

TIME

Tire Measurements

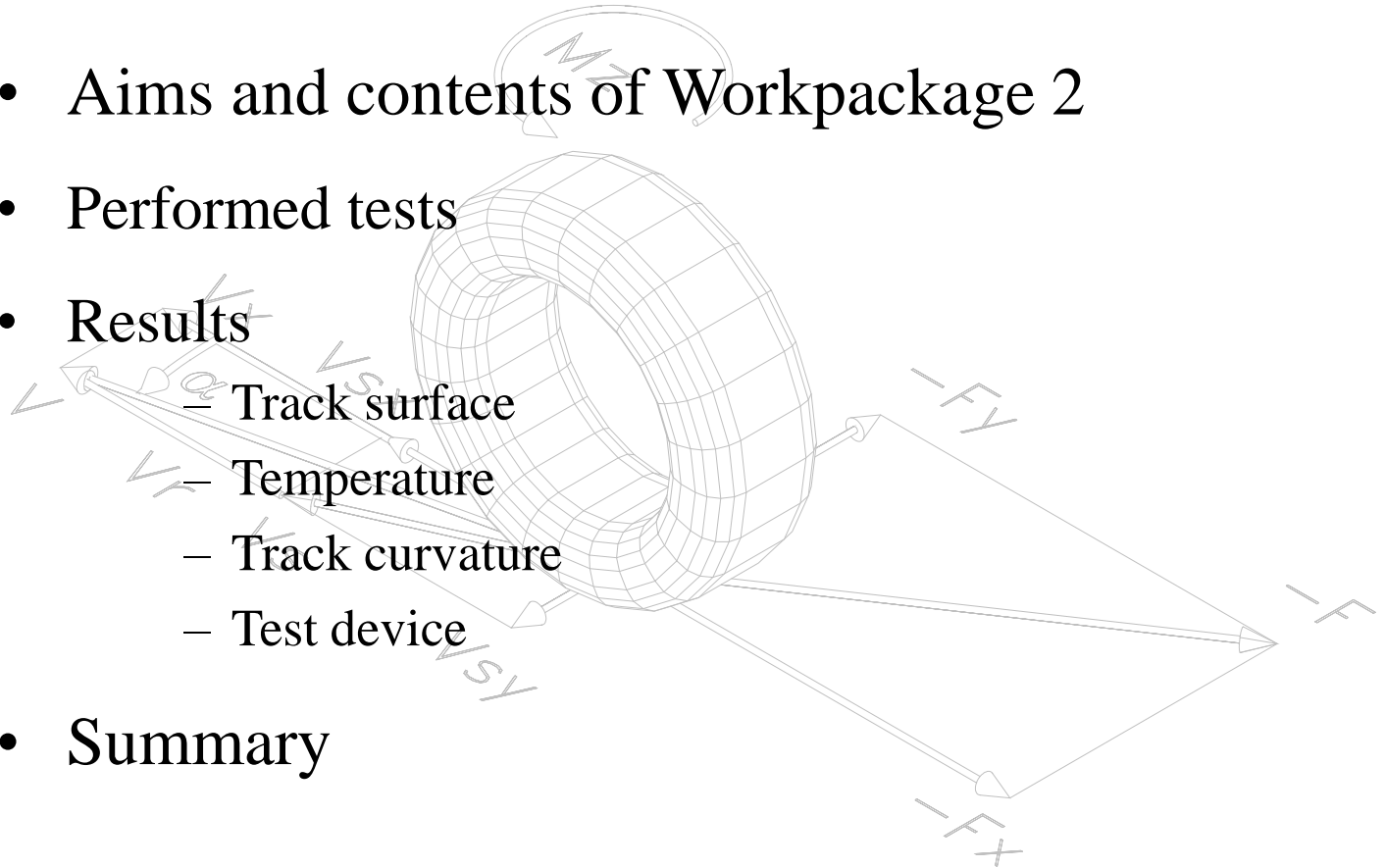


Workpackage 2: Analysis of Parameters Influence on Tyre F&M Testing

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Structure

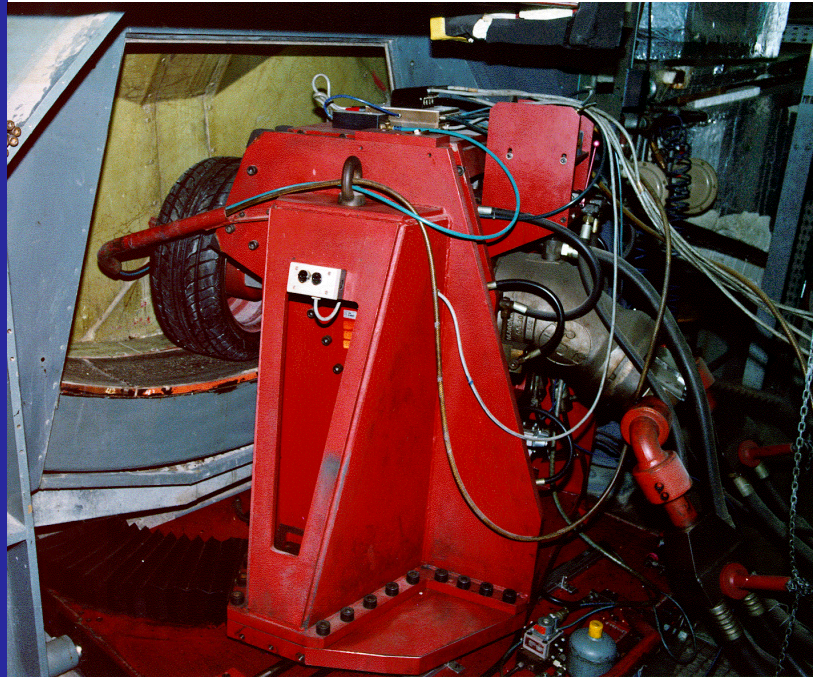
- Aims and contents of Workpackage 2
- Performed tests
- Results
 - Track surface
 - Temperature
 - Track curvature
 - Test device
- Summary



