

Path Following

From *Anthony Best Dynamics*

Application Sheet AN6006 – Path following in articulated vehicle



40 tonne articulated truck being driven around a circular path using the ABD path following system

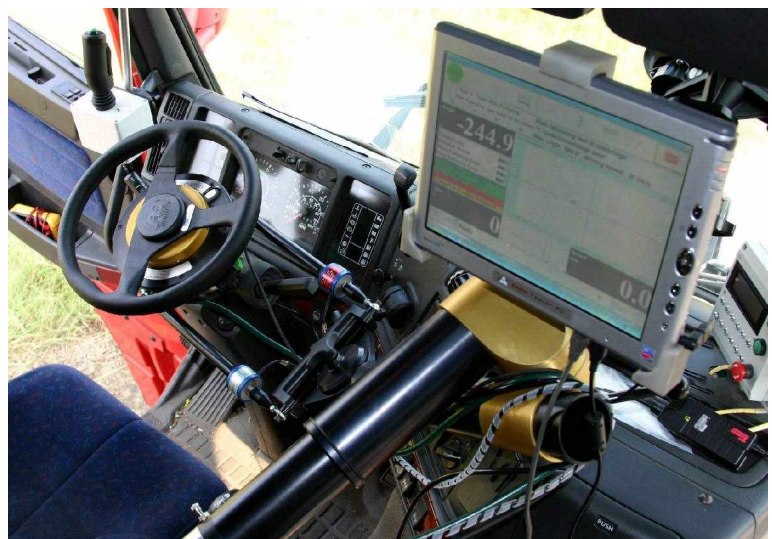
The path following system from Anthony Best Dynamics has been successfully used to steer a 40 tonne articulated truck through a series of manoeuvres with high accuracy and repeatability.

ABD's path following system is based upon its market-leading steering robot and uses a GPS-equipped motion pack from Oxford Technical Solutions to provide 2cm-accurate position feedback. This enables the steering robot to steer a vehicle along a user-defined path at high speeds and lateral accelerations.

The path following system is now used worldwide by automotive clients in the development of passenger cars, and recently interest has been shown by a major truck manufacturer. To test the feasibility of using path following in an articulated vehicle, a series of tests were performed using the experimental articulated truck at Cambridge Vehicle Dynamics Consortium (CVDC).

Installation and configuration of the system is straightforward – it took less than 2 hours to set the system up in the truck and start testing.

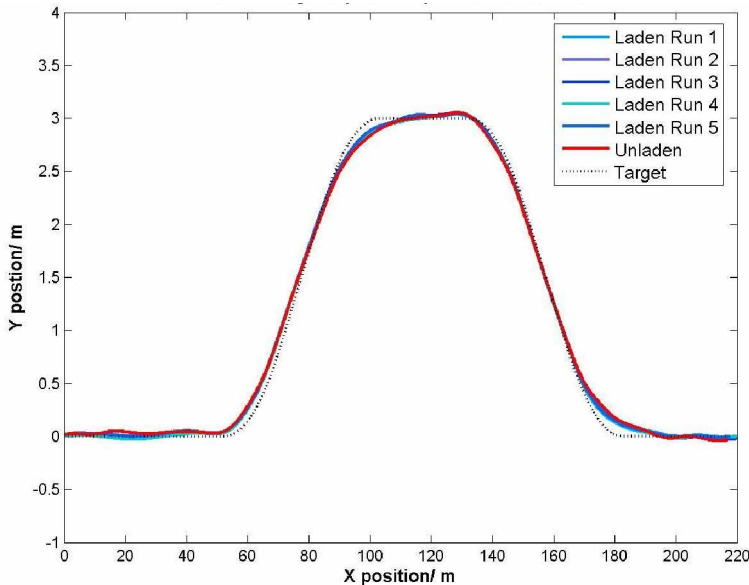
The path following system successfully performed a number of manoeuvres with different trailer load conditions (see over).



SR30-Omni steering robot installed in truck cab

Double lane-change

Repeated runs of a double lane-change manoeuvre were performed at 45km/h, with the trailer fully-laden (22 tonnes of water) and then un-laden. The results show outstanding repeatability between runs – the five runs are nearly indistinguishable.



Lane change for laden and un-laden articulated truck

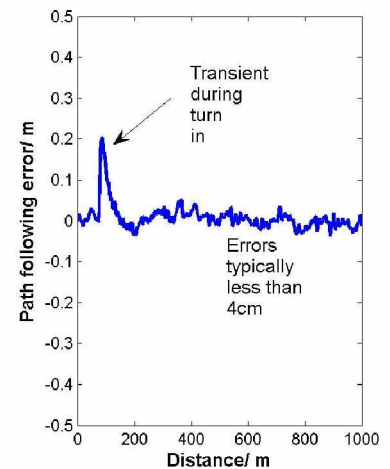
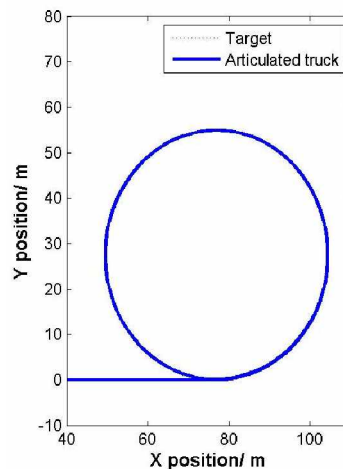
The dashed line shows the target path, the blue lines show the five runs with fully-laden trailer, and the red line shows the performance with the trailer un-laden.

The change in trailer load made almost no perceptible difference to the path followed, showing that the control algorithm is robust to varying load conditions.

Circles at increasing velocity

A circular path of radius 27.5m was then defined using ABD's path generation software module. The test vehicle with trailer followed this profile under path following control for a number of laps at increasing speed – from 18 to 32km/h. As can be seen in the adjacent graphs, the circular path was followed with very high accuracy (errors typically less than 4cm).

It was therefore demonstrated that the ABD path following system can be used as successfully in articulated vehicles as it can in passenger vehicles.



Five laps of a circle at increasing speed

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