

# **Draft Regulation on Driver Assist Systems to Avoid Blind Spot Accidents**

## **Development of Test Procedure and Verification Tests [updated]**

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## Test Results and Conclusions (GRSG 2016 01)

- Prototype information system implemented in HGV
- Test Scenarios carried out:
  - Case 1, 0/4 tests passed, bicycle movement starts late
  - Case 4, 4/4 tests passed
  - Case 6, 3/4 tests passed
  - Other test scenarios were not possible because of bug in dummy control software (to be fixed soon)
- Manual driving using cones is possible (driving robots not required)
- Manual speed control is possible
- Corridors for trajectory and speed will be defined

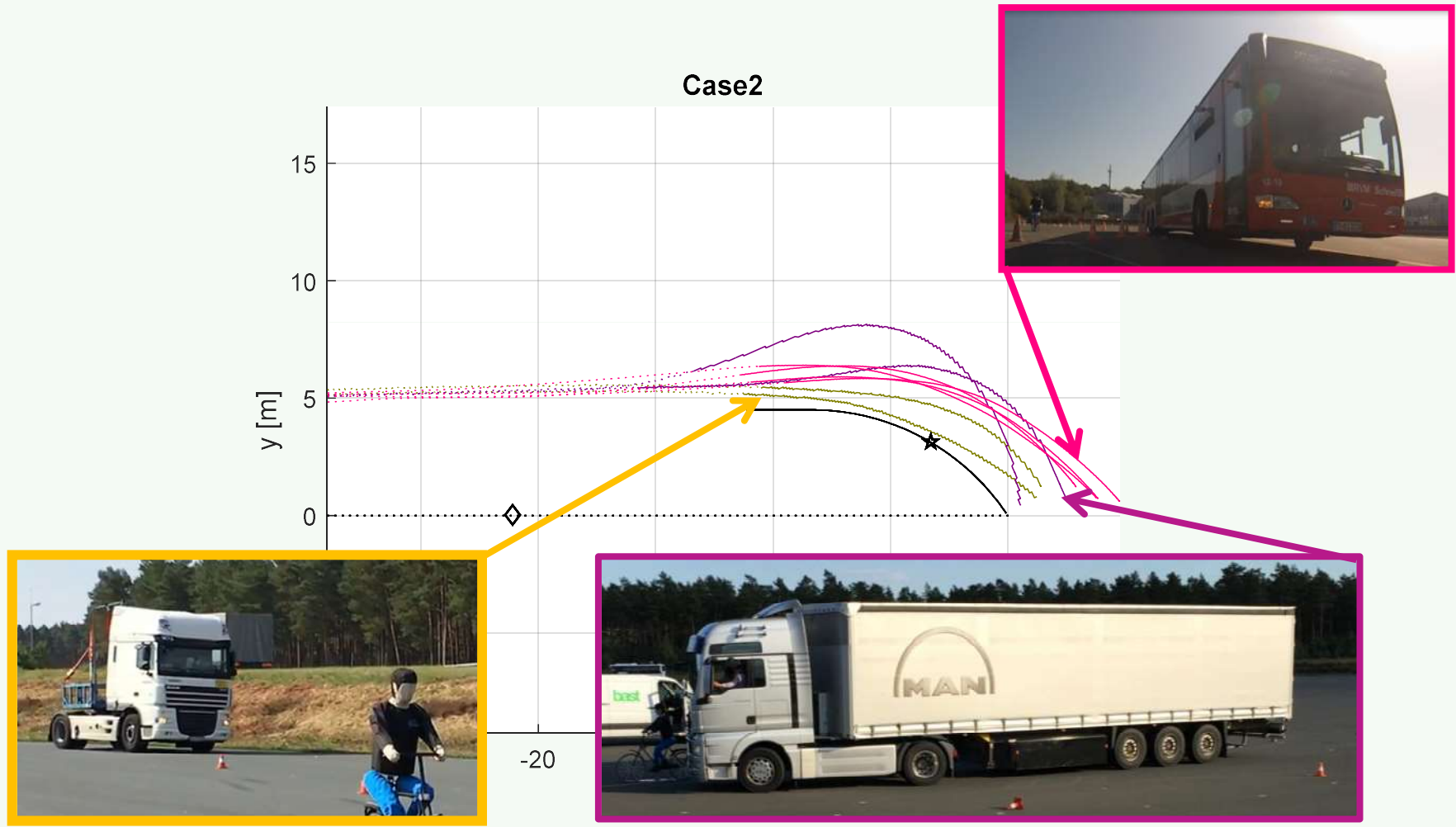
## Updates for GRSG 2016 02

- Can all scenarios be performed?
- What is the influence of the vehicle configuration (e.g. single tractor, tractor+trailer, rigid vehicle)?
- Criteria for valid test execution
- Criteria for passing the test

