR 0 ja 50 %

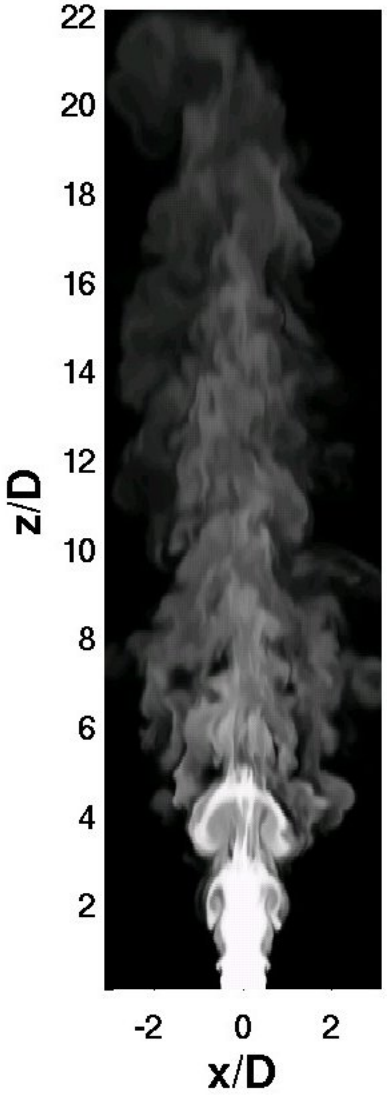




New Combustion Technology, NCT

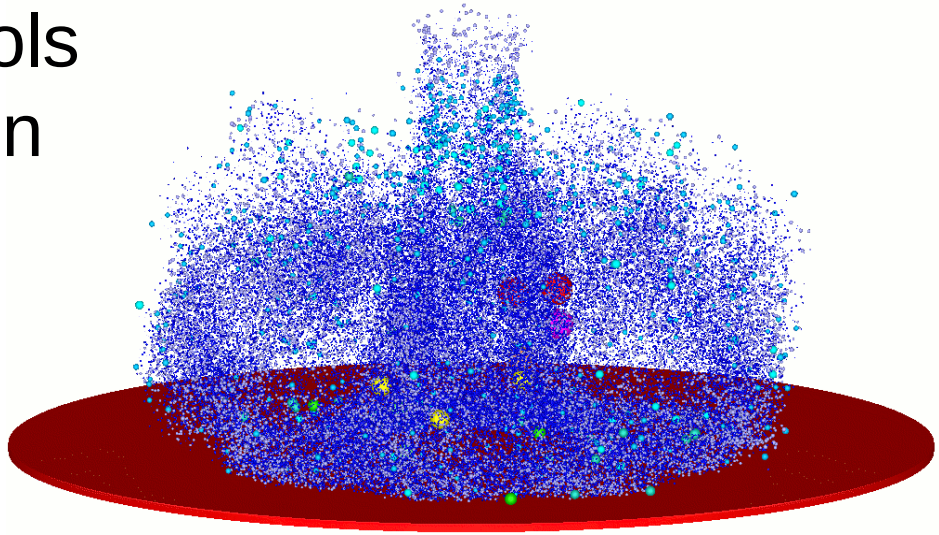
- Fuel effects in advanced combustion concept
  - Low and high Cetane number fuels
  - Hydrotreated bioderived fuels
- Mixing of fuel spray and air
  - the role of fuel spray contact with piston top
- EGR

