

CITA TA B meeting  
Bratislava, April 2022



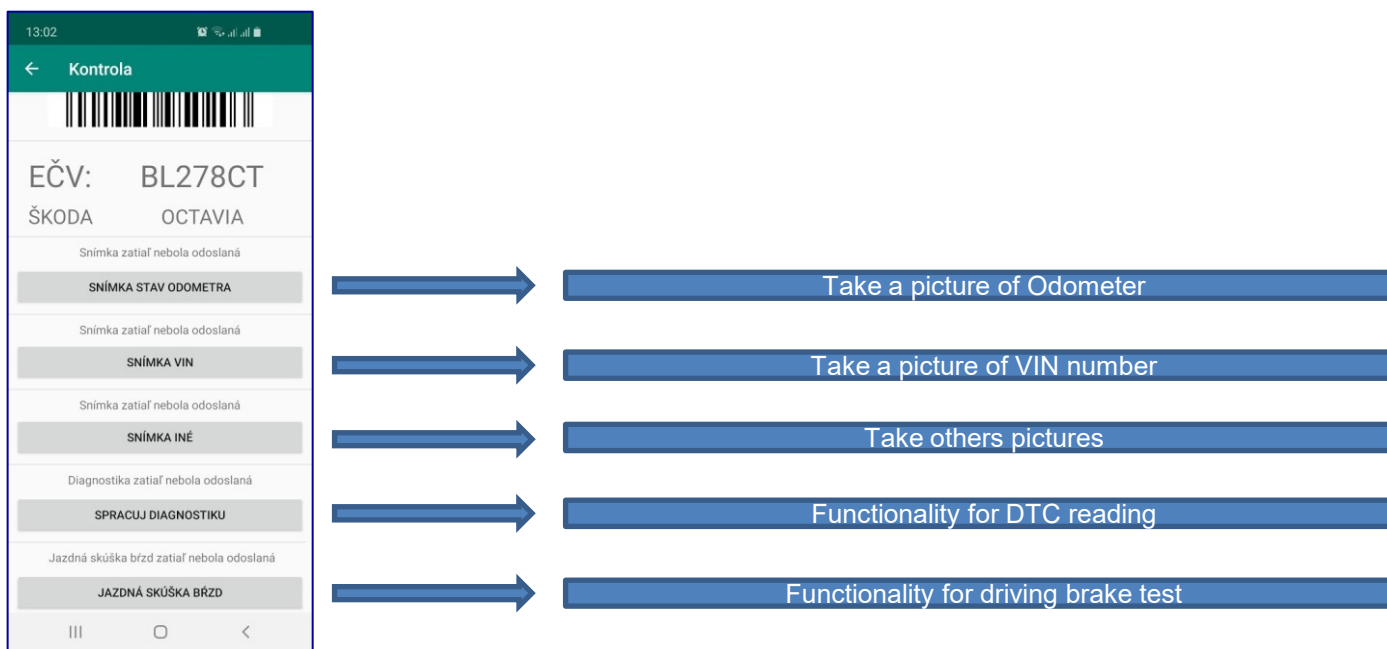
# **Practical experience from the use of PTI mobile application as OBD scan tool and decelerometer**

