PTI – Workshop

London, 16th of October 2019

Supervision of PTI in Slovakia

Marián Rybianský, Chairman of the Board
Jaroslav Olexa, Head of Supervision Department

How to supervise the PTI in an efficient way?

Inspections on the output of the process – Re-inspections:

- *the re-inspection may be performed on limited number of randomly chosen vehicles*
- *efficiency can be increased using the risk rating criteria for choosing of target vehicles, inspectors or facilities*
- *need for a high number of qualified and fraud resistant re-inspectors (high personal costs)*
- *need for mobility of the re-inspectors (to be on site in-time)*
- *it is possible to identify almost every breach of regulations (incl. corrosion, excessive play etc.)*

How to supervise the PTI in an efficient way?

Inspections of the process itself – Analysis of the recorded data and videos:

- *every single PTI can be analysed and inspected*
- *efficiency can be increased using the risk rating criteria and IT tools for choosing of target vehicles, inspectors or facilities*
- *need for extensive and expensive IT infrastructure (development and implementation of SW / HW, cameras, data transfers)*
- *focused on essential part of PTI (brakes, lights, emissions), some types of regulations breach can not be identified (corrosion, excessive play etc.)*

How to supervise the PTI in an efficient way?

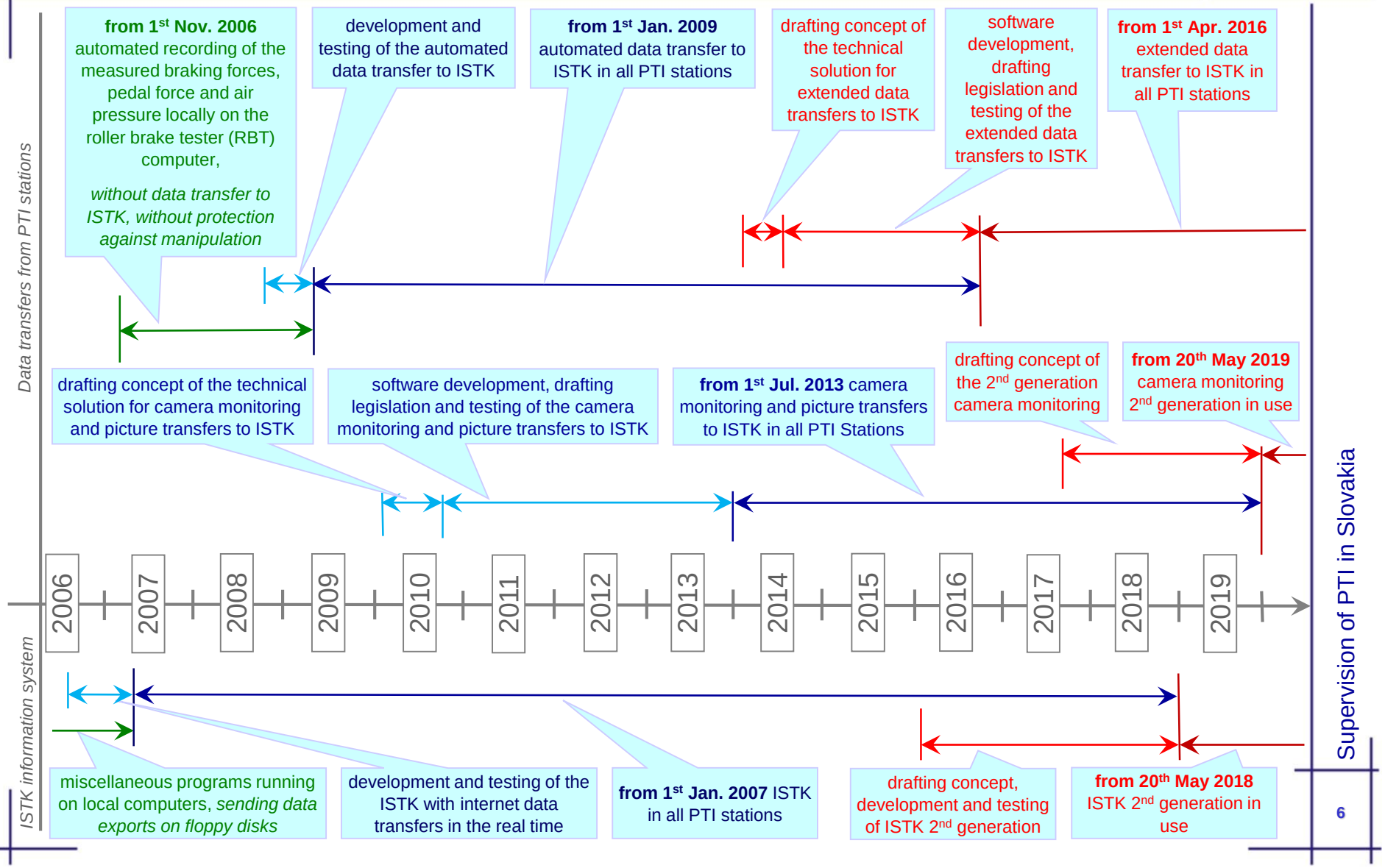
Testing the process with the simulated input – „Mystery shopping“:

- *vehicle with prepared defects is presented for inspection, inspector does not know that it is a supervision*
- *efficiency can be increased using the risk rating criteria and IT tools for choosing of target facilities*
- *usable only against low quality PTI, not in fraud cases*
- *problems with vehicles - need for frequent change of vehicles, problematic driving vehicles with dangerous defects to PTI facility etc.*

Comparison

	Re-inspection	Data Analysis	Mystery Shopping
efficiency	*access to limited number of PTIs*	*access to every PTI*	*no access to real PTIs, testing only simulated cases in limited number of facilities*
personal costs	*high number of qualified re-inspectors*	*lower number of qualified supervisors*	*high number of "mystery shoppers"*
technical means	*IT system, mobility of re-inspectors*	*IT system, HW / SW, data transfers, cameras etc.*	*IT system, frequently changed vehicles with defects*
scope	*every inspecting item (including corrosion, excessive play etc.)*	*measured data and items visible on video (essential items like brakes, lighting, emissions etc.)*	*limited number of defects in certain inspecting items; the driving safety of the prepared vehicle must be considered*
psychologic impact	*high but limited on the inspected facility*	*extremely high in the beginning („big brother is watching you" effect) but fading (inspectors are getting used to cameras), later limited on the inspected facility*	*high but limited on the inspected facility*

Why data analysis? We have been developing the IT infrastructure for efficient PTI supervision since 2006



Who is responsible for supervision in Slovakia?

until May 2018:

- **Ministry of Transport** and Construction of the Slovak Republic (supervision department)
- **local authorities** (transport department of district offices /approximately 50 departments/)
- TESTEK, a.s. was in position of an ***expert consultant*** during supervisions (since 2004) done by state authorities, employees were members of the control groups

SNAS SLOVENSKÁ NÁRODNÁ AKREDITAČNÁ SLUŽBA
Karloveská 63, 840 00 Bratislava 4, Slovenská republika

OSVEDČENIE
O AKREDITÁCII

č. I-022

Slovenská národná akreditačná služba na základe rozhodnutia
č. 209/7829/2018/1 zo dňa 19.12.2018 osvedčuje, že

TESTEK, a.s.
Plachého 14, 841 02 Bratislava
IČO: 35 914 114

Inšpekčný útvar spoločnosti TESTEK, a.s.
Vajnorská 137, 831 04 Bratislava

je spôsobilý vykonávať počiatočné a priebežné overovanie plnenia podmienok na vykonávanie technickej kontroly a odborný dozor technickej služby technickej kontroly podľa rozsahu akreditácie uvedeného v prílohe tohto osvedčenia. Príloha tvorí neoddeliteľnú súčasť osvedčenia o akreditácii.