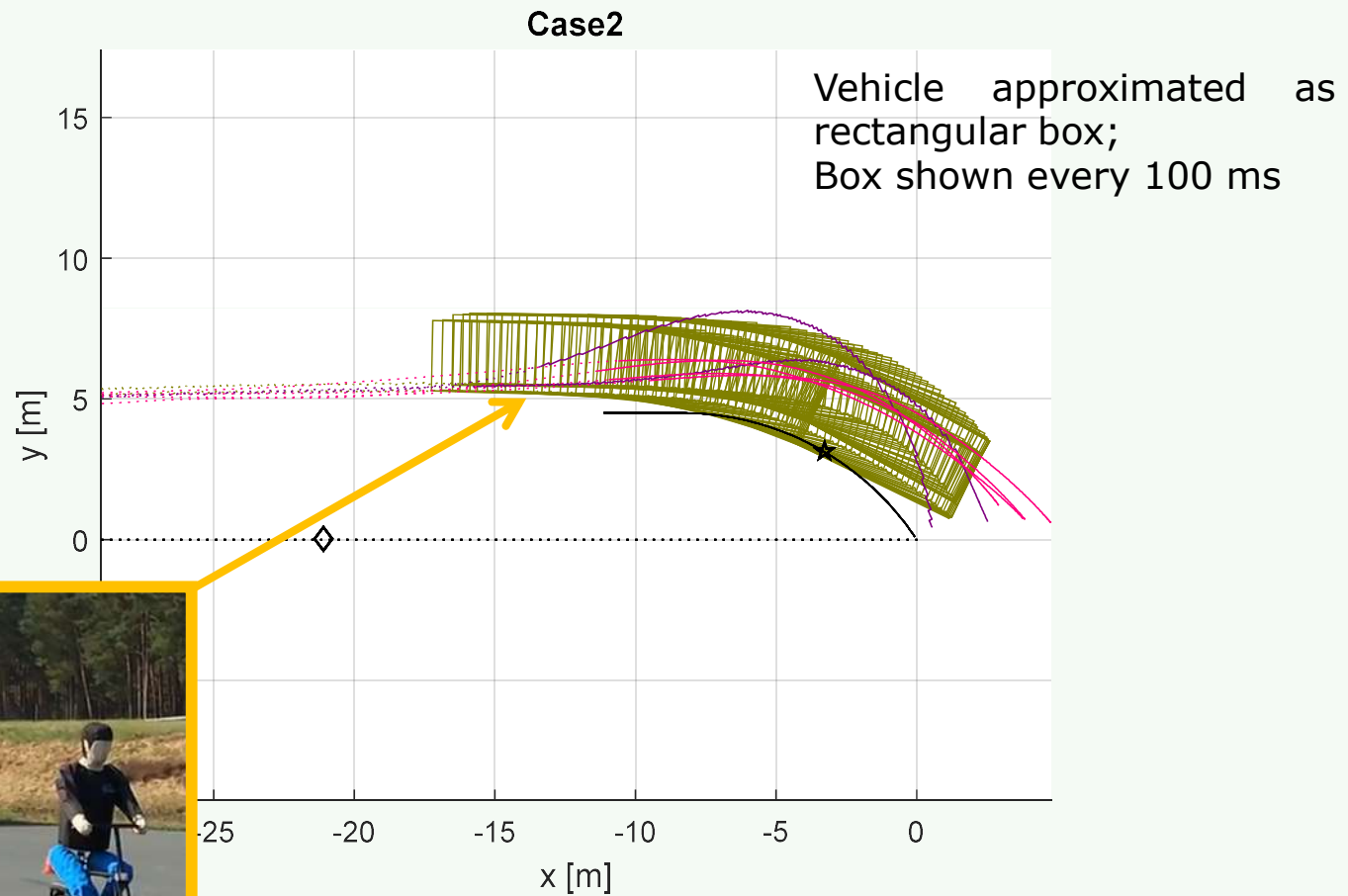
## Recapitulation: Test Cases

ID	$v_{\text{Truck}}$ [km/h]	$v_{\text{Cycle}}$ km/h]	R [m]	Initial lateral separation [m]	Impact location with respect to front of truck [m]
1	10	20	5	1,5	6
2	10	20	10	4,5	6
3	10	20	10	4,5	3
4	10	20	10	1,5	0
5	10	10	5	4,5	0
6	20	10	25	4,5	0
7	20	20	25	1,5	6

