

Master thesis proposal

Low speed maneuvering assistance for long vehicle combinations

Background

The demand on high capacity transport (HCT) vehicles, also known as long combination vehicles (LCVs), is increasing due to its efficiency as well as economic and environmental benefits. However, the safety is the main concerns during both high- and low-speed maneuvers. At low speeds, the maneuverability is the most important issue both from the safety and performance points of view. Usually, the last axle is not able to follow the first axle. Performance measure of this maneuverability is called off-tracking, defined as the maximum lateral offset of the trajectory of the rear axle center to that of the front axle during a specified maneuver. Higher the off-tracking, poorer the maneuverability.

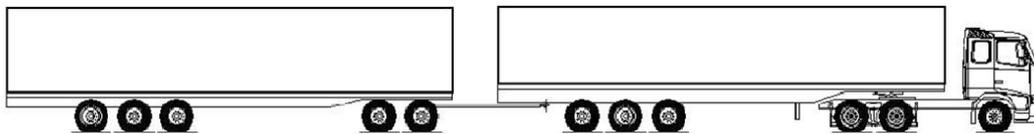


Figure 1: A-double vehicle combination (Tractor+trailer+dolly+trailer)

In this project, an A-double combination, shown in Figure 1, is used as the subject vehicle. Only the first axle of the converter dolly is made actively steerable so that existing tractor and semitrailers can be used without any modification. This configuration is expected to be industrially beneficial and lead to reduction in investment cost for the logistic company.

Project goals

The main goal of this thesis is to design a low speed steering-based controller in order to minimize off-tracking of the towed units while maneuvering and turning. The project work consists of the following parts:

- Literature review for low speed control and available solution
- Studying the kinematic/dynamic model of the combination vehicle
- Deriving single- or/and two-track vehicle models
- Synthesizing Lateral vehicle motion control with steering of the first axle of the dolly
- Building and simulating the system and the controller in Simulink
- Technical documentation of the project work

Number of students: 2

Desired qualifications: Knowledge in the modeling of mechatronics systems, vehicle dynamics and control theory, and experience with Matlab and Simulink

Contact: Please send in individual applications with CV and grade transcripts (undergraduate and graduate education) to: Maliheh Sadeghi Kati, maliheh.sadeghi.kati@chalmers.se

Supervisor: Maliheh Sadeghi Kati, maliheh.sadeghi.kati@chalmers.se;