

Synchronized data acquisition at the test bench and cycle related GCA-calculation of "real driving" applications



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CONTENT

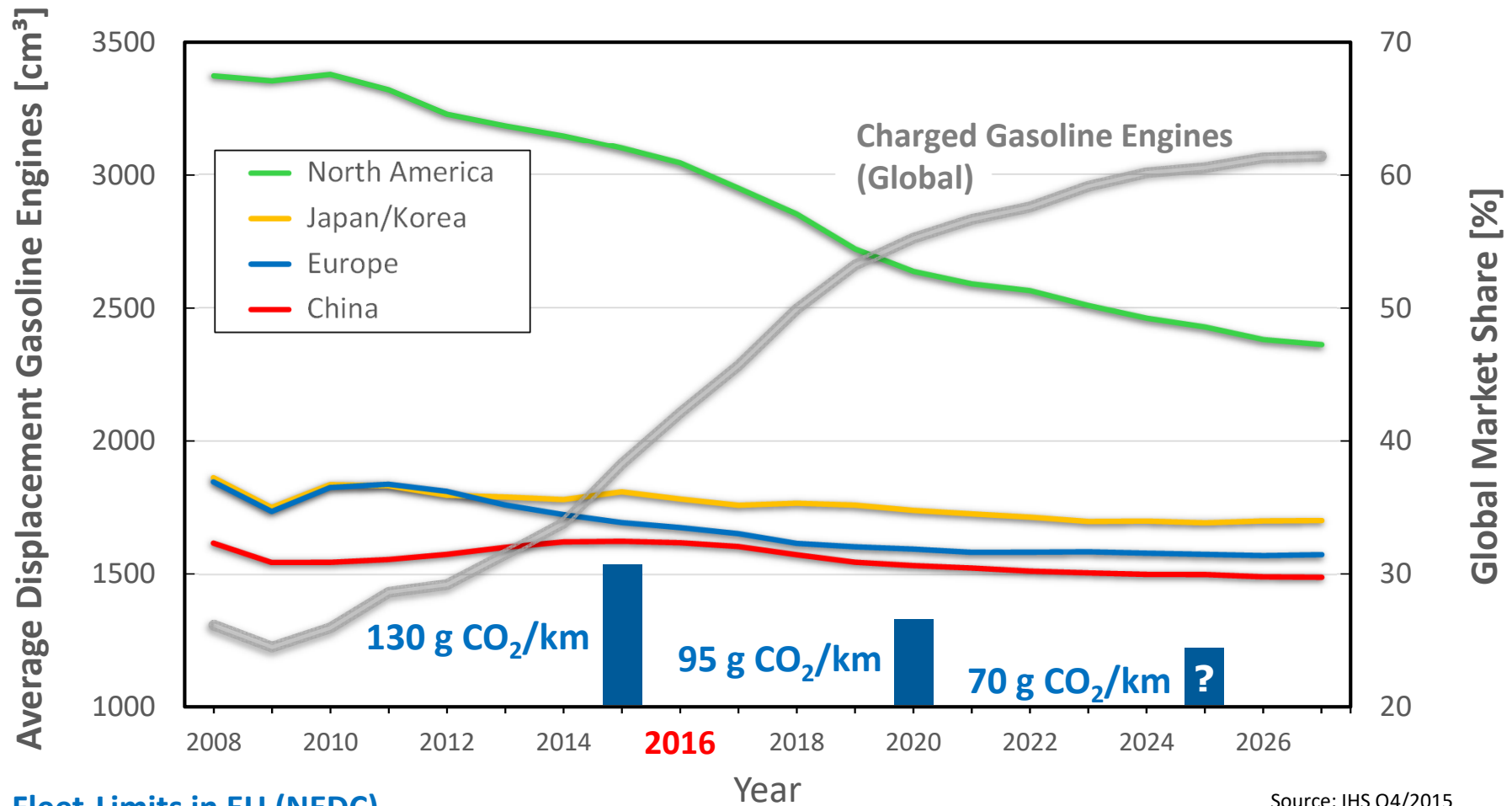


- Einleitung
 - RDE (transiente Analyse), NOx im Scavenging, Downsizing
- Aufgabenstellung
 - Zyklische Prozessanalyse (LW & Verbr.) "real driving" Betrieb
 - Potential NOx im Hinblick auf RDE
- Messtechnik & Methodik für Transiente Analyse
 - GCA – virtueller Sensor
 - Verw. Messtechnik
 - Zylinderdruckeinpassung (Sensitivität auf MFB50, etc.)
 - Kraftstoffmassenbestimmung (Anforderung: transient pro Zylinder)
 - Luftmassenbestimmung (Verifikation GCA)
 - "Next Generation Indicating"
- Anwendung "real driving"
 - Verifikationen (Sensordrift, Kraftstoffmasse zyklisch, etc.)
 - Ladungswechselanalyse (Stat. vs. Transient)
 - Optimierung Lastsprungverhalten
 - NOx-Potential RDE (Katüberwachung)
- Ausblick
- Online-Entwicklungstool in der VerbrennungsentwicklungEinleitung
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TRENDS IN DISPLACEMENT & TECHNOLOGY



