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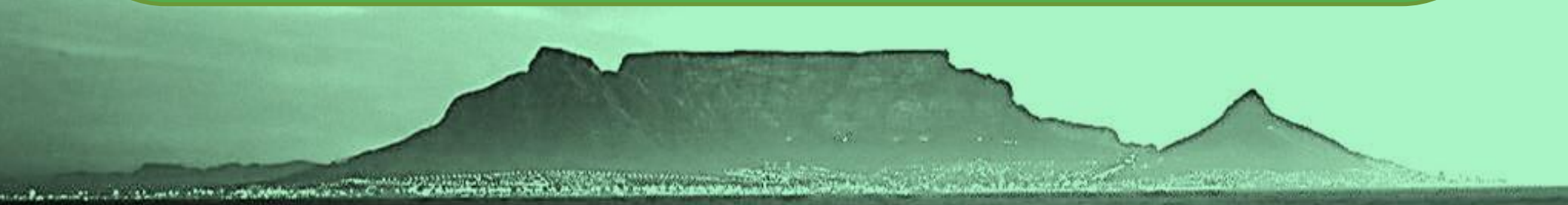
INTERNATIONAL MOTOR VEHICLE INSPECTION COMMITTEE

[WWW.CITA-VEHICLEINSPECTION.ORG](http://WWW.CITA-VEHICLEINSPECTION.ORG)

# True Vehicle Inspection by Preventing Manipulations and Tricks by Examiners

## Jan van der Does

Project Manager, Van Leeuwen Test Systems B.V. The Netherlands





# True Vehicle Inspection by Preventing Manipulations and Tricks by Examiners

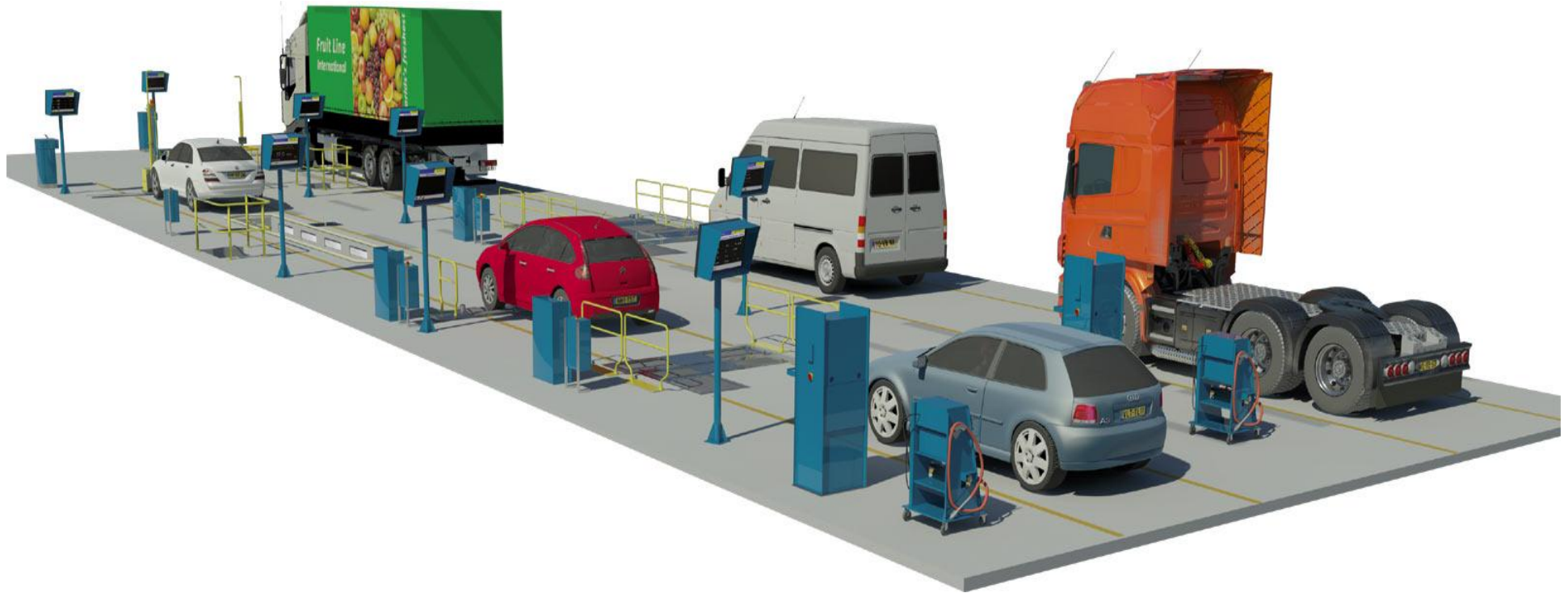


**Van Leeuwen Test Systems B.V.**  
The Netherlands

## Integrated and automated test station



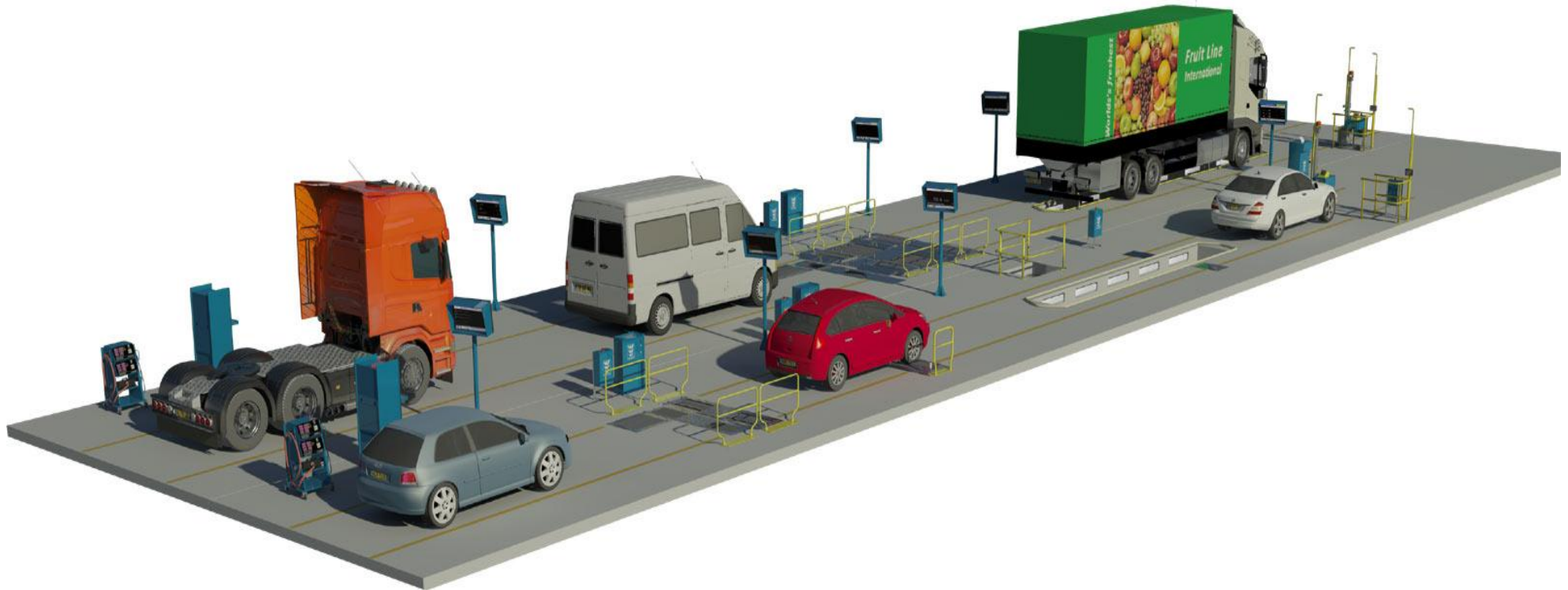
## Car test lane and universal test lane