Spôsobilosť vykonávať akreditovanú činnosť nestranne a dôveryhodne ako ***inšpekčný orgán typu A*** *a* ***inšpekčný orgány typu C*** *subjekt preukazuje plnením požiadaviek normy* **ISO/IEC 17020: 2012.**

Akreditácia udelená dňa 19.12.2018 platí do 10.06.2021.

Bratislava 19.12.2018

Mgr. Martin Senčák
riaditeľ

SNAS je signatárom EA MLA a ILAC MRA v predmetnej oblasti akreditácie.

since May 2018:

- **Ministry of Transport** and Construction of the Slovak Republic (supervision department)
- **local authorities** (transport department of district offices /approximately 50 departments/)
- **technical service** for technical vehicle inspection (TESTEK, a.s.)
  - newly formed supervision department (currently 4 employees)
  - accredited inspection body - type „C“ according to ISO/IEC 17020: 2012
  - certified according to ISO 37001

CCTV cameras

Why CCTV cameras?

- until 2013 **common practice** – „inspection“ without vehicle

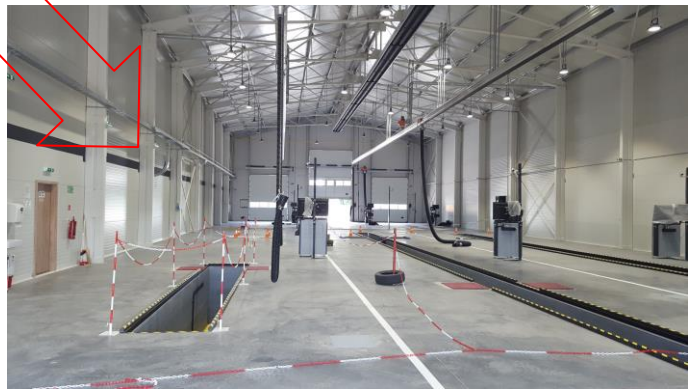
system (database)

Zoznam uzavretých protokolov

Filtrovať

Kód stanice	Stanica	Kód protokolu	Číslo protokolu	Dátum	EČV	Značka	Obch. názov	VIN	Spôsobilosť vozidla	Číslo motora (typ)	Kontroloval	Storno	Druh kontroly
				od 17.02.2014 do 17.02.2014									
8116			5429		TV041CP	RENAULT	PREMIUM	VF624GPA000074125	Spôsobilé	DXI 11 460-EEV			Administratívna
8116			5427		JDV0847	SKODA	FABIA	TMBGF65J9A3024184	Spôsobilé	BMS			Pravidelná
8116			5425		JDV0846	SKODA	OCTAVIA	TMBGP41U5Y2365759	Spôsobilé	AHF			Pravidelná
8116			5423		MI149BN	CITROEN	C3	VF7FCHFXC28530340	Spôsobilé	HFX			Pravidelná
8116			5421		TV481CB	SKODA	FABIA	TMBPH16Y323521242	Spôsobilé	AZF			Pravidelná
8116			5419		TV263CE	FORD	GALAXY	WF0GXXPSWGVR95685	Spôsobilé	Y5B			Pravidelná
8116			5417		JDV0844	SKODA	OCTAVIA	TMBHT61Z6A2079965	Spôsobilé	CAYC			Pravidelná
8116			5415		TV007CE	VOLKSWAGEN	PASSAT	WVWZZZ3CZ7P161922	Spôsobilé	BKP			Pravidelná
8116			5428		TV597CG	OPEL	ASTRA G	W0L000051V2289814	Spôsobilé	X 16 SZR			Pravidelná
8116			5426		MI586CT	AUDI	A6	WAUZZZ4AZSN109795	Spôsobilé	ABK			Pravidelná

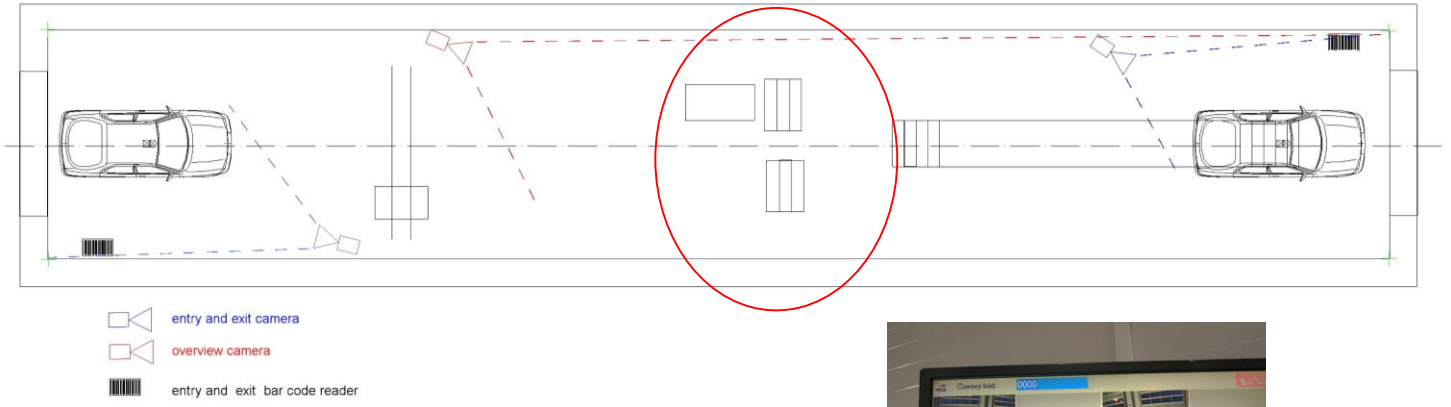
PTI lines



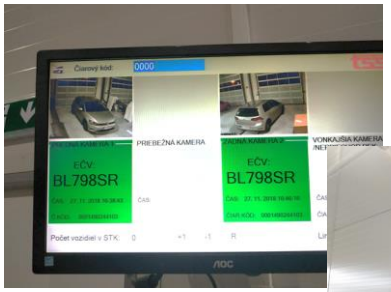
CCTV cameras

since 2013:

- **entry** and **exit** cameras with automated recognition of the licence plate
- one **overview camera** /mandatory cover of the PTI line - minimally 50 % of the length of the line + **roller brake tester**



- the technician **starts** PTI by bar code reader (entry and exit camera with the automated recognition of the licence plate)
- **overview camera** begins to monitor the process of PTI



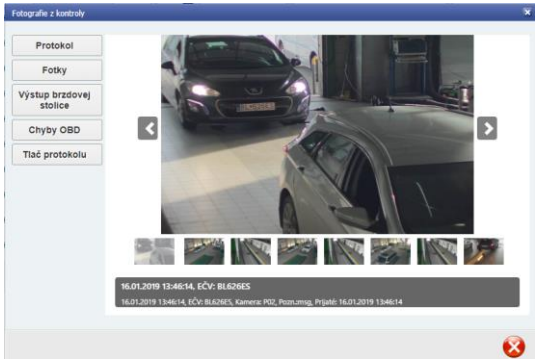
CCTV cameras

since 2013:

- pictures from entry and exit cameras automatically **transferred** to PTI administration system + in every **5 minutes** one picture from overview camera – pictures **stored for 2 years** (usually)
- video footage from the inspection **stored locally** on hard disk for **30 days**
- video footage **accessible** for supervision authorities **- locally**