Aims and Contents of WP2

- Clarification of the different results in WP1
 - Deviations of cornering stiffness, aligning stiffness
 - Deviations of the maximum values, ...
- Investigation of parameters which influences tyre characteristics
 - Track surface
 - Ambient temperature, ...
- Quantitative indication about alteration of tyre characteristics caused by different test conditions
 - Identification of important influences
 - Evaluation of correction formulas, ...

Performed Tests (1)



Internal Drum
Test Device
University of Karlsruhe

Test Devices
involved in WP2

Test Trailer
University of Delft / TNO



Performed Tests (2)

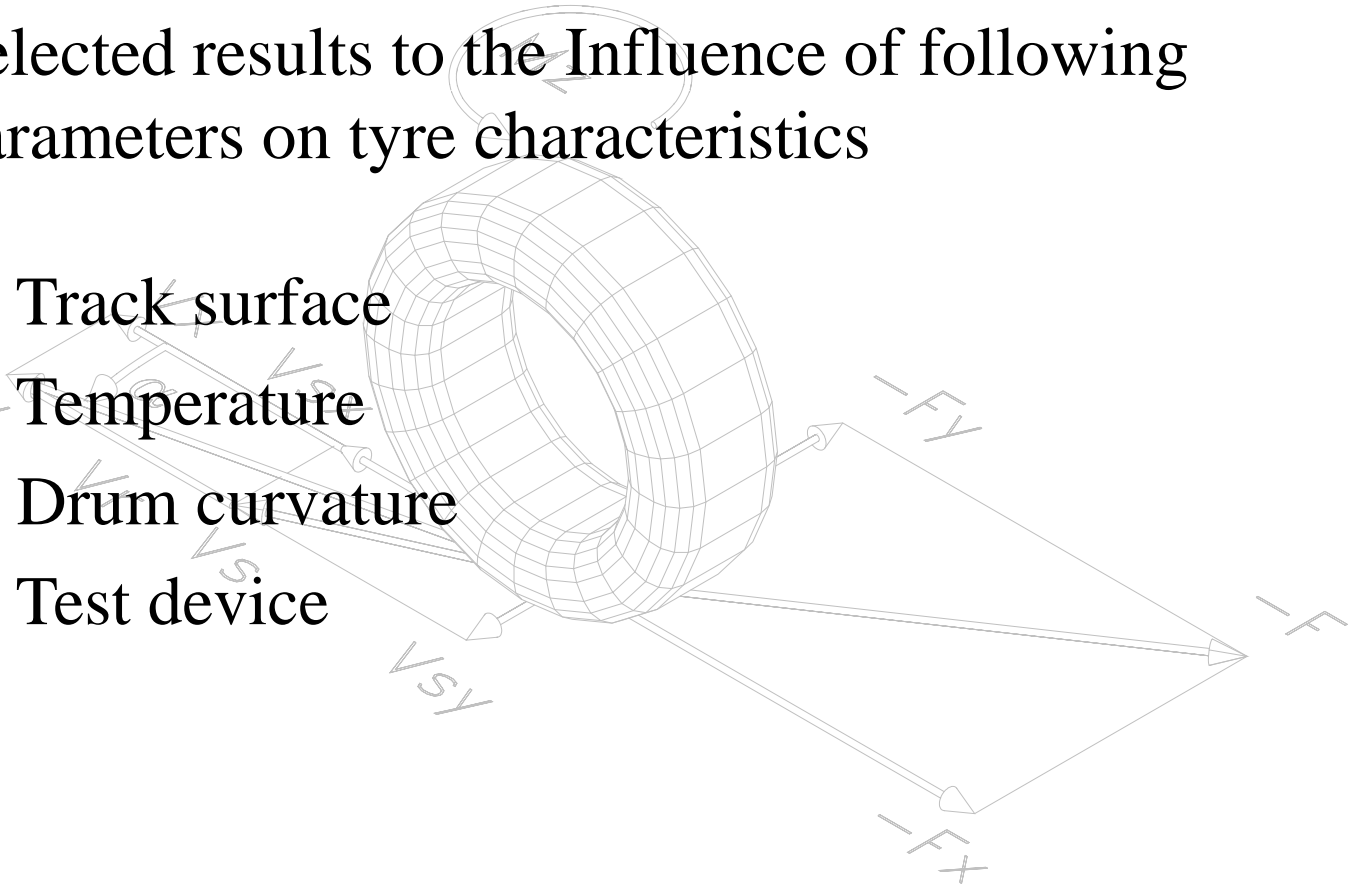
Vertical force	50% ETRTO	80% ETRTO	130% ETRTO	
Inflation Pressure		2,3 bar	2,6 bar	
Slip angle amplitude		2 deg	6 deg	10 deg
Slip angle velocity		0,8 deg/s	2,0 deg/s	4,0 deg/s
Velocity		60 km/h	100 km/h	
Track surface	Concrete	Asphalt rough	Asphalt smooth	Safety-Walk 80
Ambient temperature	5°C	20°C	30°C	

Additionally the influence of drum curvature was investigated using results of workpackage 1