# Anti-Manipulation Measures

## Car test lane and universal test lane



## Motorcycle test lane and car test lane



## Test lane overhead monitor

type of test

driver instructions

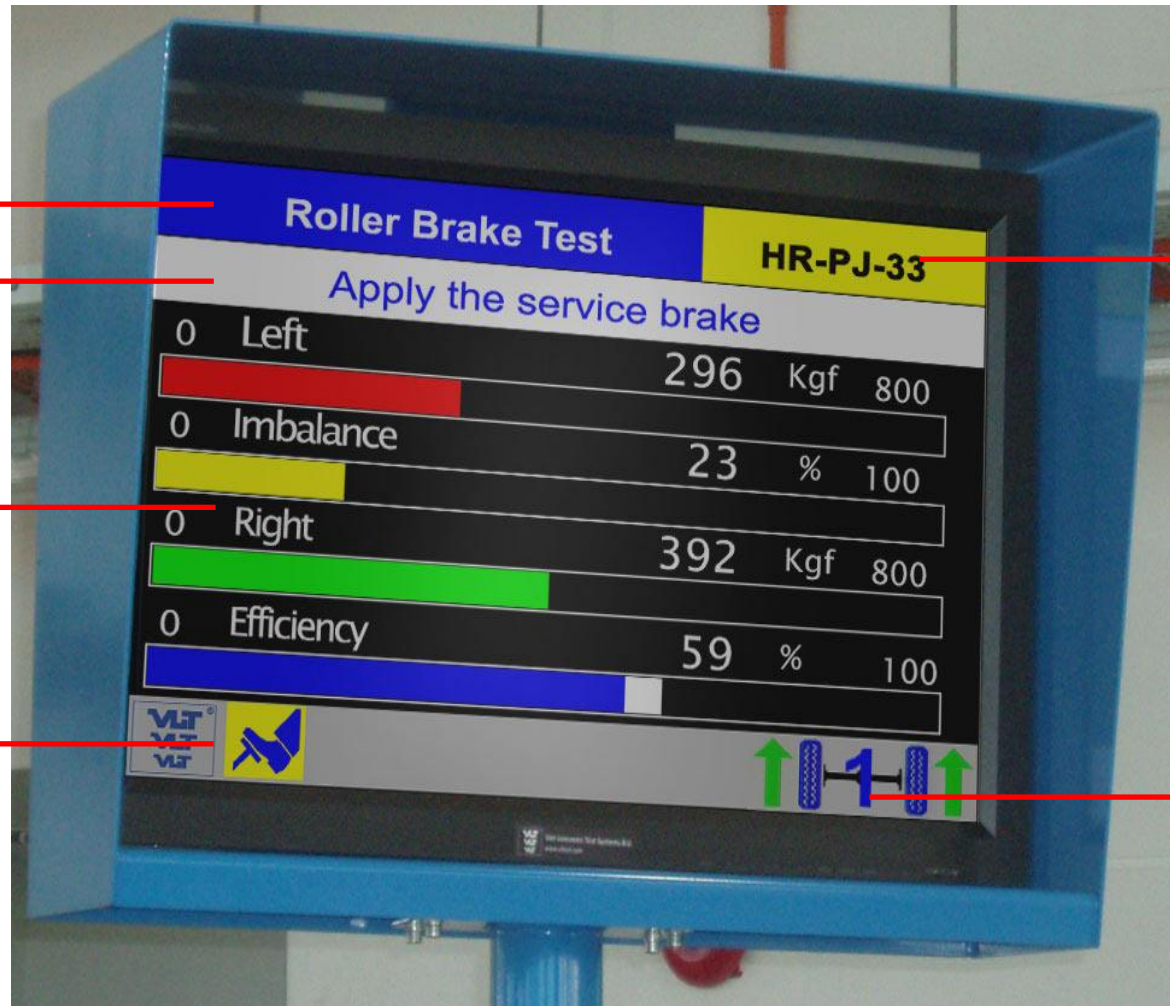
real-time

measuring values

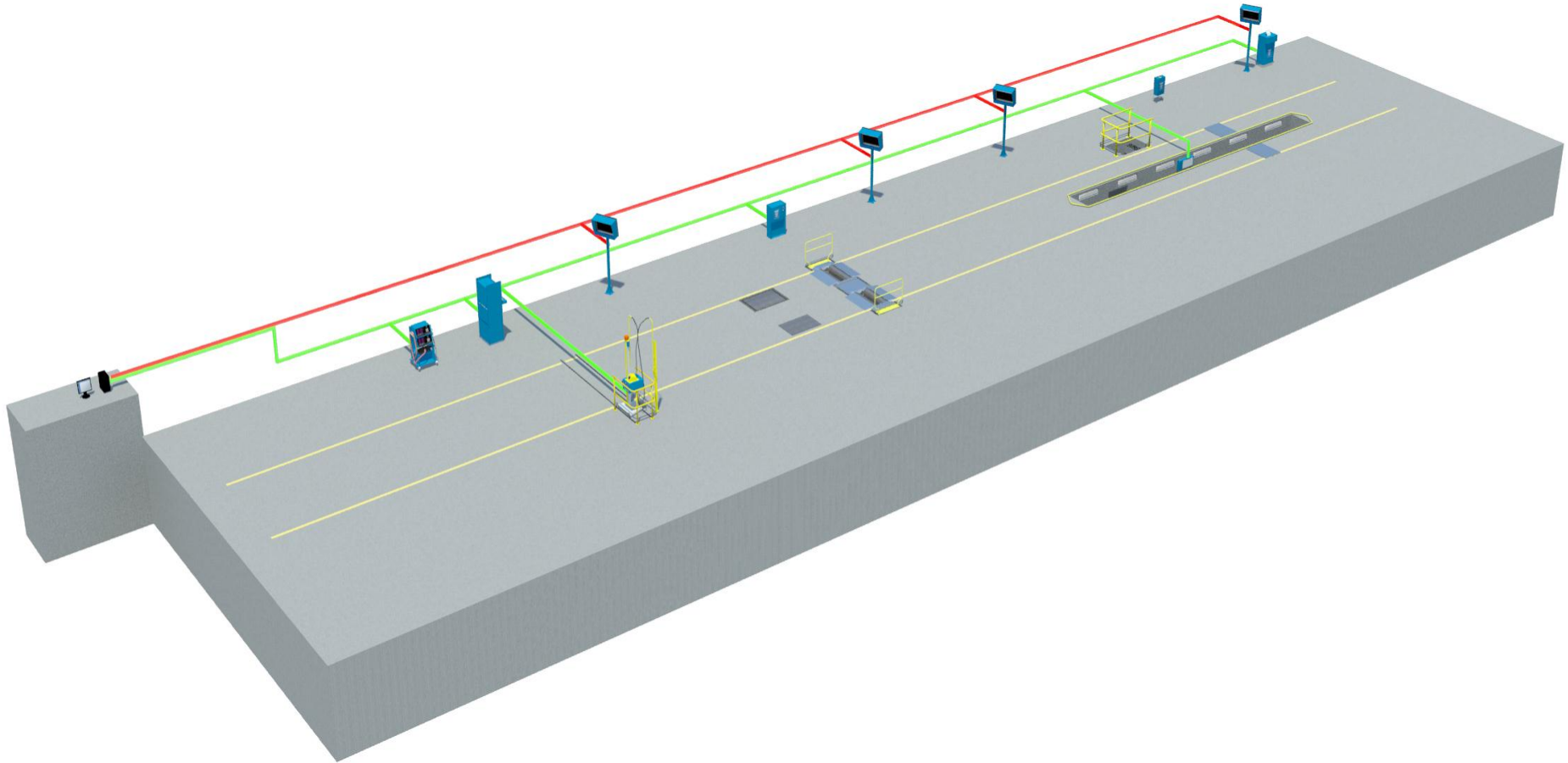
tests to perform

licence number

axle nr.