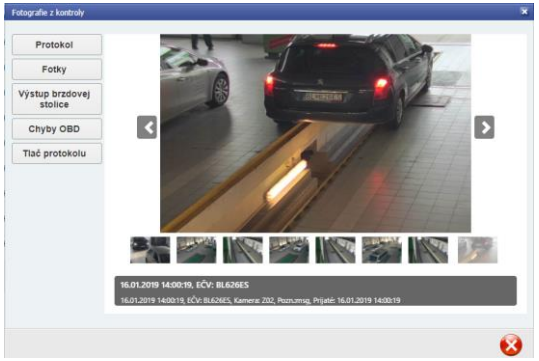
example: https://stk.testek.sk/

Entry cam



Overview cam

Exit cam



CCTV cameras

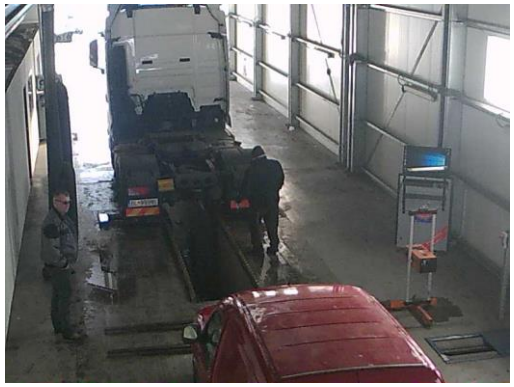
During 2013 and 2018 several **deficiencies** in the configuration of the cameras have been identified (mostly during supervisions) and therefore a **significant change** in the configuration **has been proposed.**

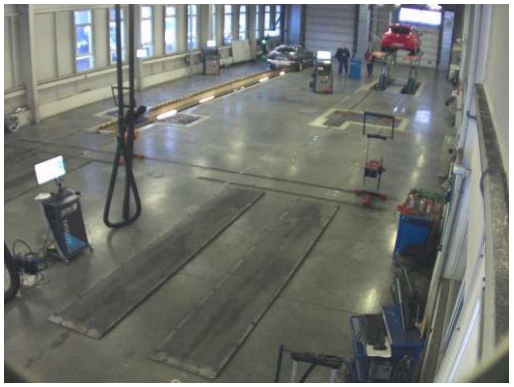
- **frequency** of frames per second in video records
- „**black**“ areas on the PTI lines, places not covered by CCTV cameras – unable to identify and supervise some inspection items and procedures
- view only from **one side** of inspection line (important for its supervision esp. in case of braking procedures)
- **insufficient** recording time (short period)
- **poor quality** of installed cameras and recordings
- **access** to records only locally on PTI station
- complicated records **downloading**, etc.

CCTV cameras

examples from PTI station:

- **appropriate** placement of CCTV camera





- **inappropriate** placement of CCTV camera

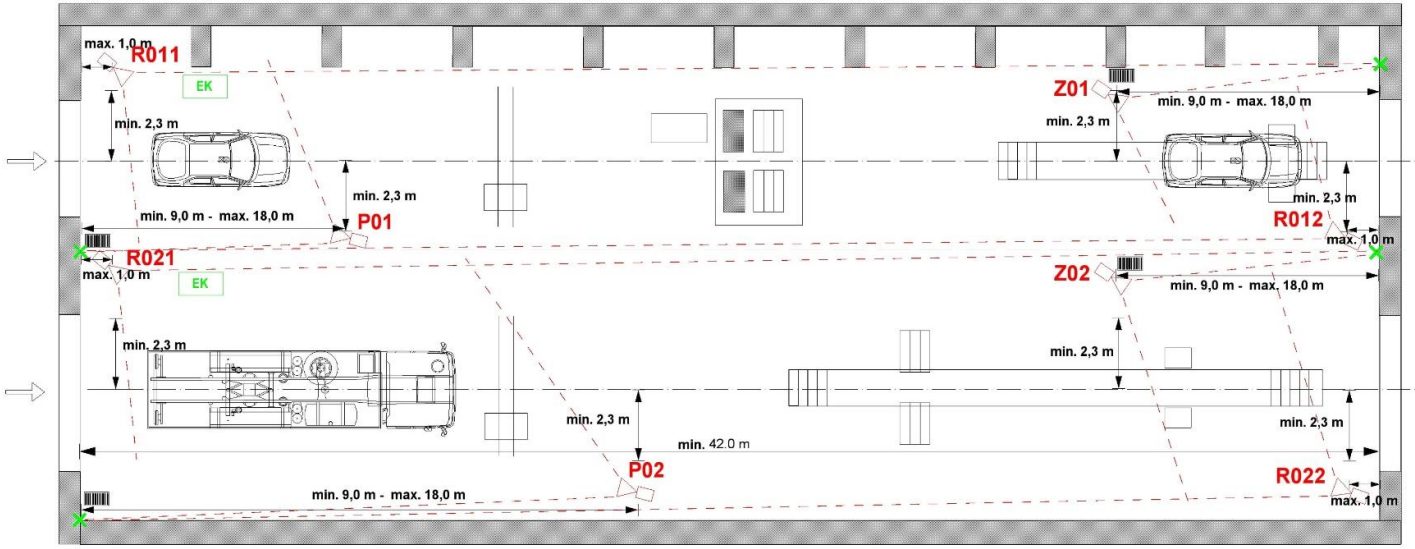
CCTV cameras

since 2018 (to May 2019 transitional period): significant changes in red

- **entry** and **exit** cameras with automated recognition of licence plate (current status)
- **two** overview cameras /mandatory to cover **100 %** of the PTI line/
- example: **two** (and more) lines PTI station

Note: overview camera R01 and R021 mutual for PTI and emission check

(currently emission check **without** video monitoring)



R011, R012, R021, R021 – overview cameras
P01, Z01, P02, Z02 – entry and exit cameras

CCTV cameras

since 2018 (2019, transitional period):

- pictures from entry and exit cameras automatically **transferred** to the PTI administration system + in every 2 minutes a picture from both overview cameras – pictures stored for 20 years
- video footage from the inspection **stored** locally on hard disk for 2 years (currently one month)
- video footage **accessible** for supervision authorities - locally but also **via remote administration**
- video footage **done** by overview cameras (both) plus video footage of entry and exit cameras

The whole inspection process is <u>covered</u> by cameras (a necessary condition if the supervision should be done by video analysis).