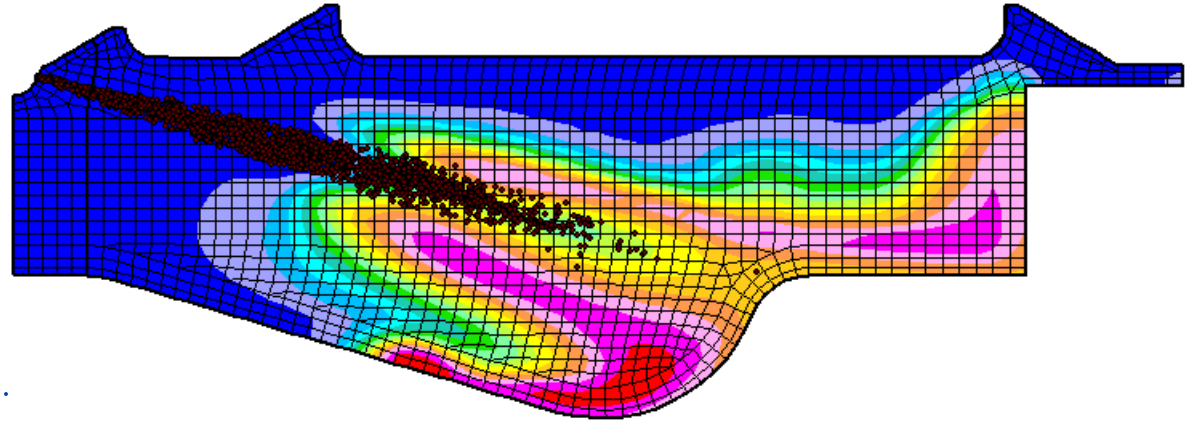




Computational Research

- LES, RANS, and 1-D tools for spray and combustion analysis

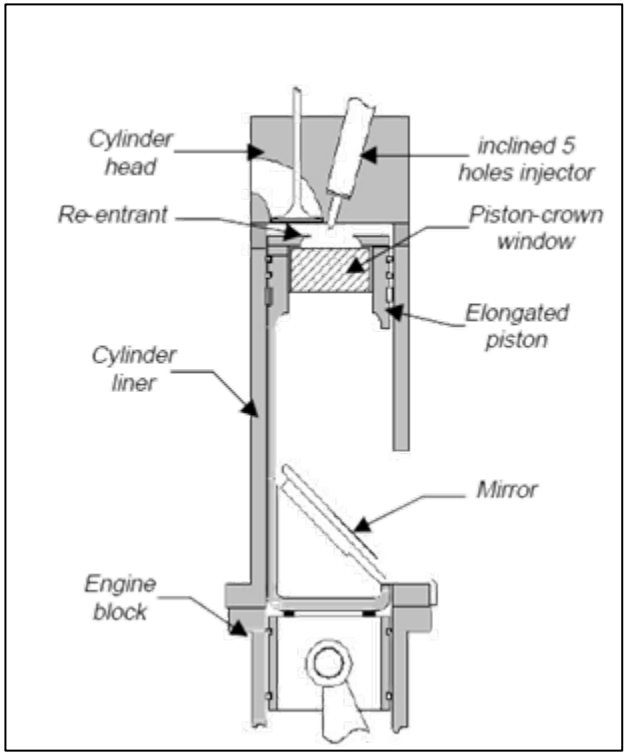




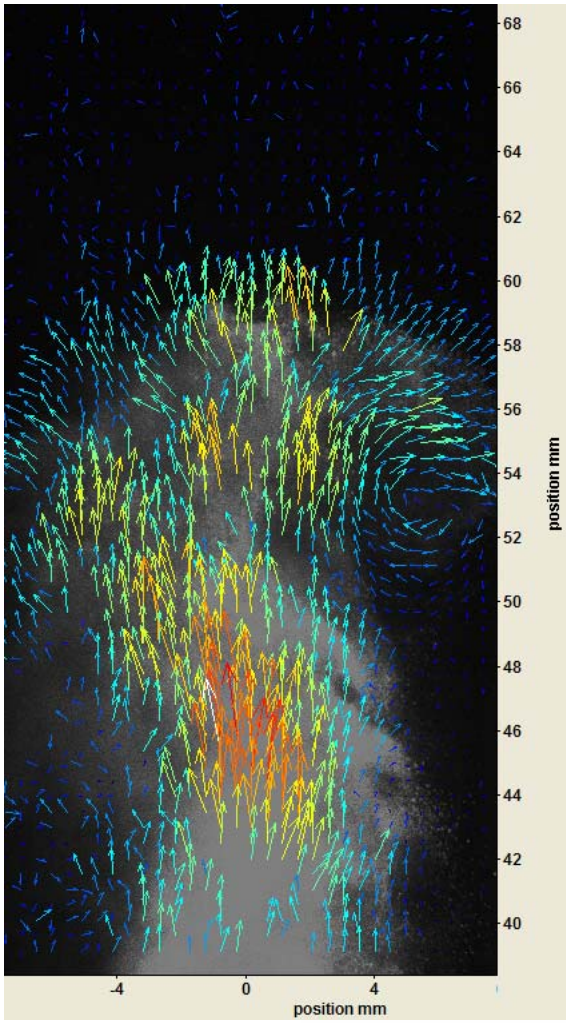
TKK

Optical Diagnostics

- Fully optical research engine under development



Instantaneous velocity field inside a fuel spray, measured at TKK



In Conclusion

- Research on new combustion techniques (HCCI, LTC)
- First research with the existing optical engine, later fully optical version (optical piston)
- Fast engine cycle control
- Optical diagnostics
- CFD (RANS, LES, 1-D)
- Fuel effects
- International Networking
- Internal Networking
- Researcher exchange