CO₂-Fleet-Limits in EU (NEDC)

Source: IHS Q4/2015

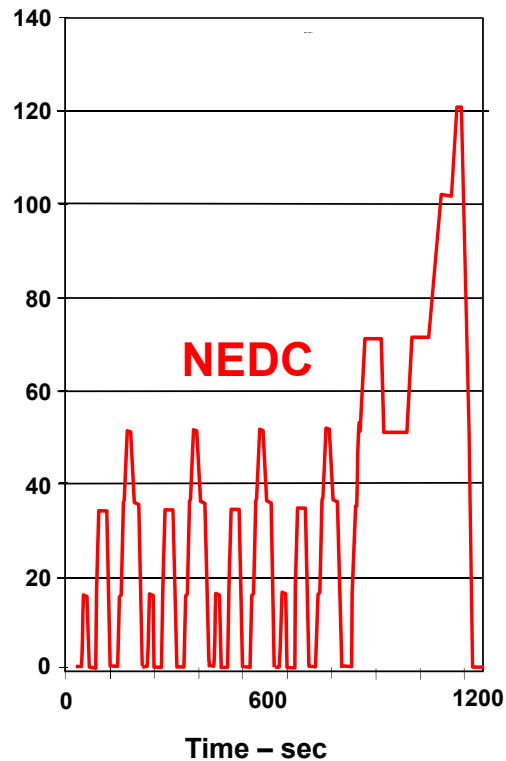
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EMISSION LEGISLATION – PASSENGER CARS

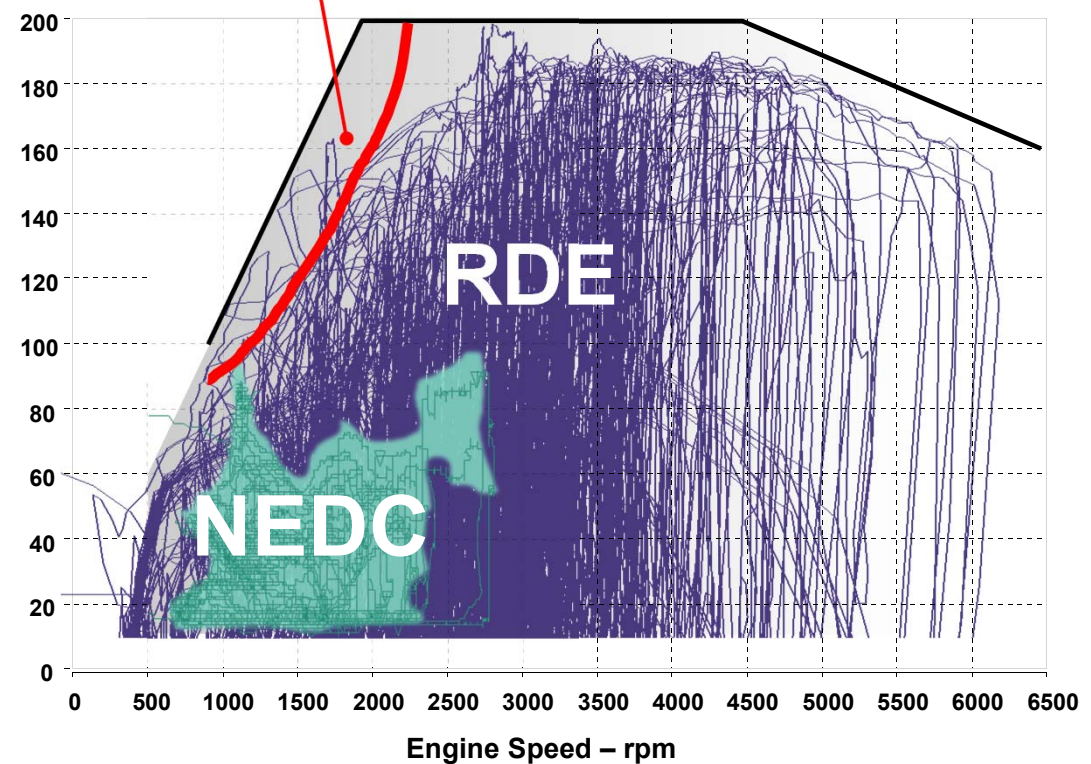
Scavenging – Risk for Future RDE-Compliance?