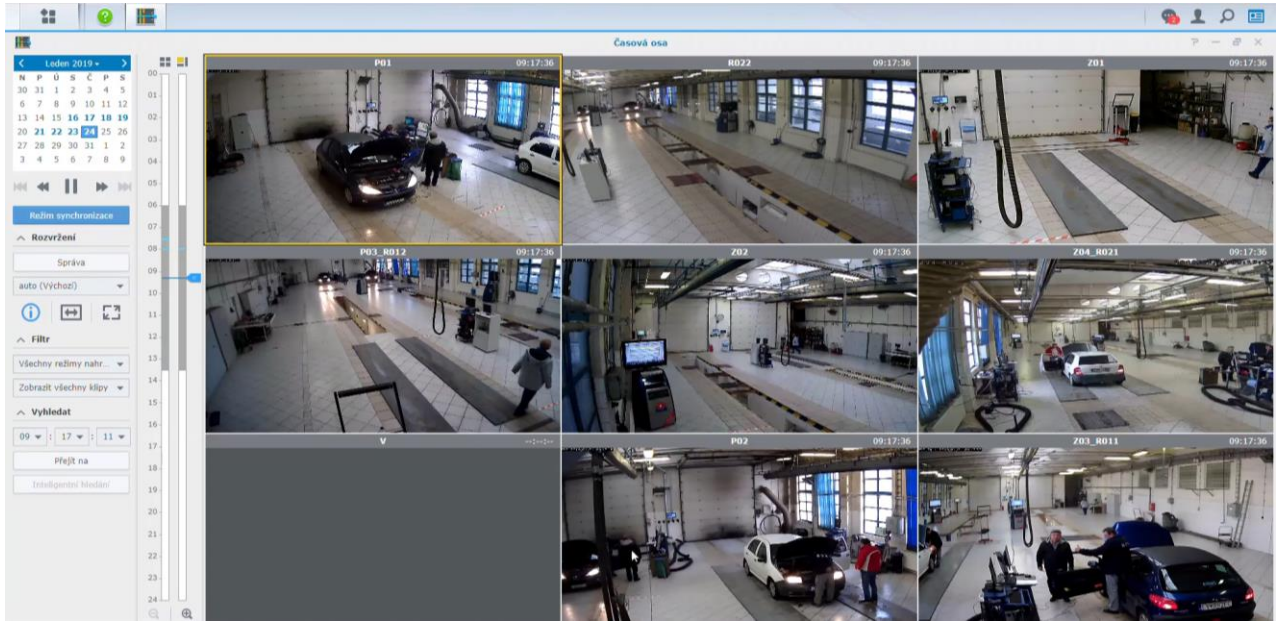
Duties of PTI station

Act No. 106/2018:

PTI station must:

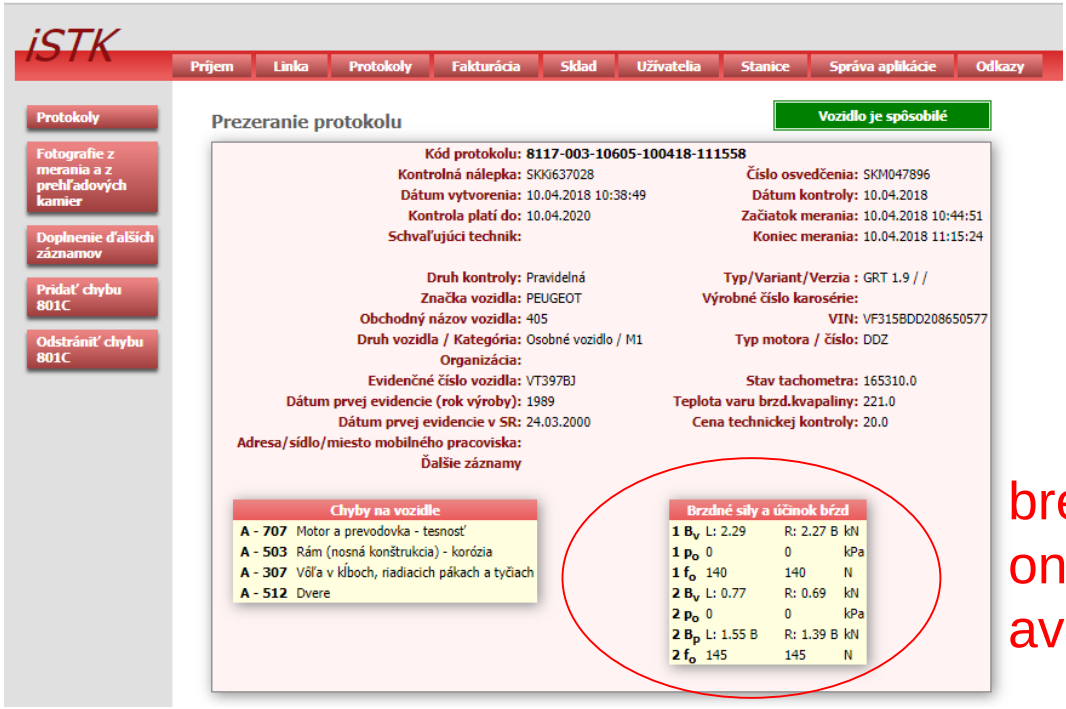
- allow the establishment of **permanent remote electronic access** to a video stored locally on the server of PTI station

example of remote access:



Information system

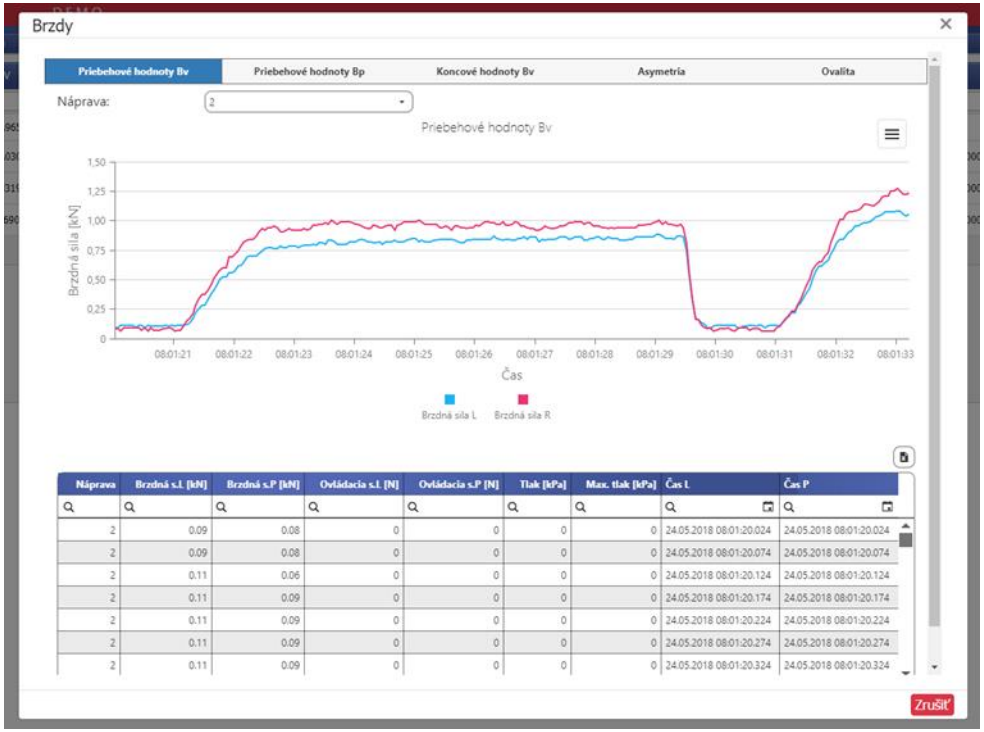
AIS TK – information system for PTI stations and supervision authorities (old version) – since January 2009 **automated recording and data transfer** of measured breaking force, pedal force and air pressure



breaking data – only final values available (to 2016)

Information system

CIS TK – since February 2016 **extended data transfer**, since **June 2018** new information system for PTI stations and supervision authorities



breaking data – **final** values plus **intermediate** values

Information system

CIS TK – since February 2016 **extended data transfer**

Scope of transferred data:

- values of **brake force** and **pedal force** (hydraulic systems) or **air pressure** (pneumatic systems) from the whole **service brake** test measurement (at least 30 seconds) recorded with sampling frequency 10 Hz
- values of **brake force** from the whole **parking brake** test measurement (at least 5 seconds) recorded with sampling frequency 10 Hz
- **pressure** in every brake circuit (pneumatic systems)
- information about the reaching of **wheel lock** during measurement (for service brake and for parking brake)
- brake force **fluctuation** (ovality, for service brake only)
- **passive resistance** value – self inflicted braking effect without any activation of the brake pedal
- **maximum difference** between the brake force on left and right side of the axle (i.e. continuous asymmetry)
- **difference** between the brake force on left and right side of the axle **at the maximum brake forces measured** (i.e. final asymmetry)

Video analysis

Data **recorded** and **transferred** from roller brake tester:

the beginning and end of the rear axle (service brake) measurement: 09:53:29 to 9:53:39 AM

