

**DAIMLER**

**ARGILLON**

**JM**

**Johnson Matthey**  
Catalysts

## **Long term experiences with HDD SCR Catalysts**

Alexander Funk

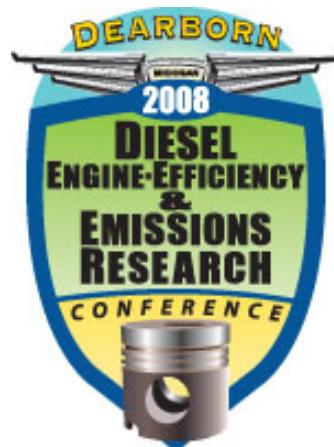
Maria Brandmair

Lothar Hofmann

Daimler AG

JM / Argillon GmbH

JM / Argillon GmbH



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ENVIRONMENTAL CATALYSTS AND TECHNOLOGIES



## **Long term experiences with HDD SCR Catalysts**

Motivation

Pot. Catalyst deterioration

Results from long term tests

Catalyst analysis and findings

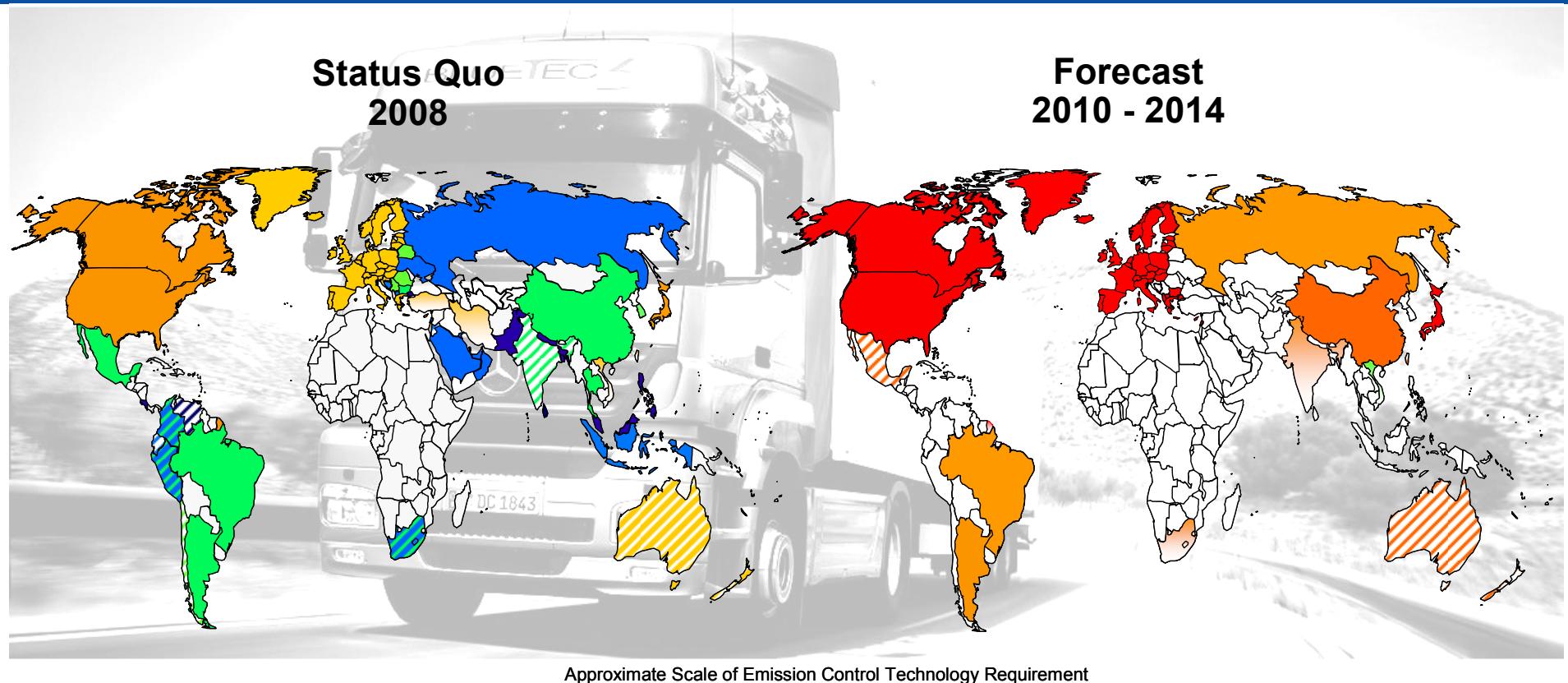
Summary and Conclusions



# Emission Standards all over the world



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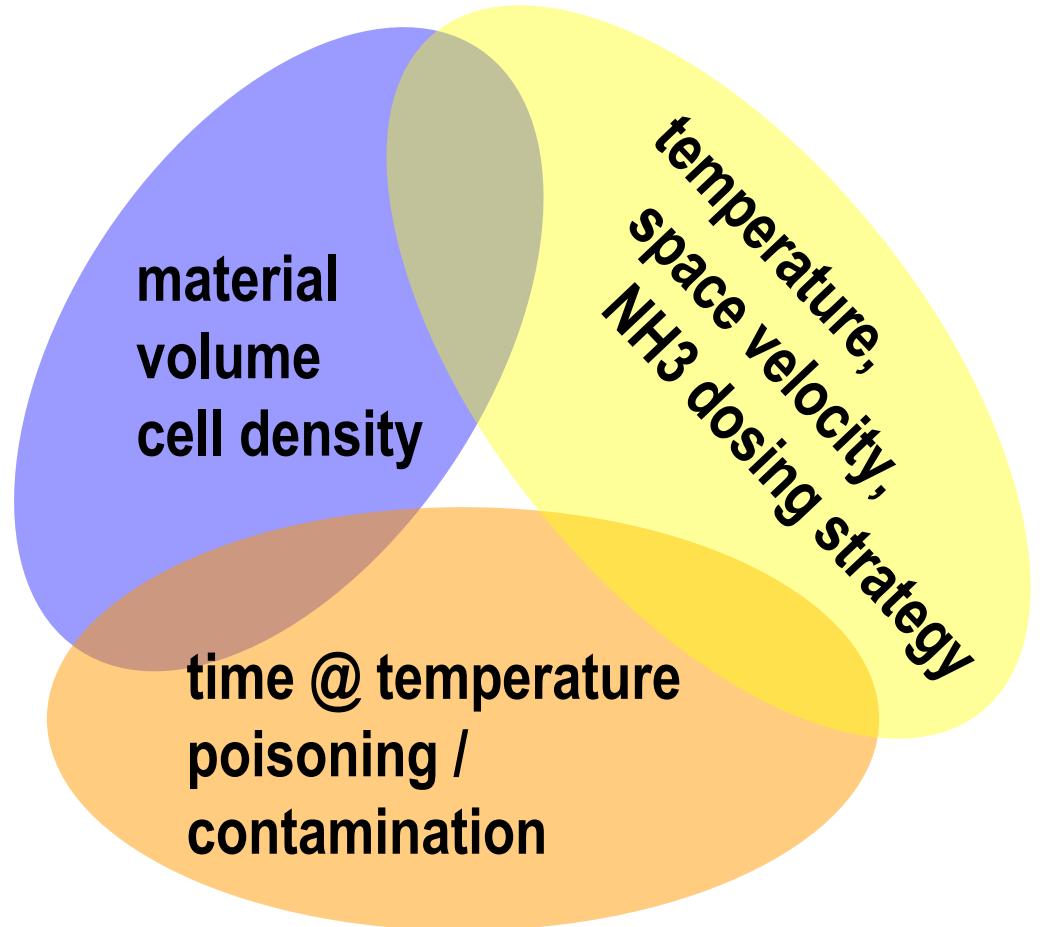
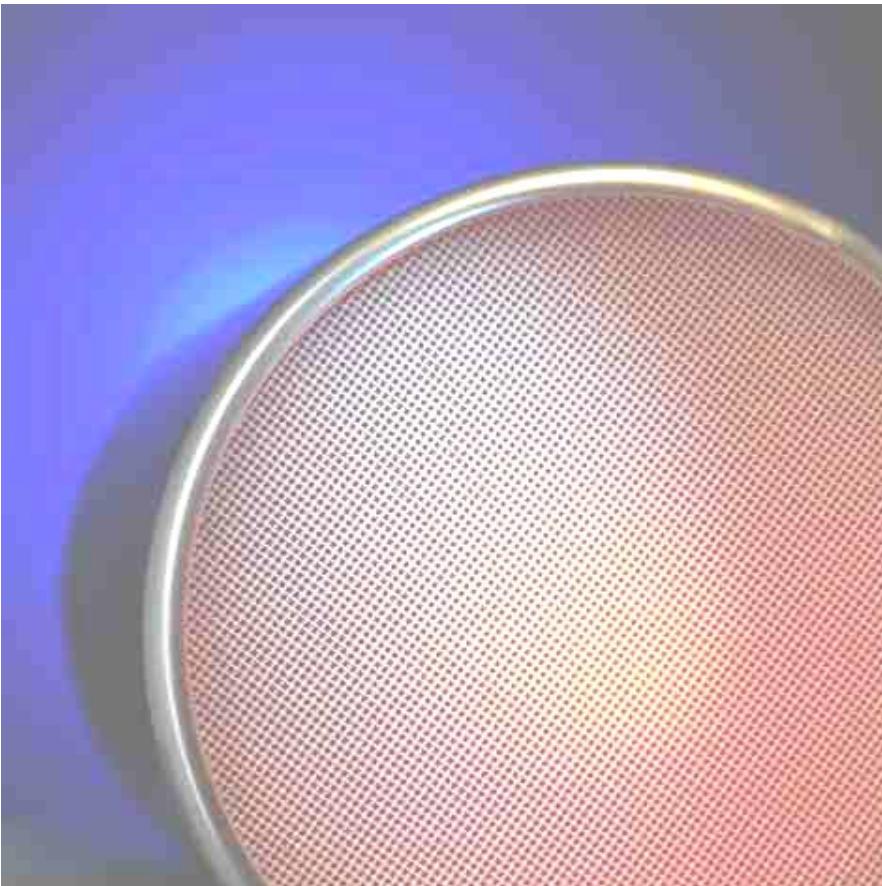
Source: DAG, M.B. country representatives, Internet, German Embassy

■ Euro 2 ■ Euro 3 ■ Euro 4 ■ Euro 5 ■ Euro 6  
■ EPA 94 ■ EPA 98 ■ EPA 04 ■ EPA 07 ■ EPA10

