



Contents of Work Package DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

2-WP06: Integrated Assessment of Impact of Emission Aftertreatment Systems

Coordinator of the WP

CTU in Prague, responsible person: Ing. Vojtěch Klír, Ph.D.

Participants of the WP

TUV SÜD Czech, responsible person: Ing. Jiří Trubač

Main Goal of the WP

2-WP06-001 • Gfunk CTU - TUV - Demonstrate concept of novel sampling method and prototype device for on-road real driving emission measurement, which will be much cheaper, easier to use, more robust and hence allow faster development and certification of new vehicles, Project deadline 12.2020

Partial Goals for the Current Period

2-WP06-002 • O – other outcomes CTU - TUV - Analysis of legislation, methodology and equipment for in-use vehicle emission testing across EU countries, Project deadline: **10.12.2020**

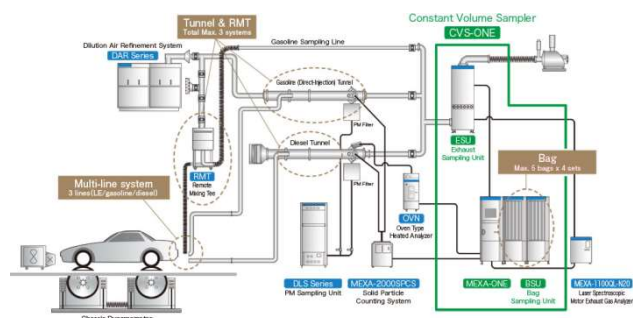
2-WP06-003 • O - other outcomes CTU - TUV - Dissemination of the achieved results, Project deadline: 10.12.2020



Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

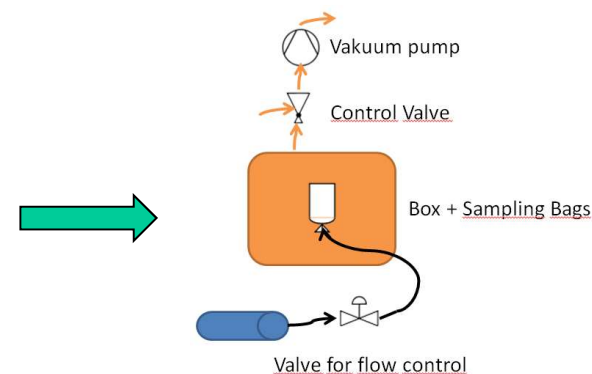


Standard CVS bag sampling system

or



RDE - PEMS



Novel PEMS – basic principle

Activities in period 2019 - 2020:

- Design of system, definition of all relevant components
- Prototype was designed including Heating control System and Exhaust Gases Flow Control
- Testing under Real Driving conditions – ready to perform