# Influence of Vehicle Geometry (Example Case2)



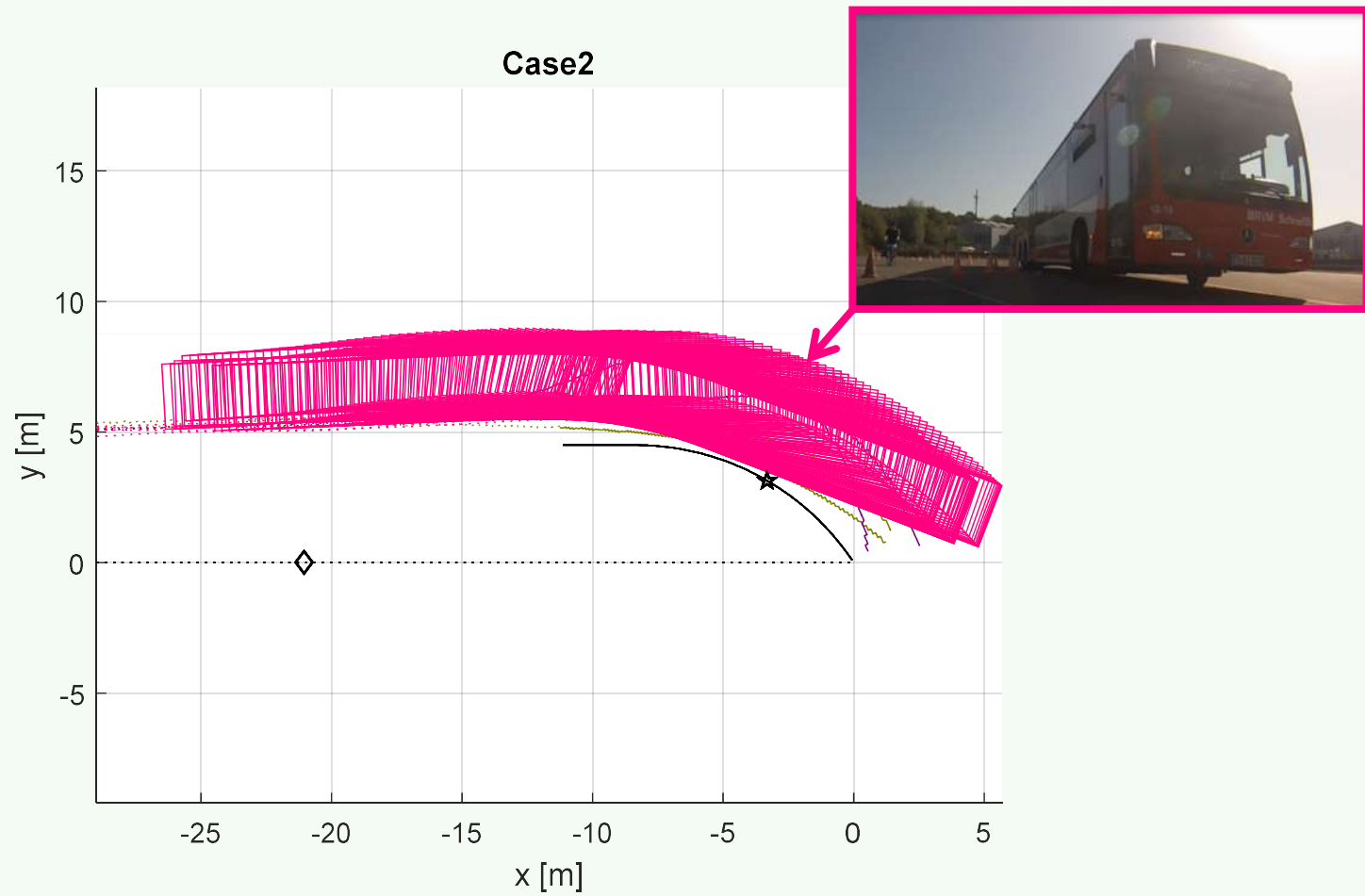
## Case 2: All positions of single tractor



