



# AVL SPA™

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Commercial Vehicle: Shift Strategy Calibration

# Presenter

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# Agenda

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- 1 About Us**
- 2 Idea of SPA General**
- 3 Virtual Shift Strategy Calibration**
- 4 Commercial Vehicles Shift Strategy Calibration Features**
- 5 Live Demo**
- 6 Summary**



# About Us



AVL



# Clean Affordable Mobility

AVL is the world's largest independent company for development, simulation and testing in the automotive industry, and in other sectors. Drawing on its pioneering spirit, the company provides concepts, solutions and methodologies to shape future mobility trends.

# Facts and Figures



## Global Footprint

Represented in 26 countries

45 Affiliates at over 93 locations

45 Global Tech and Engineering Centers (including Resident Offices)

1948

Founded

11,000

Employees Worldwide

12%

Of Turnover Invested in Inhouse R&D

70+

Years of Experience

65%

Engineers and Scientists

2,500

Granted Patents in Force

97%

Export Quota

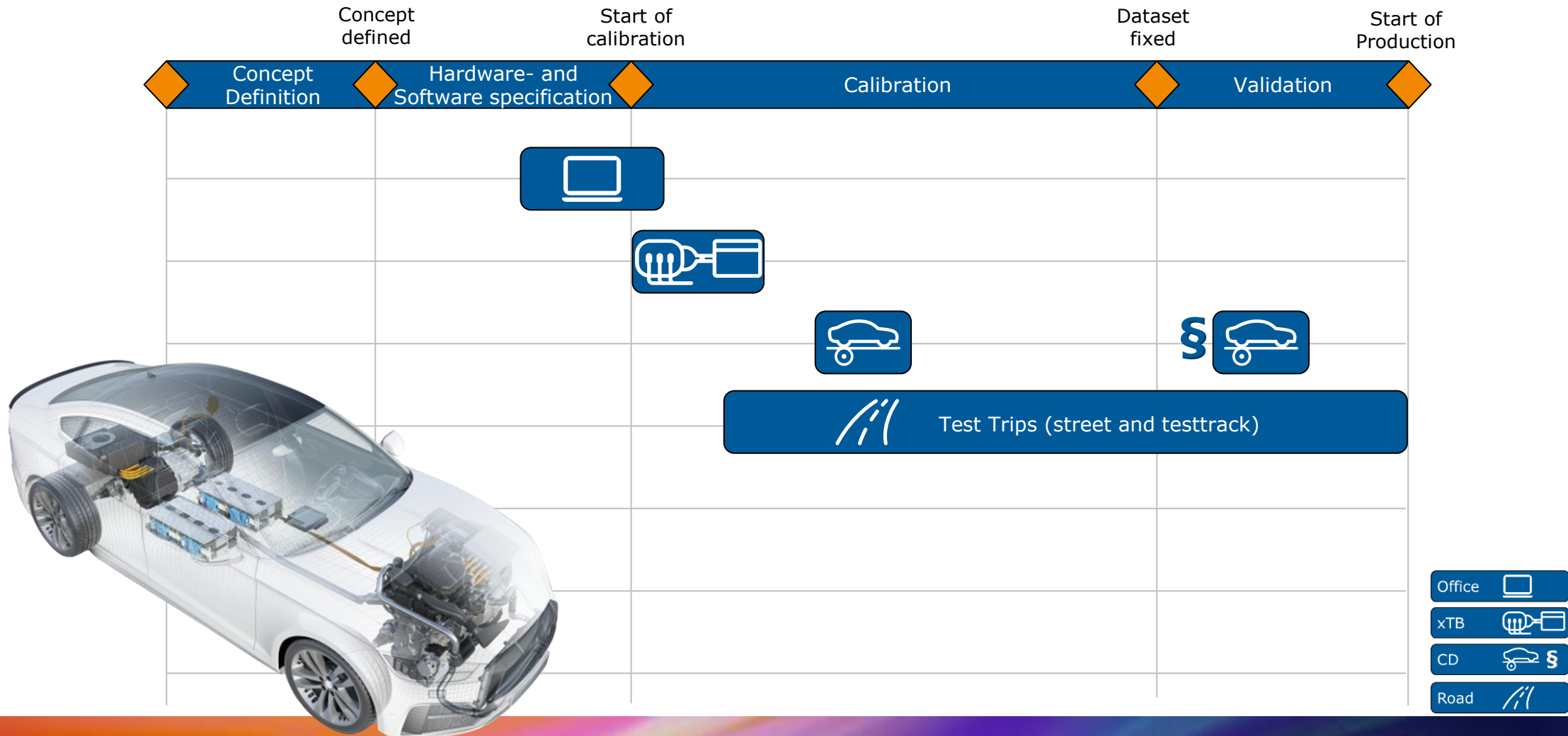




# Idea of SPA General

# Motivation

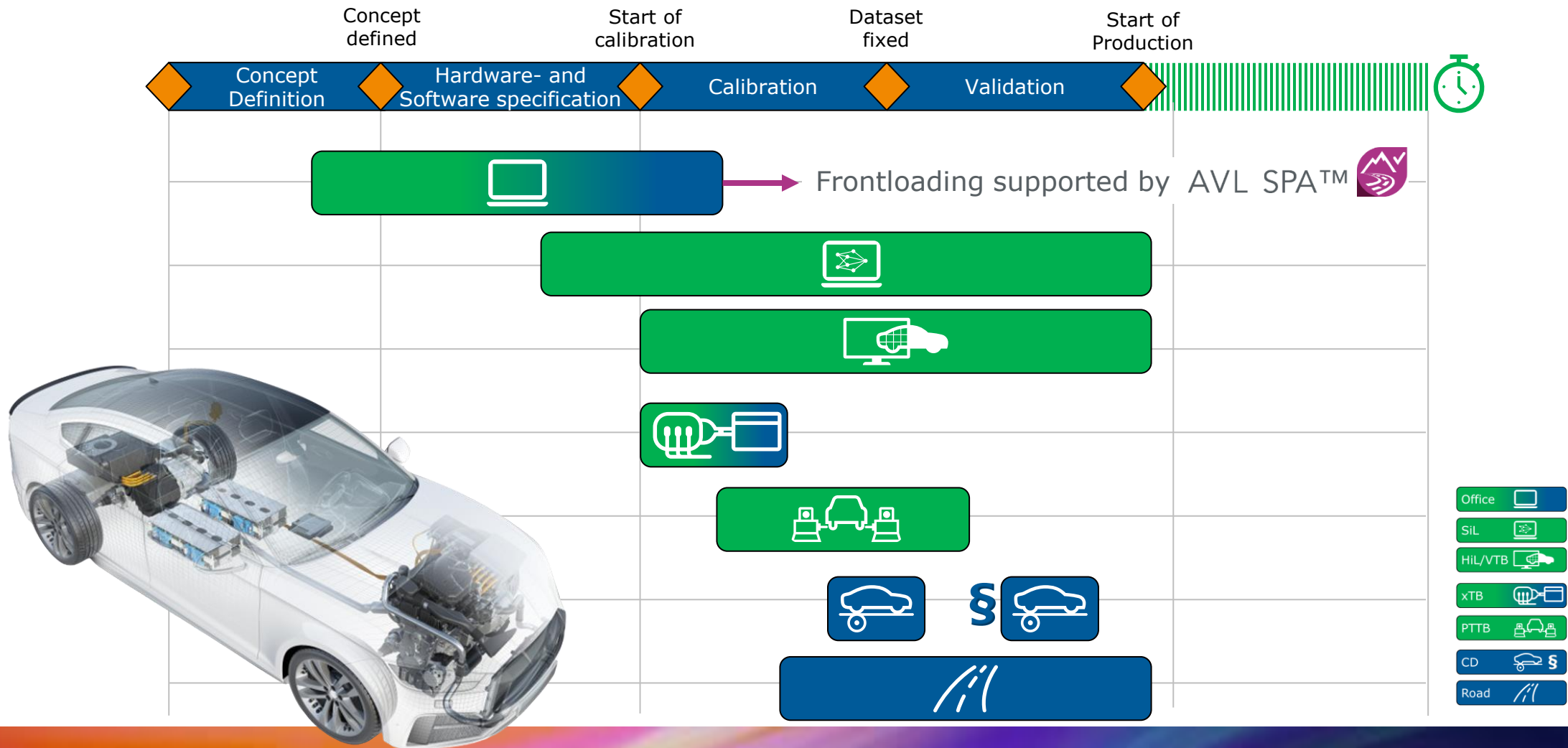
## Traditional Approach for Powertrain Calibration





# Motivation

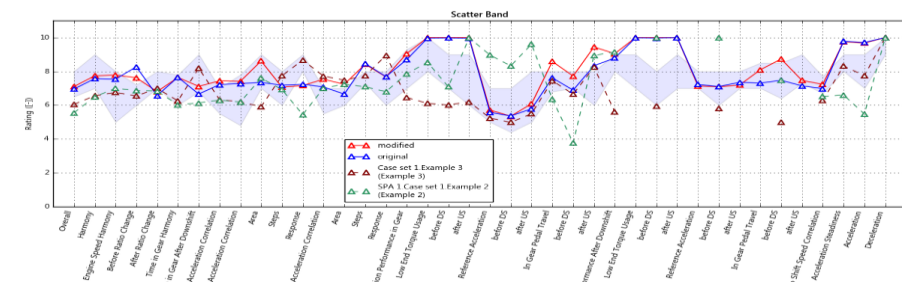
## Innovative Approach – Frontloading of Powertrain Calibration by Virtualization





