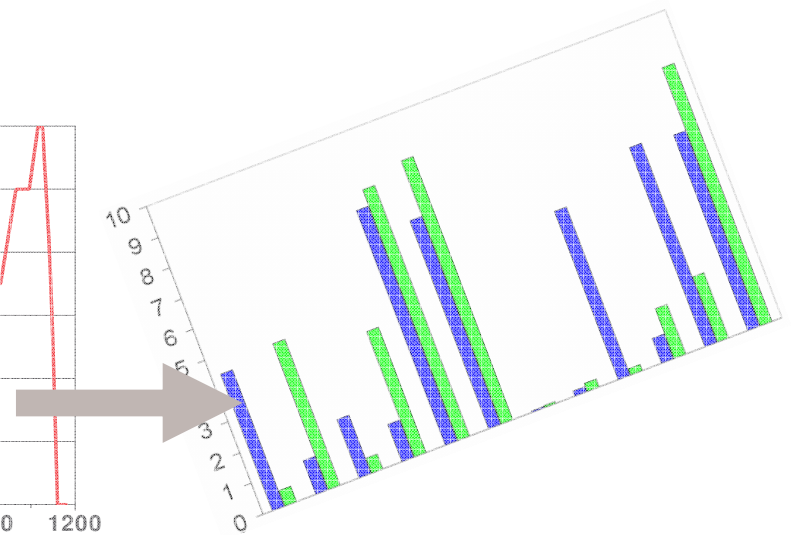
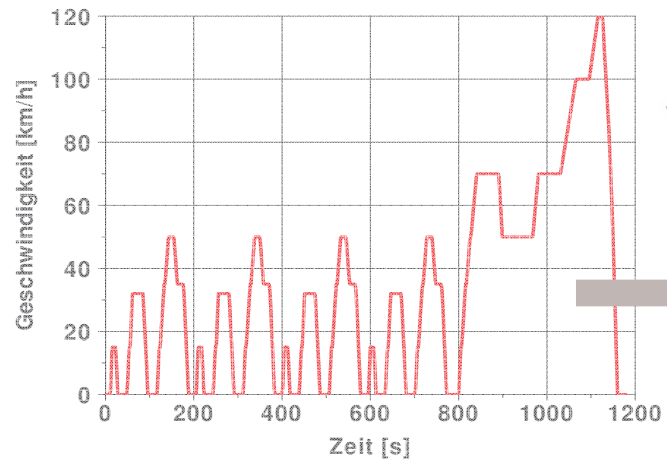


NEDC Simulation with GT-Drive

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Prof. Dr.-Ing. M. Bargende



Overview

- 1. Introduction**
2. Simulation Background
3. Investigated Vehicles
4. Split of loss calculation in the NEDC
5. Conclusion

Introduction

NEDC and Split of Loss Calculation:

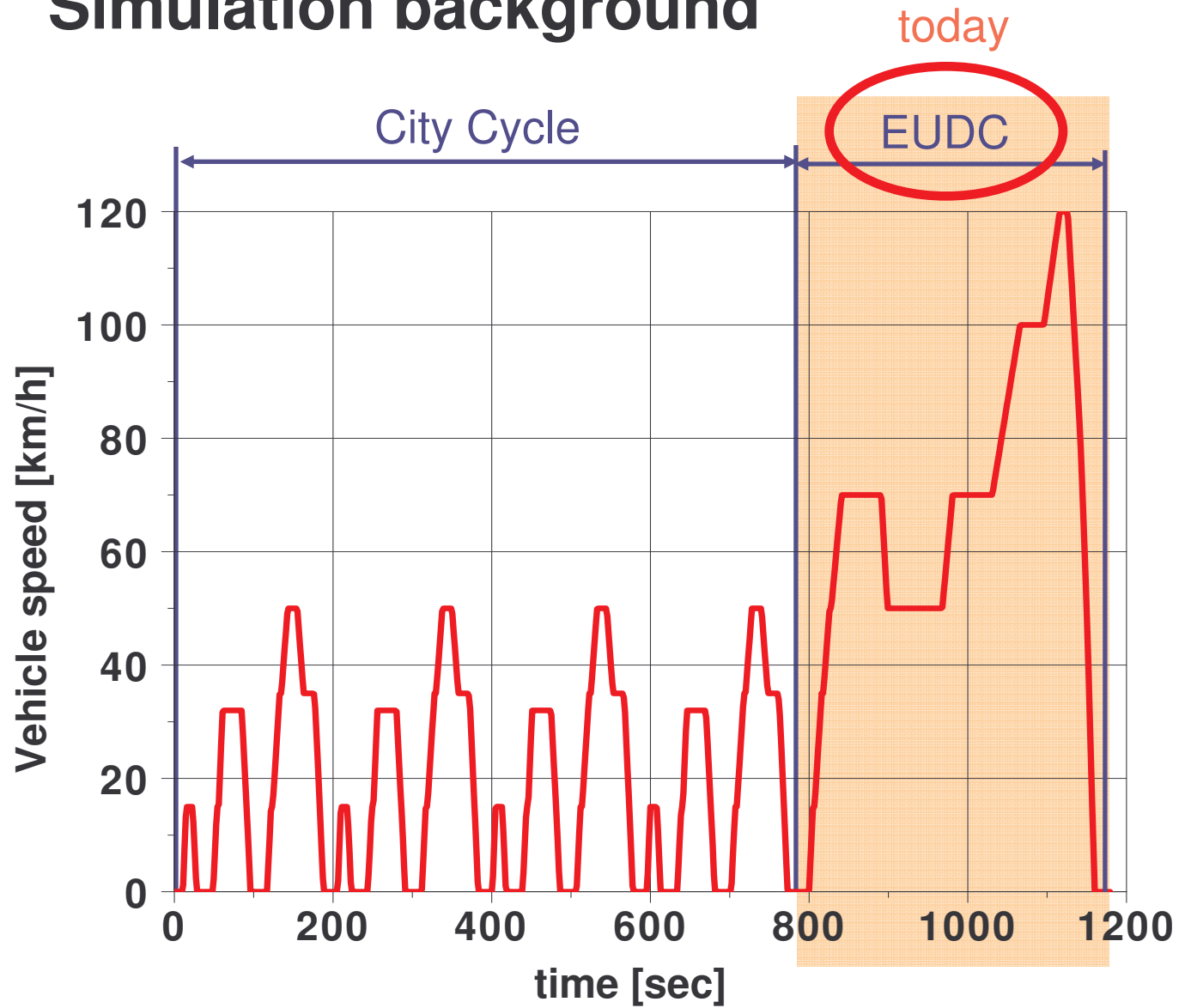
- Split of loss calculation in combustion engines is commonly used for comparing combustion systems on the test bench
- Gives an idea how to optimize the internal combustion to increase efficiency

→ How to do a split of loss calculation based on the NEDC ?