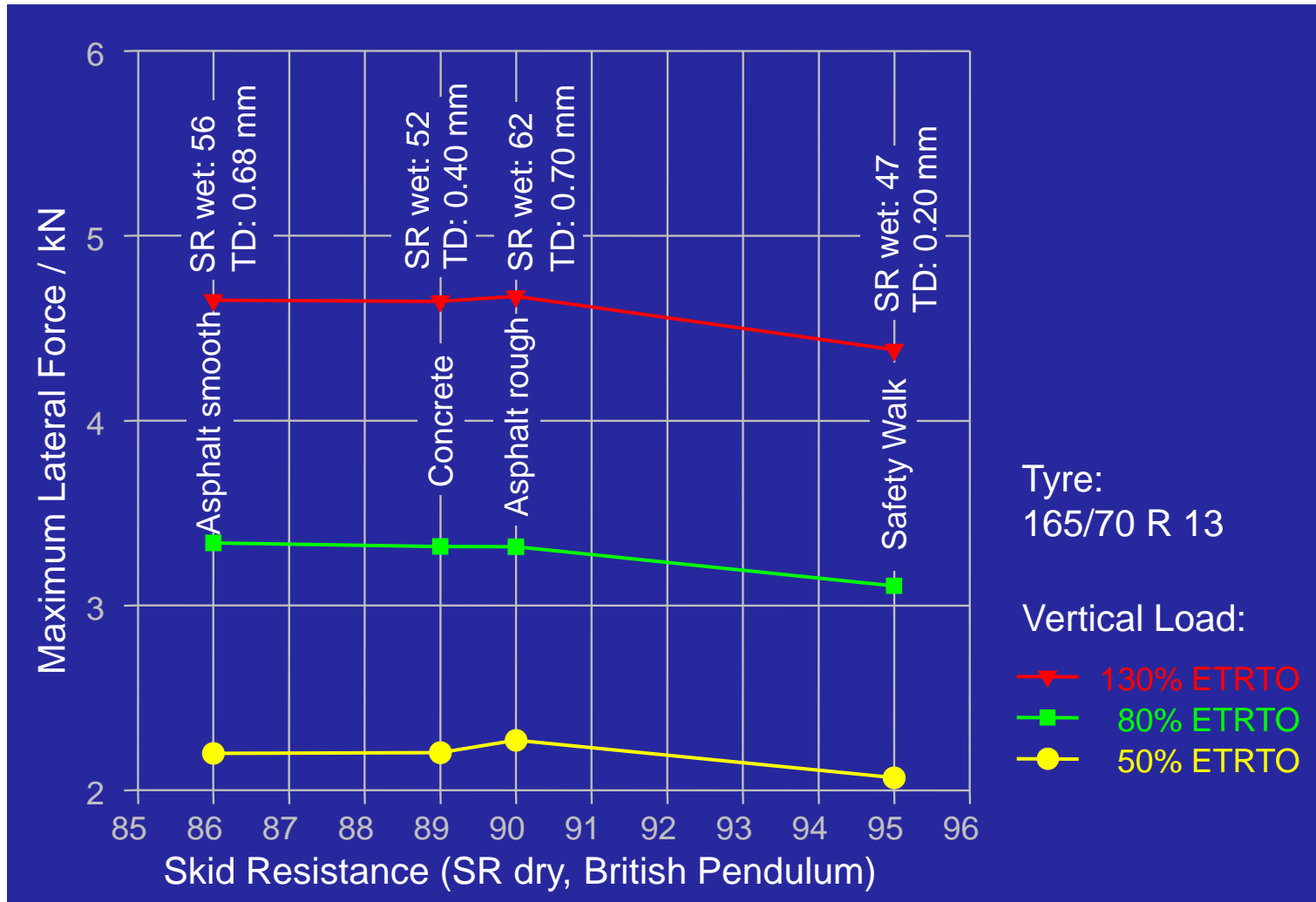
Results

Selected results to the Influence of following parameters on tyre characteristics