Vehicle Speed – km/h



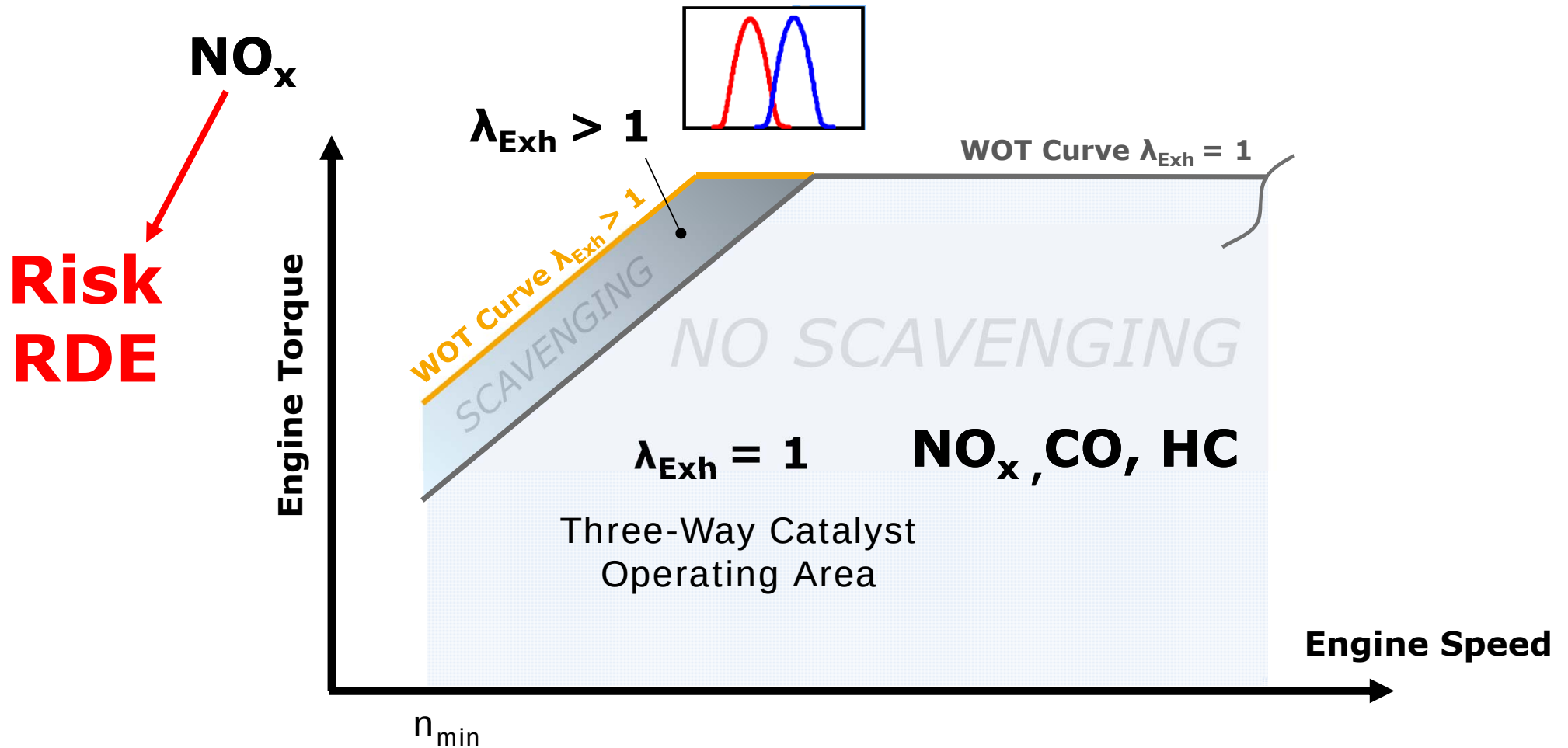
NEDC ... New European Driving Cycle

Rel. Engine Load – %



RDE ... Real Driving Emissions

SCAVENGING – FUTURE RISK FOR TGDI



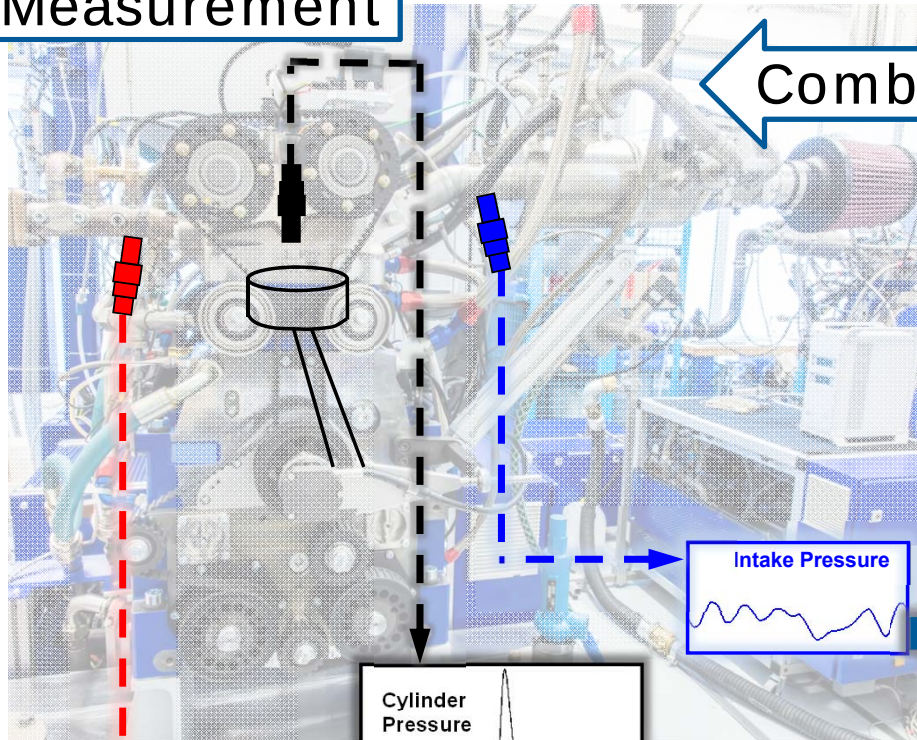
TGDI ... Turbocharged Gasoline Direct Injection