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# Mobile application



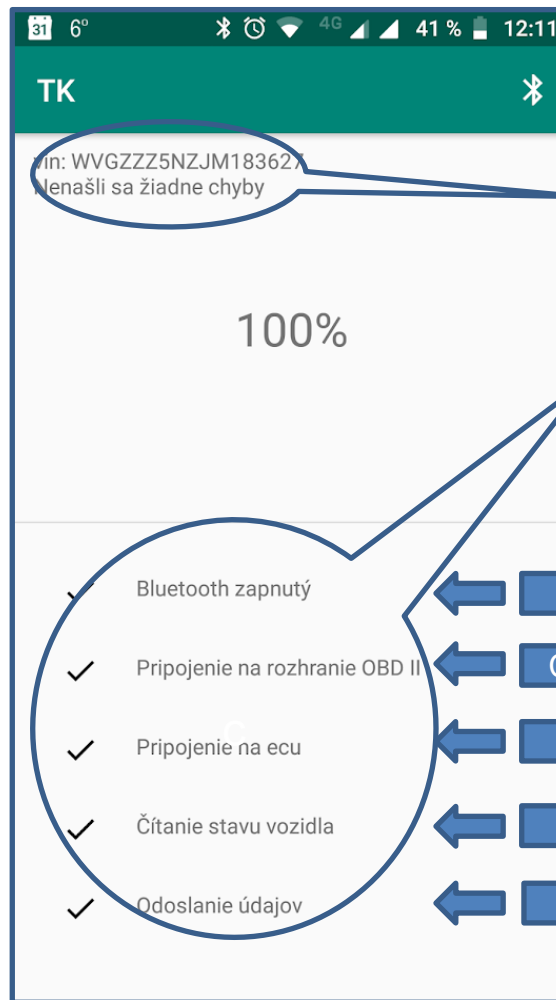
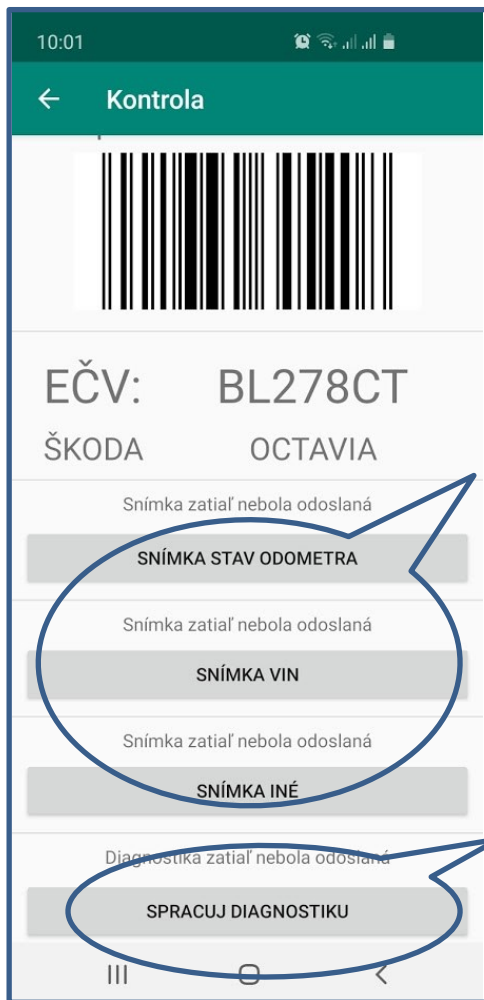
- Free application for PTI Inspectors from January 2020,
- Application takes and transfers pictures of VIN number, odometer etc. to the information system,
- Application reads and transfers DTC to the information system (mentioned in the previous CITA meetings)
- Functionality for the driving brake test is available to use from June 2020 (mentioned in the previous CITA meetings)



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OBD scan tool and decelerometer

# Diagnostic trouble codes (DTC) reading

## Mobile application GUI



VIN and information about transferred DTC

Automatic process without inspector intervention

Bluetooth ON

Connection to OBD interface

Connection to ECU

Data reading

Data transferred

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# Diagnostic trouble codes (DTC) reading

## Assigning transferred data

- For example:

If the information system recognizes DTC for ABS, it automatically assigns this to a major failure according to the Directive 2014/45/EU

1.6.f - Anti-lock braking system (ABS) - System indicates failure via the electronic vehicle interface – Major failure.

OBD správy ↻			
Kód	Popis	VIN	Km
C0081	ABS Malfunction Indicator (Subfault)	VF37J9HP0CJ629844	0
<small>iOS, v1.2, Adapter identification: ELM327 v1.5, Voltage: 13.8V, Vehicle Protocol: ISO 15765-4 (CAN 11/500), Adapter States: [OBD2AdapterStateInitializing, OBD2AdapterStateInitializing, OBD2AdapterStateInitializing, OBD2AdapterStateReady, OBD2AdapterStateConnected]</small>			

DTC for ABS

Yellow colour indicates Major failure – visual information for inspector

# Diagnostic trouble codes (DTC) reading

## Assigning transferred data

- Directive 2014/45/EU
- The information system uses a conversion table for assigning of DTC to PTI failures according to the Directive 2014/45/EU