□ N/A  
Shaded area: not decided yet  
Hatched area: more standards apply

=> NOx emission control is indicated all over the world

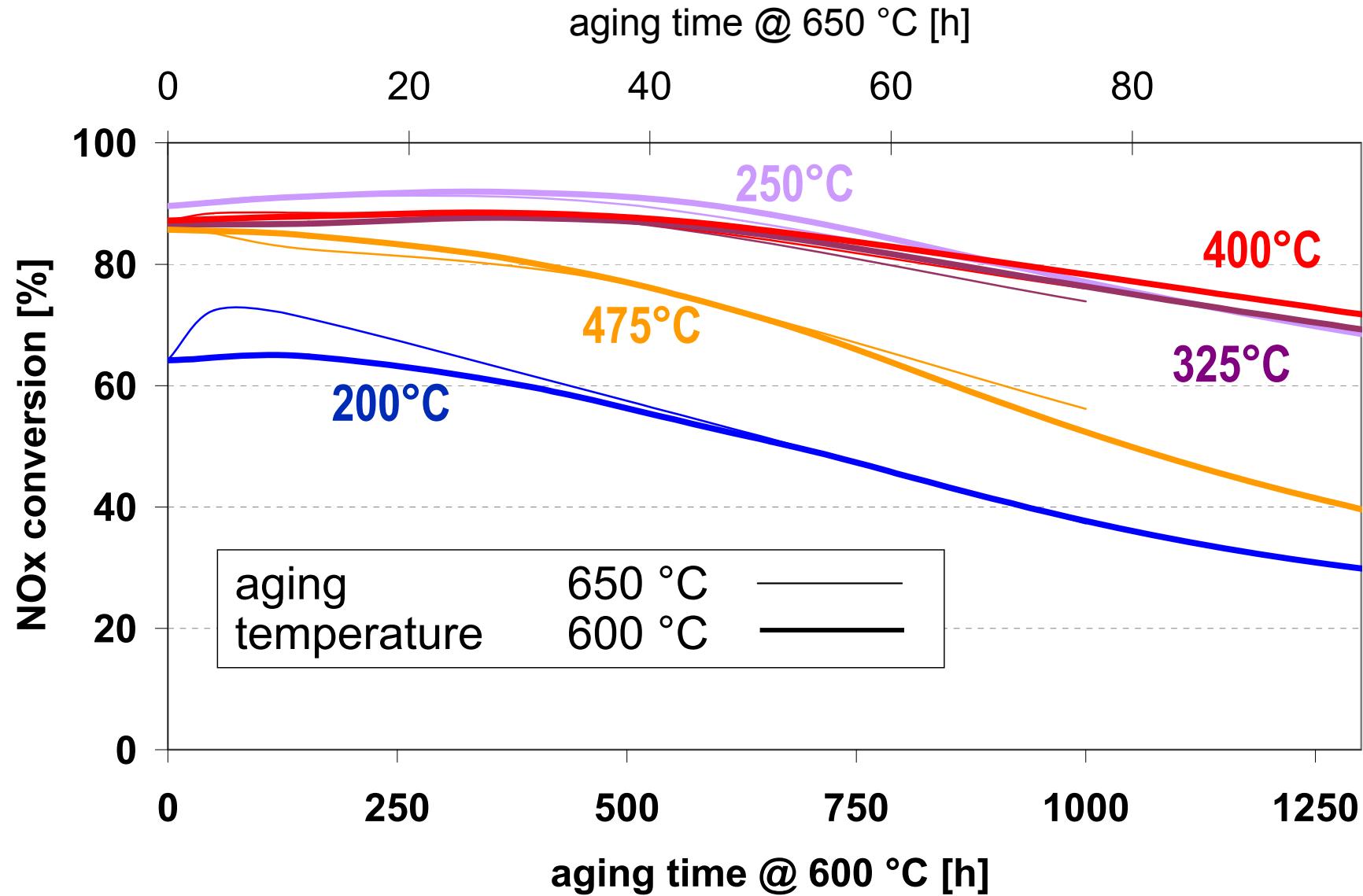
# NOx conversion performance is result of various parameters



# Activation or deactivation by thermal aging ?



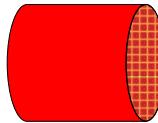
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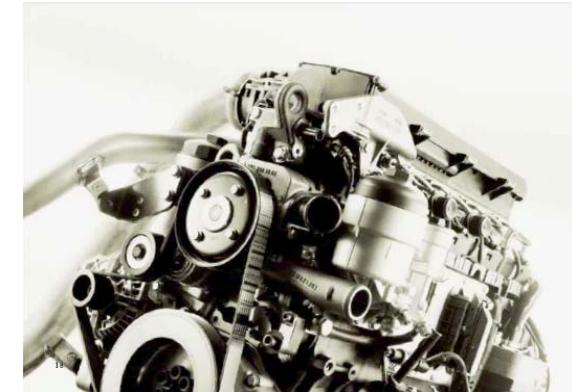
# Evaluated long term test programs



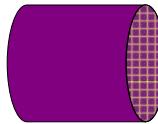
**3000h**



- Medium Duty Application Durability Test
- Test Bench Program



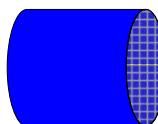
**750 000km (466 kMiles)**



- 3 Years Heavy Duty Durability Test
- Severe Test Program



**915 000km (569 kMiles)**



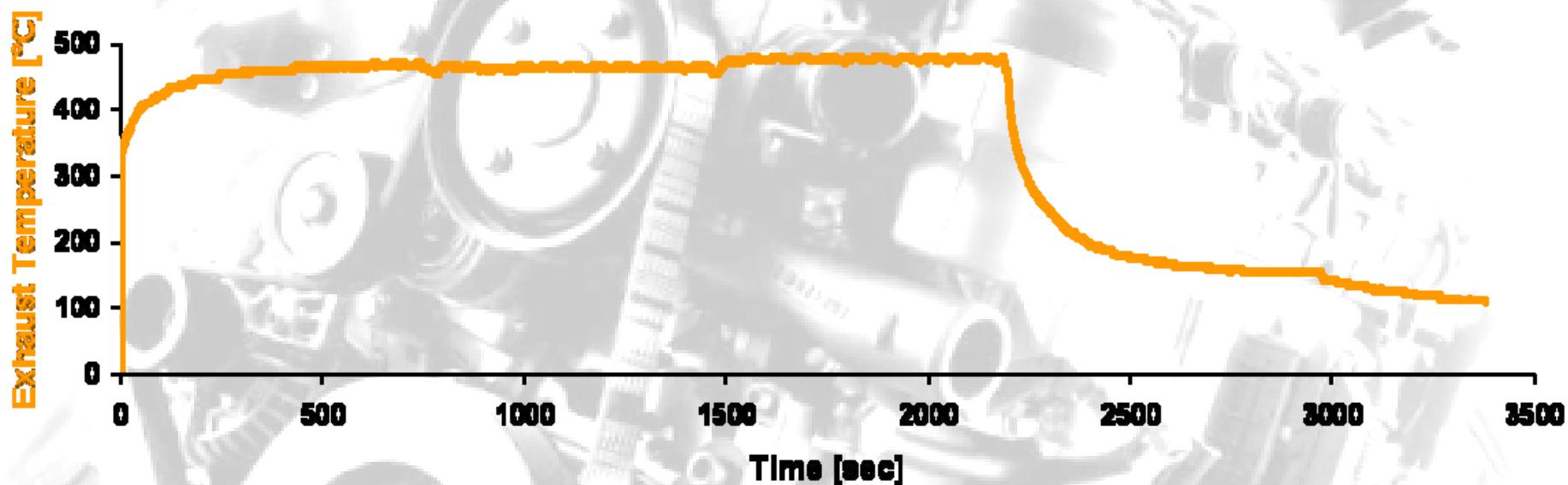
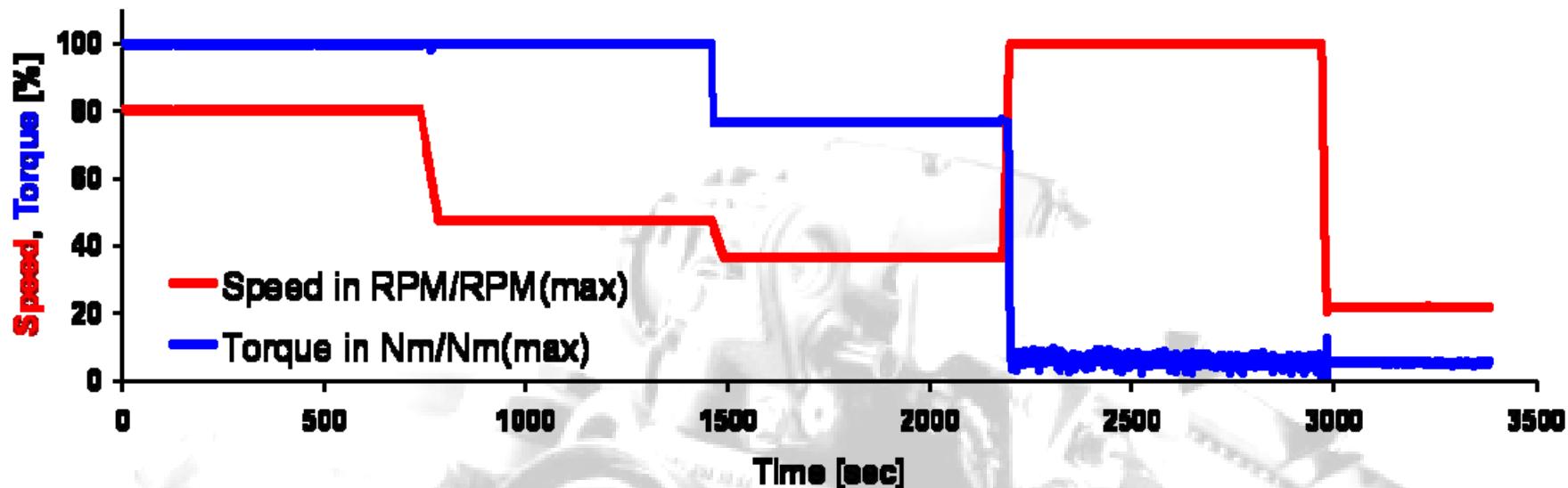
- 3 Years Heavy Duty Field Test Program
- On-Highway Test