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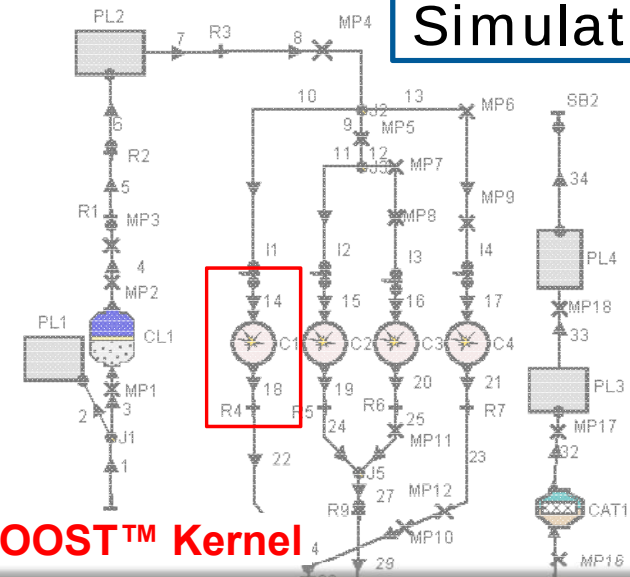
AVL GCA™ – WORKING PRINCIPLE

Measurement

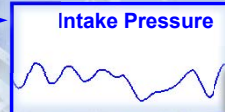
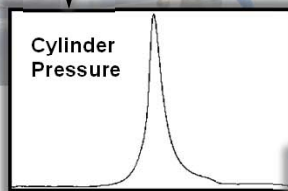
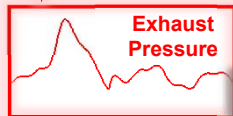
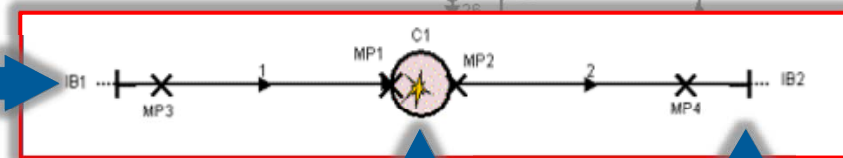