<p>1.6. Anti-lock braking system (ABS)</p> <p>Visual inspection and inspection of warning device and/or using electronic vehicle interface.</p>	<p>(a) Warning device malfunctioning.</p> <p>(b) Warning device shows system malfunction.</p> <p>(c) Wheel speed sensors missing or damaged.</p> <p>(d) Wirings damaged.</p> <p>(e) Other components missing or damaged.</p> <p>(f) System indicates failure via the electronic vehicle interface.</p>		<p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p> <p>X</p>		
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Item

Reason for failure

Assessment of deficiencies

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# Problems with OBD reading

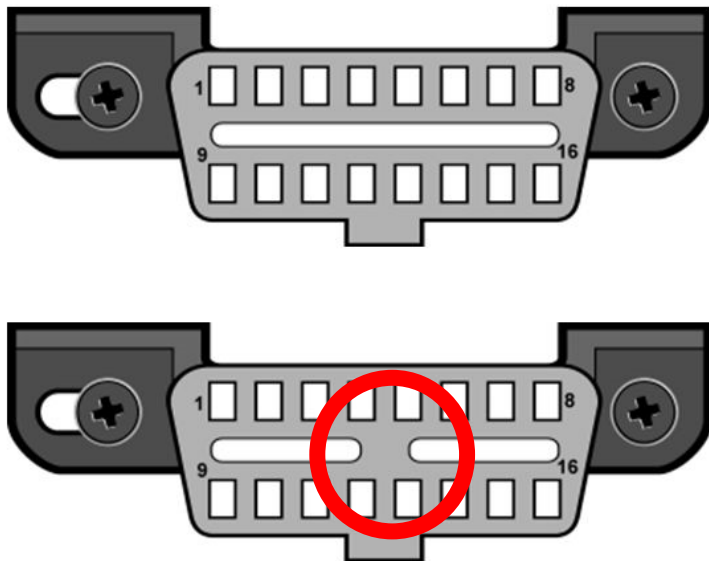
- In Slovakia, the use of an OBD scan tool for technical inspection is mandatory for vehicles of categories M1 and N1 with the first registration after 2012,
- Some vehicles of categories M1 and N1 are still without OBD connector, for example:
  - Durso Multimobil
  - Tesla Model 3



# Problems with OBD reading

- Some N1 category vehicles have a connector of type B
- It is not possible to use standard ELM327 scan tool because of the barrier in the middle

## Connector Types – A & B



# Problems with OBD reading



- Some vehicles have an OBD connector without voltage or one that is completely non-functional
- It is not possible to completely read data from some electric vehicles, for example Fiat 500e

## Slovak failures related with OBD connecting

Item (Slovak)	Assessment of deficiencies	number	total
4.SK.6.3 incompleted data loading (but connector works)	A	3693	3693
4.SK.6.4 connector without voltage/doesn't work	B	97	97



# Diagnostic trouble codes (DTC) reading - statistics

- Total DTCs transferred in 2021:

**10 587**

- DTCs related for PTI in 2021:

DTC	number	description
B0075	1	Second Row Right Seatbelt Pretensioner Deployment Control (Subfault)
C0020	1	ABS Pump Motor Control (Subfault)
C0040	1	Brake Pedal Switch "A" (Subfault)
C0048	1	Brake Booster Travel Sensor (Subfault)
P0504	9	Brake Switch "A"/"B" Correlation
P0555	9	Brake Booster Pressure Sensor Circuit
P0572	1	Brake Switch "A" Circuit Low
P2299	1	Brake Pedal Position/Accelerator Pedal Position Incompatible
U0121	31	Lost Communication With Anti-Lock Brake System (ABS) Control Module
U0128	3	Lost Communication With Park Brake Control Module
U0151	2	Lost Communication With Restraints Control Module
U0241	1	Lost Communication With Headlamp Control Module "A"
U0415	14	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module
U0418	2	Invalid Data Received From Brake System Control Module

