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BACHELOR / DIPLOMA / MASTER PROJECTS

Combustion Engine Projects



The IC Engine Group (ICEG) study Internal Combustion Engines. The group has its own website: www.iceg.mek.dtu.dk.

This leaflet describes the general areas of project activities where students at DTU can be supervised by ICEG. Specific project can be arranged within these areas.

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Combustion Engines

Basic Theory

-
Thermodynamics and
Mechanics

New Powertrain Concepts

Alternative
Fuels

Ecocar

Emissions

Project proposals (experimental and theoretical):

The basic thermodynamic and mechanical principles are together with combustion chemistry the basic engineering disciplines enabling the fundamental understanding of engine design and performance

Presently projects are offered within the following areas:

-Large 2-stroke diesel engines:

- *heat release*
- *heat transfer*
- *scavenging process*
- *spray formation*
- *emission formation*
- *corrosion and mechanical wear*

- Combustion principles

- *HCCI, PCCI etc.*
- *Alternative Fuels*
- *Mixed Fuels*

Studies on alternative fuels for combustion engines are essential for the future energy supply. At present, many of the projects in ICEG deal with application of DME and ethanol. We are also involved with studies on application of Fischer Tropsch fuels. DME and Fischer Tropsch are synthetic fuels and can be made from various raw materials like natural gas, coal and biomass. DME combustion is very "clean", and we were the first in the world to apply this fuel in an experimental engine.

Presently projects are offered within the following topics:

- *Bio-DME for Euro 6*
- *DME application in a new engine concept (HCCI)*
- *DME injection systems (DME's lubrication propertie)*
- *Ethanol as an IC engine fuel*
- *Ammonia/hydrogen in IC engines*

The students at MEK design and build small vehicles based on various engines and fuels (powertrain concepts). At present, we work on a vehicle using ethanol fuel, and a vehicle based on fuel cells combined with an electric engine. The underlying idea of the vehicles is to make them as energy efficient as possible. "The Shell Eco Marathon Challenge" in 2009 holds the record for the IC engine category – our DME car did 589 km/l of gasoline equivalent !!

Presently projects are offered within the following topics:

- *Development of the ethanol engine*
- *New powertrain concepts*
- *Kinetic Energy Recovery System*
- *Energy losses in small combustion engines*
- *Demand sizing the IC engine for vehicle application*

Engine emissions are one of the main factors in the design of the future engines. Many years' research has led to outstanding results, and we have excellent laboratory facilities for student projects. We have equipment for measuring gaseous emissions from both engines and vehicles. ICEG also has a chemical laboratory for analyzing more specific emissions.

Presently, projects are offered within the following topics:

- *Modelling of NOx- and particle emissions from large 2-stroke diesel engines*
- *Measurement of NOx- and particulate emissions from diesel engines*
- *Combustion of particles in diesel particle filters*
- *Particulate emissions from mopeds applying ethanol in the gasoline*