# Virtual Shift Strategy Calibration

- More than **25 objective criteria for powertrain strategy**
- **Objective comparison** of internal and external benchmark vehicle
- Target / DNA **definition** with AVL SPA™
- Fleet-drivability **monitoring of supplier** with AVL SPA™
- Transmission **calibration to target** with AVL SPA™
- Immediately assess the impact of parameter changes on the drivability
- Visualize and understand tradeoffs between different powertrain strategies
- Identify weaknesses in the powertrain strategy in very short time





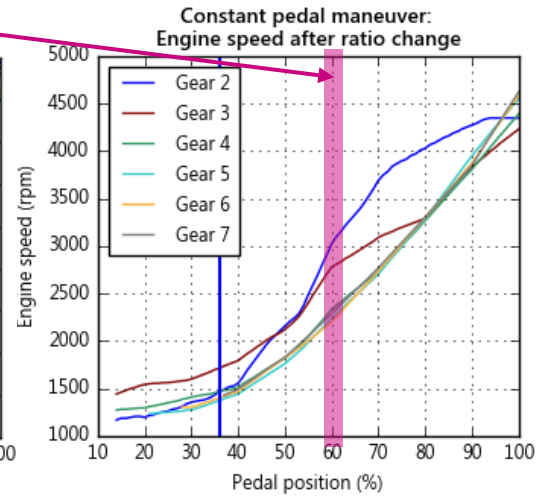
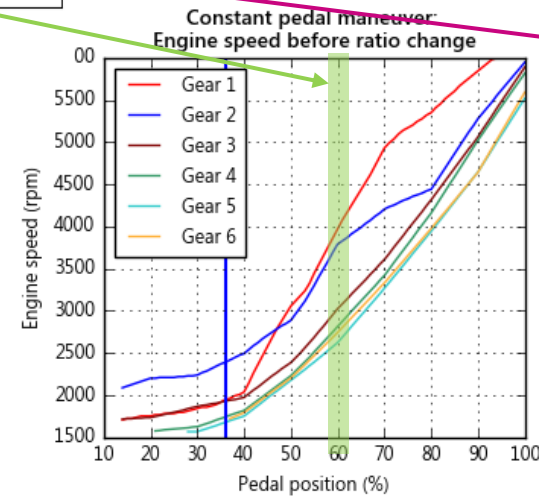
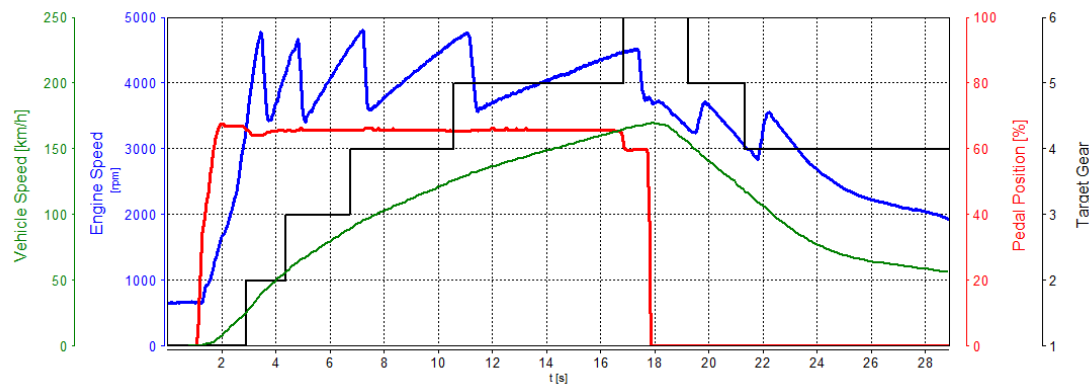
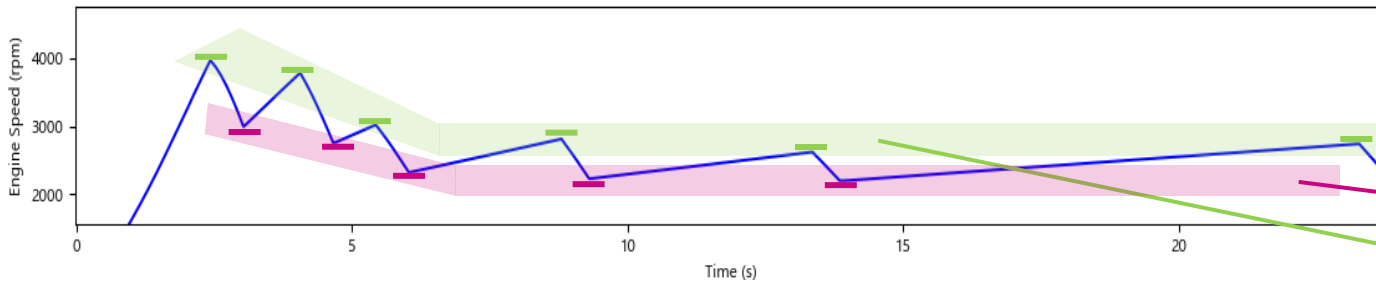
# Objective Criteria – Engine Speed Harmony