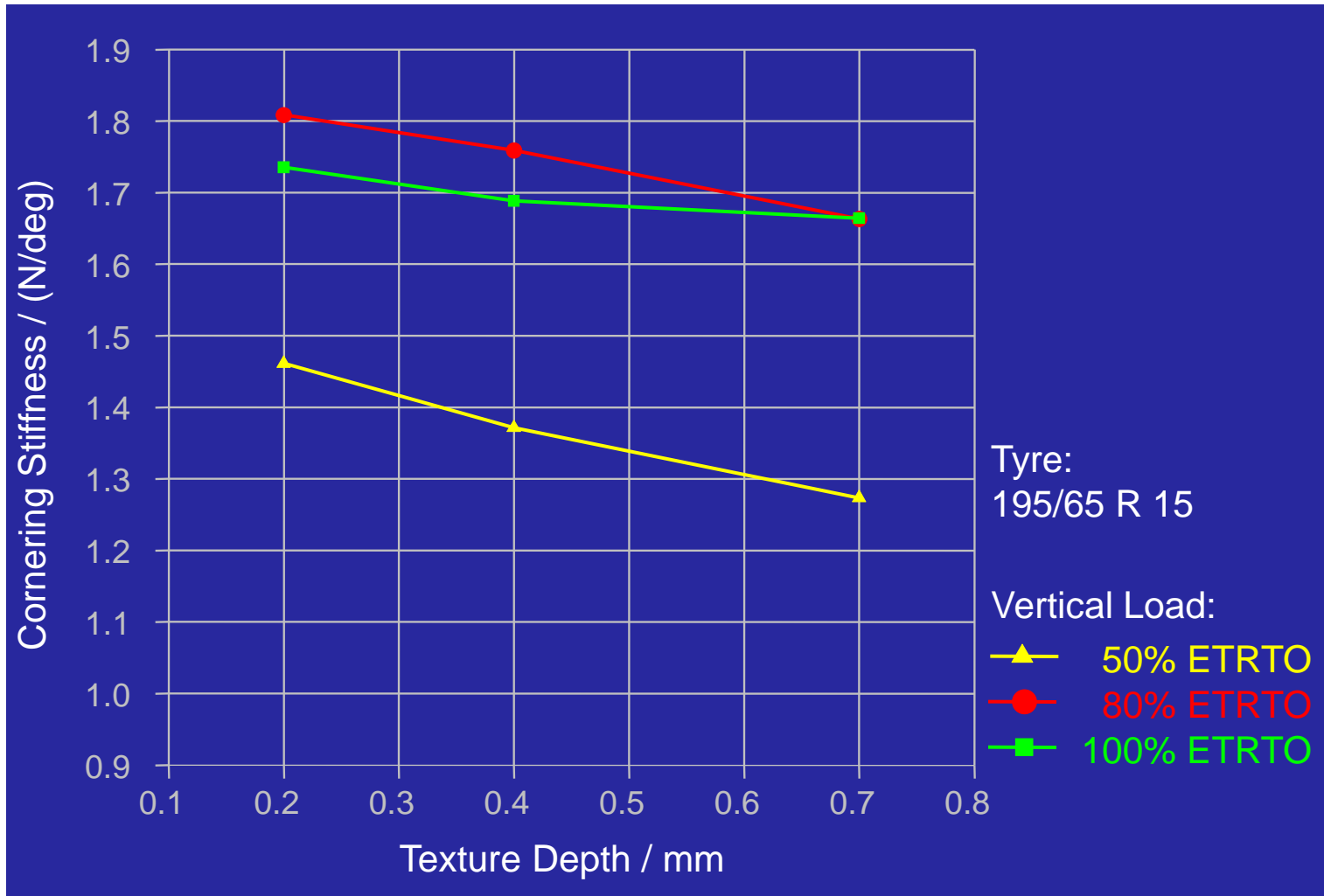
- Track surface
- Temperature
- Drum curvature
- Test device



Influence of Track Surface (1)



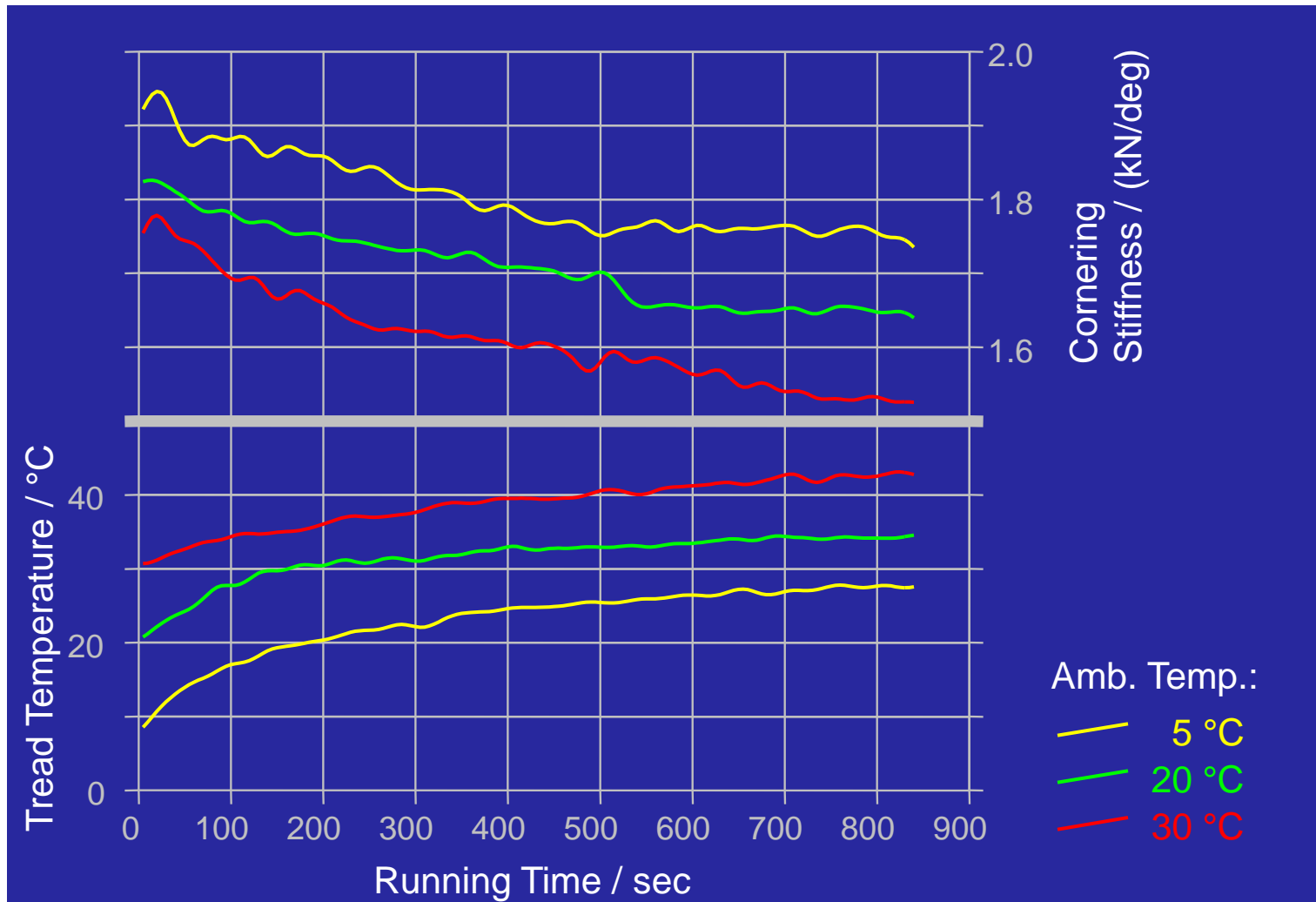
Influence of Track Surface (2)



