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Santiago Hernandez M.	Project/Proposal	
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Master's Thesis Project

Proposal within the Aerodynamic department to carry out a master's thesis project concerning the methodologies and processes of Koenigsegg CFD in-house capabilities. Koenigsegg is committed to hiring and developing top talent from across the world for any given discipline. Our world-class team operates with a non-conventional, 'Lean Development' philosophy of high inter-disciplinary collaboration, flat organizational structure, and technical contribution at all levels. You will be expected to challenge and to be challenged, to create, and to innovate.

Koenigsegg is synonymous of excellence and state of the art engineering, we are proud of our attention to detail that is why we are looking for a master's student with a solid technical background in CFD and Aerodynamics, academic excellence, and self-learning skills. The student shall develop tools and propose methodologies, contributing directly to the development of the Aerodynamics Department:

• Study of tyre aerodynamics and latest state of the art CFD methodologies in the automotive industry

Tyre effect on cars is of extreme importance. The wheel assembly directly and indirectly contributes to more than 25% of drag on a passenger car. A most accurate simulation of tyre and its contribution to a high-performance car, such as a Koenigsegg model is needed to estimate correctly in CFD the aerodynamic behaviour.

The project consists in reviewing the state-of-the-art methodologies in tyre modelling and bringing all the available knowledge into our CFD workflow. In the first part of the project the student should do an exhaustive bibliographical review on the different approaches in tyre physics models for CFD. Depending on the length of the project the student should experiment with different parameters and bring all together in a sole modelling approach. There will be the possibility to correlate numerical results with wind tunnel results or with a high-fidelity model like LES or DES. The following is a list of the different parameters that the student could undertake:

➢ <u>Boundary conditions at the contact patch:</u> This is the most sensitive region of the tyre and where some of the main structures which can directly affect the evolution of the tyre wake. Defining and testing different B.C. will be critical.

➢ <u>The rotating Nature of the tyre:</u> Modelling the rotation of the tyre can be tackle with different approaches, the student should test with the available models and decided which one is the most cost effective, considering the computational cost and the accuracy of the model. Examples could be using MRF, GRF or sliding meshes.

➢ <u>Grooves and Tyre deformation:</u> The level of detailed in the geometry and how this type of features can be replicated in our model can also be explored. The student should investigate and replicate proper B.C for grooves and look for tyre deformation effects.

➢ <u>Roughness and turbulence modelling:</u> Tyres are inherently sensitive to inconsistent separation and reattachment, with poor repeatability. Roughness and turbulence B.C could help in the repeatability of this characteristic.

The student should be preferably studying a master's degree in Automotive/Aerospace Engineering. A strong background in Fluid Dynamics and CFD is necessary. It is advantageous if the candidate has been exposed to OpenFOAM. The student also will be required to develop tools using Python and C++.

Execution:

The project can be run as a 30hp or a 60hp thesis, the scope will change accordingly. The company cannot offer any compensation.

The student has the option between carrying out the thesis remotely (candidate is expected to travel a few times to the company) or to come to our headquarters in Ängelholm.

Contact:

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