## Case 2: All positions of tractor (driven with trailer)

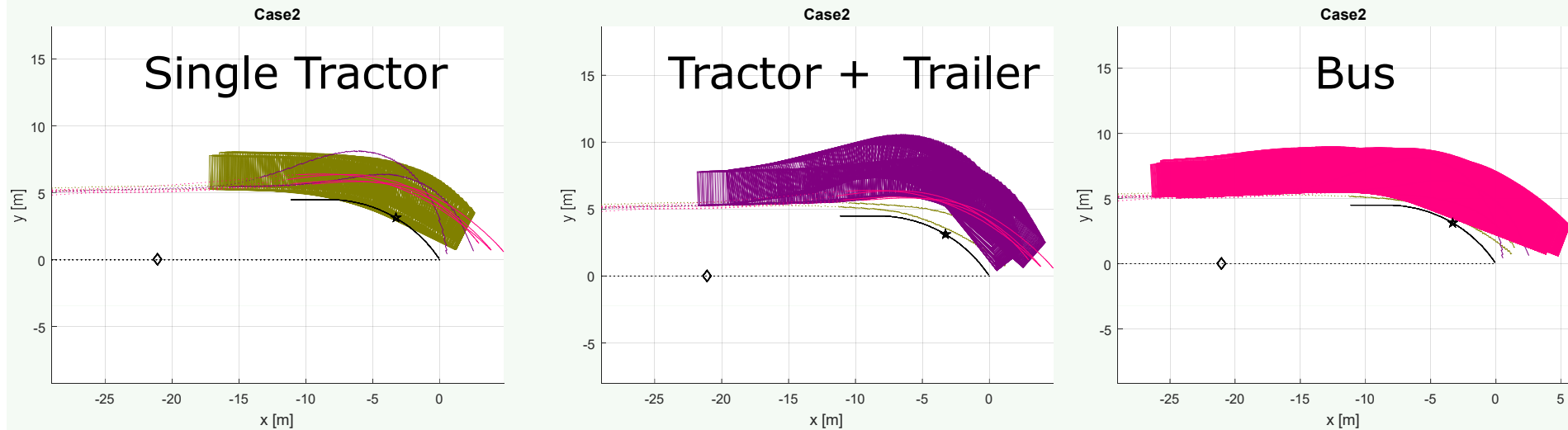


## Case 2: All positions of bus



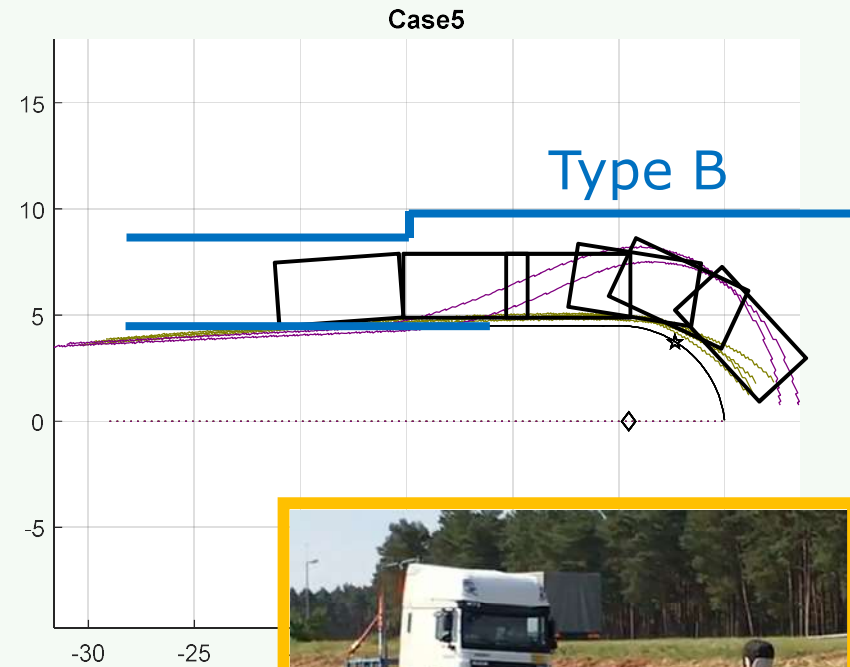
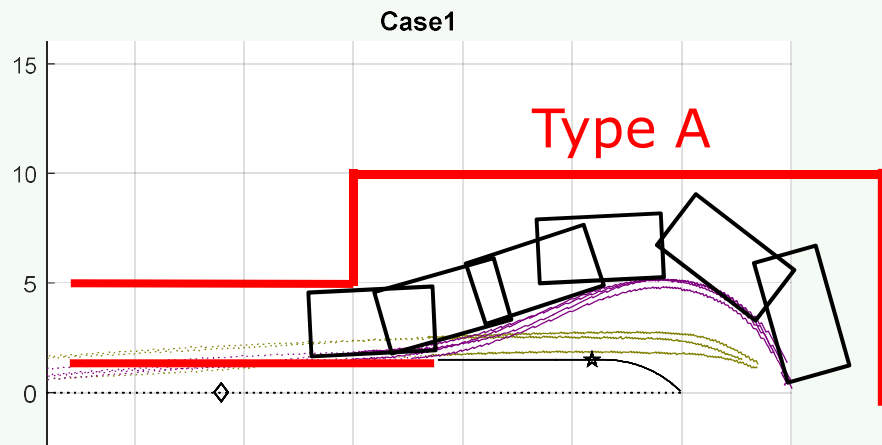


## Case 2: Overview



- Different vehicle types show different cornering styles
- Corridors for test conduction need to be adjusted to take this into account
- → Corridors Type A and Type B