# 3000h DAIMLER BlueTec® Medium Duty Application Durability Test – Test Bench Aging Conditions



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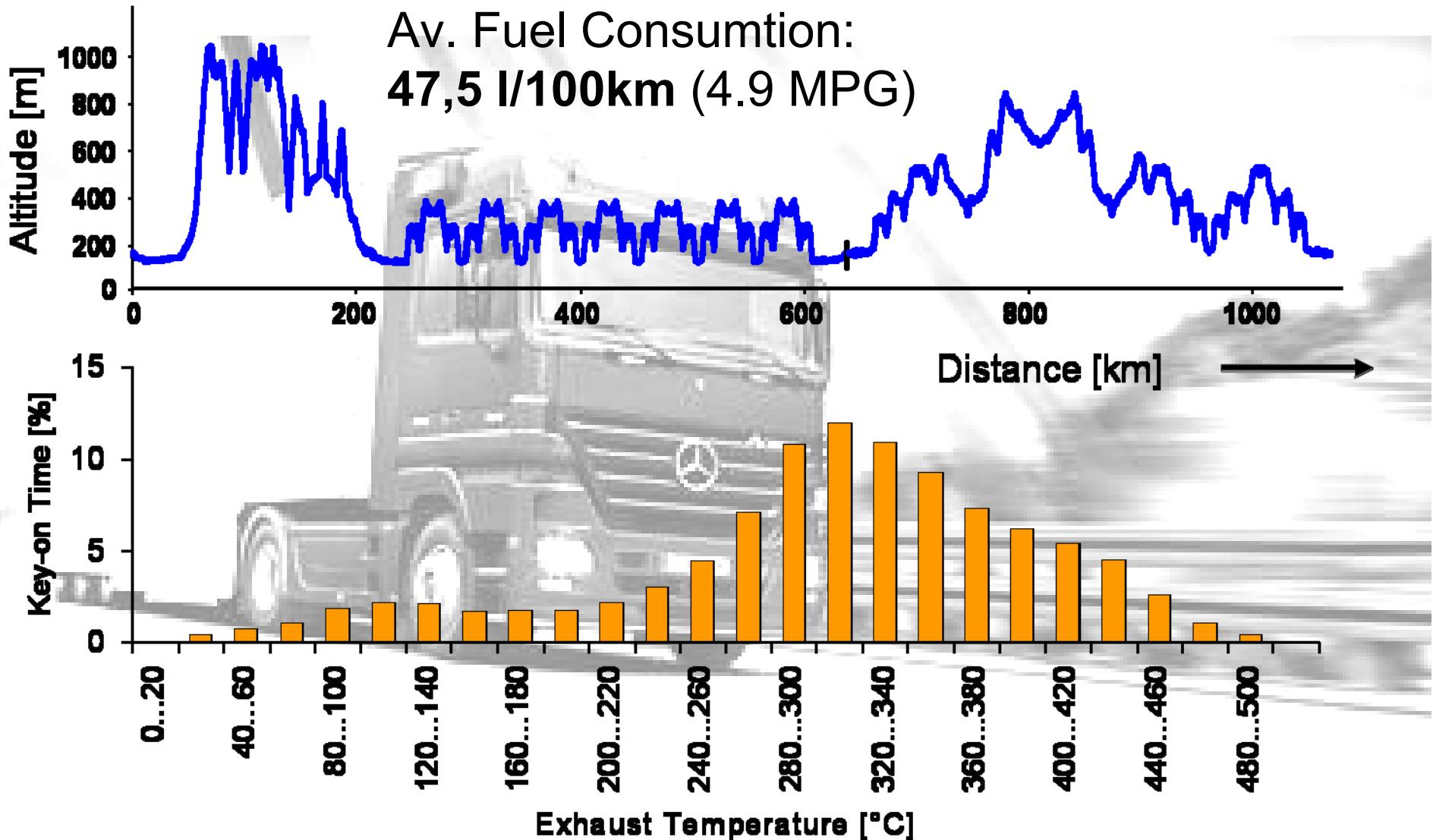