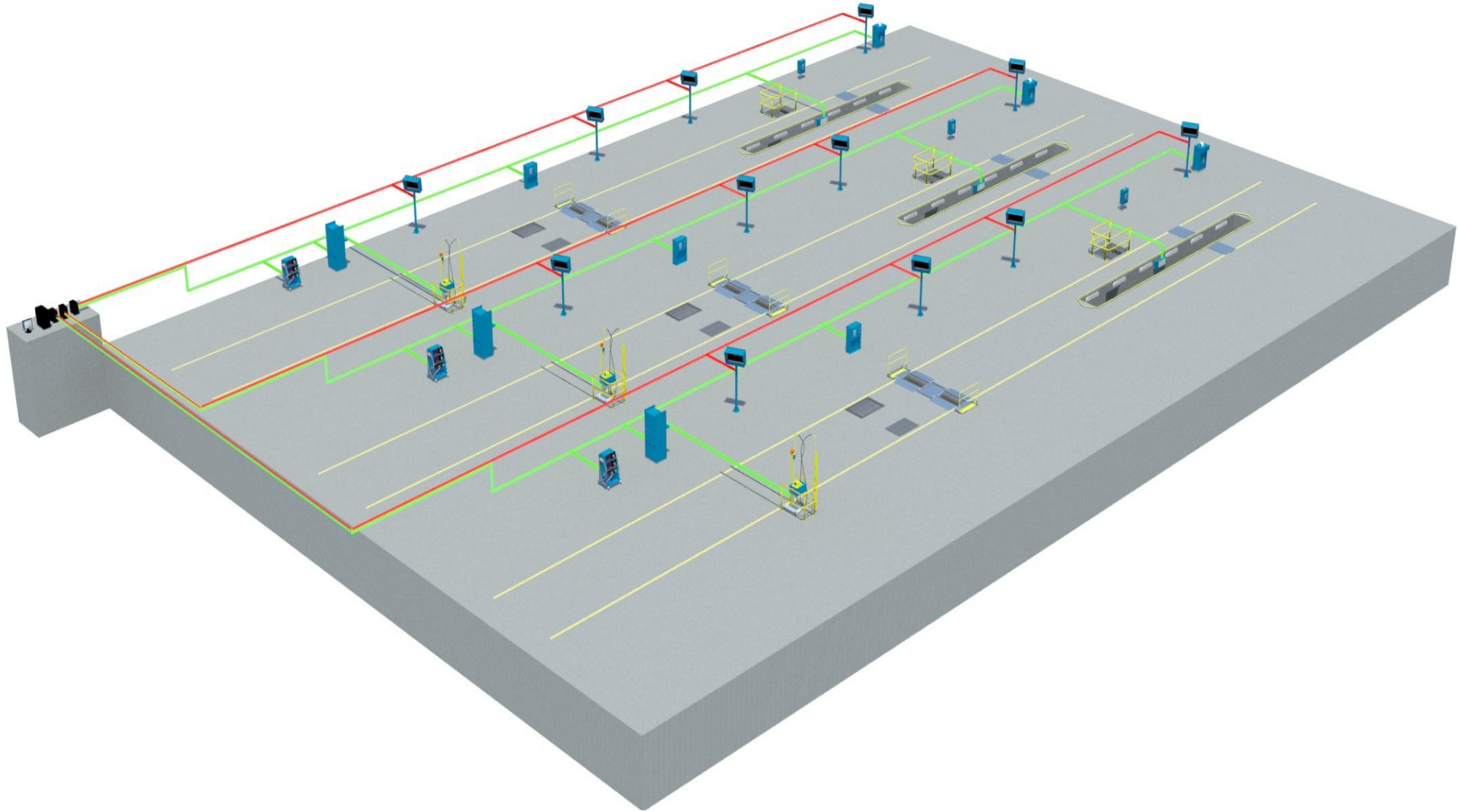


## Network connections test lane

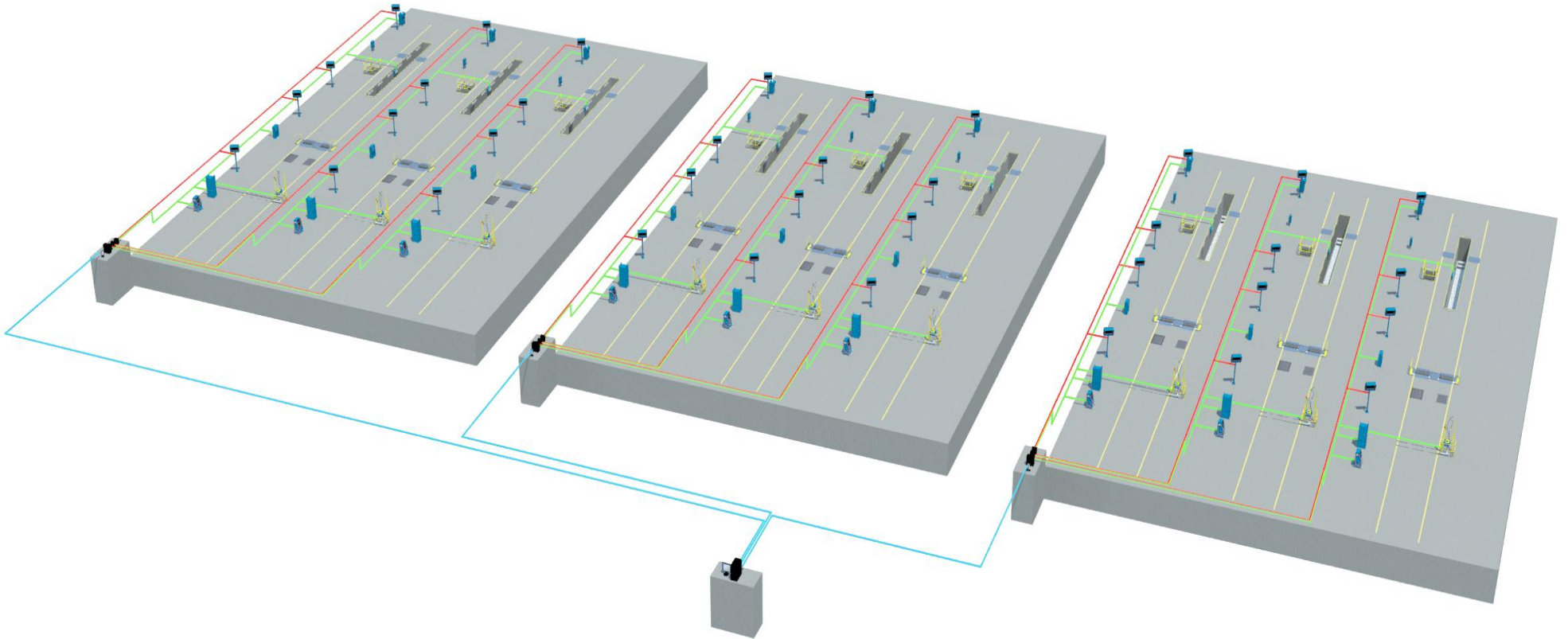




## Network connections test station

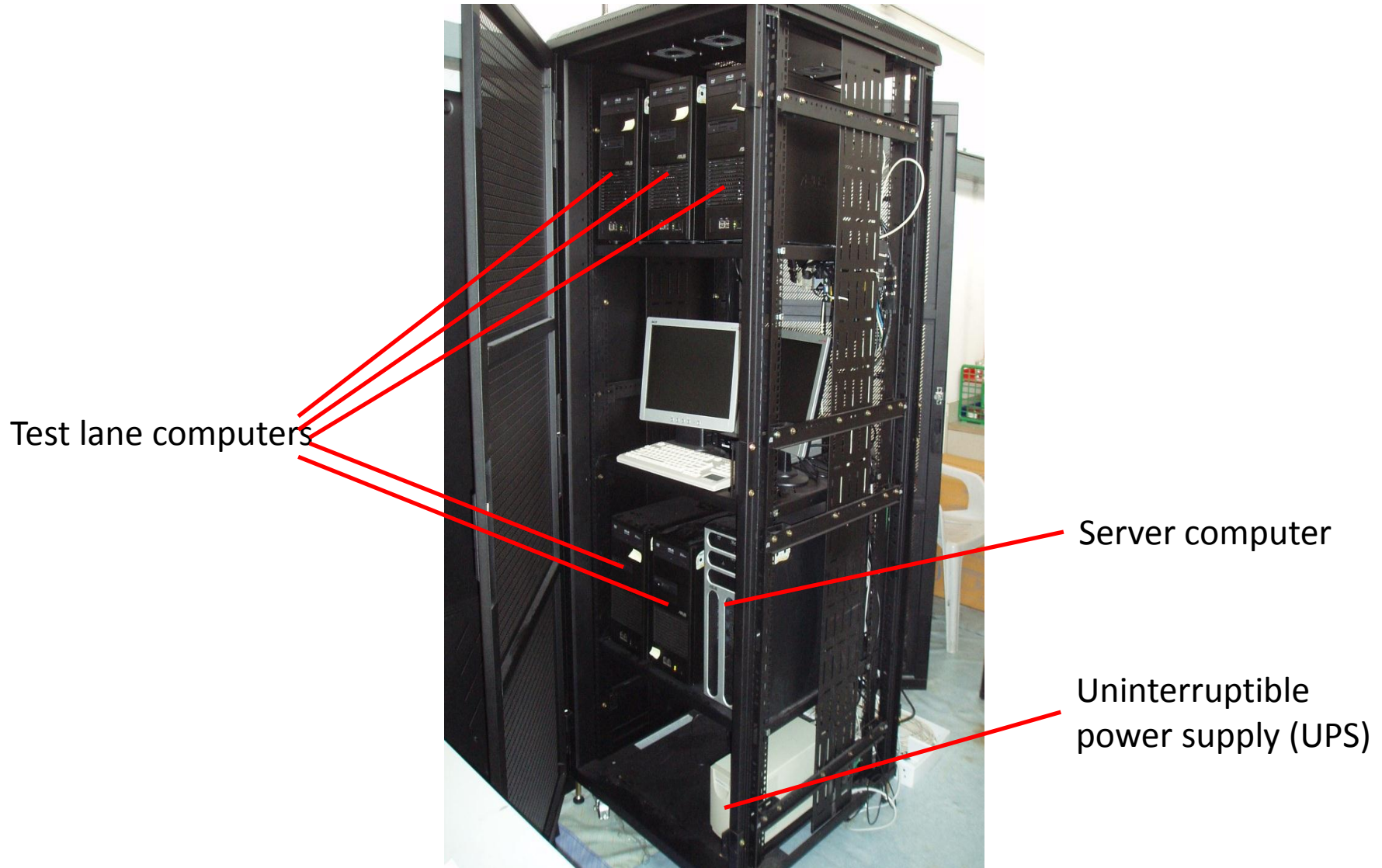


## Network connections test organisation



# Anti-Manipulation Measures

All test station computers in locked air conditioned room



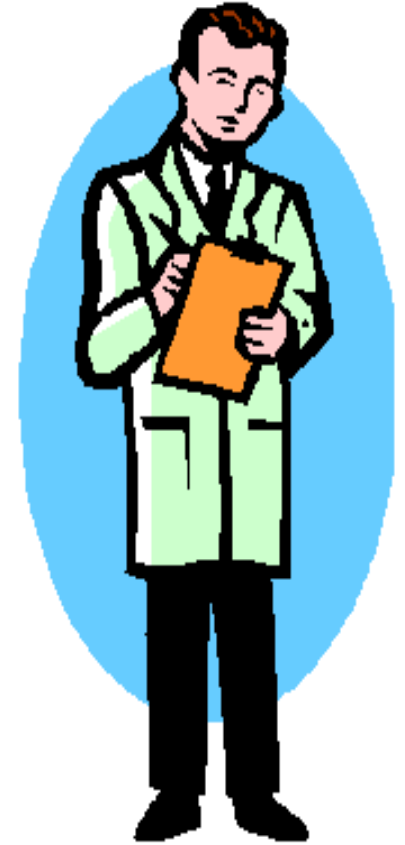