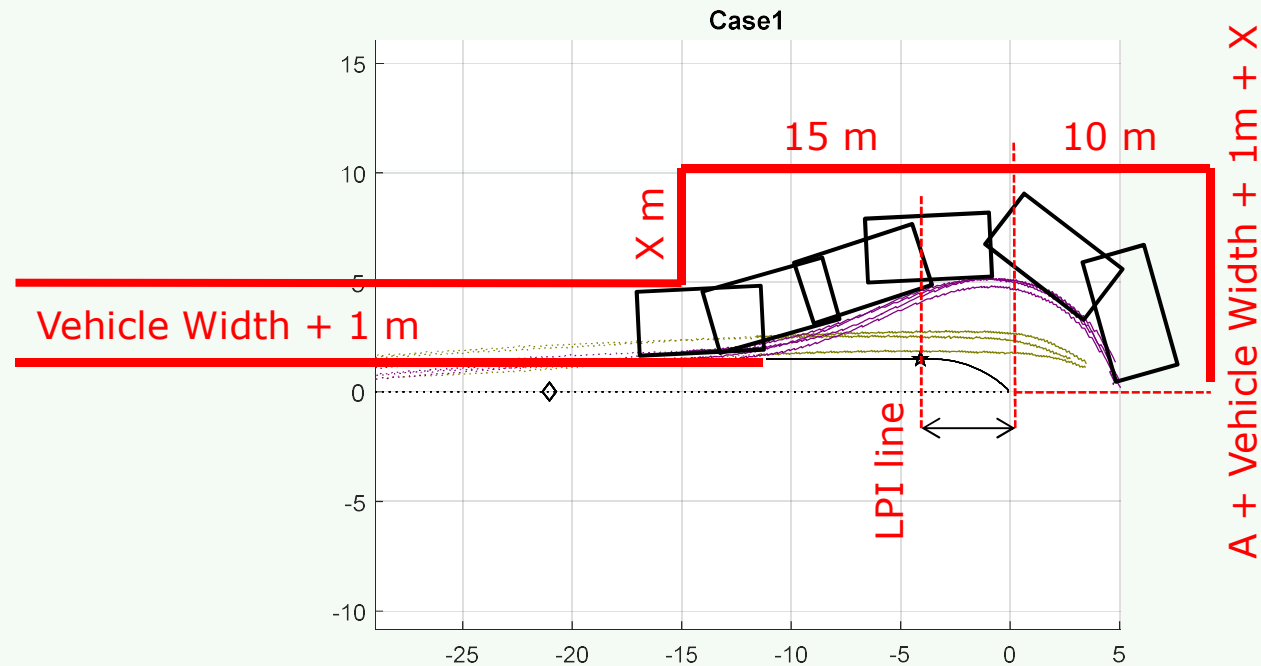
# Test Case 1, 5 (5m Radius)



\* M3 vehicles not in the scope yet  
but bus is representative for  
long rigid vehicle

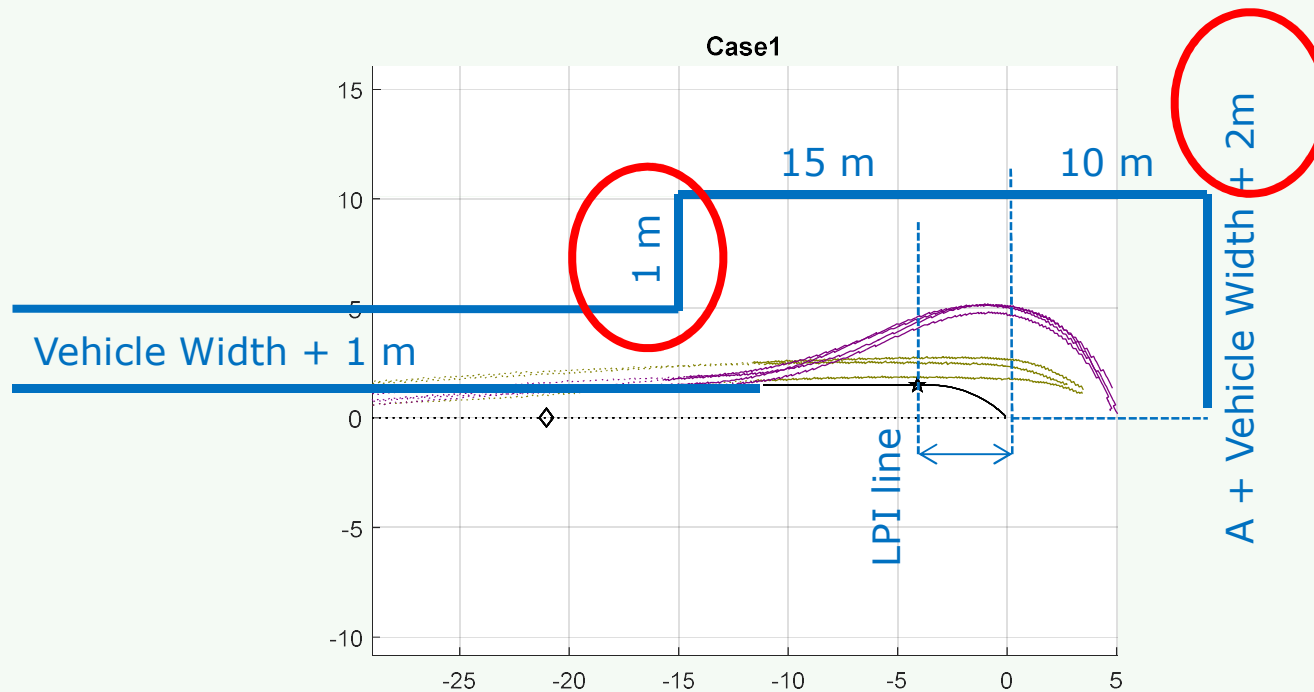
# Corridor – Type A (for articulated combinations or long vehicles)