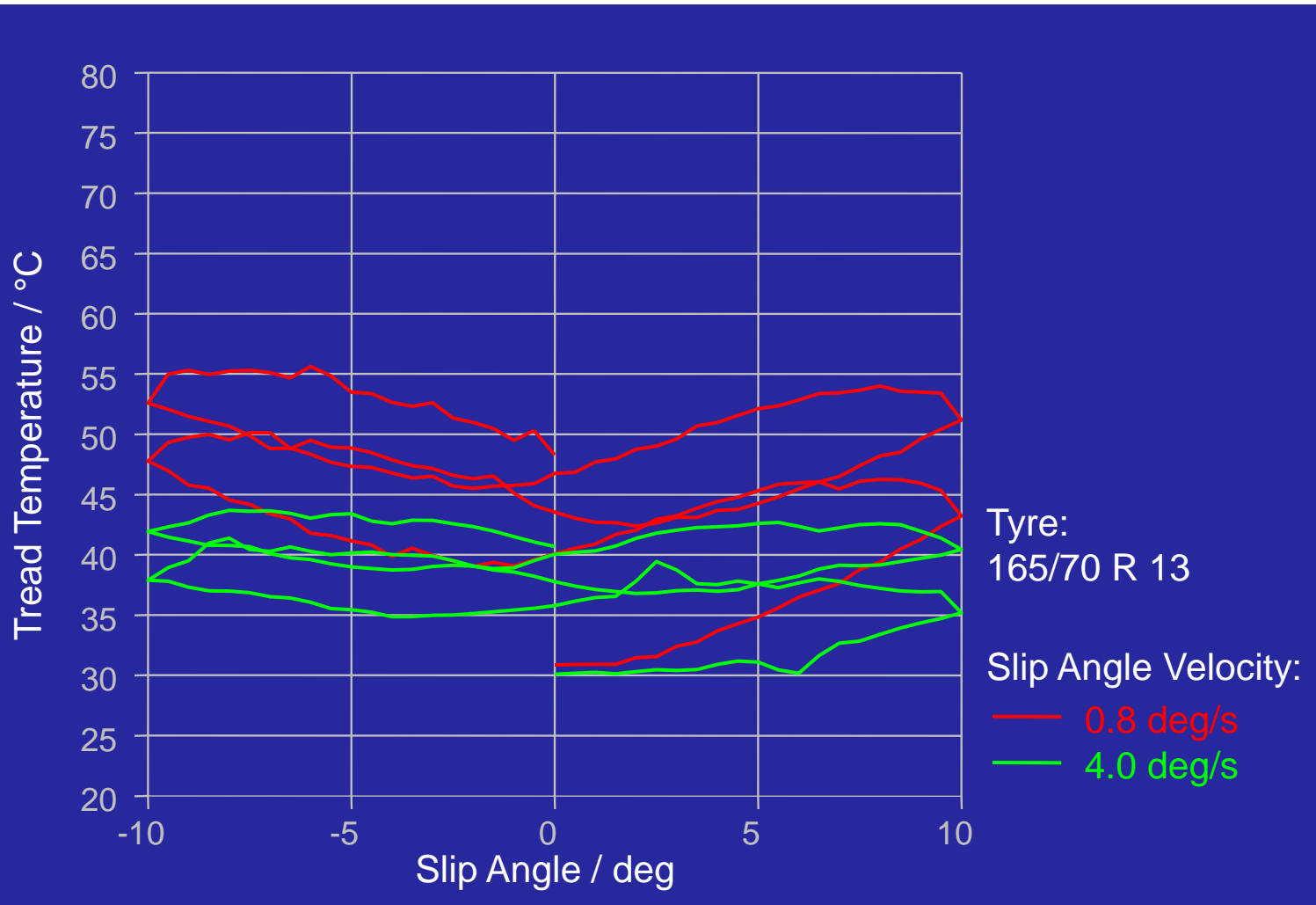
Influence of Track Surface (3)

- Maximum of lateral force
 - Differences on the investigated track surfaces up to 10 %
 - The influence of the track surface depends strongly on the tyre
- Cornering and aligning stiffness
 - Cornering and Aligning stiffness depend on the texture depth
 - Cornering stiffness varies up to 13 %, aligning stiffness up to 21 %