## Controlled access to IT system

### Permissions Add permission

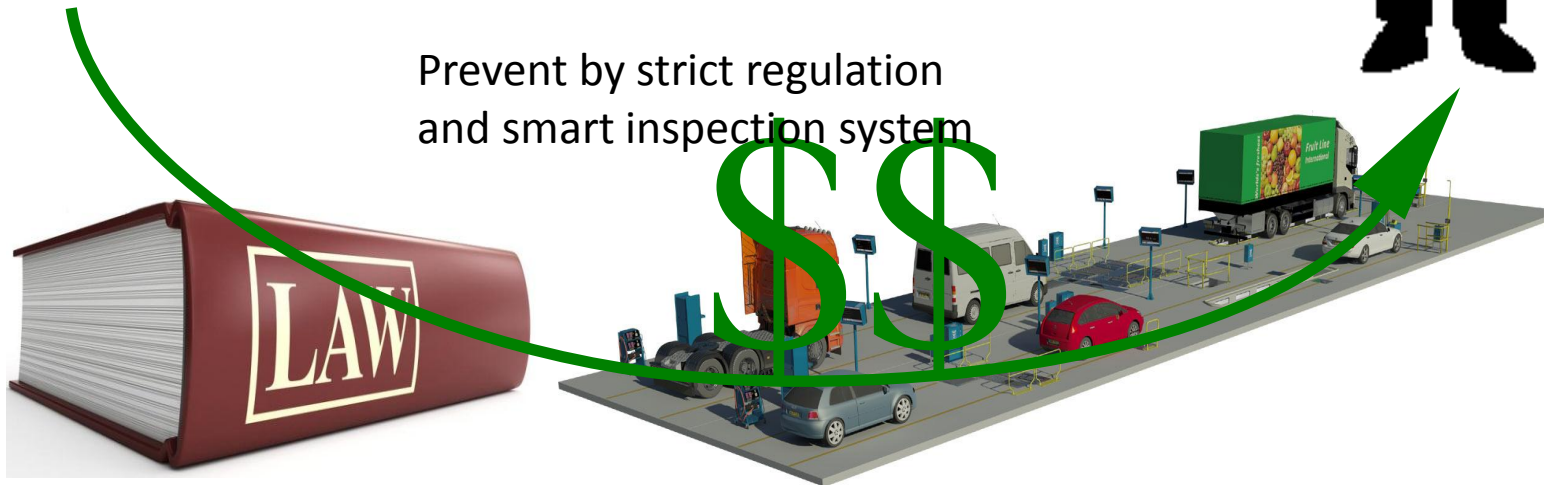
Permission name	Station overview	End of day summary	Inspector reporting	Statistics and graphics	Information equipment/calibration	Add equipment event	User access	Vehicle info
Administrator	v	v	v	v	v	v	v	v
Manager	v	v	v	v	v	x	x	v
Station Manager	v	v	v	v	v	x	x	v
Maintenance	x	x	x	x	v	v	x	x