AxleNumber	ns1:Fb_L	ns1:Fb_R	ns1:PercentageAsymmetry	ns1:Fo_L	ns1:Fo_R	ns1:Pb	ns1:PbMax	ns1:Timestamp_L	ns1:Timestamp_R
2	0,13	0,16		0	0			2017-10-25T09:53:29.628	2017-10-25T09:53:29.628
2	0,14	0,15		0	0			2017-10-25T09:53:29.678	2017-10-25T09:53:29.678
2	0,12	0,16		0	0			2017-10-25T09:53:29.728	2017-10-25T09:53:29.728

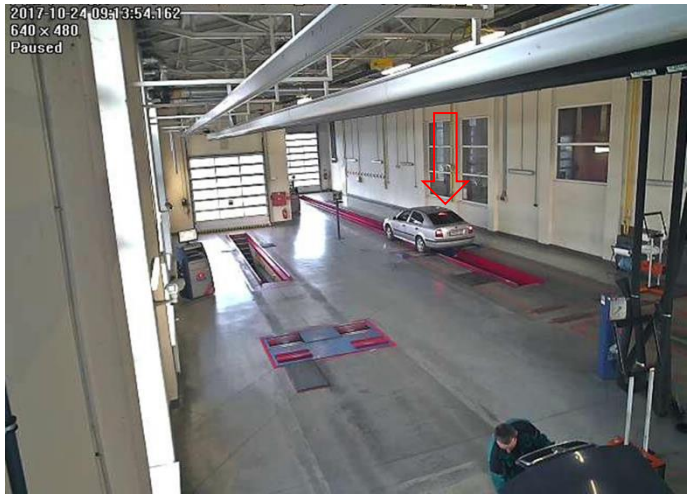
AxleNumber	ns1:Fb_L	ns1:Fb_R	ns1:PercentageAsymmetry	ns1:Fo_L	ns1:Fo_R	ns1:Pb	ns1:PbMax	ns1:Timestamp_L	ns1:Timestamp_R
2	1,19	1,02		185	185			2017-10-25T09:53:39.778	2017-10-25T09:53:39.778
2	1,2	1		185	185			2017-10-25T09:53:39.828	2017-10-25T09:53:39.828
2	1,21	0,99		180	180			2017-10-25T09:53:39.878	2017-10-25T09:53:39.878

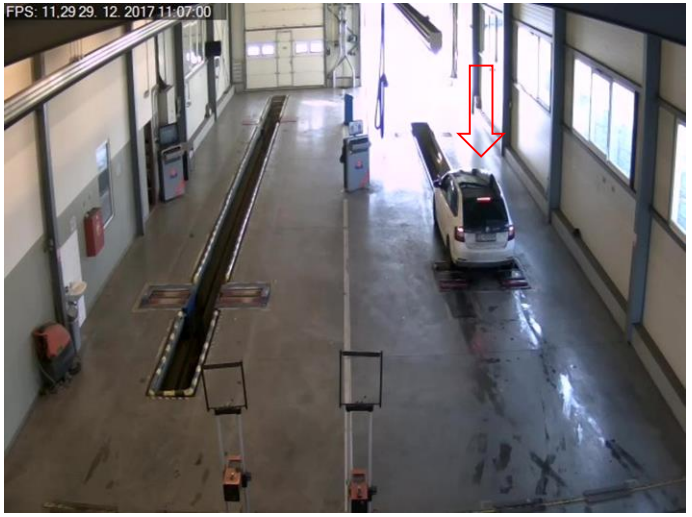
During the measurement of rear axle **in roller brake tester** **front** axle!

Video analysis

Data **recorded** and **transferred** from roller brake tester:

Parking brake





Question? Why did the **brake lights light up** when the parking brake of the rear axle was measured (according to the data transferred from brake tester)?

A common practice of measuring the effect of parking brake on PTI stations

Video analysis

Data **recorded** and **transferred** from roller brake tester:

the beginning and end of the front axle measurement (vehicle SKODA): 10:23:27 to 10:23:33 AM

AxleNumber	ns1:Fb_L	ns1:Fb_R	ns1:PercentageAsymmetry	ns1:Fo_L	ns1:Fo_R	ns1:Pb	ns1:PbMax	ns1:Timestamp_L	ns1:Timestamp_R
1	1,07	1,11		75	75			2018-04-18T10:23:27.024	2018-04-18T10:23:27.024
1	1,13	1,17		75	75			2018-04-18T10:23:27.074	2018-04-18T10:23:27.074
1	1,16	1,25		75	75			2018-04-18T10:23:27.124	2018-04-18T10:23:27.124
1	2,31	2,51		95	95			2018-04-18T10:23:33.474	2018-04-18T10:23:33.474
1	2,48	2,61		95	95			2018-04-18T10:23:33.524	2018-04-18T10:23:33.524
1		2,611							2018-04-18T10:23:33.574

During the measurement of the front axle on **vehicle ŠKODA in roller brake tester** **front** axle of **vehicle KIA**!

Video analysis

Data **recorded** and **transferred** from roller brake tester:

Manipulative measurement of truck and trailer:

During the measurement of six axles of truck and trailer **in roller brake tester front** axle of truck!

Video analysis

Data **recorded** and **transferred** from roller brake tester: data modification

How long and how exactly does a **transfer** of measurement data from brake tester into the system last?

Solution: CCTV camera **directly** on the brake tester control panel?

change of Eurosystem – MahaCom (control software)?

Video analysis

Specific forms of influencing the brake measurement outcome:

Why does the technician have **two different kinds** of shoes on his feet (the technician went in the dressing room (during the measurements), but **changed** only one shoe ...)

Video analysis

Specific forms of influencing the brake measurement outcome:

Why is technician **moving** over the **rolling** brake tester?