Combination

Simulation



AVL BOOST™ Kernel



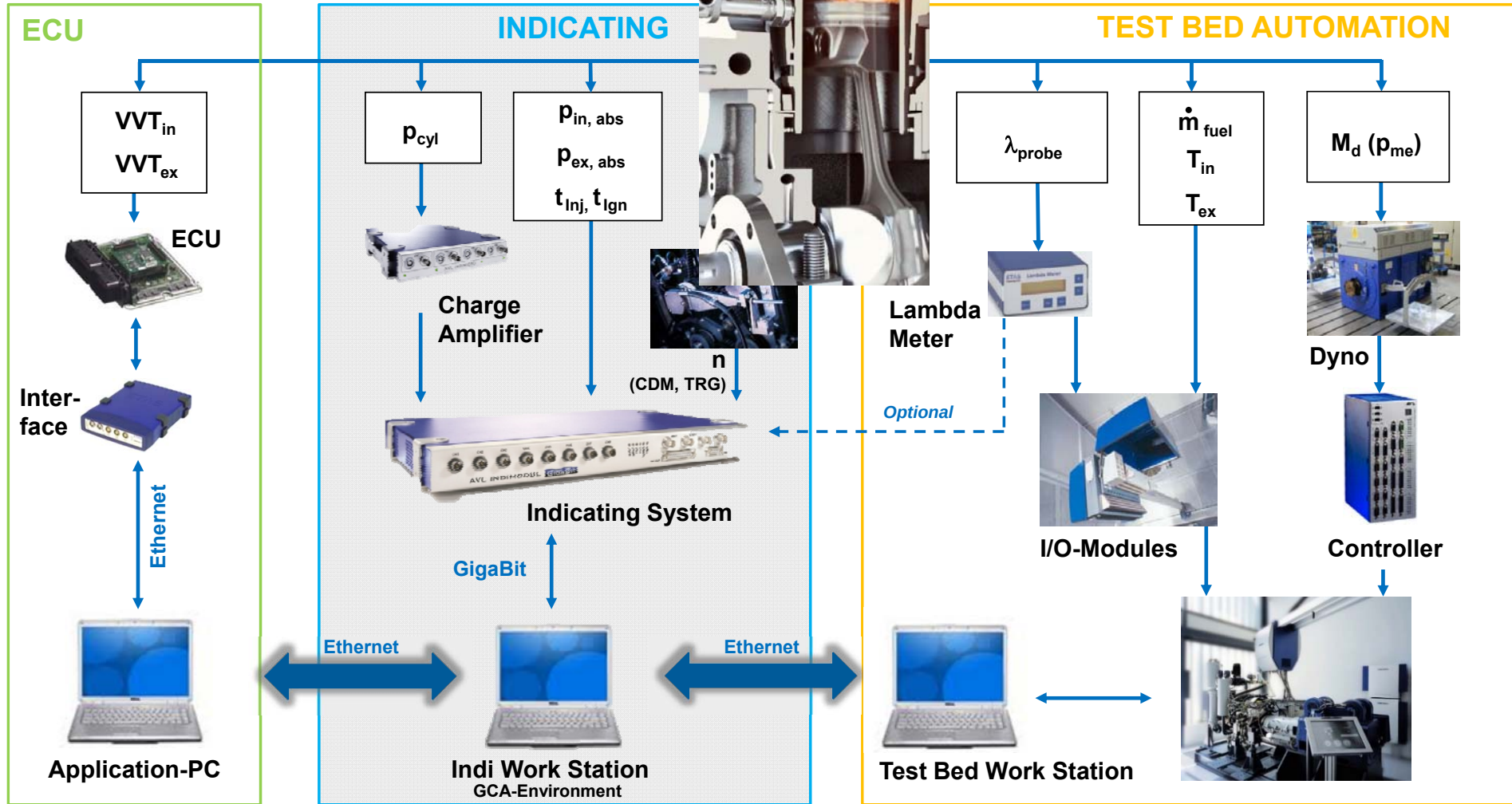
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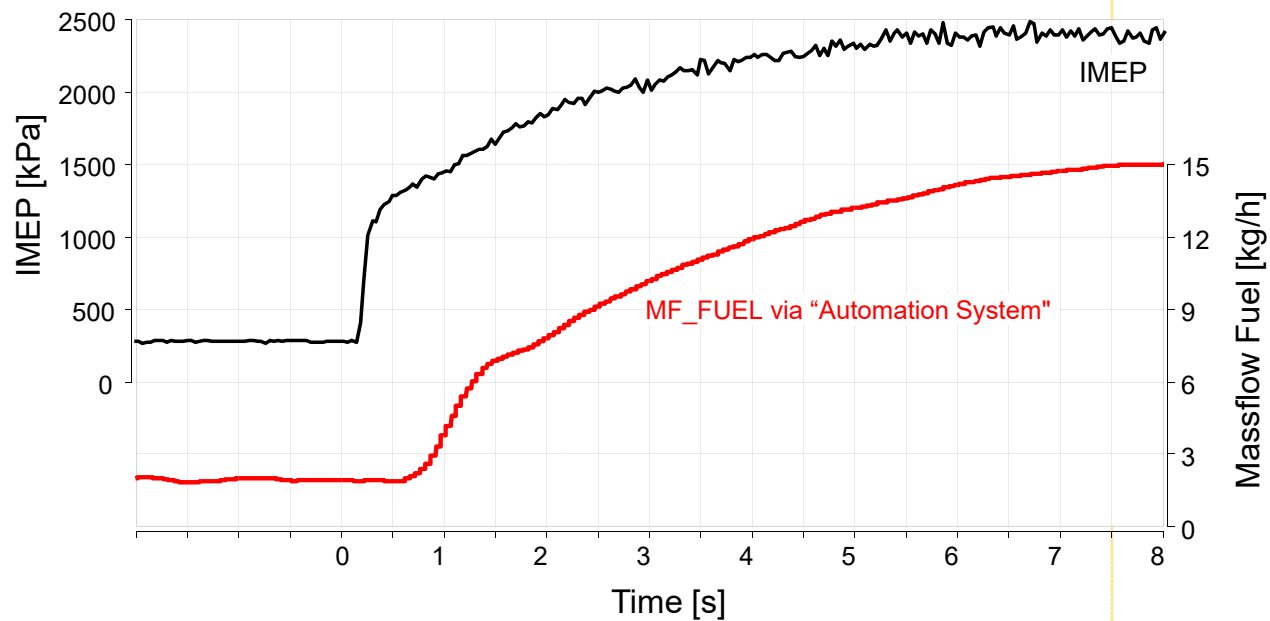
TEST BED SETUP



