

## AN6028 – Reverse Path Following

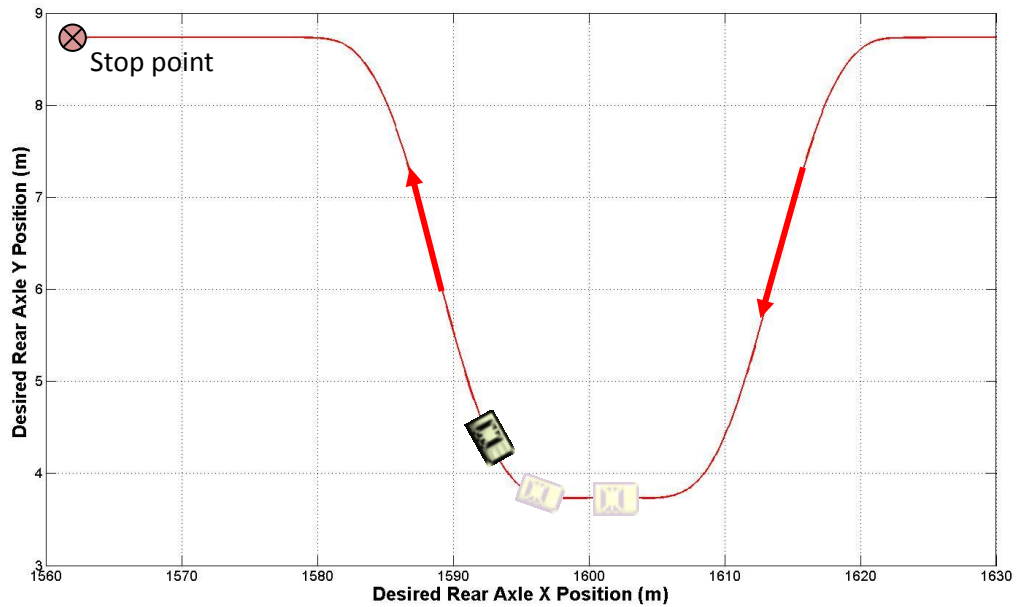


ABD has successfully carried out path following tests with a vehicle in reverse gear. Using a steering robot and 2cm accuracy GPS-inertial motion pack, the vehicle was able to accurately and repeatably follow a pre-programmed path on the ground whilst reversing. This control mode could be used for testing parking sensors, for example.

Path files can either be generated from data recorded while driving, or created from geometric segments using ABD's path following software. ABD's Combined Brake and Accelerator Robot (CBAR) was used to control the vehicle's reversing speed and longitudinal position along the path during the tests.

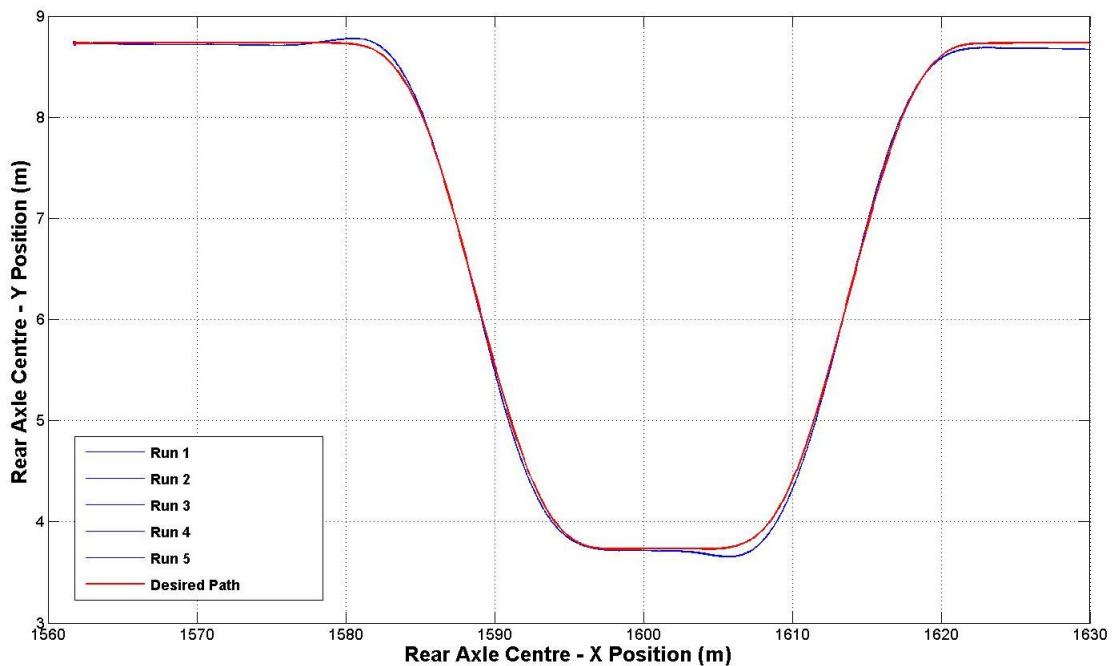
## Test Profile

The vehicle was programmed to follow the double lane-change profile shown below at a constant reversing speed of 15 mph, followed by a controlled stop.

