

## Kandidatarbete vid Institutionen för Mekanik och Maritima Vetenskaper

**Titel \***

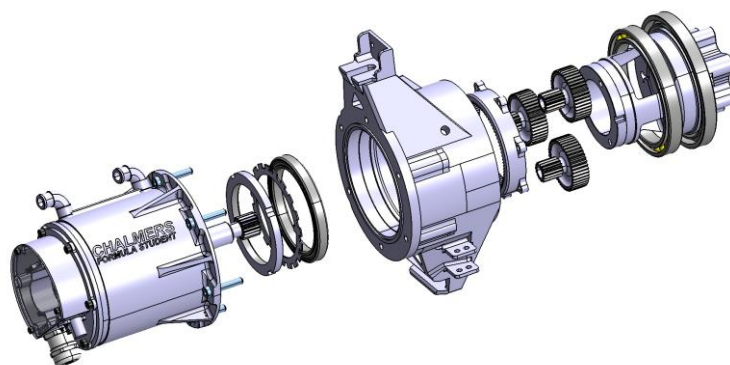
**Design of weight-optimized gearbox for a Formula Student car**

**Beskrivning** (bakgrund och problembeskrivning i "image and text block")

Formula Student (FS) is an educational project format in which university students design, build, and compete with a small formula style race car, see the picture below. Formula Student has been present at Chalmers since 2002 under the name Chalmers Formula Student (CFS), and since 2015 CFS build electric cars. For the competition season 2019 CFS built its first 4wd car and the 4wd concept will remain for the academic year 20/21.



Lightweight designs are of great importance when building a high-performance competition car. This is especially true for components in the wheel assemblies since unsprung mass has a large effect on vehicle dynamics and the road holding capability of the tires. The current generation of CFS cars with 4wd has one electric motor mounted at each wheel. The torque from each motor is transferred to the corresponding wheel via a 1.5 stage planetary gearbox. This design is great for packaging and reducing the overall weight of the car, but it makes for a rather high unsprung mass at each wheel.



The purpose of this BSc thesis project is therefore to develop a new and lighter gearbox solution for future CFS cars with hub mounted motors. In the project the motor and the rim interfaces will be specified, but the project will have full freedom to design the lightest possible gearbox solution between those interfaces. Additional requirements regarding e.g. reduction ratio and expected mileage will also be provided. Some details regarding the project may change during the autumn.

The design for the different concepts will be drawn in CAD (Catia V5 or UG NX) and will be evaluated using Finite Element Method (ANSYS), the multi body simulation software ADAMS and KISSsoft, a dedicated program for the analysis and dimensioning of gears.

<b>Målgrupp</b>
M & F-elever
<b>Gruppstorlek</b>
3-4 studenter
<b>Litteraturförslag</b>
<b>Speciella förkunskapskrav</b>
Nej, men en kurs i maskinelement är önskvärt.
<b>Handledare</b>
Björn Pålsson
<b>Examinator</b>
Håkan Johansson
<b>Kan projektet dubbleras? JA / NEJ</b>
NEJ
<b>Övrigt</b>
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