# 3 Years Mercedes-Benz BlueTec® HD Durability Test

## Severe Test Program: 750 000 km (466 kMiles)



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# 3 Years Mercedes-Benz BlueTec® - HD Field Test Program

## On-Highway Test: 915 000 km (569 kMiles)



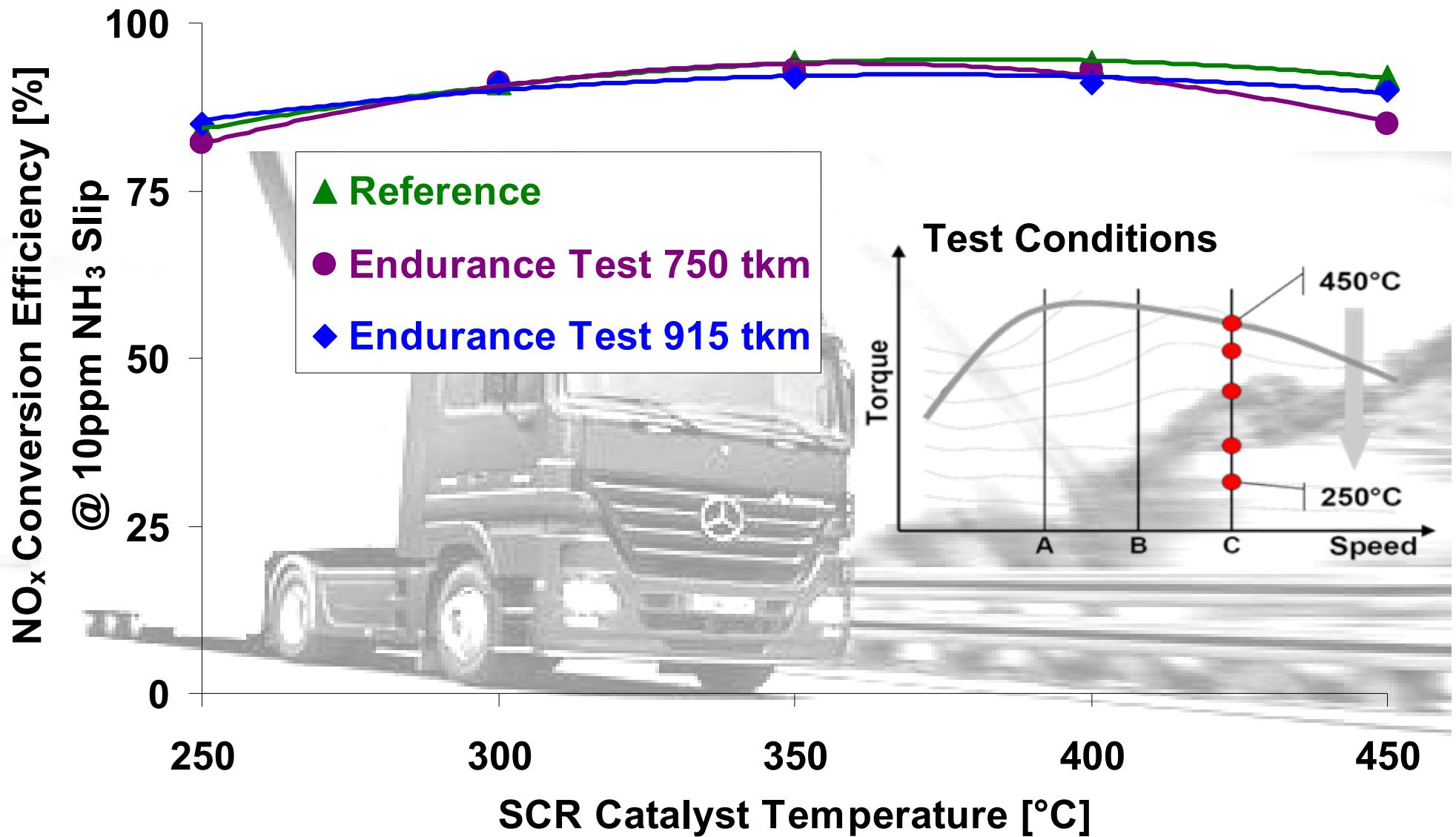
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The collage includes:

- A Mercedes-Benz logo.
- Two blue Mercedes-Benz trucks.
- A close-up of a truck's exhaust pipe and a purple fuel tank.
- A molecular model of AdBlue.
- A blue truck driving on a road.
- A map showing a route from Cologne (Köln) to Frankfurt, Stuttgart, and Dortmund, with "Example" text.
- A close-up of a truck's side panel with a "BLUE TECH" badge.
- A map showing a route from Cologne (Köln) to Koblenz, with "Example" text.
- A large white Mercedes-Benz truck with "1 Million km mit BlueTec" written on its front grille.

Average Fuel Consumption:  
31,3 l/100km (7.5 MPG)

