

# Volvo Group Trucks Technology

## Powertrain Engineering

**Thesis: H2 Gas Compressor Modeling for H2 HPDI Engines**

**Position description:**

### Background

Heavy duty road transport is in a transition phase towards CO<sub>2</sub> neutrality. One promising carbon free energy carrier is hydrogen and an internal combustion engine is one technique for converting the chemical energy in hydrogen to mechanical work.

### About us

Volvo Group Trucks Technology provides Volvo Group Trucks and Business Area's with state-of-the-art research, cutting-edge engineering, product planning and purchasing services, as well as aftermarket product support. The Powertrain Engineering Sweden organization has the full worldwide product platform responsibility for heavy duty engines and transmissions with a large organization of 750 colleagues in Gothenburg and Malmö.

### Content

Your study should answer some or all of the following questions, depending on the complexity of the tasks:

- How much work will it take to compress gaseous H<sub>2</sub> up to the required HPDI injection pressures? What is the optimum injection pressure in terms of compression work versus thermodynamic efficiency?
- What are the effects of the minimum allowed fuel tank level / pressure, driving cycle, compressor type?
- How much compression work can be recovered in the form of piston work and/or fuel tank pressure?
- How does the performance of the entire powertrain system get affected by the choice of the compressor and its operating conditions?

Initially a literature study should be conducted in order to gain information and experience from previous work. Then, the H<sub>2</sub> engine and fuel compressor data should be investigated to decide on the modelling strategy. Finally, a model in GT-Power / Matlab / Python (or equivalent) should be implemented to answer the above questions.

### Suitable Background

Candidates should be in their final year of Master studies and preferably in the faculties of Mechanics, Applied Physics or computer science. An interest in aerodynamics and vehicles combined with good analytical skills and excellent understanding of physics is a good background. Basic knowledge of internal combustion engines is a plus. Relevant courses include but are not limited to: Combustion physics, Programming, Thermodynamics, Numerical analysis, Computational fluid dynamics.

### For any further details please contact

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**Thesis level:** Master

**Language:** English

**Starting date:** September 2022

**Number of students:** 1

**City/Town** Göteborg

**Last application date** August 1, 2022

File your application on [www.volvo.se](http://www.volvo.se)