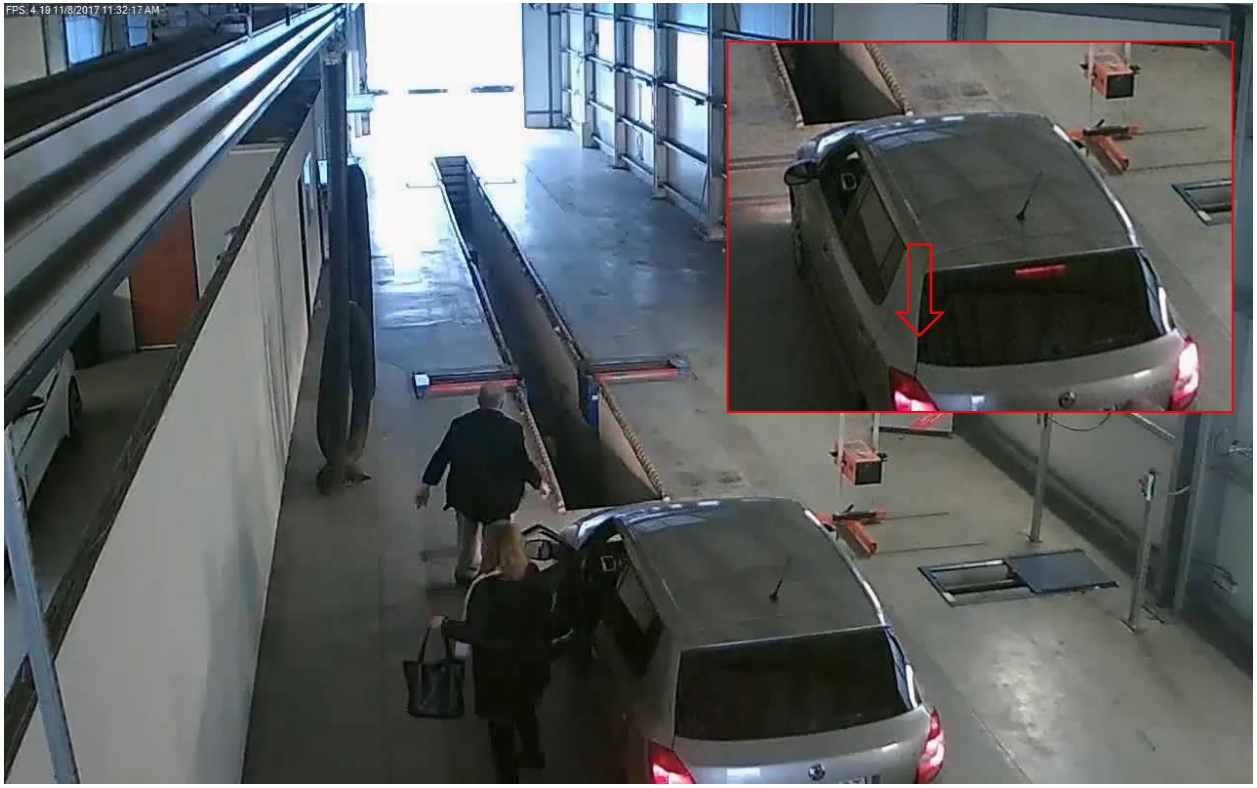
Video analysis

Specific forms of influencing the brake measurement outcome:

What **did** the technician **spray** on the brake discs?

Video analysis

The vehicle owner is **constantly standing**, respectively **walking** behind the vehicles while the vehicle is inspected on brake tester.. why?



Attempt to **hide** a serious vehicle defect (dysfunctional left rear brake light).

(in the picture: the moment when the brake pedal is pressed during the light inspection)

Video analysis

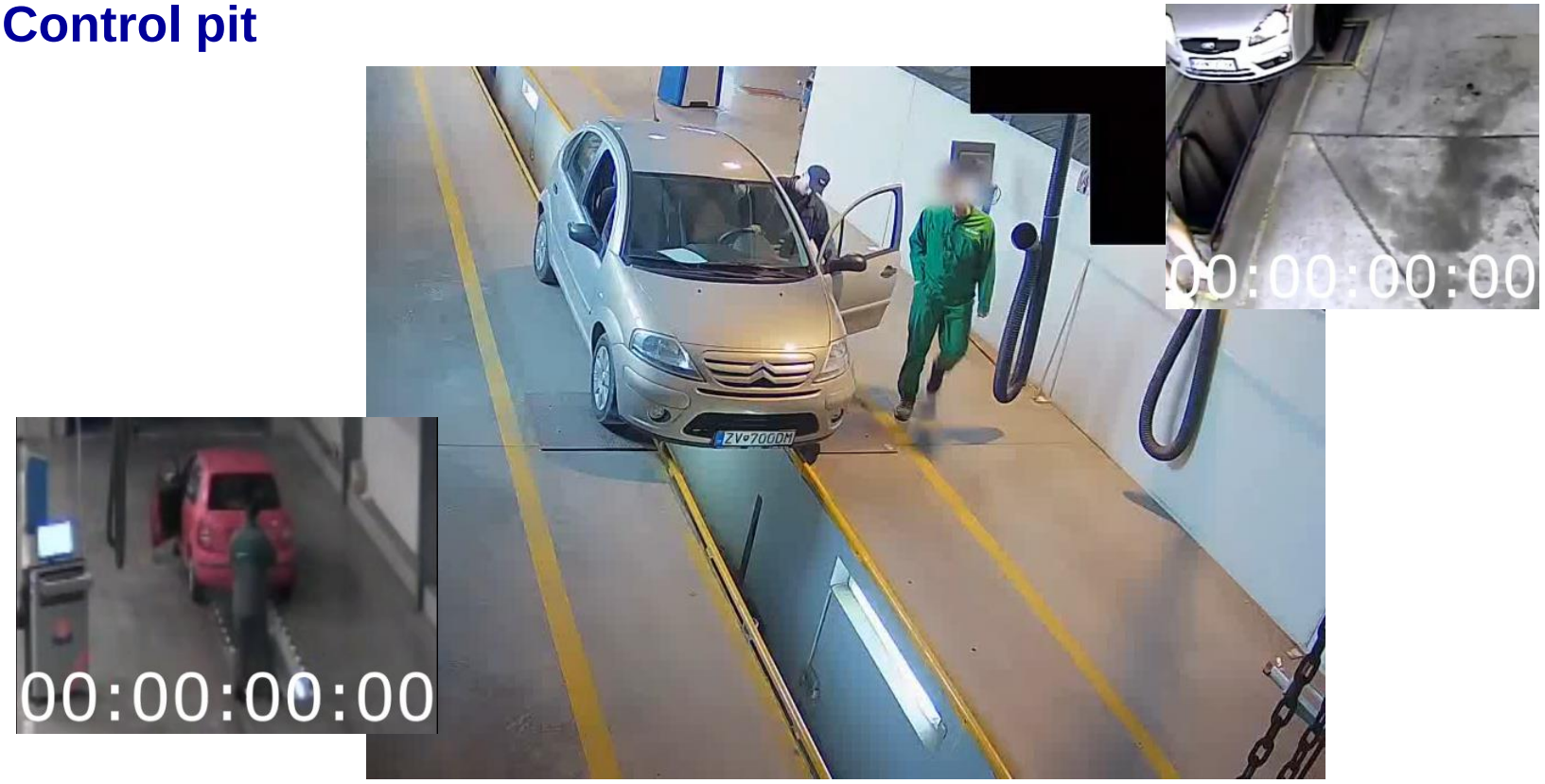
Ignoring serious and dangerous defects (**brake light**) + manipulation on brake tester (measured on another vehicle axle or on another vehicle)

Beam tester: **omitted** in both cases (MAN + PEUGEOT Boxer) + PEUGEOT Boxer **manipulated** brake measurement (measured on front axle)

Result: both vehicles **roadworthy**

Video analysis

Control pit



Is it possible to inspect the vehicle from the pit in about **5 seconds**?

Is it possible to inspect the vehicle from the pit with the cell phone in one hand (**chatting with somebody**)?

Video analysis

Other Video Analysis Options:

Was the PTI done by a person **qualified** to carry out technical inspection (certified technician)?

Was the PTI done by a technician who **did not pass the exams** after periodical retraining?

Did the authorized person (PTI station owner) **allow** other (**not certified**) persons, such as technicians and administrative staff **to use the information system** for technical inspections?