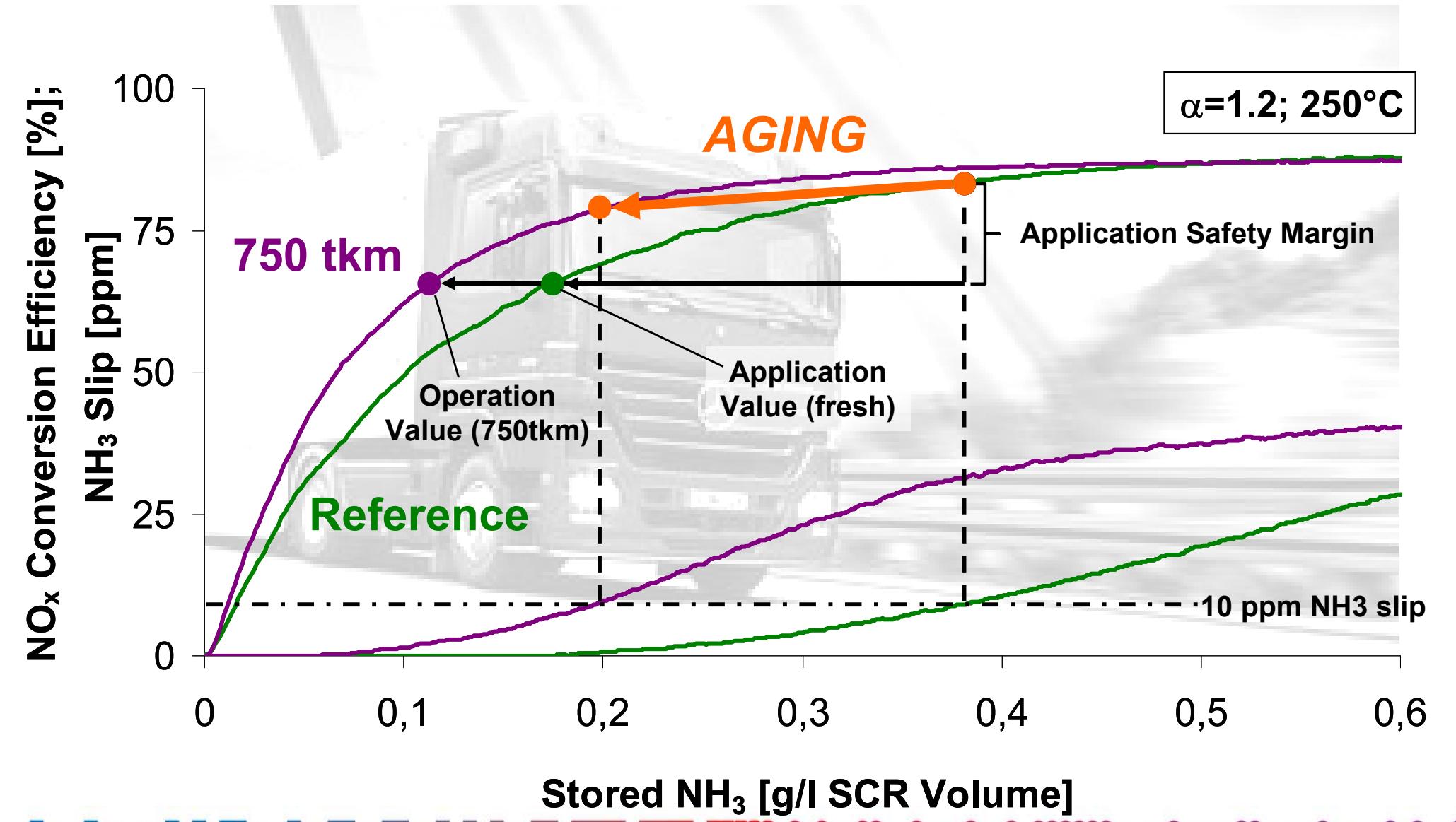
# 3 Years Mercedes-Benz BlueTec® HD Durability Test NOx Conversion Activities – Heavy Duty On-Highway



# Impact on transient NOx conversion performance after 750 000 km (466 kMiles)



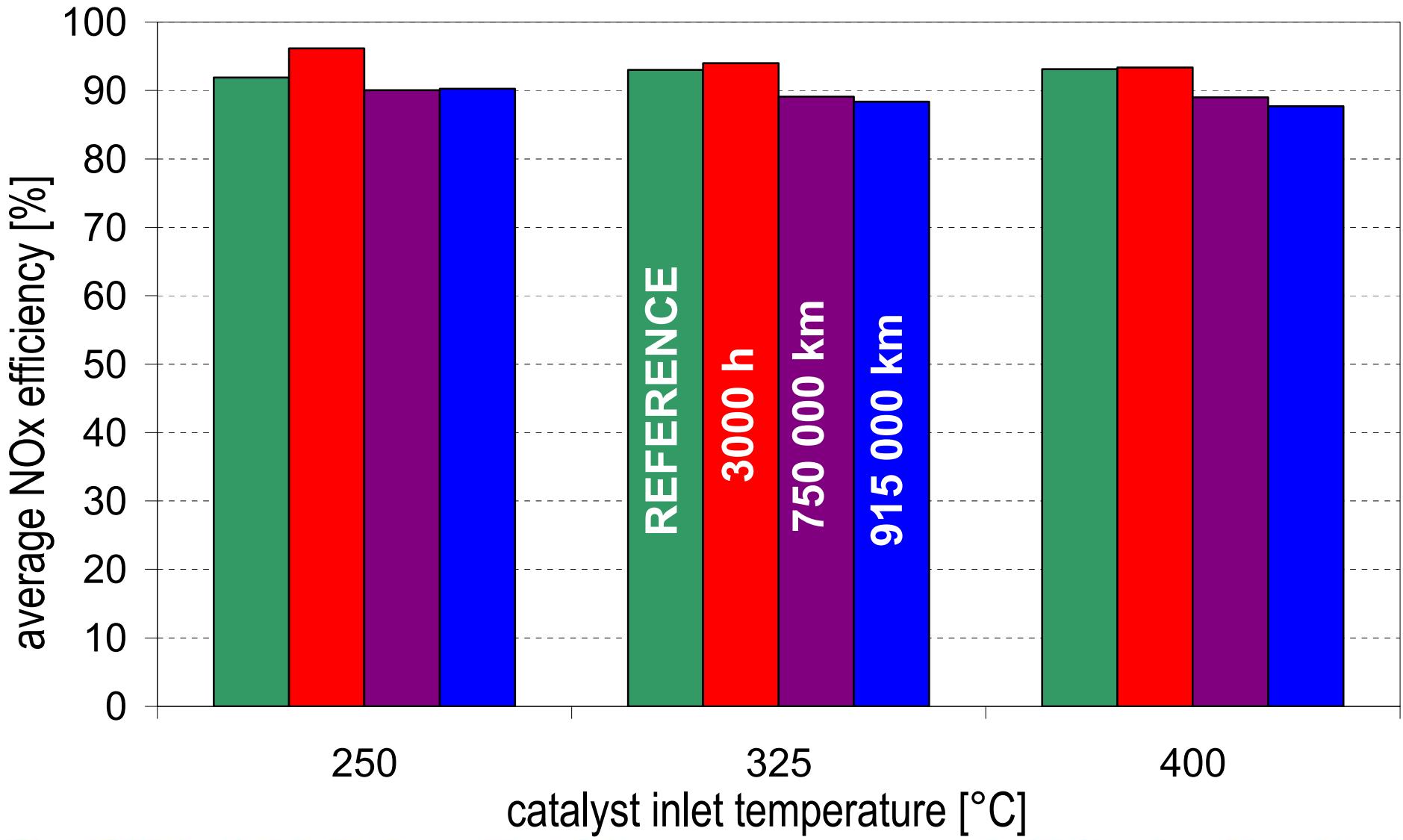
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# NOx conversion after long term tests for total catalyst - lab scale conditions