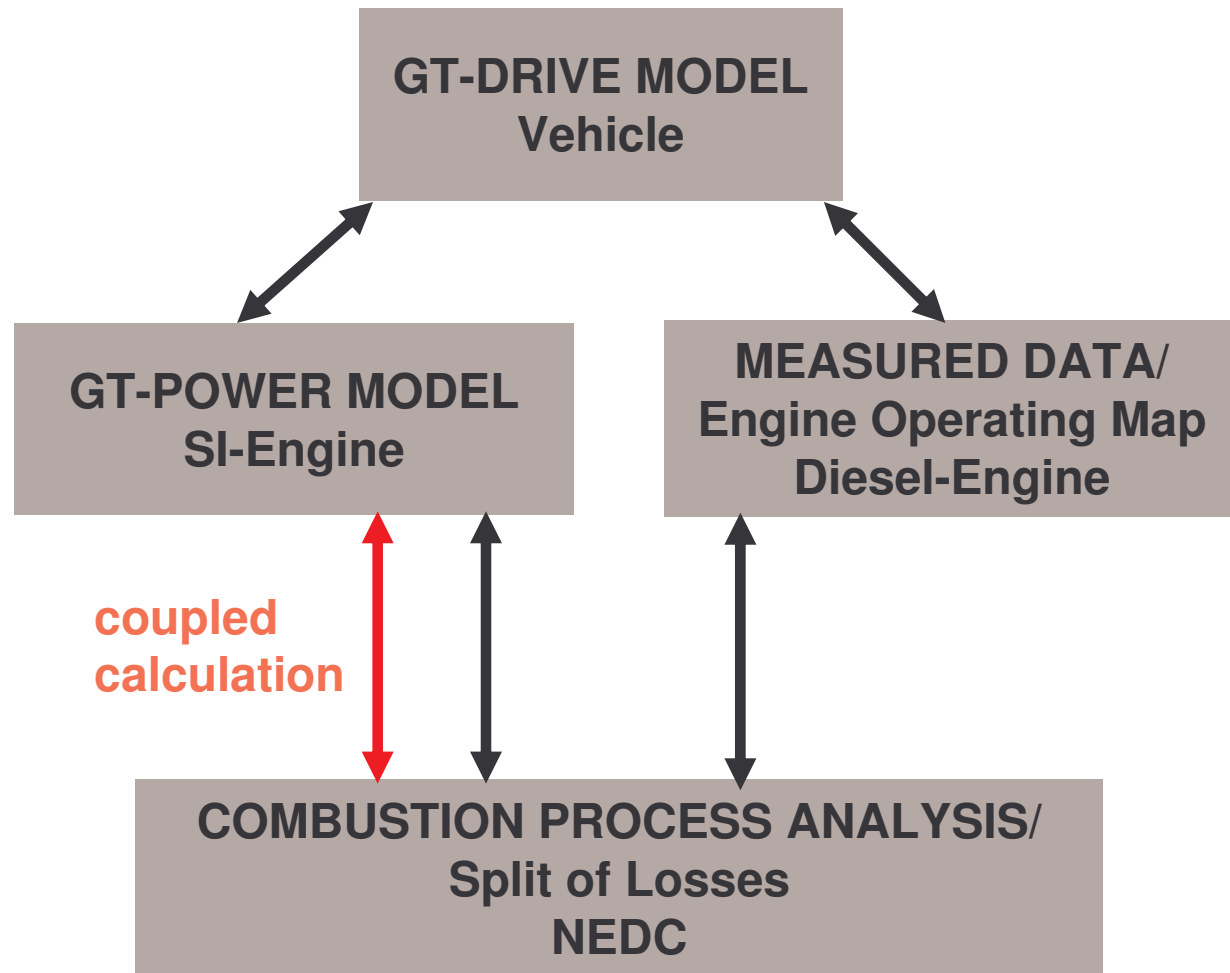
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Simulation background



Simulation background



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Investigated Vehicles

Vehicle

weight:	1540 kg
gearbox:	6-gears (mechanical gearbox)
cw-value:	0,27

SI-Engine

number of cylinders:	4
engine displacement:	2198 cm ³
power:	114 kW (5600 rpm)
compression ratio:	11,3