TGDI



TIME DELAY @ FUEL MASS ACQUISITION

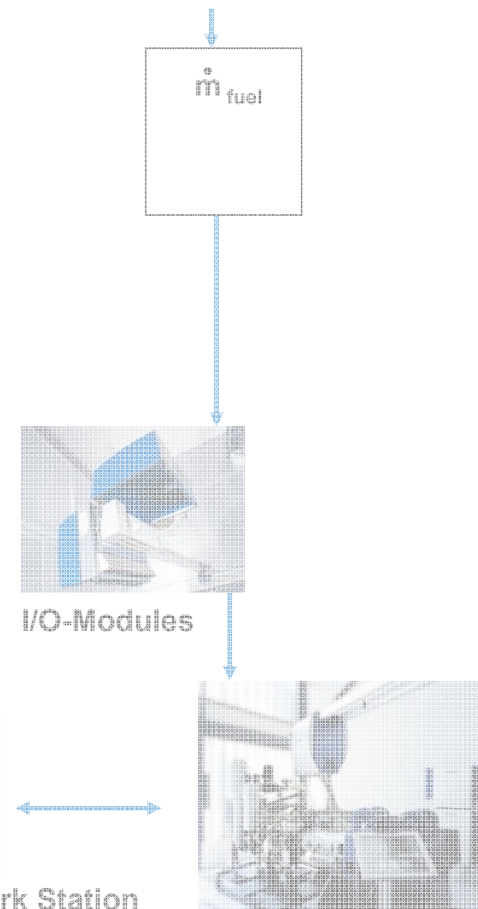


TEST BED AUTOMATION

Indi Work Station
GCA-Environment

Ethernet

Test Bed Work Station



WORKFLOW TRANSIENT ANALYSIS

Standard System



Post Processing

GCA, CalcGraf, ...

e.g. „Real Driving”

offline

Data Acquisition

Synchronization

Calculation

Analysis

online

**Intelligent
System**

GCA, CalcGraf, ...