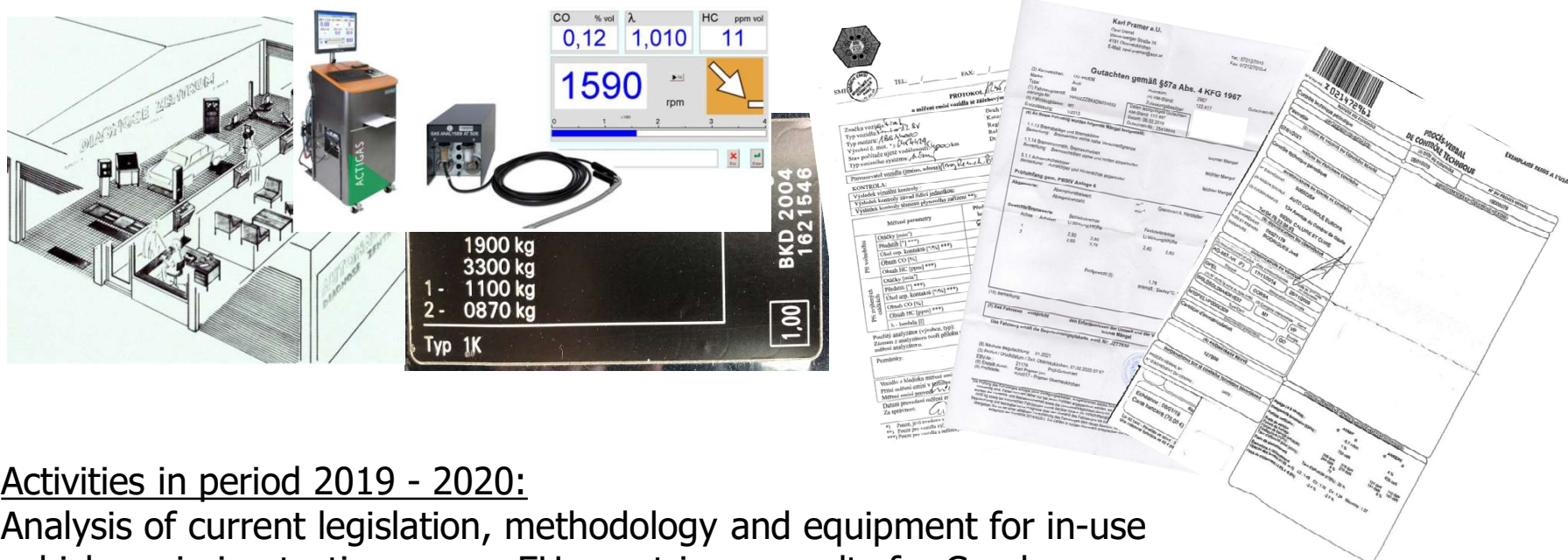
Novel PEMS – PESS



Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-002

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020



Activities in period 2019 - 2020:

Analysis of current legislation, methodology and equipment for in-use vehicle emission testing across EU countries – results for Czech Republic, Germany, Austria, France, Great Britain
Technical report – current knowledge, best practices, recommendation for future