## Bribery sensitive situation



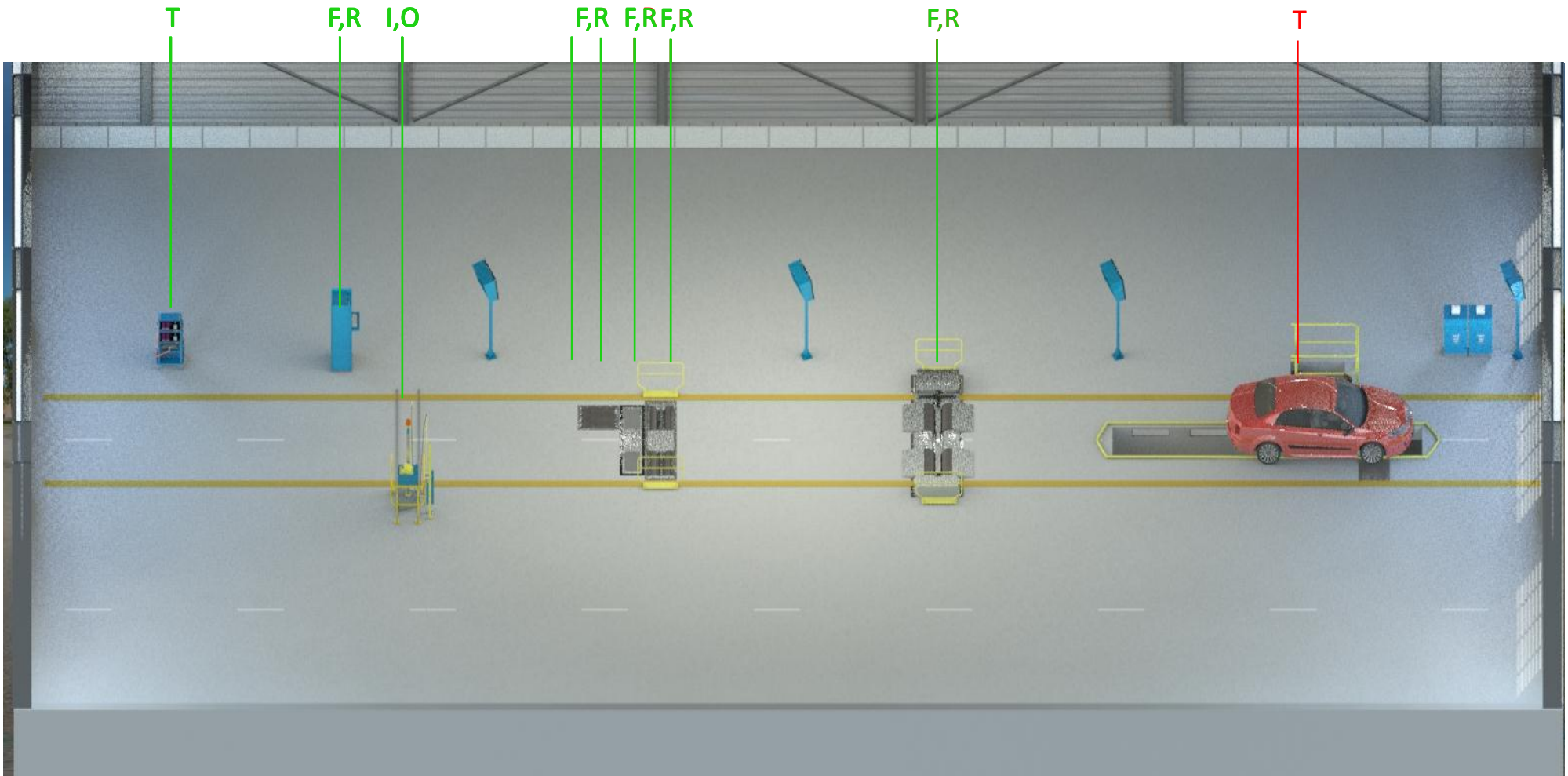
Prevent by strict regulation  
and smart inspection system



# Anti-Manipulation Measures

Tracking system links the tests to the correct vehicle (axle)

T = tracking  
F = front axle  
R = rear axle  
I = in  
O = out

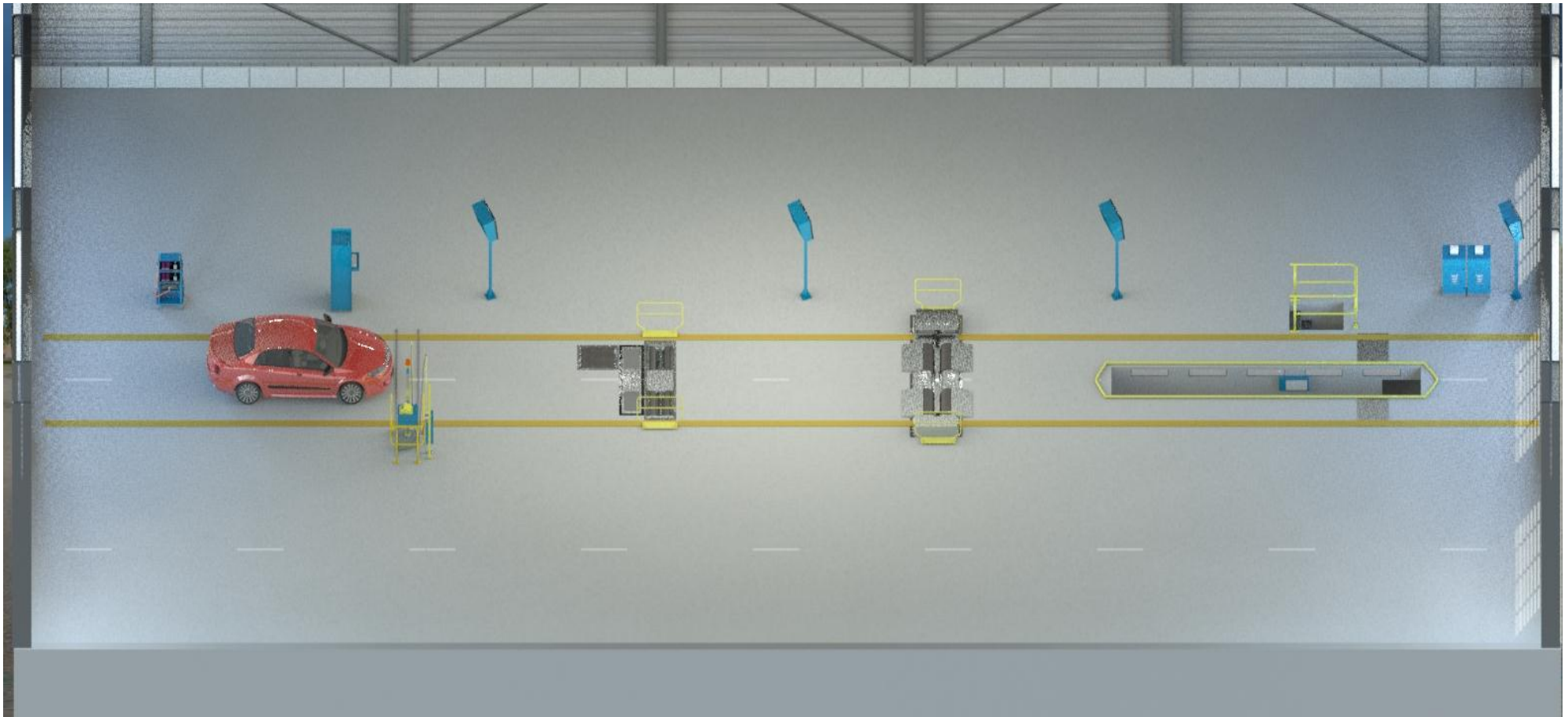


## Licence number check





## Stage 1





# Anti-Manipulation Measures

Inspector identification with RFID tag at each test stage



Inspector id stored with each test

RollerBrakeTest							
Test Result	Start Time	End Time	Lane	Performed by			
Passed	17:41:12	17:42:36	406050				
Measured Values							
Axle	Weight	Drag	Brake type	Left force	Right force	Efficiency	Diff - Prog
1	781	22,6%	Service	271	252	67%	F
			Serv Imbal.	265	242	-	8%
			Parking	0	0	-	-
2	766	45,8%	Service	214	208	55,1%	P
			Serv Imbal.	214	208	-	2%
			Parking	219	198	54,4%	10%

