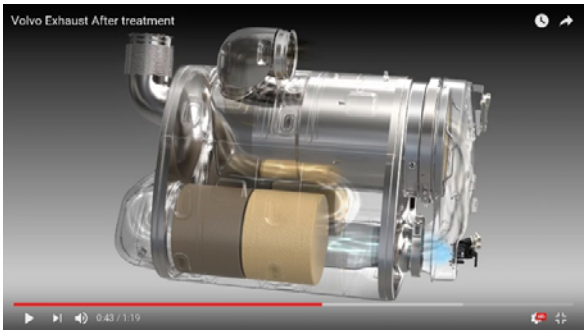
Detailed modelling (CFD) of Exhaust AfterTreatment Systems (EATS)

Local emissions from internal combustion engines (ICE) are removed to a high extent in modern vehicles. Legislation limits are very stringent and will continue to me more demanding for the vehicle manufacturers in the future. Ultimately, to become an alternative to pure electric propulsion, ICE needs to reach zero emissions (not above background levels). Modern Exhaust Aftertreatment Systems (EATS) are very efficient with close to 99% reduction of e.g. NO_X. However, the requirements on packing puts geometrical constraints on the design of the complete EATS (often functioning as a muffler), which can impact the performance. In order to reach the very high reduction, a system engineering approach is needed including the detailed understanding of flow patterns and temperature distributions inside the EATS. By understanding the flow and temperature distribution inside the EATS, improved modelling is enabled. Finally, by having access to valid, detailed models, powertrains that have zero emissions becomes possible.



This project aims at simulating the flow and temperatures inside a specially designed muffler (containing the catalyst) using CFD and to evaluate the temporal and special distributions of velocities and temperatures during transient operation. You will use Ansys Fluent and different modelling approaches will be tested and evaluated.

About you:
The project will be performed at Mechanics and Maritime Sciences, division of Combustion and Propulsion Systems, Chalmers in collaboration with several industrial partners connected to CERC (Combustion Engine Research Centre). The project is suitable for 1-2 students with the ability to work independently and creatively. Suitable Background is a Master's program in Chemistry, Physics or Mechanics and knowledge in mathematical modelling. A strong interest of contributing to improved environment and human health is of course necessary.

Project start: January 2018

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