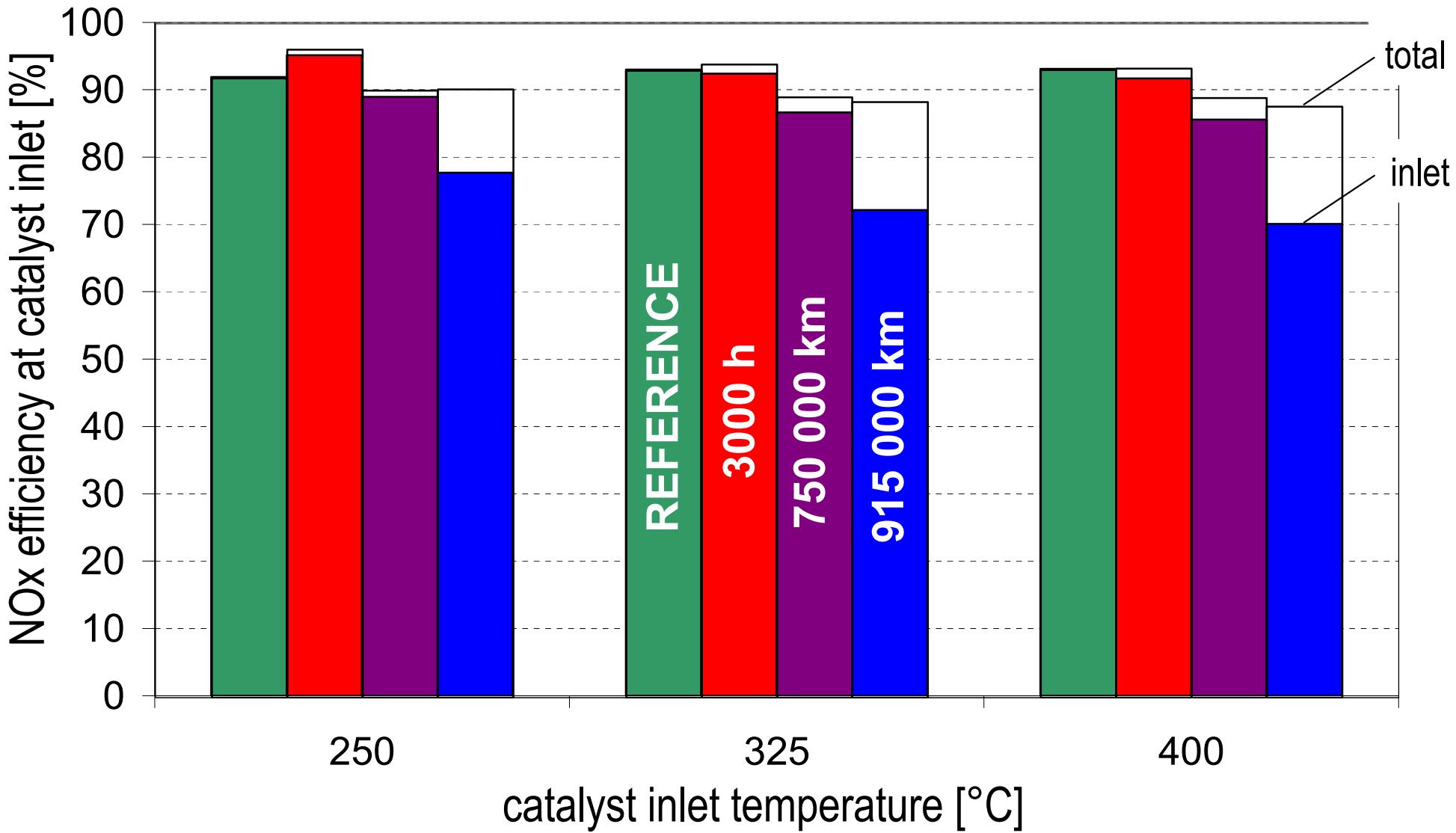
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# NOx conversion after long term tests for catalyst inlet - lab scale conditions



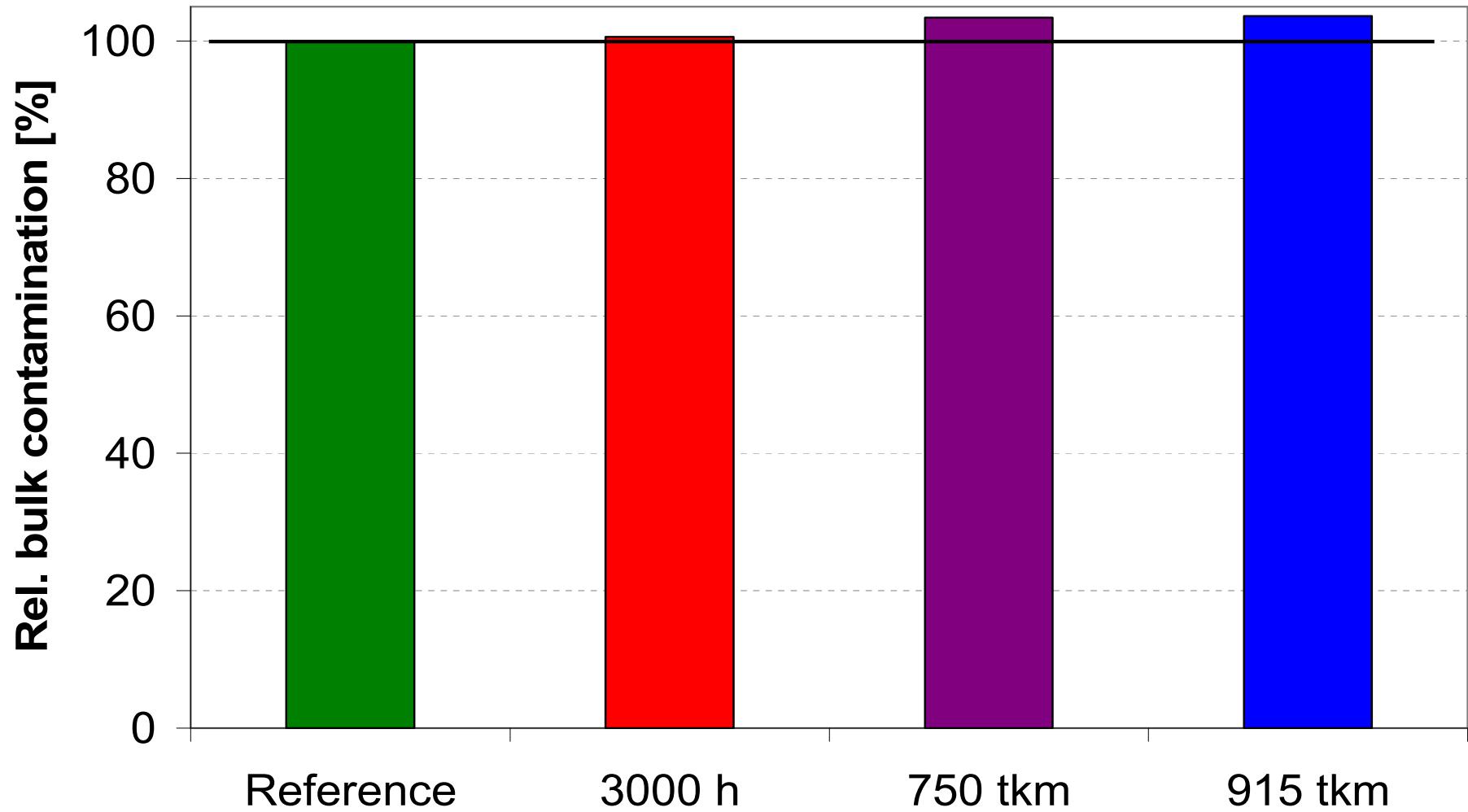
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# Poisoning of bulk catalyst by XRF