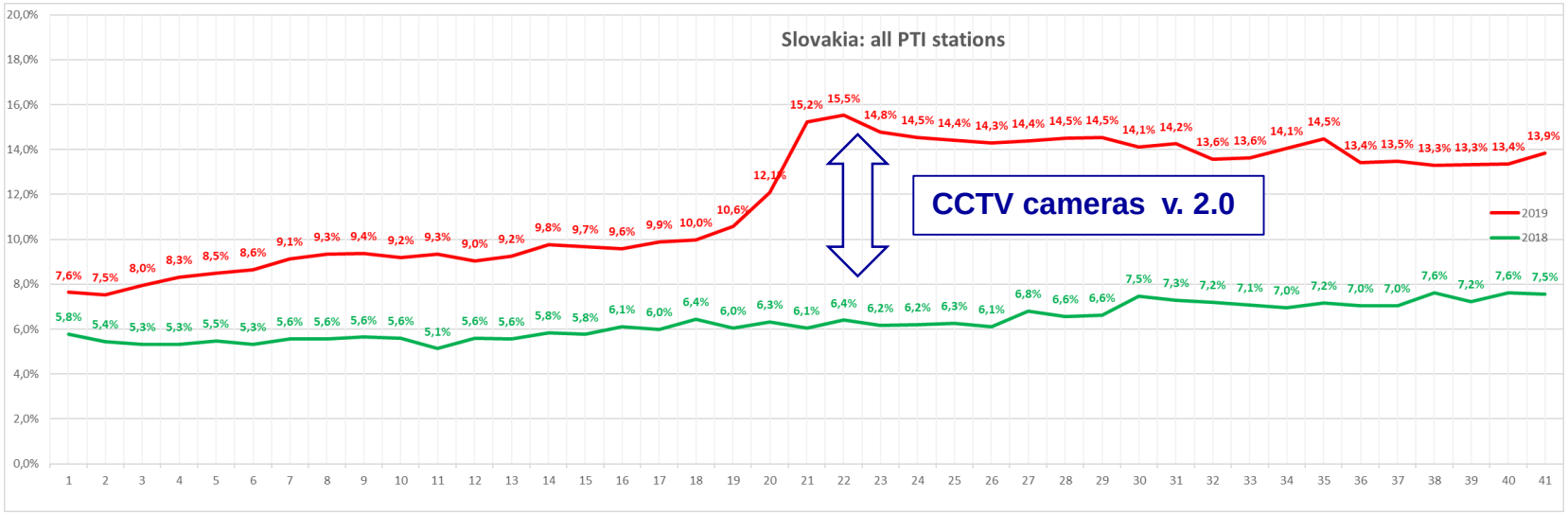
Video (photo) analysis

Which vehicle was inspected?

Underestimated (neglected) identification (quadruplets) ....

Consequences

number of defects 2019 in comparison with 2018 (weekly)

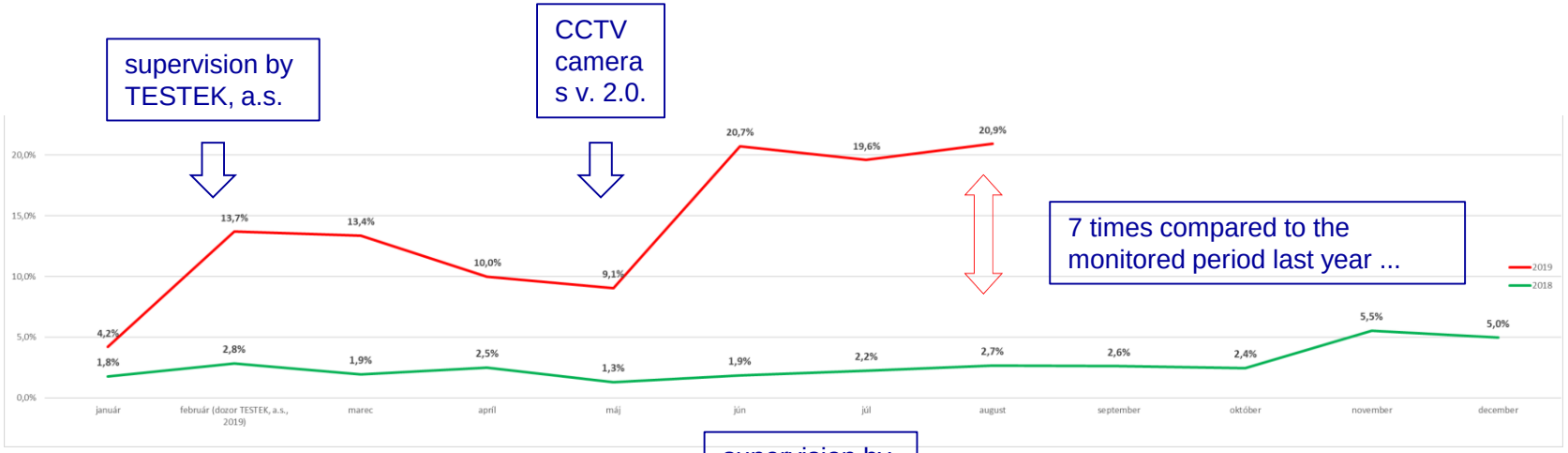


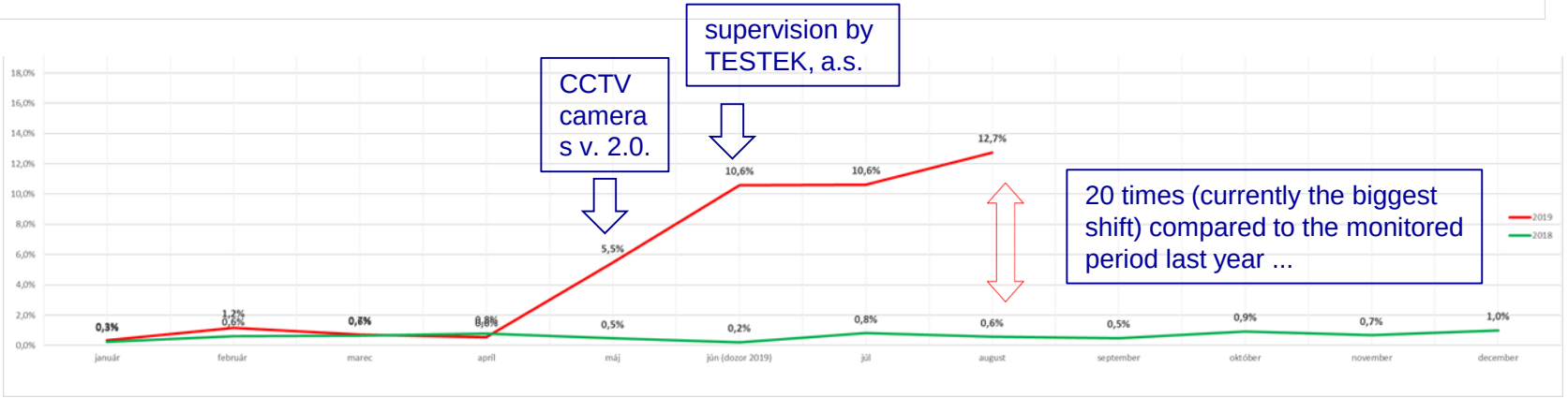
red: not roadworthy + temporary roadworthy (2019)

green: not roadworthy + temporary roadworthy (2018)

Consequences

number of defects 2019 in comparison with 2018 (PTI station **with supervision**)