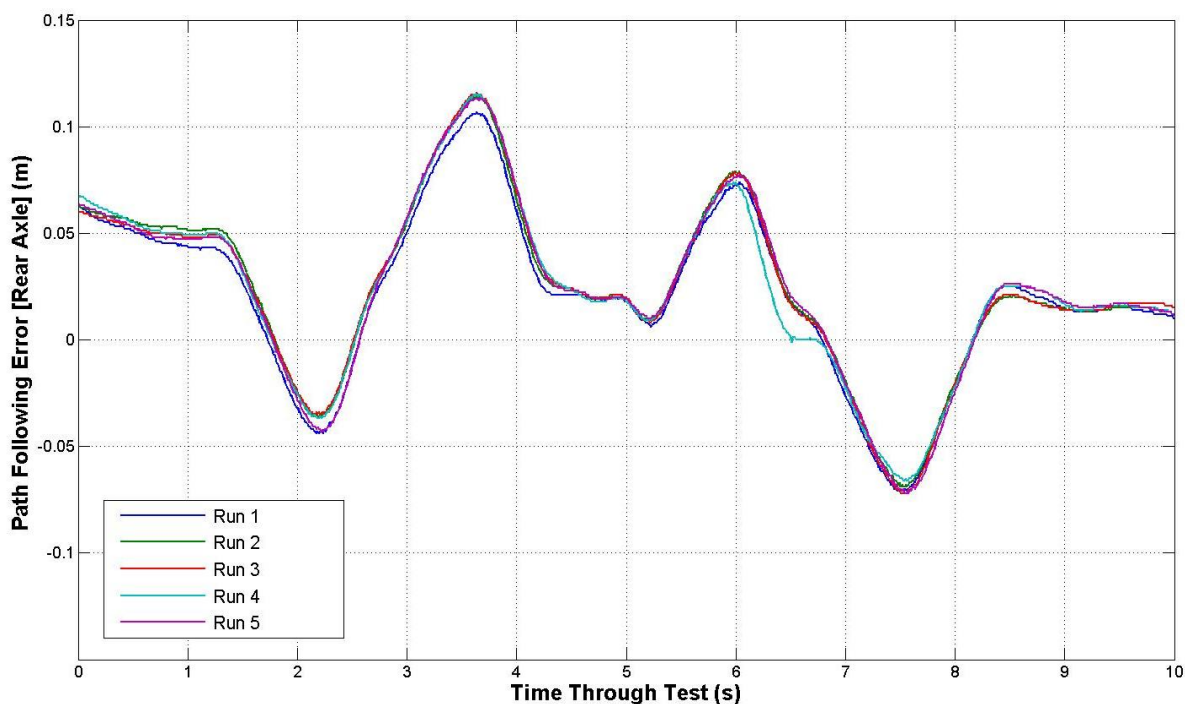


## Path Following Repeatability

The graph below compares the actual position of the centre of the vehicle's rear axis against the desired position from the path file, for five separate runs of the same path.