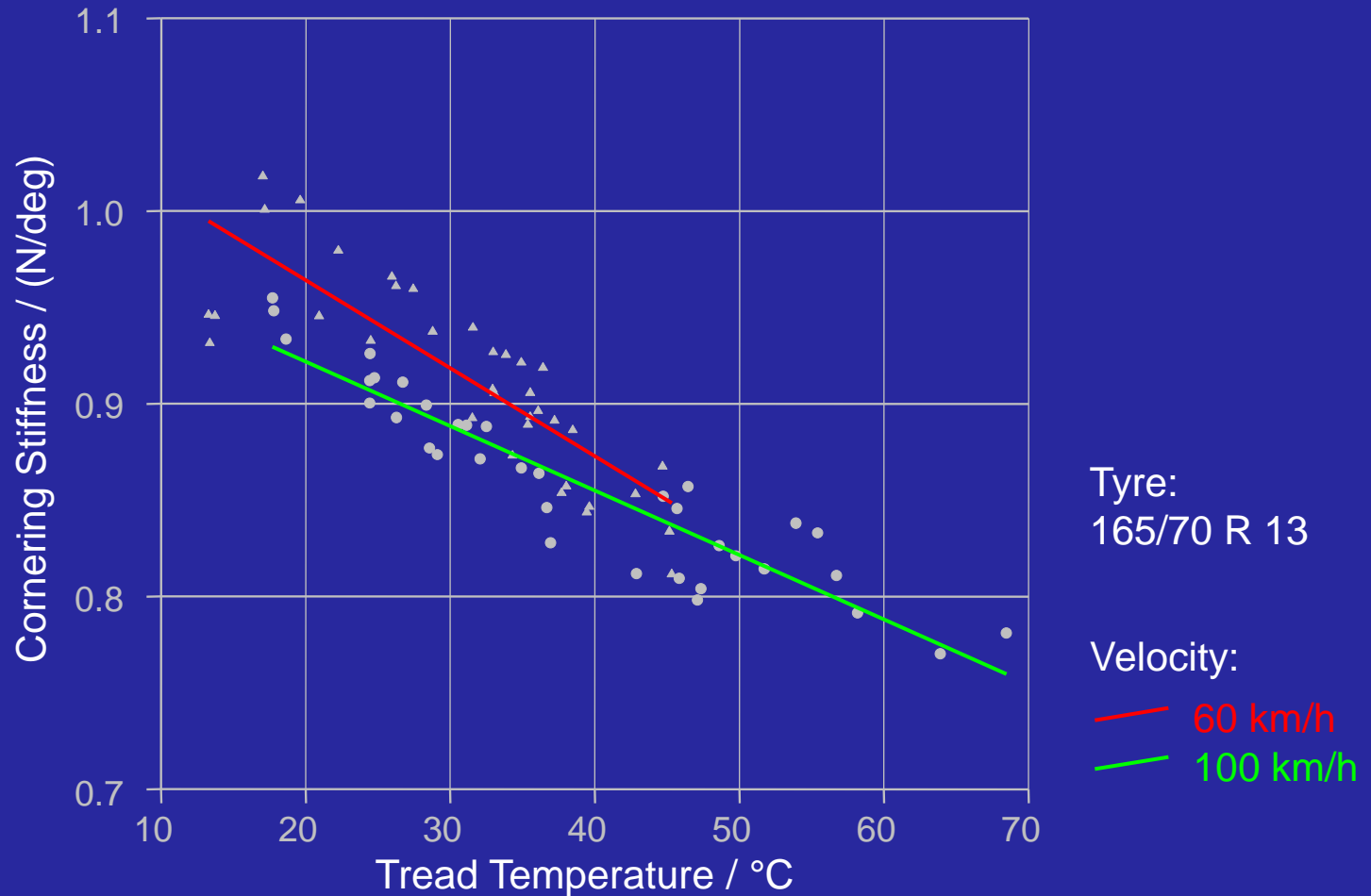
Influence of Temperature (1)



Influence of Temperature (2)



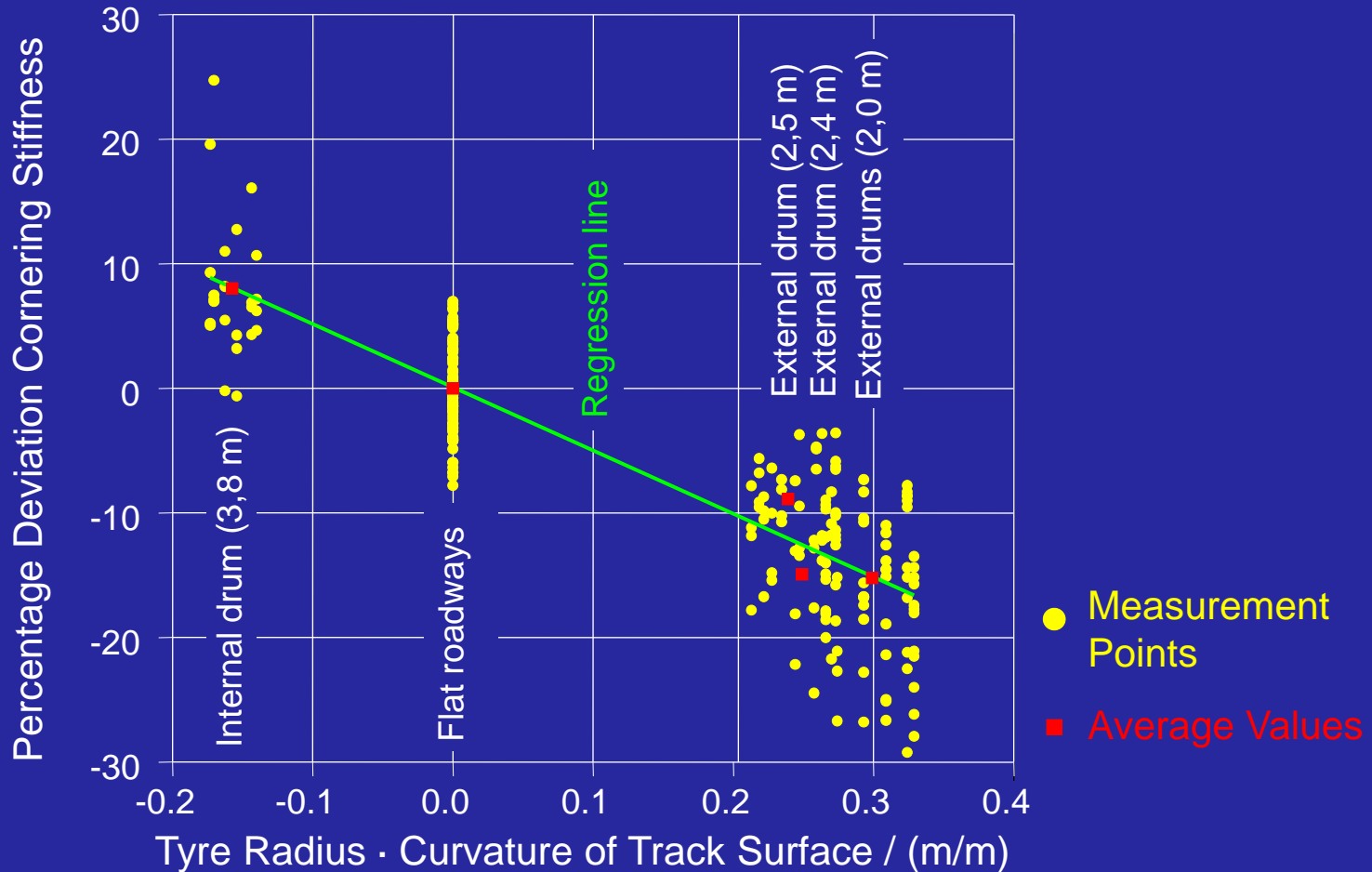
Influence of Temperature (3)