Example

Evaluation of the harmony of engine speeds before and after ratio change for constant pedal upshifts (accelerator pedal constant at 60 %):

@60 %

|                      | Current |
|----------------------|---------|
| Harmony              | 6.5     |
| Engine Speed Harmony | 6.4     |
| Before Ratio Change  | 6.3     |
| After Ratio Change   | 7.0     |
| Time in Gear Harmony | 7.1     |





# Commercial Vehicles Shift Strategy Calibration Features

# Commercial Vehicle Shift Strategy Calibration

## Now available for commercial vehicle calibration

Adding driveability and shifting strategy to the equation!

Virtual assessment of shift lines in terms of shift strategy for commercial vehicle:

- Virtual calibration of shift lines
- Comparison and reassessment of shift strategies
- Drivability assessment
- Fuel consumption calculation with custom cycles



# Commercial Vehicle Calibration 2022 R1

## New driving mode „commercial“ in the advanced settings

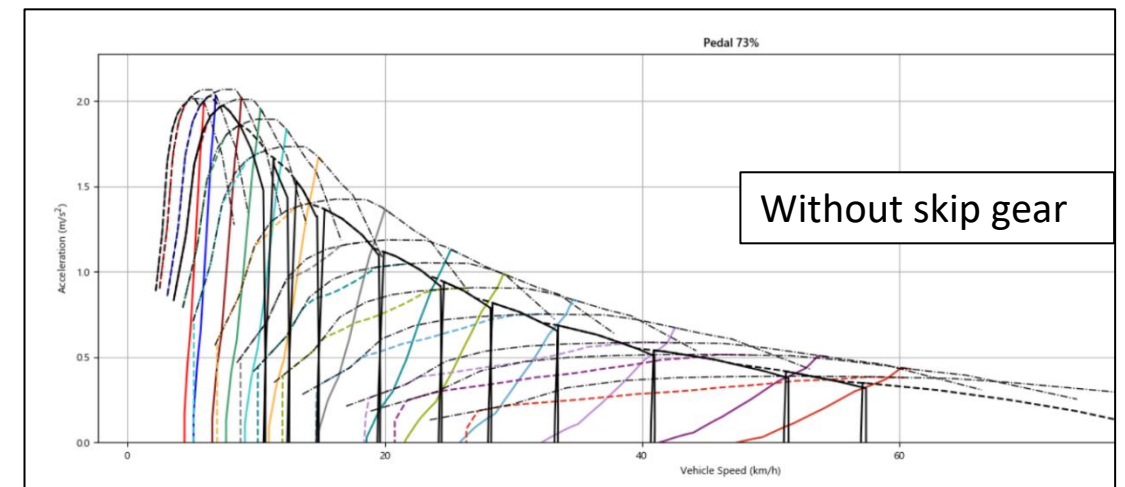
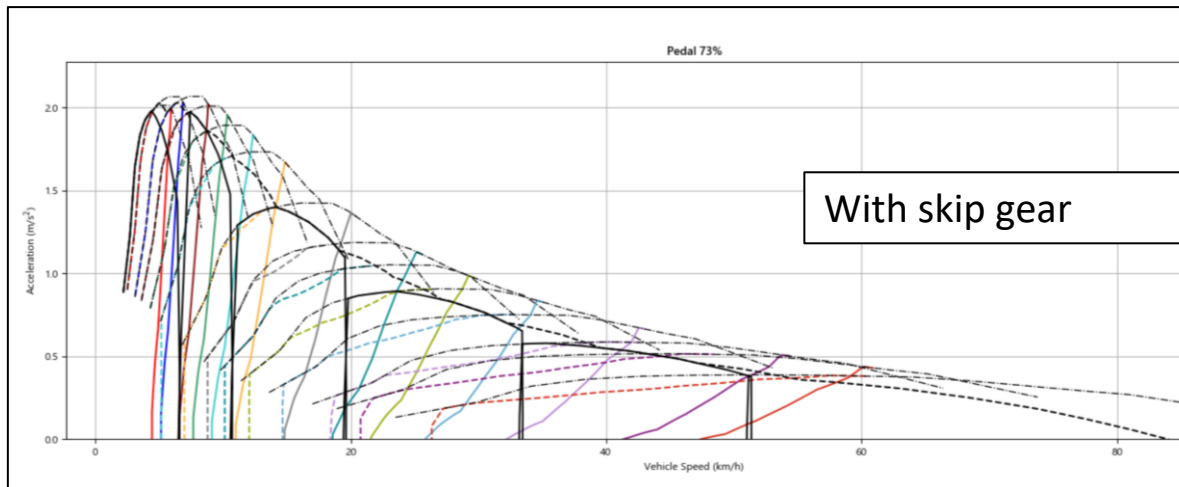
- Adjusted weights and settings for commercial vehicles
- Adapted target line “pedal to shift speed correlation” – to meet a typical commercial behavior
- Adapted drivability criteria