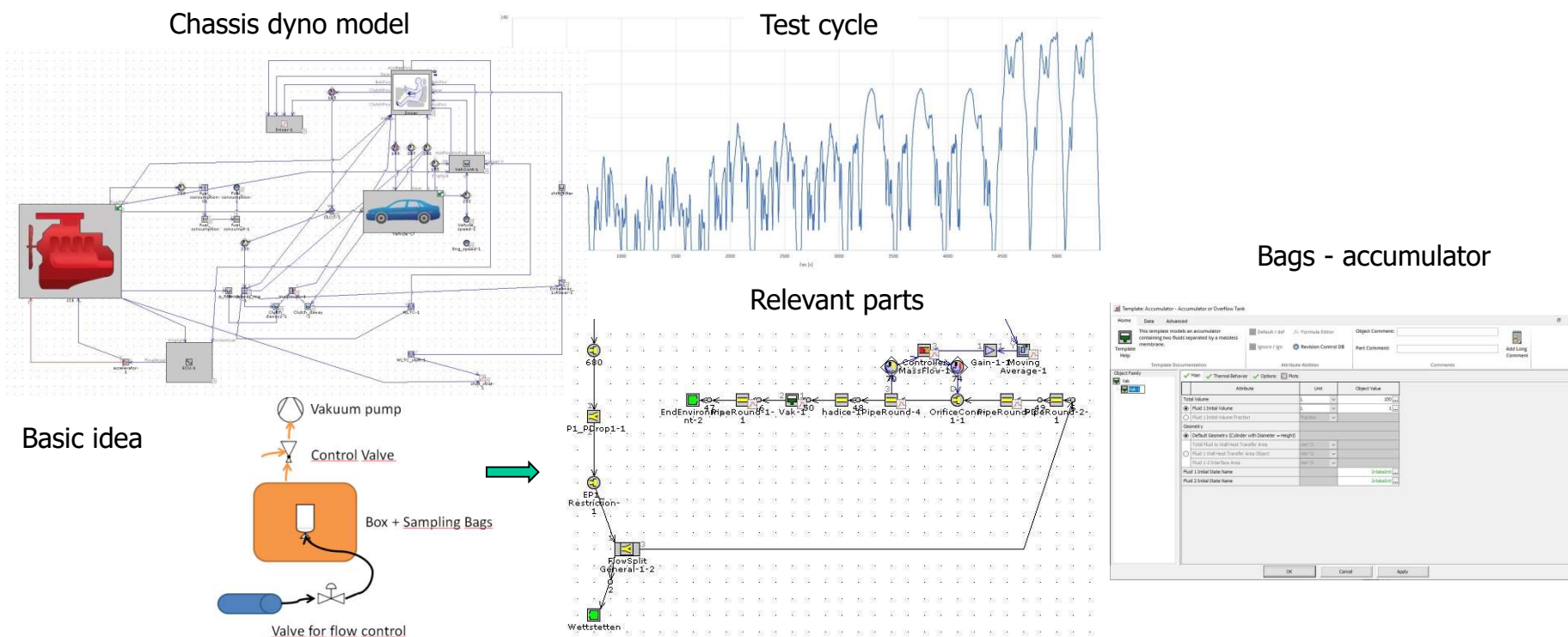


Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001 – ZV - Gfunk

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

SW GT suite in design loop – flow control strategy development



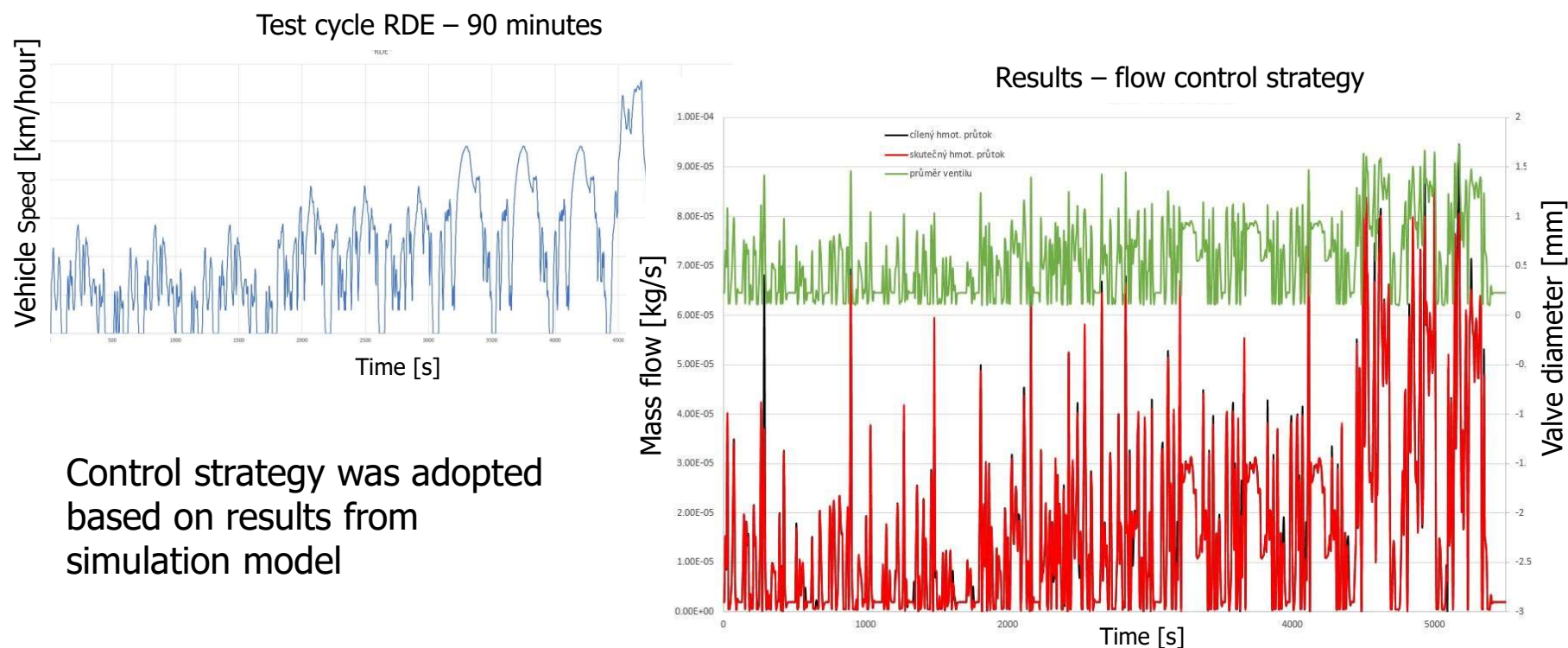


Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001 – ZV - Gfunk

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