Type A

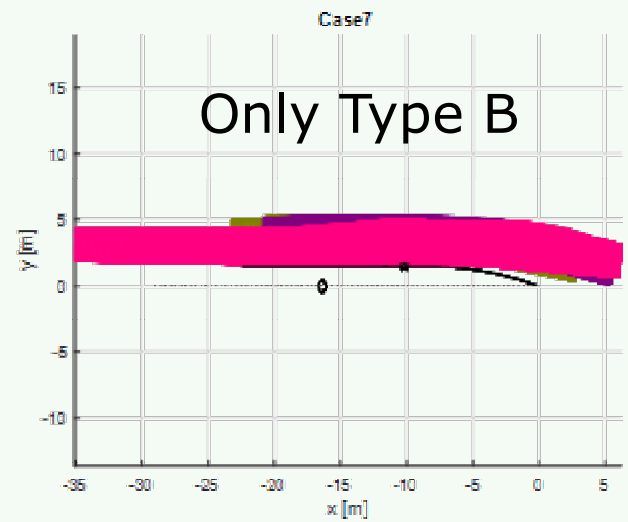
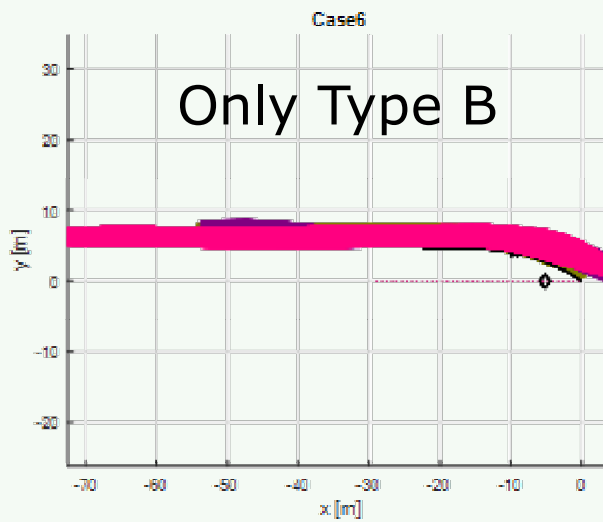
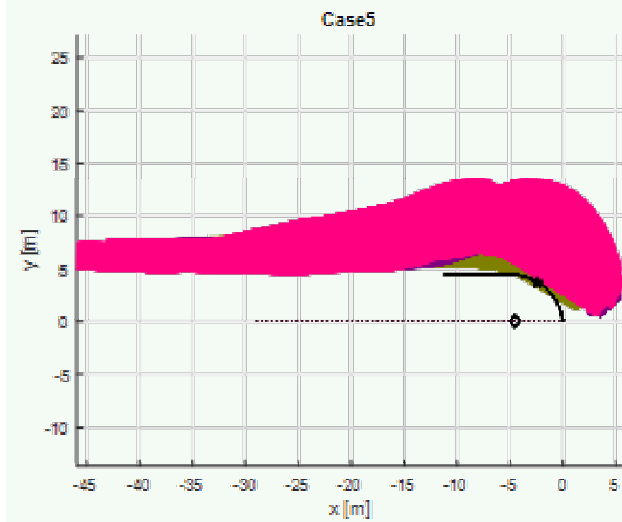
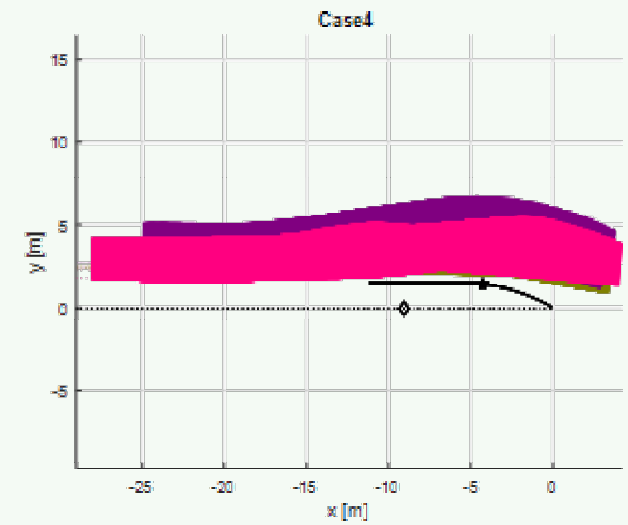
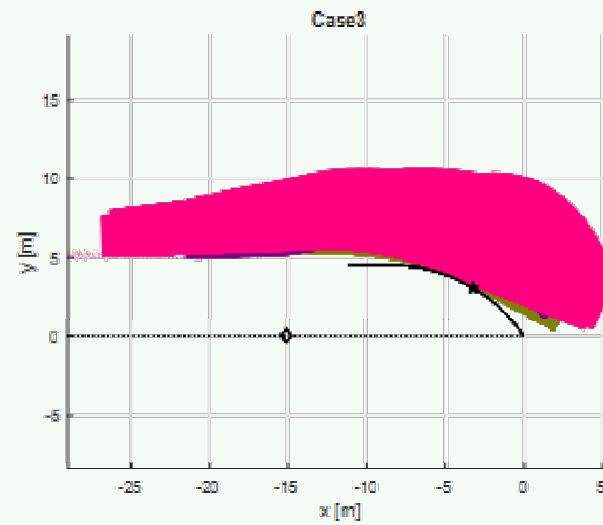
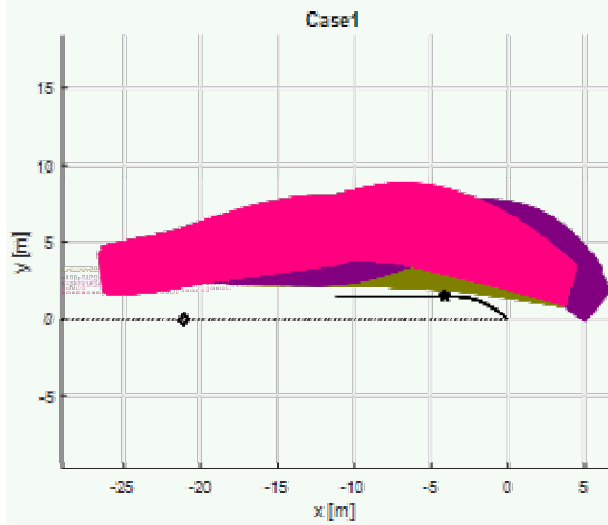