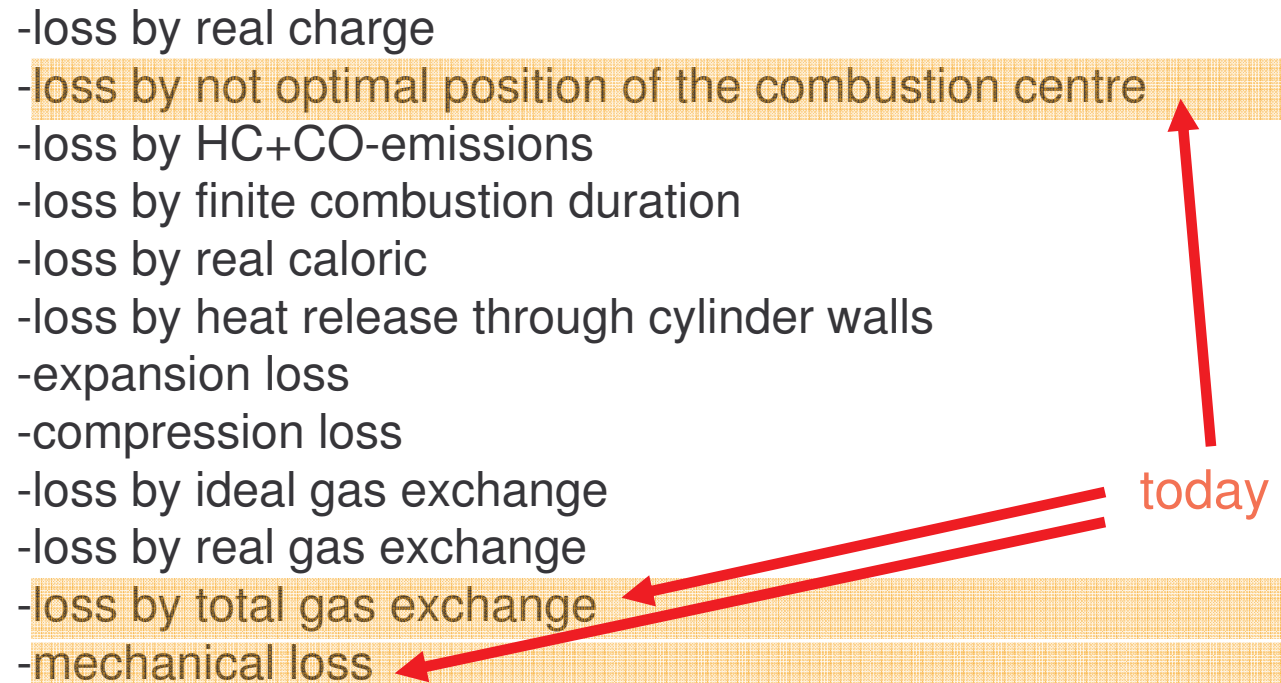
Diesel-Engine

number of cylinders:	4
engine displacement:	2148 cm ³
power:	107 kW (4200 rpm)
compression ratio:	16,5

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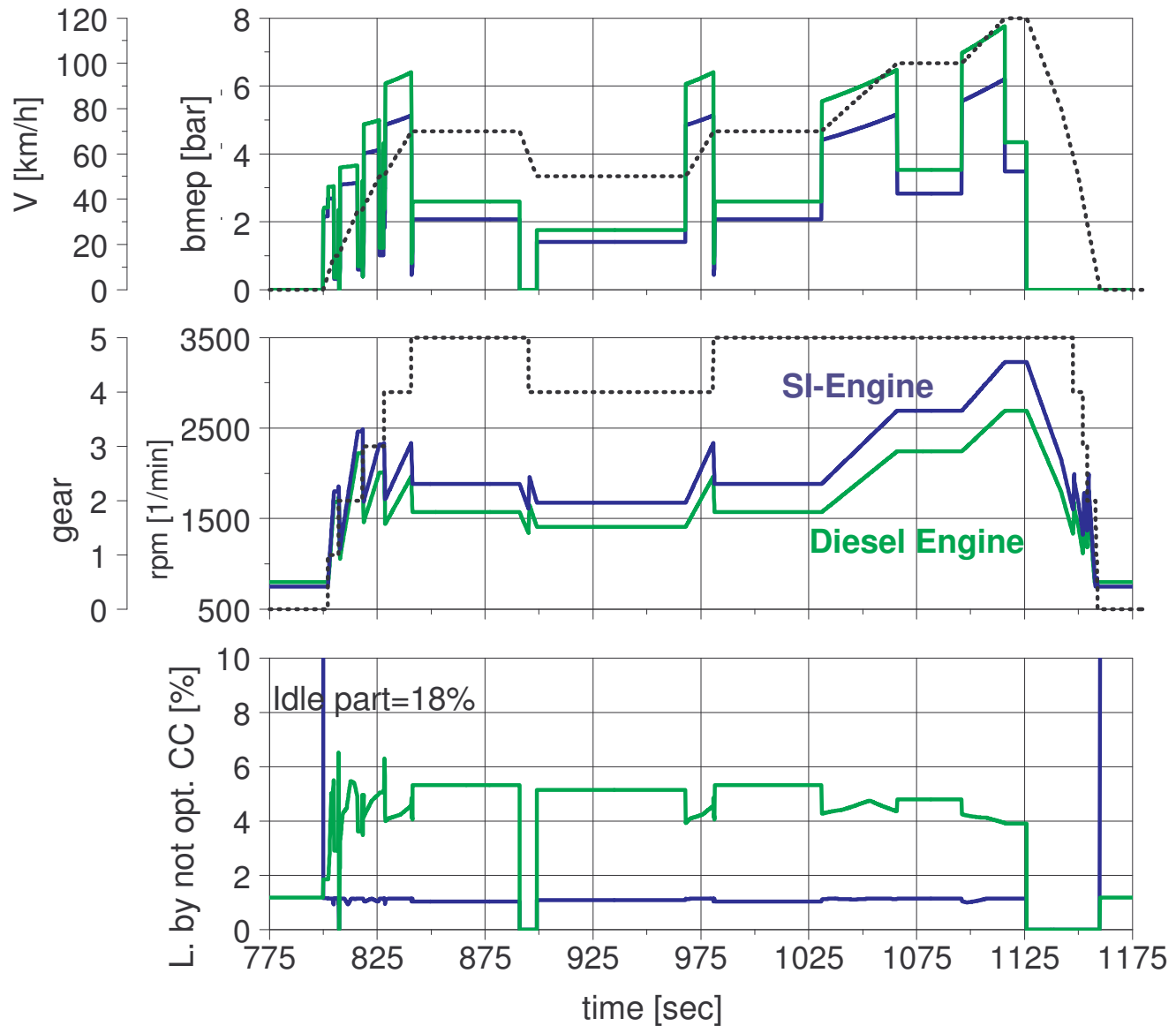
Split of loss calculation in the NEDC