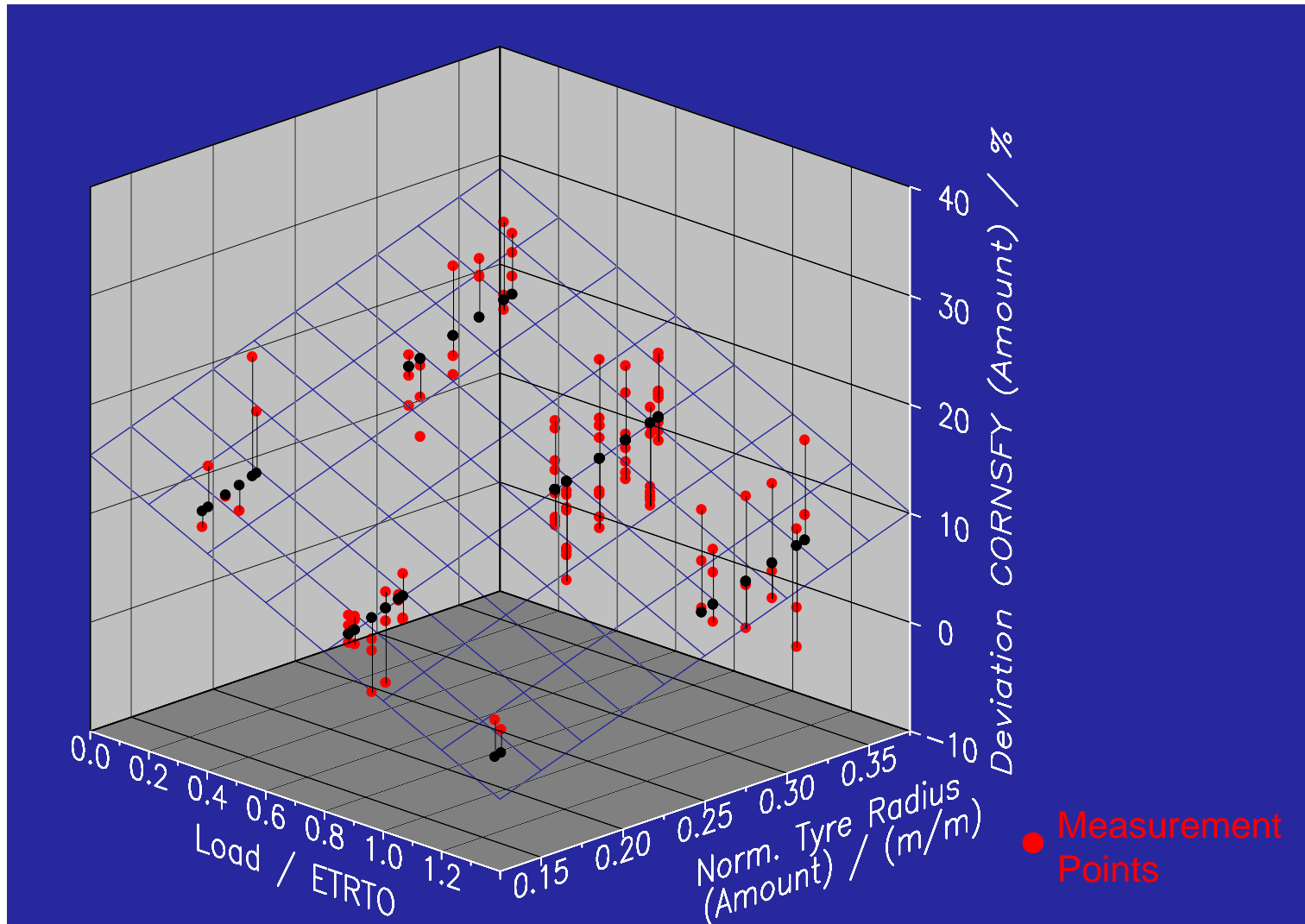
Influence of Temperature (4)