# Diagnostic trouble codes (DTC) reading - statistics



- Transferred DTCs according to Directive 45/2014EU

DTC	number	description	Directive 2014/45 EU	
			Item	Assessment of deficiencies
B0075	1	Second Row Right Seatbelt Pretensioner Deployment Control (Subfault)	7.1.4.b) Safety belt Pretensioners	B
C0020	1	ABS Pump Motor Control (Subfault)	1.6. f) Anti-lock braking system (ABS)	B
C0040	1	Brake Pedal Switch "A" (Subfault)	1.7.c) Electronic brake systems (EBS)	B
C0048	1	Brake Booster Travel Sensor (Subfault)	1.7.c) Electronic brake systems (EBS)	B
P0504	9	Brake Switch "A"/"B" Correlation	1.7.c) Electronic brake systems (EBS)	B
P0555	9	Brake Booster Pressure Sensor Circuit	1.7.c) Electronic brake systems (EBS)	B
P0572	1	Brake Switch "A" Circuit Low	1.7.c) Electronic brake systems (EBS)	B
P2299	1	Brake Pedal Position/Accelerator Pedal Position Incompatible	1.7.c) Electronic brake systems (EBS)	B
U0121	31	Lost Communication With Anti-Lock Brake System (ABS) Control Module	1.6. f) Anti-lock braking system (ABS)	B
U0128	3	Lost Communication With Park Brake Control Module	1.7.c) Electronic brake systems (EBS)	B
U0151	2	Lost Communication With Restraints Control Module	7.1.6. SRS Systems	B
U0241	1	Lost Communication With Headlamp Control Module "A"	4.1.3. Headlamp Switching	B
U0415	14	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module	1.6. f) Anti-lock braking system (ABS)	B
U0418	2	Invalid Data Received From Brake System Control Module	1.7.c) Electronic brake systems (EBS)	B

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# Driving brake test

- Driving brake test



Next button in main GUI: Driving test

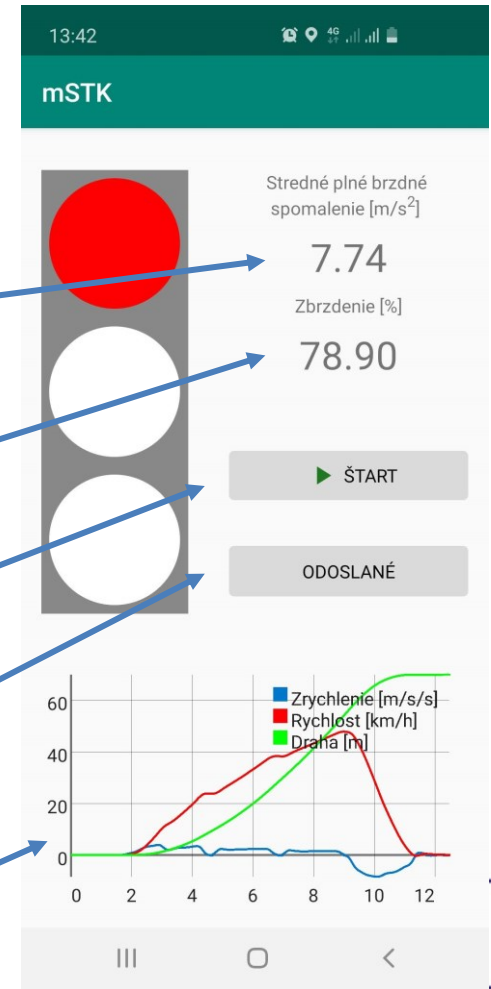
The mean fully developed deceleration

Brake efficiency

Button to Start driving test

Button to data transfer

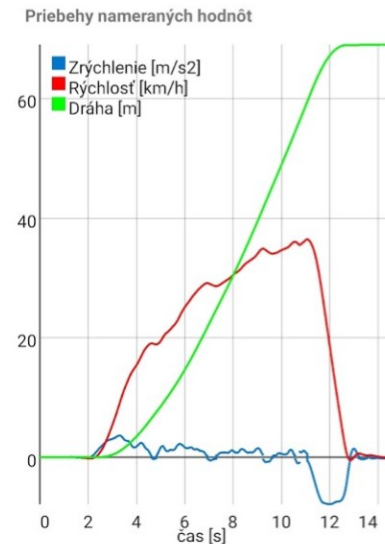
Graph of distance, speed and acceleration