- loss by real charge
 - loss by not optimal position of the combustion centre
 - loss by HC+CO-emissions
 - loss by finite combustion duration
 - loss by real caloric
 - loss by heat release through cylinder walls
 - expansion loss
 - compression loss
 - loss by ideal gas exchange
 - loss by real gas exchange
 - loss by total gas exchange
 - mechanical loss
- 
- The diagram shows a vertical stack of loss categories. Three categories at the bottom are highlighted with a yellow grid pattern: 'mechanical loss', 'loss by total gas exchange', and 'loss by real gas exchange'. A red arrow points from the word 'today' to the top of this stack. Another red arrow points from 'today' to the 'loss by not optimal position of the combustion centre' category. A third red arrow points from 'today' to the 'loss by real gas exchange' category.

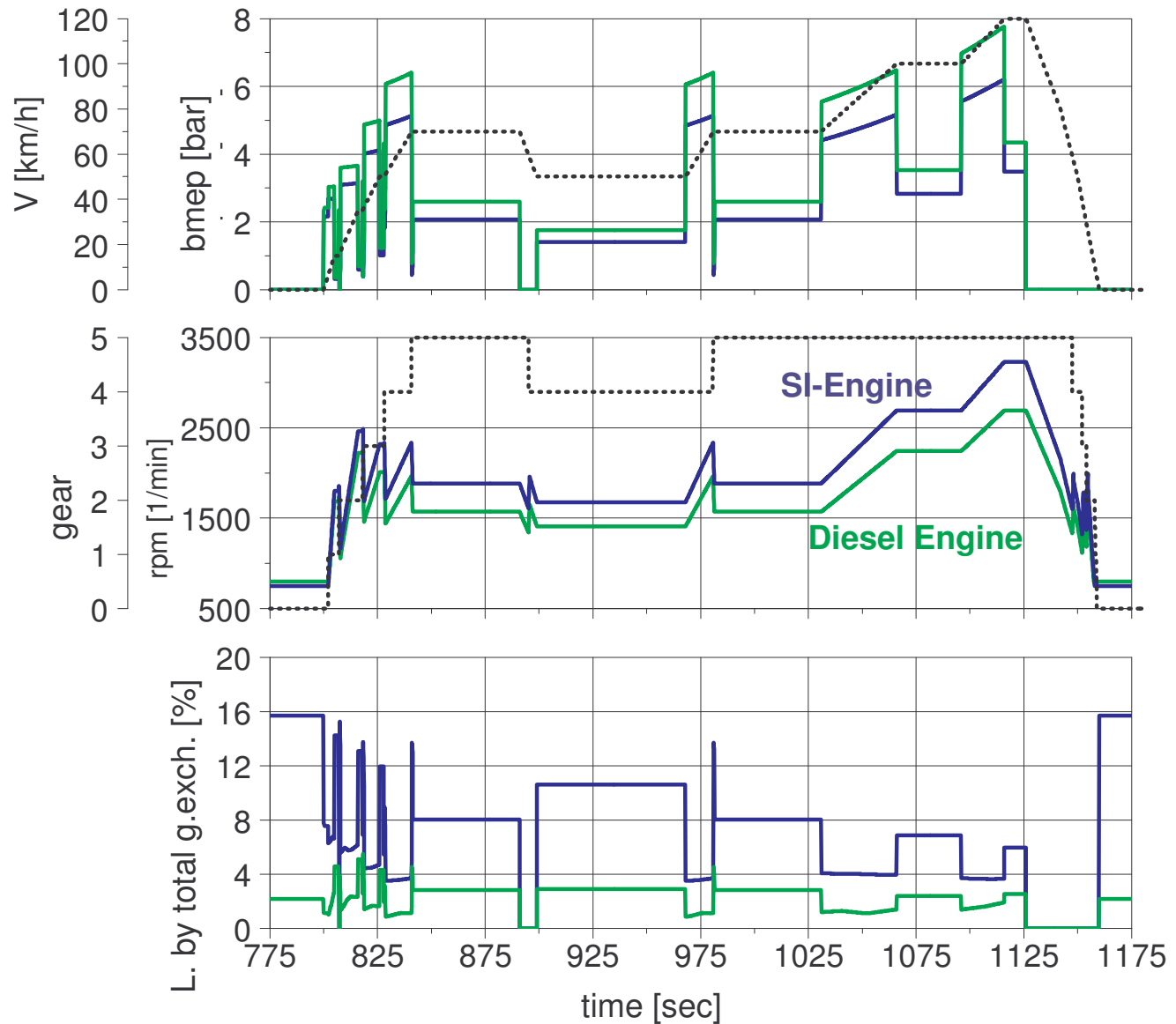
Intension:

Where does a vehicle with a SI-engine compared
to the vehicle with a diesel engine loose efficiency ?

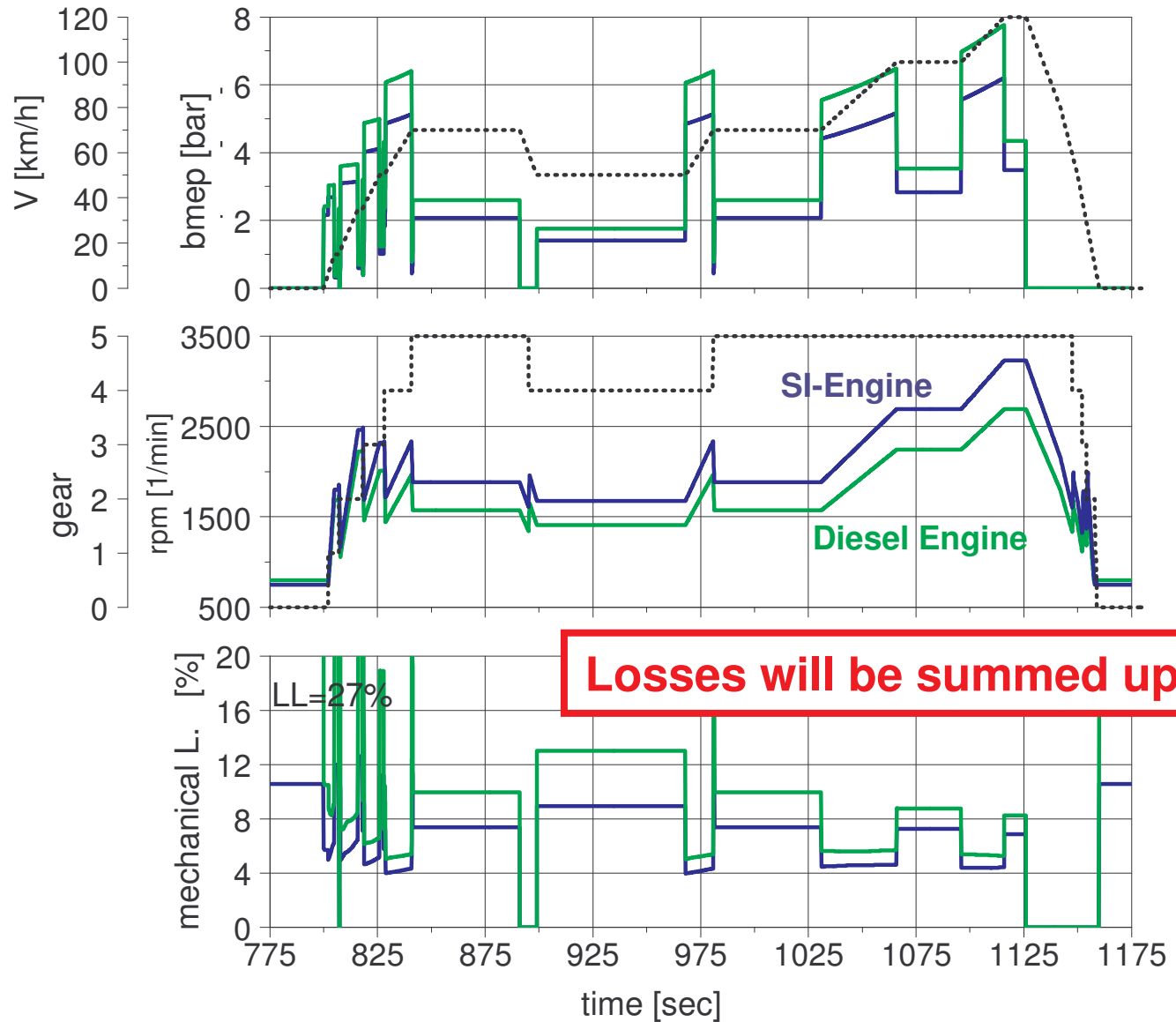
Loss by not optimal position of the combustion center [%]



