

# Analytical Methods in Vehicle Dynamics

Master Thesis Project: Subjective and Objective Evaluations of Car Handling



Source:

Johan Helssing, CEVT PTE, *A national laboratory for electromobility*, [Electromobility – Back to the future](#), Chalmers Sept 13, 2018.

## ***Project group***

Peter Folkow, Associate Professor, Division of Dynamics

Mathias Lidberg, Associate Professor, Division of Vehicle Engineering and Autonomous Systems

## ***Steering group***

TBD

## ***Background***

Modern road vehicle development is highly supported by computer aided engineering. Modeling and simulation of chassis and vehicle subsystems are used intensively in various stages of development all the way from vehicle concepts to production ready designs. High fidelity modelling and simulation also known as virtual prototyping of vehicles enables objective evaluation of chassis properties and reduces development cost and time. Subjective evaluation is still required to verify that the chassis performance meets the requirement targets. The relationship between the objective and the subjective evaluation is a core competence of each car manufacturer and regarded as a very important part of the development process.

## ***Objective***

The objective of this master thesis is to improve the development process by strengthening the connection between the objective evaluation performed in the conceptual design phase to the

simulation of virtual prototypes and also to the subjective evaluation performed based on vehicle testing.

## ***Methods***

Vehicle modeling and simulation  
Model based handling assessment procedure  
Vehicle testing equipment and procedures

## ***Deliverables***

- Literature review
- Chassis concept evaluation based on the understeer budget procedure
- Vehicle simulation model (intermediate level vehicle model in Matlab)
- Vehicle handling testing post processing procedures (Steady state cornering, Frequency response, Double lane change)
- Driver model for vehicle performance evaluation
- Subjective and objective evaluations procedures of car handling
- Evaluation of Chalmers experimental vehicle with and without chassis enhancement (TBD)

## ***References***

1. Tire and Vehicle Dynamics, Pacejka, H.B, 2012.