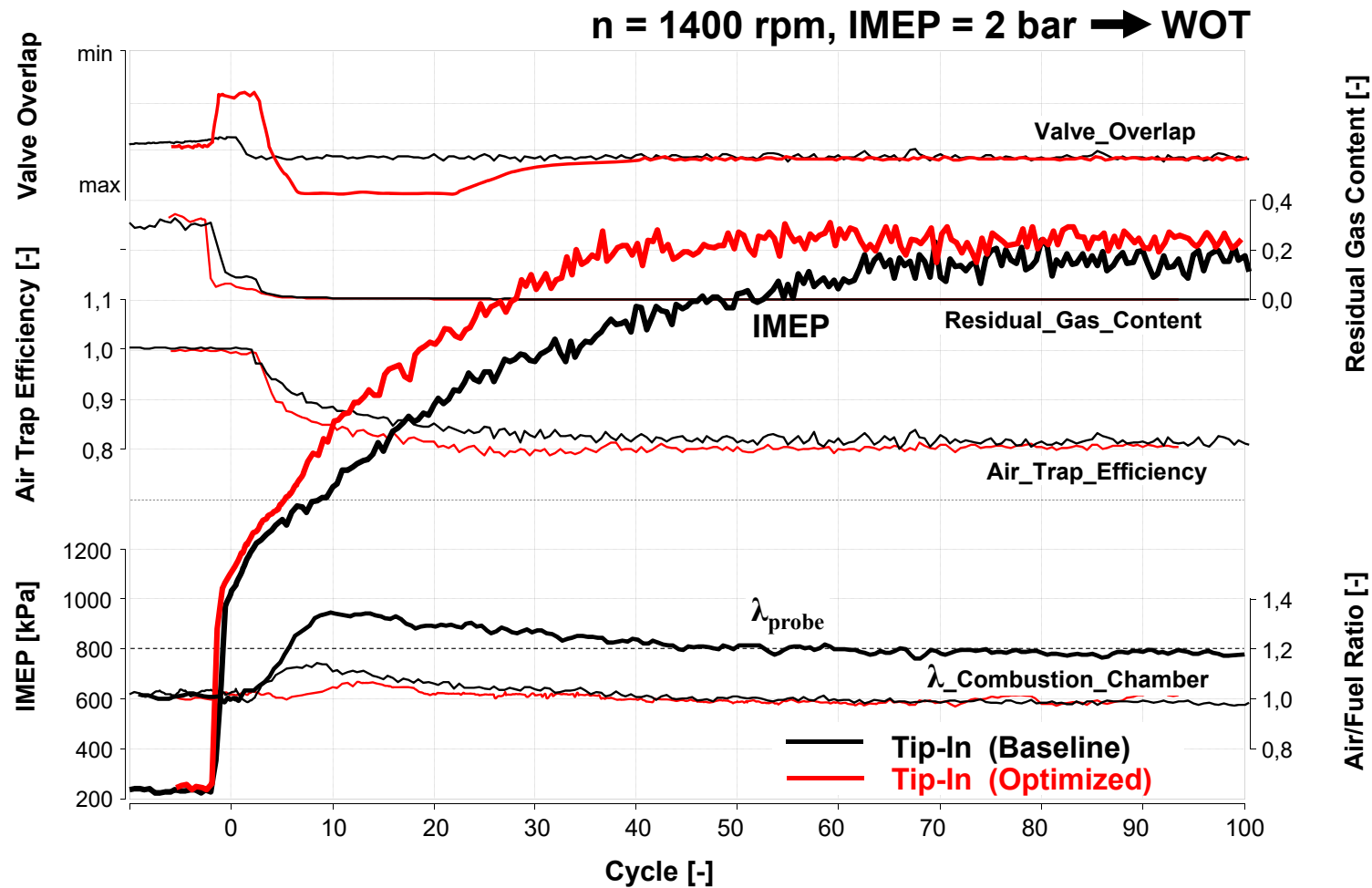
e.g. „Real Driving”

Saving of Time

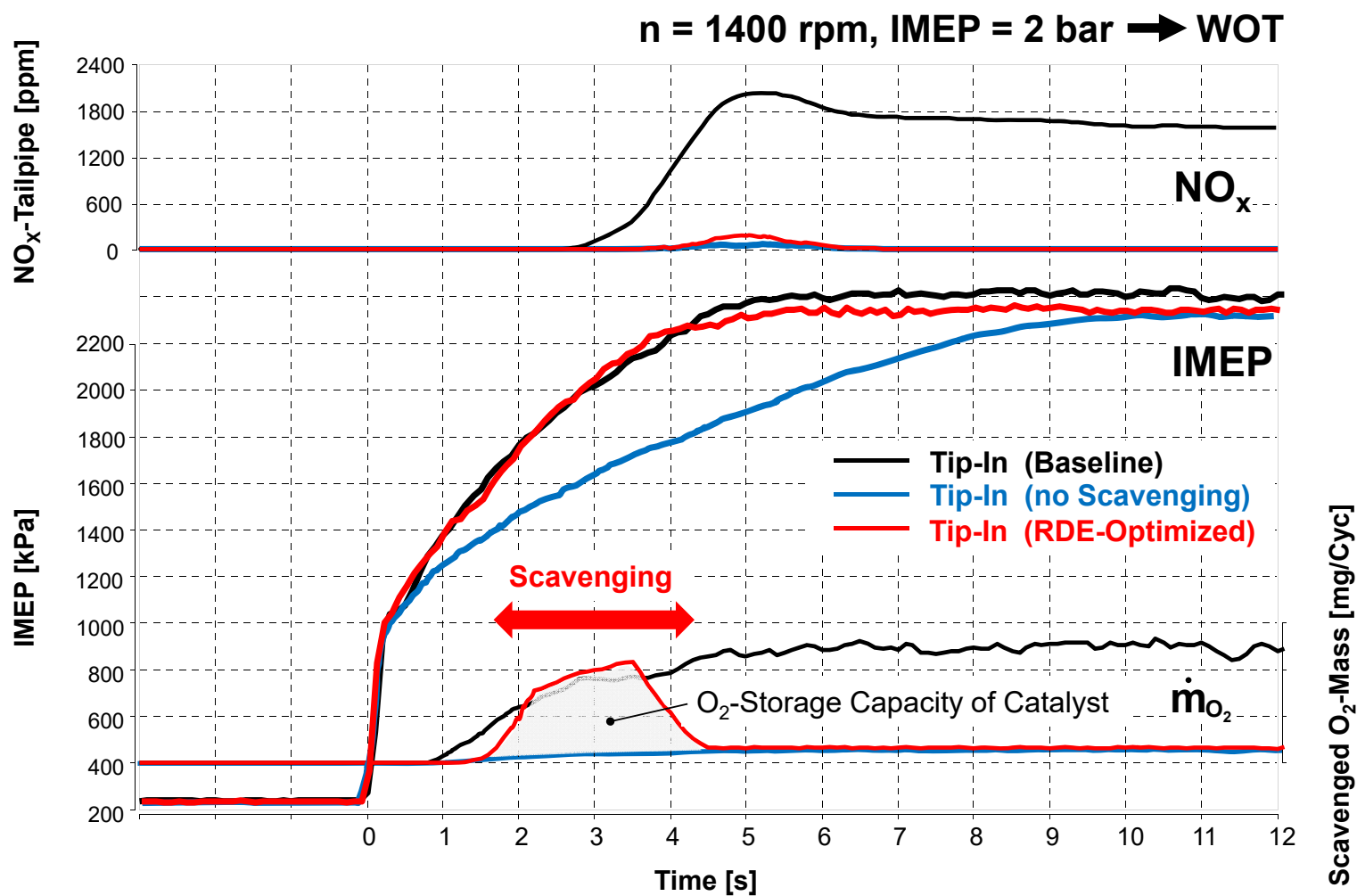
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RESPONSE OPTIMIZATION