## Irregularity alerts

File Tools Help

### Vehicle Search

Plate: 123-abc Search

### Inspection Information

Inspector Name: VLT Inspector Receipt No: 0 km

### Vehicle Information

Vehicle Type: Car  
Manufacturer: Color:  
Model: Year: (dd/mm/yyyy)  
Chassis: Engine No.:  
Engine Type: Four Stroke E.Capacity Weight:  
Max Power: Max RPM: Power:  
Fuel Type: Petrol Item: BELOW\_5999\_NO\_AB!  
Speed Limiter: ☐ Suit Box: ☐

### Head Beam Information

HeadLight Configuration: 2 High

### Axle Information

Number of Axles: 2

	Traction	P. Brake - Start test with P. Brake	Lifted	Steered	Speed Sensor	Tyre Type:	Distance to Next(mm)
Axle 1	<input checked="" type="checkbox"/>	<input type="checkbox"/> Released <input type="radio"/> Applied	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NORMAL	0
Axle 2	<input type="checkbox"/>	<input checked="" type="checkbox"/> Released <input type="radio"/> Applied	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NORMAL	0

### Custom Properties

#### Tests to Perform

- ☒ Above Carriage Insp.
- ☒ Under Carriage Insp.
- ☐ Diesel Smoke
- ☒ Emission
- ☒ Roller Brake
- ☒ Side Slip
- ☐ Speedometer
- ☐ Suspension

Unselect All

405050-HV Lane 5 - Sectio

Cancel Start

**Attention**

**Vehicle profile printed**

## Anti-Manipulation Measures

Fixed preselected tests for each compulsory inspection.

**Inspection Information**

Inspection Type: 210 First In

km

Custom Properties

**Tests to Perform**

- ☒ Diesel Smoke
- ☐ Emission
- ☒ Head Beam
- ☒ Roller Brake
- ☒ Side Slip
- ☒ Sound Level Tester
- ☒ Speedometer
- ☒ Suspension
- ☒ Above Carriage Insp.
- ☒ Under Carriage Insp.

