
Background
The combustion engine group at Lund University is one of the largest research groups in Academia with funding from all the Swedish industries as well as international like for instance Toyota, Caterpillar, Cummins and Chevron. The work is focused on the combustion processes with the aim of reducing local emissions (NOx, HC, CO and PM) as improve fuel efficiency. Special interest is renewable fuels, which can enable a sustainable transport system in the longer time perspective.

Humid Air Motor (HAM) is a technology originally invented in Lund university, this idea was applied and tested in a marine engine. HAM gave positive results when it comes to emissions, and only little is known about the efficiency. In an attempt to recover otherwise wasted heat in a heavy duty truck diesel engine, afore mentioned HAM concept could be beneficial. Before studying HAM engine to understand the potential of water-air mixture in the engine and the resulting combustion behavior is interesting.

Task
The task of this master thesis is to investigate the effect of water injection in a HD Volvo truck diesel engine. The hypothesis is water injection can increase the mixing timing and therefore combustion could be oriented towards premixed combustion. The additional mass flow in the turbine could produce more boost. Along with more boost and reduced inlet temperature the volumetric efficiency could be increased and the engine could produce more power for the same displacement. The initial task is to construct the port injector platform (modifying the existing). Secondly the engine would be tested with various water-fuel ratios sweeping the Start of Injection for MBT timing and injection pressure. The engine would be tested in EGR/non-EGR operation. The control parameters at hand are injection pressure, amount of EGR.

Where
The work will be conducted at the Combustion Engine laboratory at Lund University. The results will be utilized at the Competence Centre Combustion Processes and reported to the 12+ members of this consortium. Ph.D. student Prakash Narayanan will be assigned as your daily supervisor and the project will be supervised by Docent Martin Tuner.

Timeframe
The M.Sc. project can start between February 17 and May 15 2014. The first 3-6 weeks will be spent on a literature study and preparation of the experimental work. Then an experimental campaign will be conducted trying to answer the research questions generated by the end of the literature study. A final period of 6 weeks is devoted to summing up and writing the M.Sc. report. A total duration of 6 months is expected for the work.

Qualifications
A suitable background is mechanical engineering. A focus towards Automotive Engineering or Energy Engineering can be favorable. Students from Engineering Physics, Chemical Engineering, Electronics Engineering and other Mechanical Engineering students who are currently studying or have previously done M.Sc. (as well as Ph.D.) within the Combustion Engine group.

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