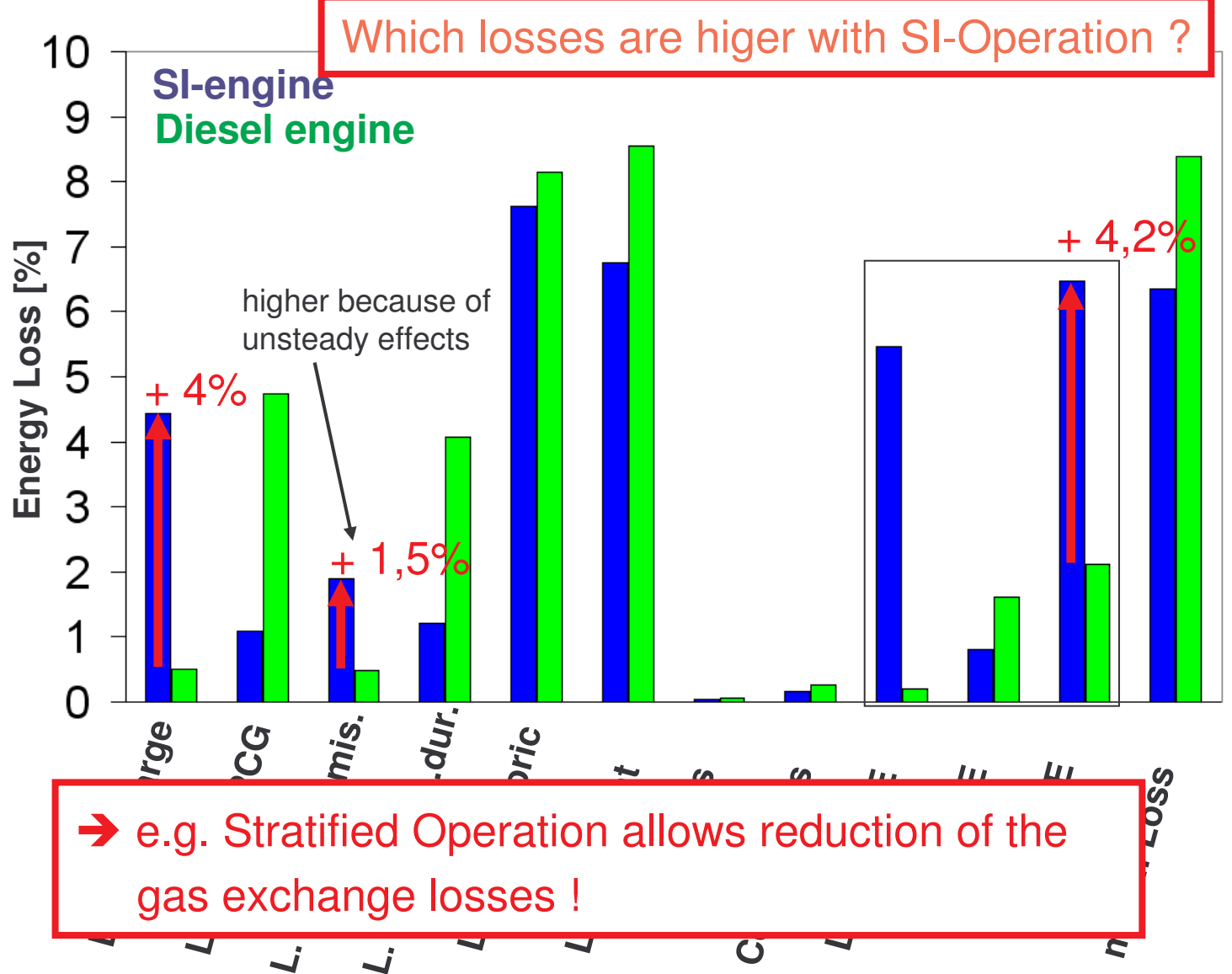
Loss by total gas exchange [%]



Mechanical loss [%]