white

11/08/2000

1765

4000

SPV

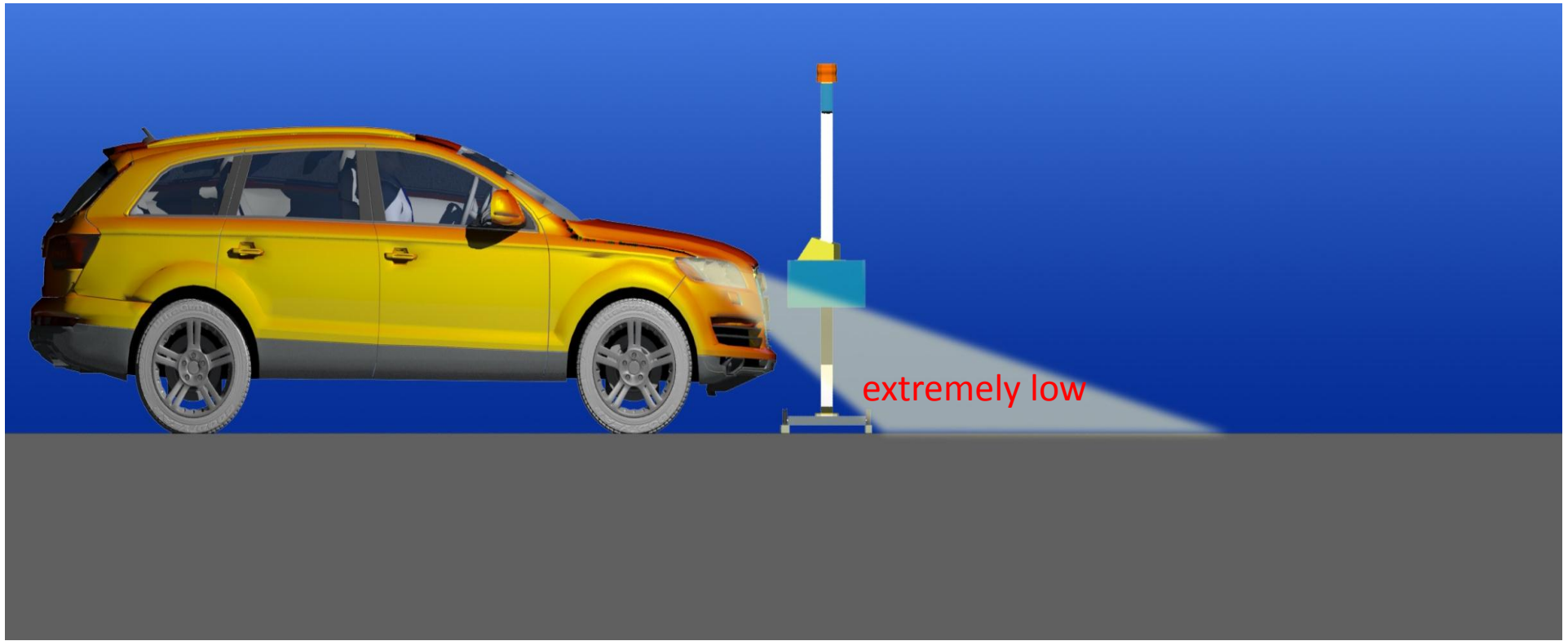
Password



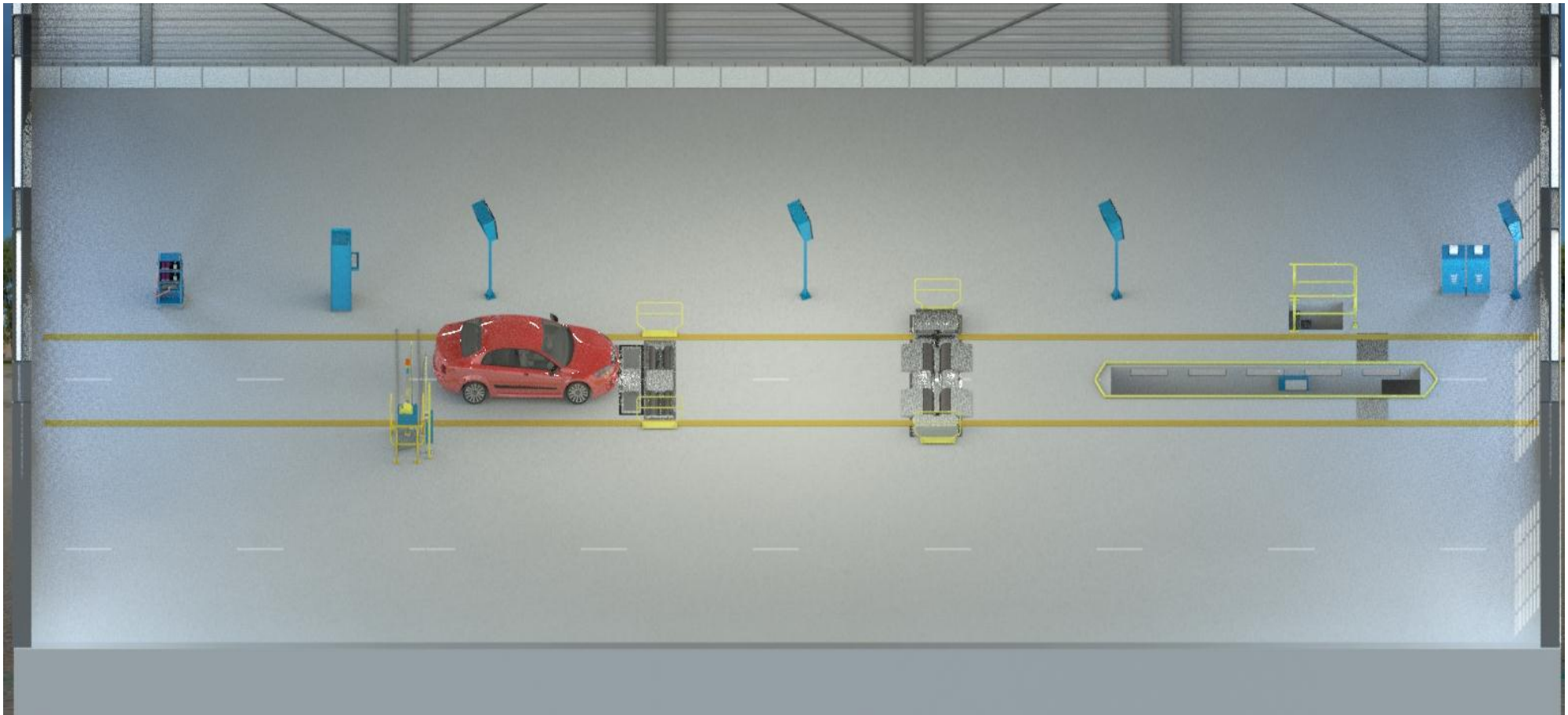
Robotised headlight beam tester  