- Maximum value of lateral force
 - Influence of the ambient temperature (5°C , 30°C) amounts to 5 %, related to 20°C
 - Influence of velocity and slip angle velocity amounts up to 6 %
- Cornering stiffness
 - Influence of the ambient temperature (5°C , 30°C) amounts up to 8 %, related to 20°C
 - Influence of velocity, slip angle amplitude and slip angle velocity amounts up to 8 %

Influence of Drum Curvature (1)



Influence of Drum Curvature (2)

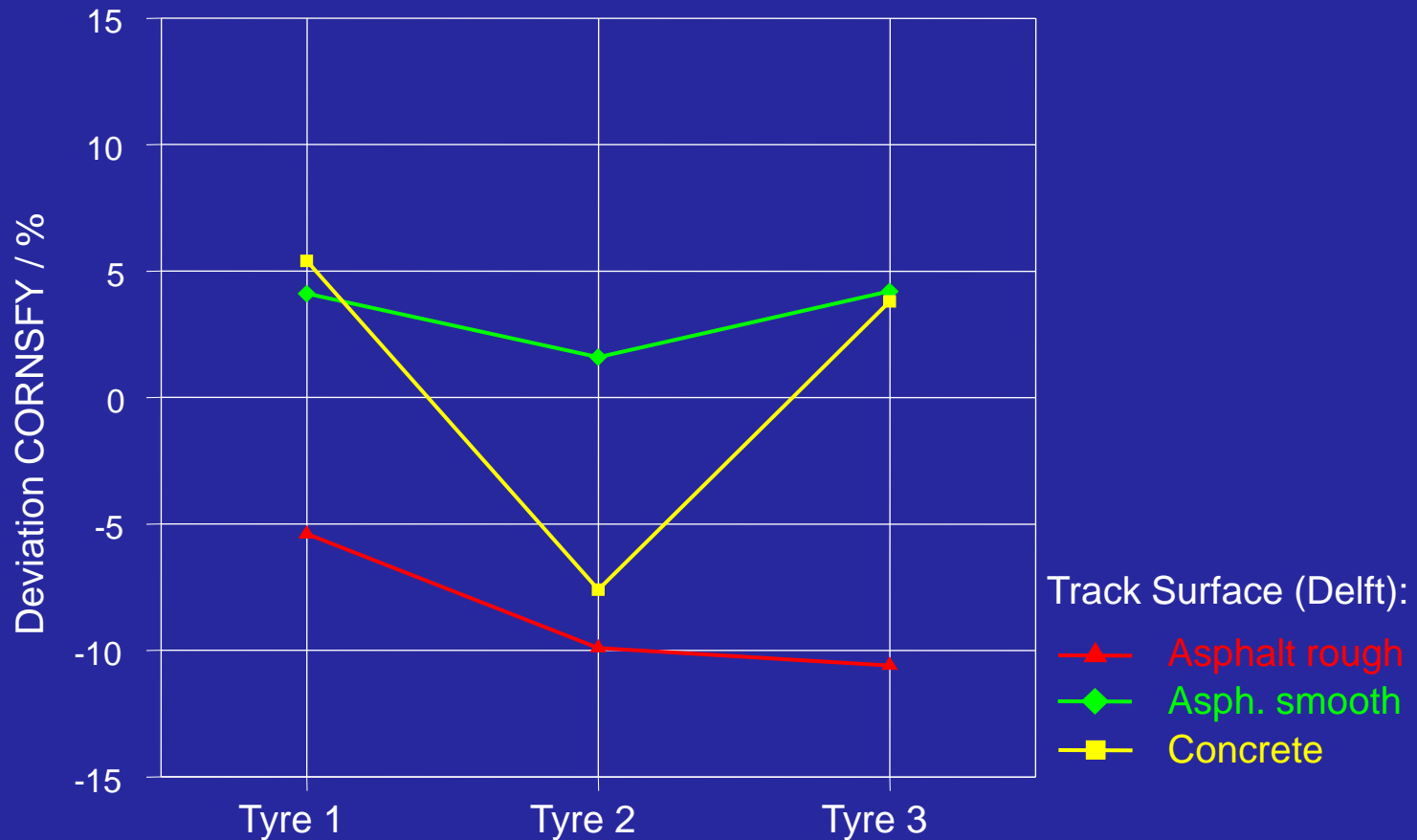


Influence of Drum Curvature (3)

- In comparison with a flat track surface the cornering stiffness is
 - on a external drum smaller
 - on a internal drum bigger
- For a \varnothing 2.0 m drum the difference amounts to approximately 15 %
- The percentage influence of the curvature increases
 - with increasing tyre radius
 - with decreasing vertical load
- The influence of the drum curvature on the aligning stiffness is bigger but in tendency similar

Influence of the Test Device (1)

Cornering Stiffness Measured with the Test Trailer of Delft
Referred to Results measured on Concrete in Karlsruhe



Influence of the Test Device (2)

- The measured tyre properties show
 - similar parameter influences but
 - partly with different sensitivity
- The best agreement between the two test benches was found on
 - smooth asphalt track for the test trailer and
 - concrete surface for the internal drum

Summary

- For a comparison of results measured on different test devices
 - the track surface and
 - the track curvature have to be considered
- Different measurement procedures cause
 - different tyre temperatures and
 - therefrom different tyre test results
- These boundary conditions have to be as identical as possible with real driving conditions on the road