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# Driving brake test

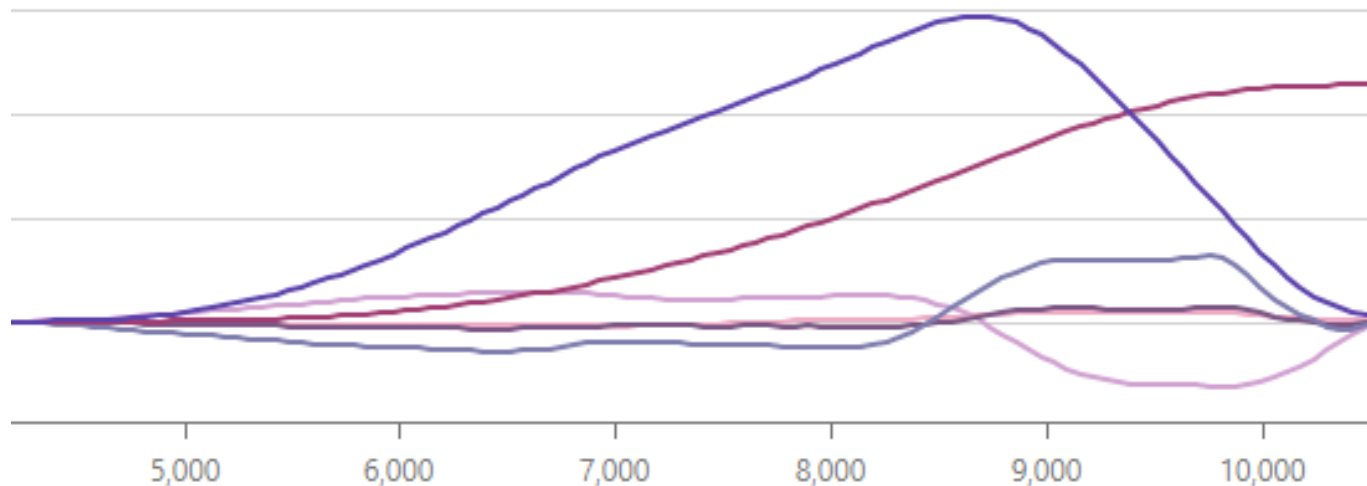
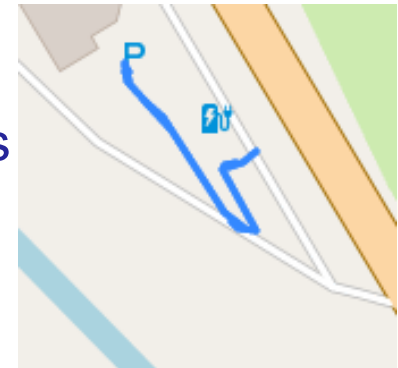
- Mobile device with application must be in a holder in the tested vehicle in any position
- Application uses an accelerometer in the mobile device to calculate
- A longitudinal acceleration of the vehicle is calculated by the accelerations of the mobile device
- The mean fully developed deceleration is calculated by longitudinal deceleration
- From the mean fully developed deceleration brake efficiency is calculated



# Driving brake test – transferred data

Transferred data from the driving brake test to the information system:

- Mobile device serial number
- The mean fully developed deceleration (m/s<sup>2</sup>)
- The brake efficiency (%)
- Graph of mobile device acceleration in x,y,z directions
- Graph of vehicle longitudinal acceleration
- Graph of vehicle velocity
- Graph of travelled distance
- GPS coordinates from driving brake test





## Total numbers of Driving brake tests

2019 (no data transferred)	2020 started with data transfer (June 2020 - still not mandatory)	2021 data transfer is mandatory	2020 (until March)
unknown	7624	135913	32949

## Failure according to Directive 45/2014EU only for Driving brake test

Item	Assessment of deficiencies	2019	2020	2021	2022 (until March)
1.2.2.1 Service braking efficiency	B	unknown	13	195	37
1.2.2.2 Service braking efficiency	C	unknown	4	36	2

# Thank you for your attention

For more information do not hesitate to contact

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