Control strategy development





Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001 – ZV - Gfunk

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

Control system based on NI components

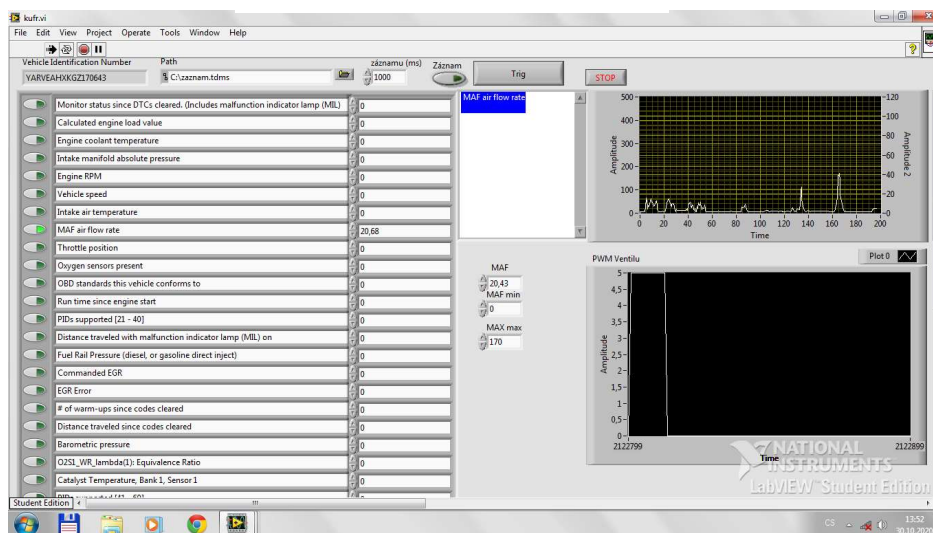
Laptop with Labview SW

Reading data from ECU using NI USB 8473

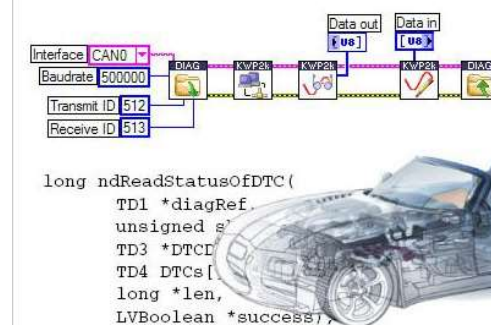
PWM signal for control valve using NI 9478 (mounted in cDAQ module 9171)