## New and improved features

- Skip gear input depending on pedal position for heavy duty application
- Possible definition of launching gear

# Commercial Vehicle Calibration 2022 R1

## Acceleration plots over velocity

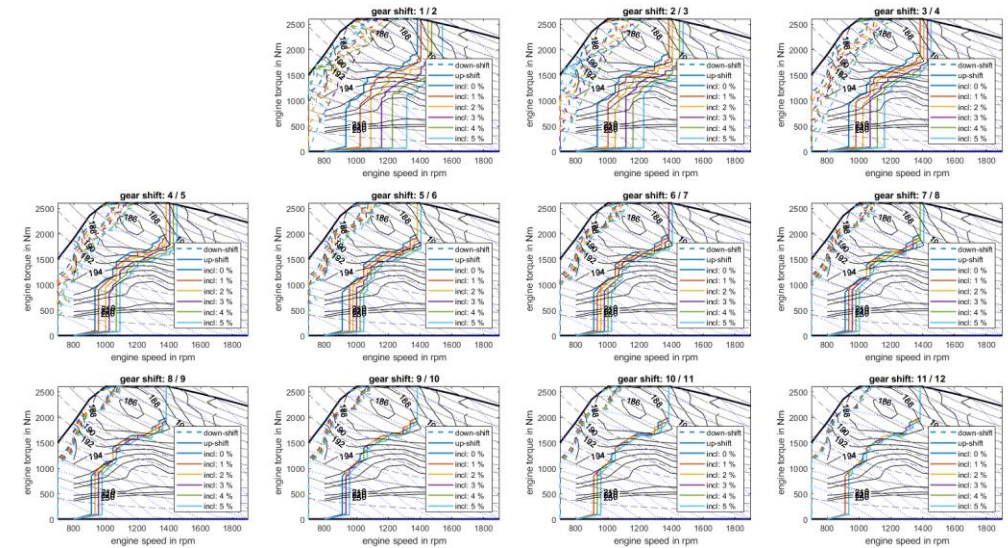


# Commercial Vehicle Calibration 2022 R2

## COMMERCIAL features

- Commercial shift line generator
- Target engine speed skipping gears
- Advanced fuel consumption calculation

## HD single gear shifts lines





# Commercial Vehicle Calibration

2023 Outlook

## COMMERCIAL features

- Shift map: Target speed representation for TCU calibration
- Driveability criteria for skip shift optimization

## COMMERCIAL features

- Adaptation for commercial hybrid vehicle  
→ ALREADY AVAILABLE AS SERVICE PROJECT
- Criteria for hybrid vehicle
- EV commercial vehicle criteria





# Live Demo

# AVL SPA™ - Commercial Vehicle Calibration

## Summary

### Applications

- Conventional applications
- P2 Hybrid applications
- Amount of gears can be freely defined
- Commercial applications

### Commercial Features

- Skipping gear definition
- Launching gear can be parametrized
- Consideration of custom commercial drive cycles
- Dedicated commercial shift line generator

### Advantages

- Automatic generation of shift lines and pedal maps from little input data
- Acknowledging fuel efficiency and driveability
- Brand driveability DNA definition: Benchmarking of different shift line calibrations
- Consumption minimized starting point
- Reduction of pre-calibration time up to ~50 %

# Contact Information

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Thank you



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