Summary

This report describes the modelling of a straddle carrier in the multibody software application ADAMS. This study is the first of a project of the section transportation technology and Nelcon B.V. about modelling a carrier with ADAMS. The final goal of the project is developing a reference model in which in a simple way carriers can be computed according rollover stability. Finally the project must lead to a dynamic simulation model in which complex system properties as tire properties, slip-forces and displacements due to frame stiffness will be described. In this report of these properties, only the tire-properties have been implemented.

The goal of this study is the following: Build in the finite multibody application ADAMS a parametric model of a rigid straddle carrier. Describe and do some test-runs that result to indicative results concerning stability. Finally describe in which way the model has to be extended to analyse further complex properties and behaviour of the model.

After a model of the four-high stacking carrier was built some testruns are executed at three different container heights, bottom of container at 1 [m] above groundlevel (low), bottom of container at 2 [m] above groundlevel (ECT-height) and top of container at 12 [m] above ground level (high). In the runs is tested what are the maximum speeds before rollover, breaking out or tipping forward take place. The executed tests are: the NEN 2029 test, which is driving with different steering angles, breaking, driving with maximum steering angle, 90 degree turn, 180 degree turn and the s-curve.

Conclusions are that one can achieve good results with modelling in ADAMS, a constraining factor is the tire-model. It's difficult to use the part tire and the file is not easy. It isn't also easy to get good values to put into a tire-file.

Recommendations are that the model has to be extended with a spring-damper system, flexibility in the legs and torsion stiffness of the frame. Finally more realistic values must be put in the tire-file, and then the calculated values must be verified at a real straddle carrier.