Control Panel visualization



NI Automotive Diagnostic Command Set

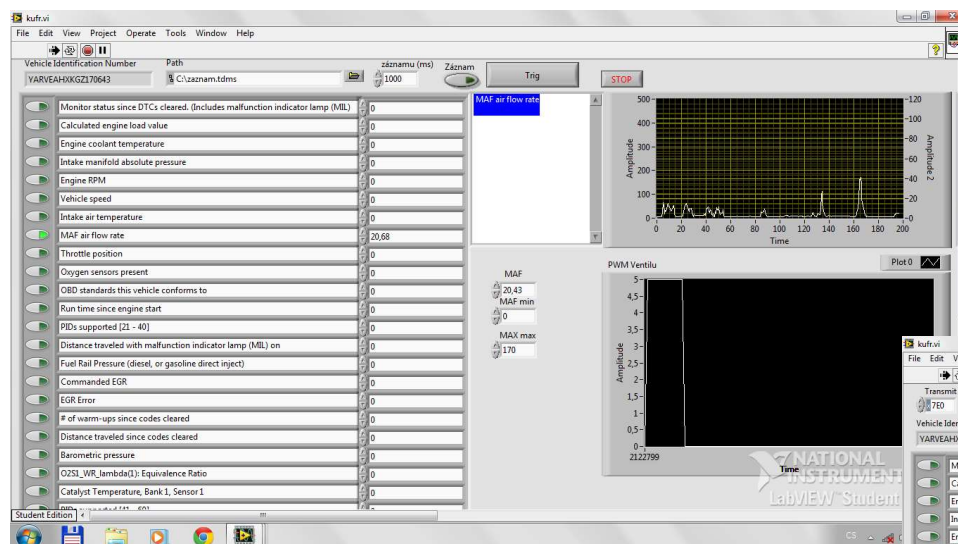




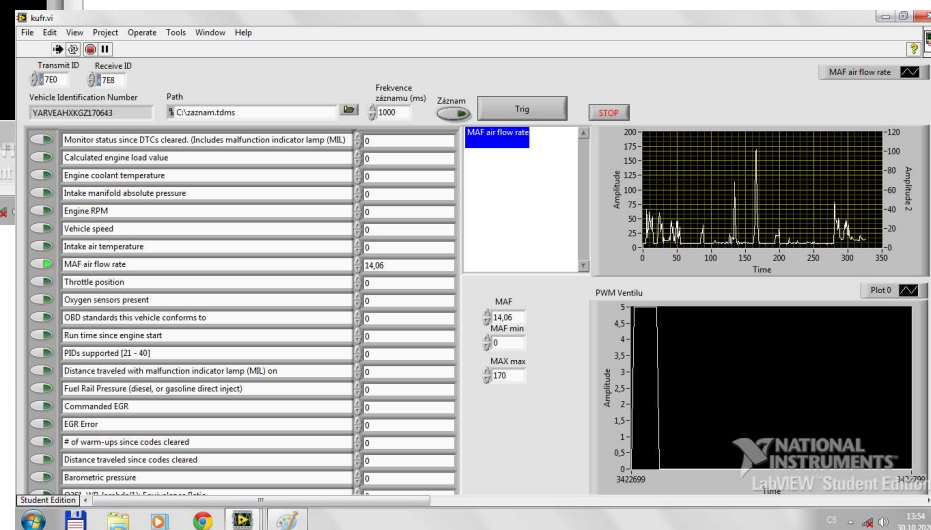
Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001 – ZV - Gfunk

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020



PWM control strategy for control valve





Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-001 – ZV - Gfunk

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

PESS system design

Tedlar Bags 150 l

Peli Case 1730

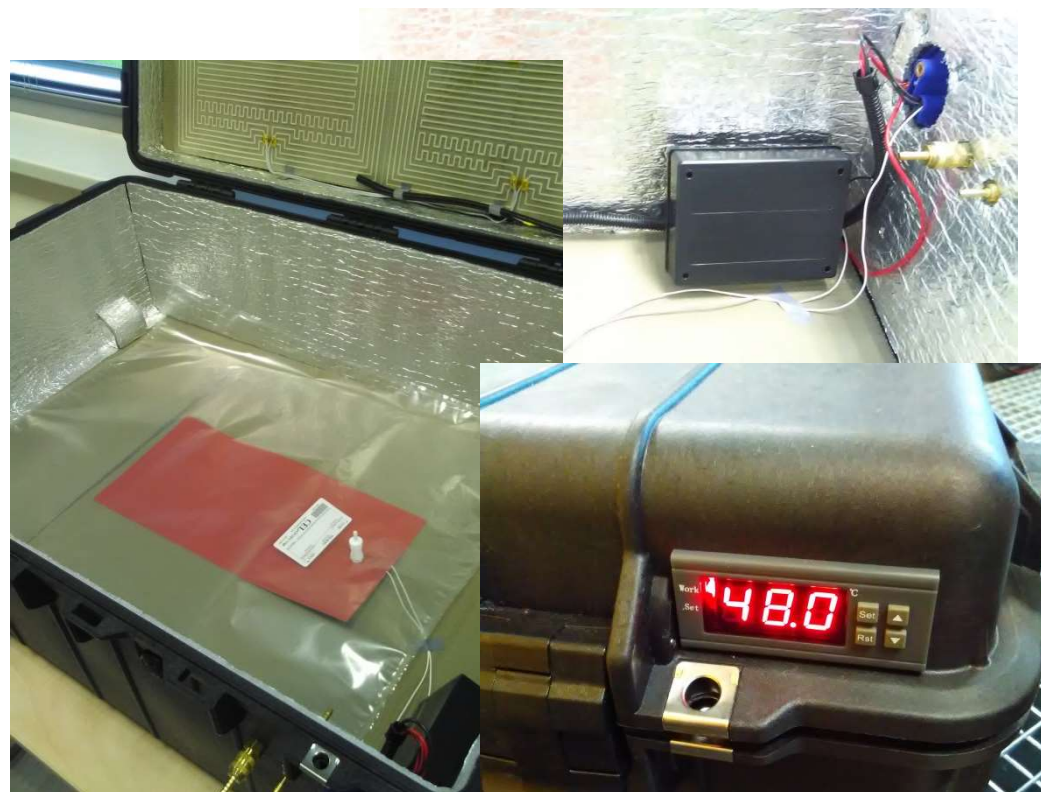
Temperature control unit

Vacuum pump

Control Valve Burkert 2836

Heating system

Heated sampling pipe





Activities in DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Activities in 2-WP06-002

(FEM CTU + TUV SÜD Czech) Project deadline: 10.12.2020

Analysis of legislation, methodology and equipment for in-use vehicle emission testing across EU countries

Actual standard of the EU

Since 29.4.2014 is in effect the standard of the European Parliament and Council 2014/45/EU regarding the periodical roadworthiness tests of vehicles and trailers.