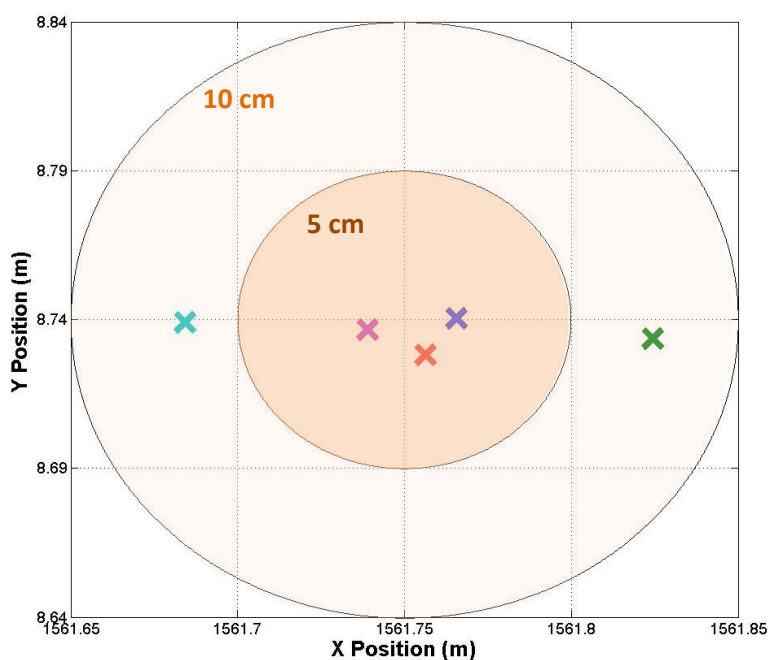
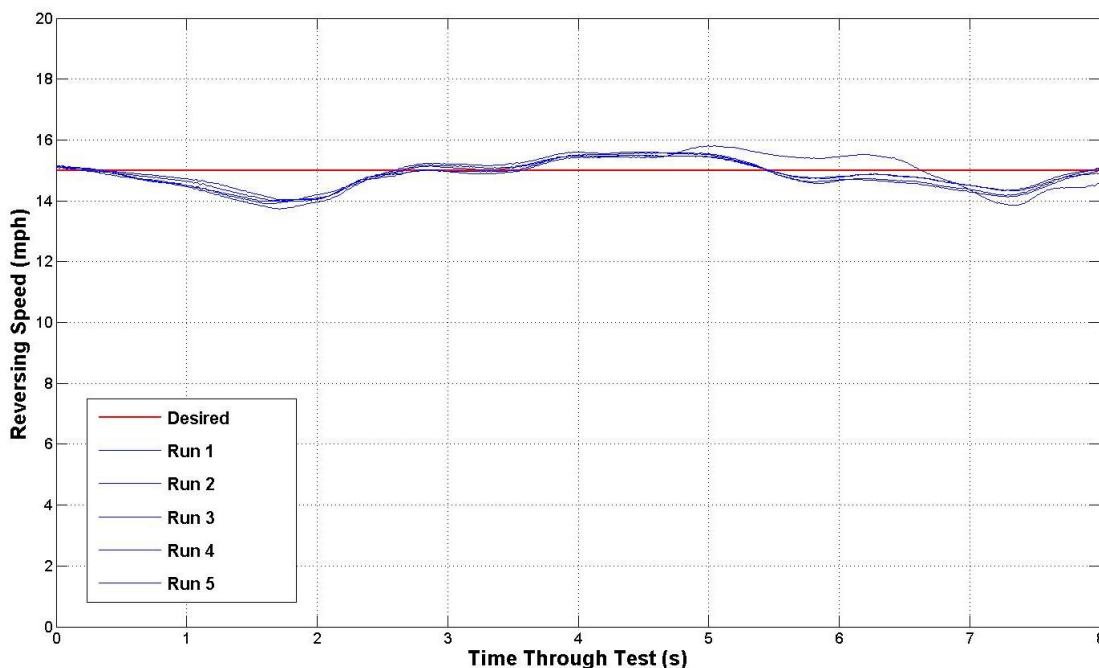
The next graph shows the path following error (lateral error between actual and desired rear axle centre positions) for the five double lane-change runs.



From these graphs we can see that the maximum lateral path following error (which occurred at the end of the first lane-change manoeuvre) was 12cm. This was repeatable, with the variation in path following error being less than 2cm across the five runs performed. This repeatability is a characteristic of the path following algorithm, which is dependent upon path corner radius and vehicle speed.

## Speed Control and Stop Point Repeatability

The graph below shows the measured speed during the double-lane change manoeuvre, against the commanded reversing speed of 15mph. In these tests the Combined Brake and Accelerator Robot (CBAR) was used to control the vehicle’s speed, and longitudinal distance correction was also enabled.



The diagram on the left indicates the repeatability of the vehicle’s position when stopped at the end of the test. Across the five runs, the variation in lateral (Y) and longitudinal (X) stopping positions were less than 2cm and 15cm respectively.

## Summary

Reverse path following and speed control can be achieved using ABD robots, with a level of accuracy comparable with forward path following and speed control. Additional fields in the path following/speed control setup pages in the Robot Controller software allow tuning scale factors for reverse tests to be specified.



### For more information contact:

Anthony Best Dynamics Ltd  
Holt Road, Bradford on Avon,  
Wiltshire, BA15 1AJ England

Tel: +44 (0) 1225 860200  
Fax: +44 (0) 1225 860201  
Email: [info@abd.uk.com](mailto:info@abd.uk.com)  
Web: [www.abd.uk.com](http://www.abd.uk.com)  
Videos: [youtube.com/user/abdynamics](http://youtube.com/user/abdynamics)