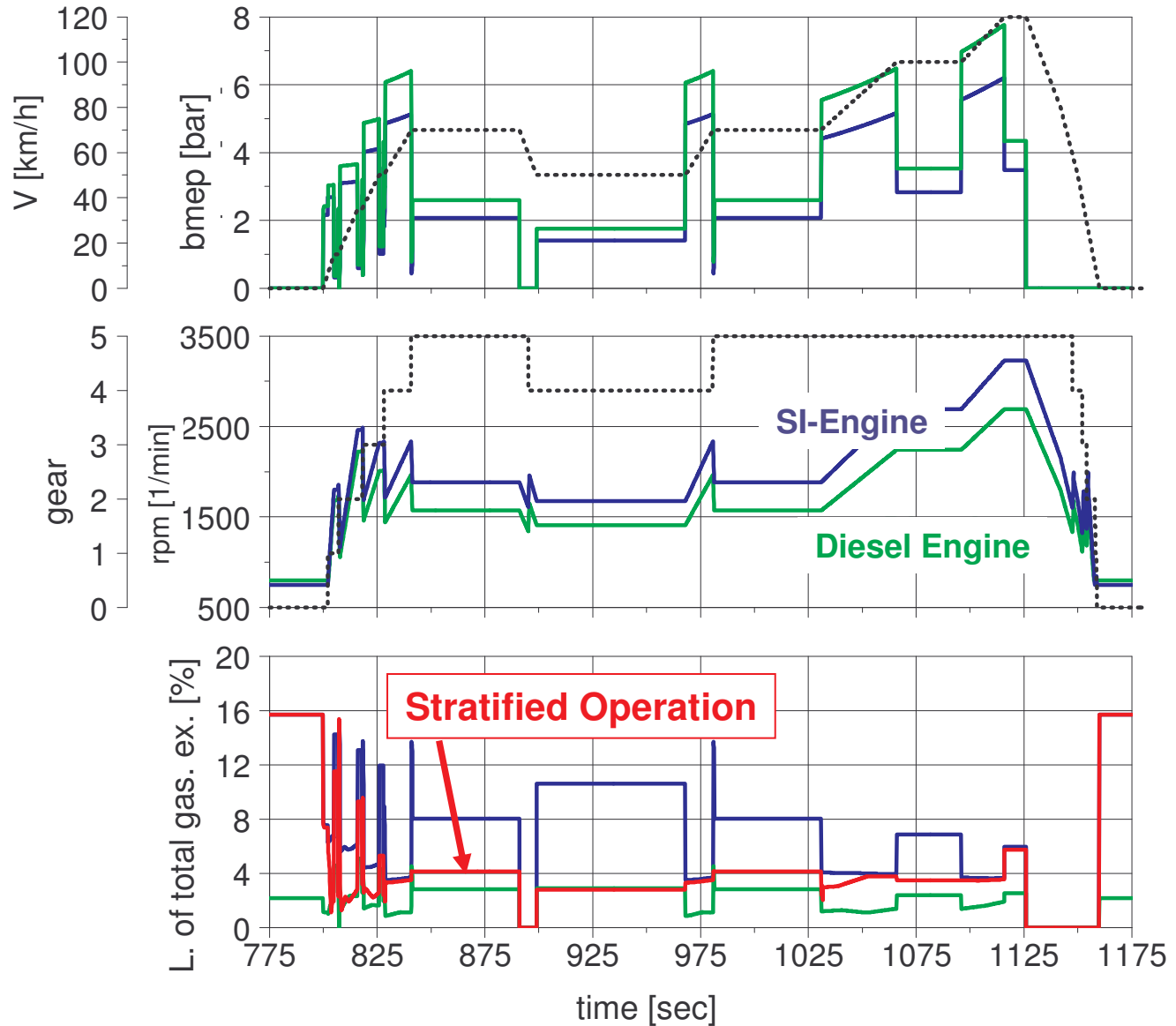


Energy Losses summed up in the EUDC [%] (without engine idle part)



Stratified Operation in EUDC

Loss by total gas exchange [%]



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Conclusion

Split of loss calculation with GT-Drive:

- Split of loss calculation is very fast and useful for analysing combustion systems
- Useable on the test bench or based on data coming up with the GT-Power Simulation
- Split of loss calculation coupled with GT-Drive allows a deep understanding of the different behavior of cars with SI-engines and Diesel engines
- Powerful Tool to understand where to reduce the fuel consumption in the NEDC



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END