This standard assigns minimal requirements on methodology and periodicity of roadworthiness tests of all vehicles used in the area of each member countries. Each country implements these requirements in it's legal provisions and it is allowed to assign more strict criteria.

Differences in each Countries were collected and further analyzed

Main tasks – periodicity, methodology, limits

All obtained knowledge included to technical report

Recommendation for future – enhancing the EOBD system functionality



Fulfillment of goals and deliverables of DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Current State of Deliverables, Milestones and Fulfillment of Goals

In december 2020 - Functional sample - Concept of novel sampling method and prototype device for on-road real driving emission measurement

In december 2020 – technical report - Analysis of legislation, methodology and equipment for in-use vehicle emission testing across EU countries

List of Due Deliverables and Their Added Value

2-WP06-001 • Gfunk – functional sample CTU in Prague-TUV SÜD Czech

The main output to be achieved by 12/2020 is a functional sample

Solving the project tasks in 2020 enabled the employment of junior researchers and enhanced cooperation with TUV-SÜD Czech



Current contribution of DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

Assessment of the Contribution of Deliverables

Price of a single commercial PEMS system of about 250 000 EUR is quite high. Moreover, each RDE test takes at least half a day. As a result, throughput of the RDE testing is very limited – few PEMS devices and long test runs.

Our activities leads toward a demand for cheaper, more efficient and easier to operate device that would be used in the development process for fast, cheap and simple tests to verify new designs and calibration strategies, before the final certification is reached. All preliminary results seem to be acceptable for final testing procedures under real driving conditions planed on this month.



Výtah z prací 2019-2020 na DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems

2-WP06-001 Gfunk – funkční vzorek (ČVUT FS + TUV-SÜD Czech)

Termín dokončení: 12.2020

Návrh zařízení, definice všech potřebných dílů

Výroba prototypu, včetně systému pro regulaci teploty a průtoku vzorku spalín

Připraveno na provedení zkoušek v reálném provozu

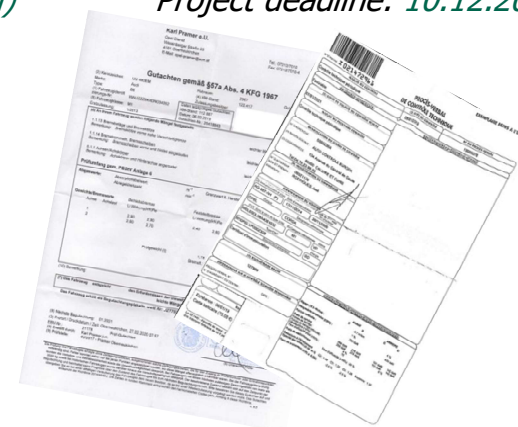


2 – WP06 - 002 (Ost.) and 2 – WP06 - 003 (Ost.) (FEM CTU+ TUV-SÜD Czech)

Project deadline: 10.12.2020

Analýza stávající legislativy, postupů a vybavení pro hodnocení emisního chování vozidel v provozu – results for Českou republiku, Německo, Rakousko, Francii, Velkou Británii

Technická zpráva – současné poznání, vhodné postupy, doporučení do budoucnosti





Results of DP2-WP06 Integrated Assessment of Impact of Emission Aftertreatment Systems – Achieved 2019-2020

2-WP06-001 Gfunk – functional sample (FEM CTU+ TUV-SÜD Czech)

Project deadline: 12.2020

Design of system, definition of all relevant components

Prototype was designed including Heating control System and Exhaust Gases Flow Control

Testing under Real Driving conditions – ready to perform



2 – WP06 - 002 (Ost.) and 2 – WP06 - 003 (Ost.) (FEM CTU+ TUV-SÜD Czech)

Project deadline: 10.12.2020

Analysis of current legislation, methodology and equipment for in-use vehicle emission testing across EU countries – results for Czech Republic, Germany, Austria, France, Great Britain

Technical report – current knowledge, best practices, recommendation for future