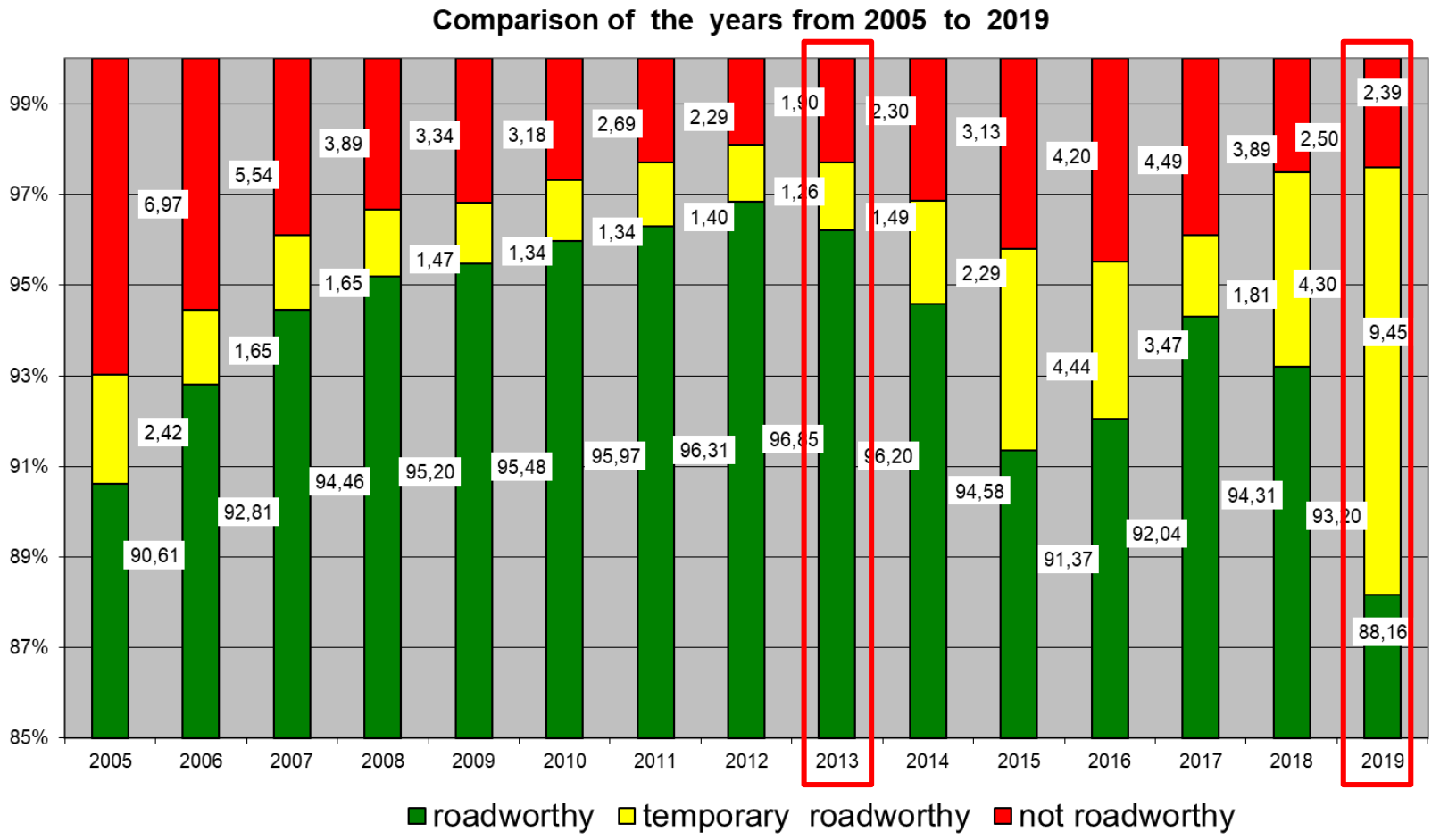


red: not roadworthy + temporary roadworthy (2019)

green: not roadworthy + temporary roadworthy (2018)

Consequences

number of defects since 2005 to 2019



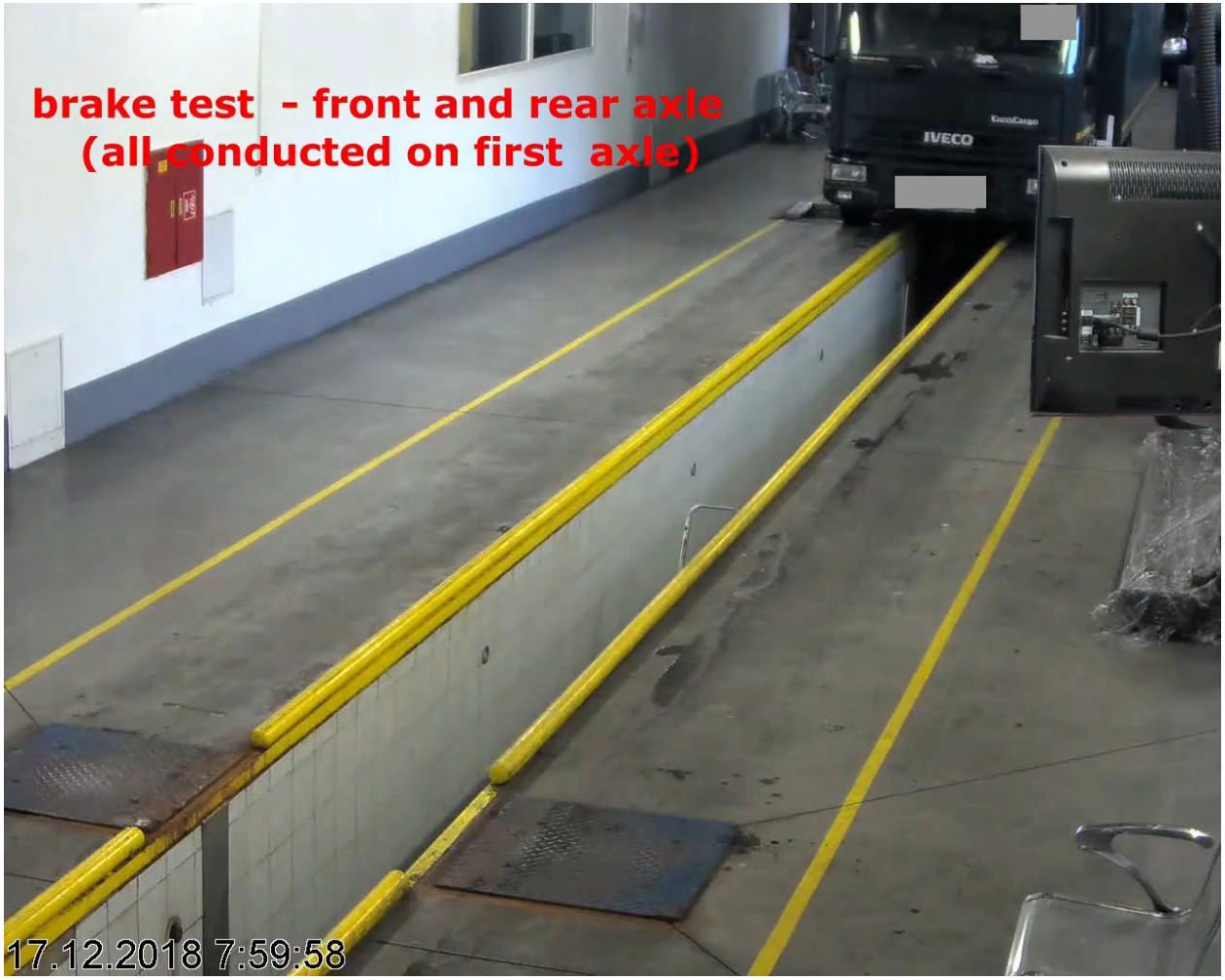
2019: January to September

Future steps

- **Automatization** of brake test evaluation (without possible influence of human factor)
  - **eliminate** possible influence on data transfer process (IT solutions - **blocking** unnecessary application on brake test computers)
  - automatic **notification of suspicious measurements** based on risk criteria (eg. average braking force, difference between progress data and final value, etc.)
- **Implementing smart devices in the process of PTI**
  - **scanning** and transferring data from OBD
  - **mobile application** for deceleration measurement
  - scan (shoot) the vehicle's **VIN + mileage** (to exclude bringing identical vehicles for PTI)
- **Other measures**
  - if necessary an **extension** of CCTV cameras - control panel of roller brake tester
  - occasional **reinspection** and mystery **tests** (as a second and third accredited supervision method)
  - **preventive activities** – lecturing activities for technicians and PTI owners
  - ISO 37001 (anti corruption) certification of PTI station (mandatory in Slovakia) – **consultancy**

Video (photo) analysis

No comment (motivation?) ...



THE END

Questions?

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