# Corridor – Type B (for short vehicles)

Type B



# Other cases – overview



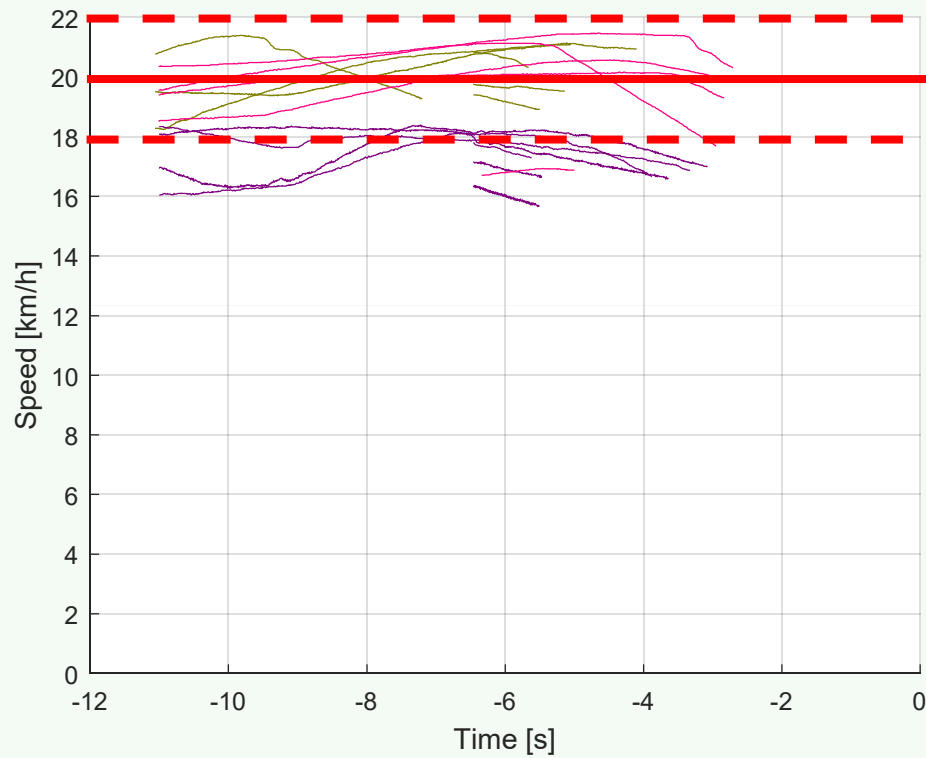
## Test Overview

Test No	LPI Line [m]	X [m]	LPI in turn?	Tractor	Short Vehicle
1	4,1	5	No	Type A	Type B
2	3,3	3	Yes	Type A	Type B
3	3,3	2	Yes	Type A	Type B
4	4,3	2	Yes	Type A	Type B
5	2,4	6	Yes	Type A	Type B
6	9,5	1 (=Type B)	Yes	Type B	Type B
7	10,2	1 (=Type B)	No	Type B	Type B

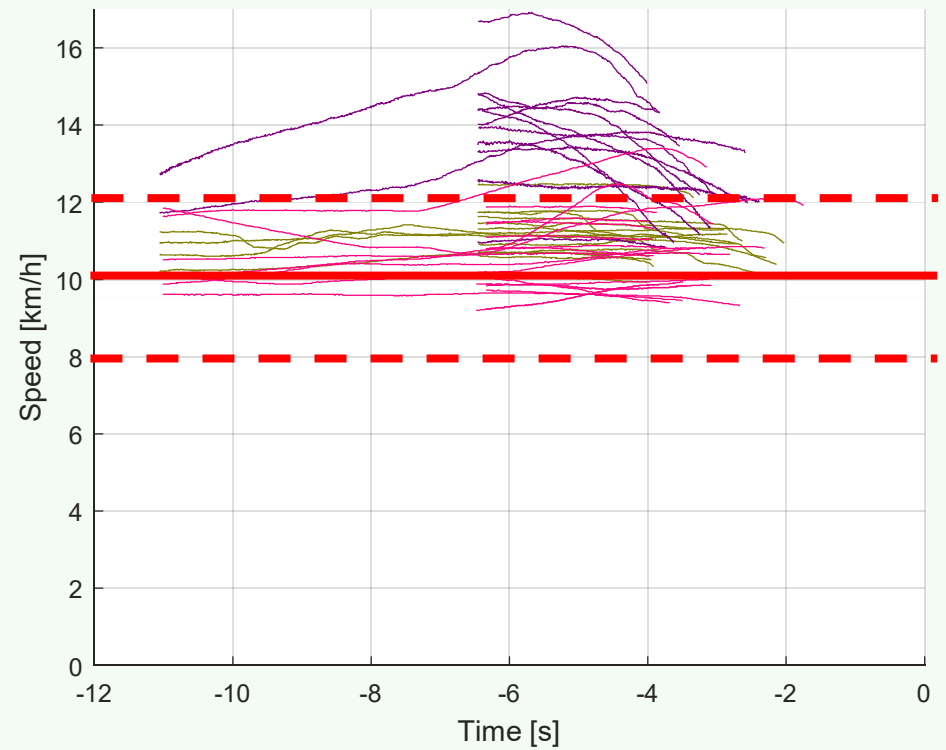
# Speed Accuracy (manual driving)



20 km/h desired speed



10 km/h desired speed



## Test Tools - Update

- Dummy propulsion system software bugs have been eliminated
- Synchronization between bicycle and truck is now working well
- Euro NCAP Bicycle Target has been used for most of the tests (pre-commercial version)
- Specifications will follow soon





## Remaining issues

- Start of bicycle at 4s before „Last Point of Information“ (LPI) not sufficient
- Better: bicycle at speed at least 6 seconds before LPI
  - This means 33 m bicycle at full speed and 9 m acceleration length = 41 m belt length before impact point
  - Requires updates to current propulsion system control software

## False Positive Tests

- System must not react to trees, cones and other road clutter
- Tests will always be carried out using cones
  - Information should only be given when approaching the bicycle
- Generic local road sign should be placed at entry of corridor
  - No information should be given when entering the corridor

## Summary and next steps

- Can all scenarios be performed?
  - Yes
- What is the influence of the vehicle configuration (e.g. single tractor, tractor+trailer, rigid vehicle)?
  - *Different corridors for valid execution proposed*
- Criteria for valid test execution
  - *Vehicle within corridor*
  - *Speed within an accuracy of  $\pm 2$  km/h*
- Criteria for passing the test
  - *Information has been given before the LPI line*
- **Next step: draft procedure will be provided**