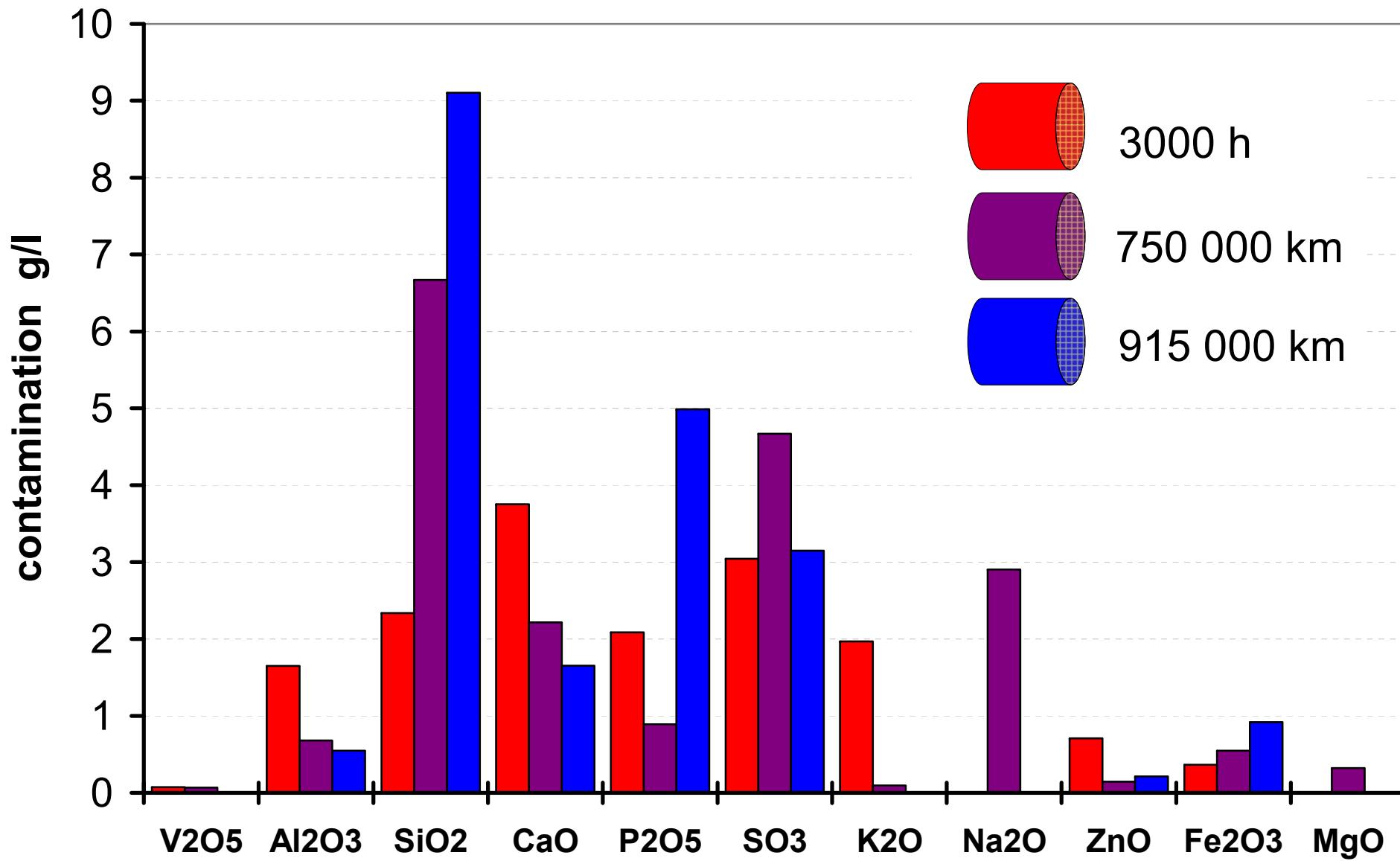
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# Catalyst Contamination after endurance tests



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# Summary and Conclusions



- 3 long term test programs were performed at Daimler while conditions were tracked, thus tendencies of aging impacts could be figured out
- High robustness and extensive long-term stability of Argillon SCR catalysts are demonstrated under typical truck operation conditions
- Improved catalyst performance was determined after 3000 h test bench aging
- Highest catalyst contamination in inlet zone detected but thermal activation may partly compensate for poisoning effect
- NOx efficiency decrease correlates mainly to P und Si poisoning



# Acknowledgements



- Martin Zipperer, Daimler AG
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- Mandy Griese, PMNOx
- Thomas Johansson, MBTech



## Thank you