RDE OPTIMIZATION

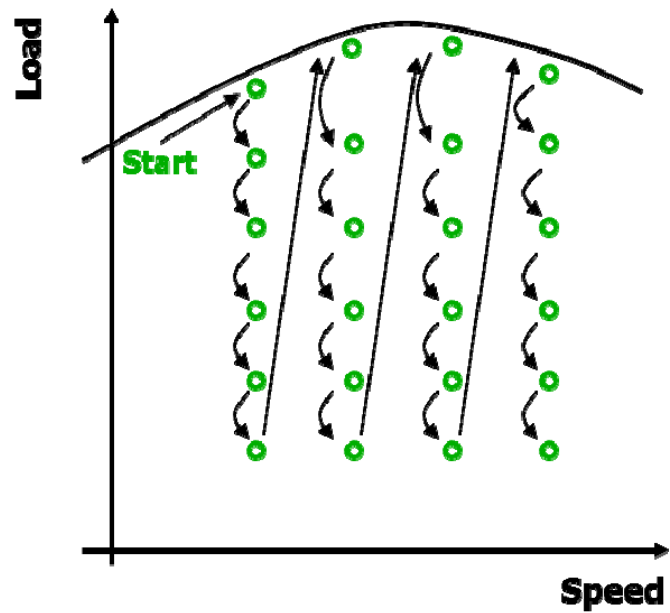


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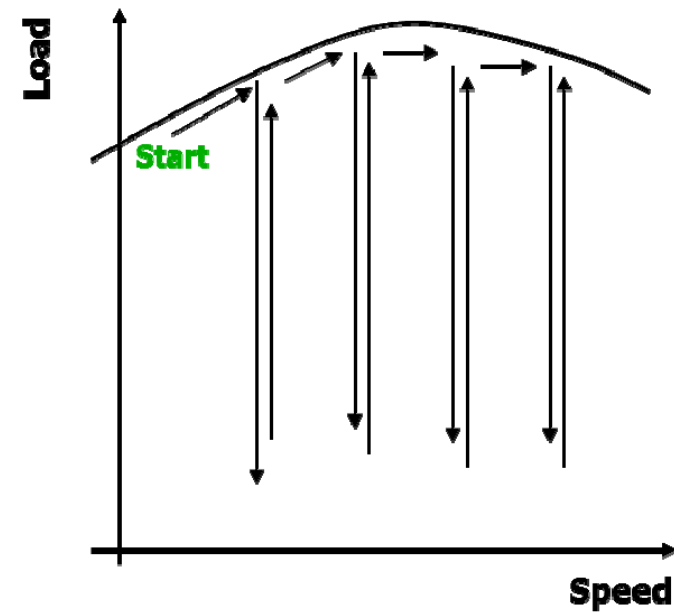
SUMMARY & OUTLOOK

Traditional



Variation of Parameters:
Step by Step

SDS



Variation of Parameters:
Continuous

SDS ... Slow Dynamic Slopes



THANK YOU



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