with laser scanner to prevent  
incorrect  
vehicle alignment



## Comprehensive PTI standards



## Stage 2, side slip tester



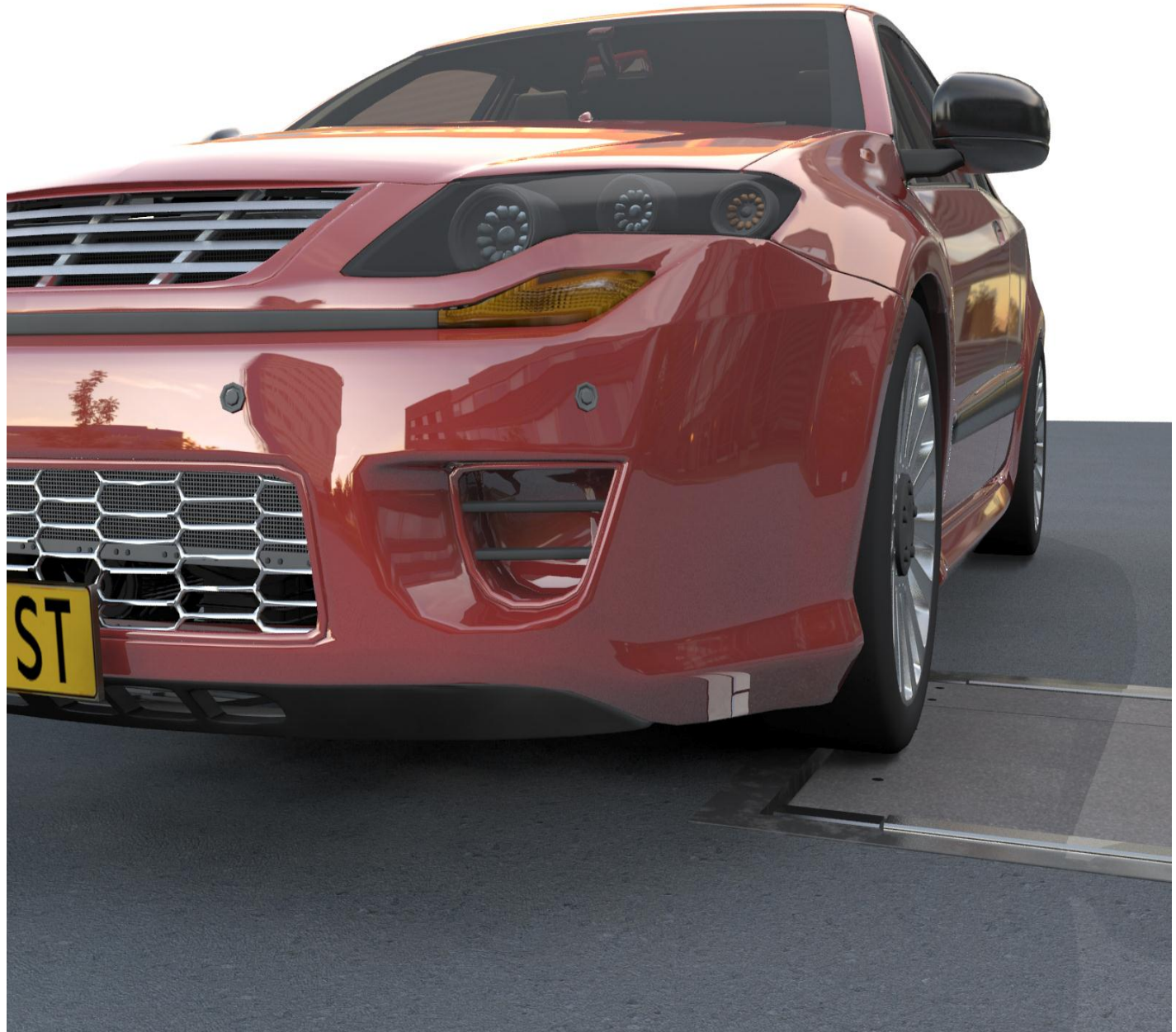


## Side slip tester

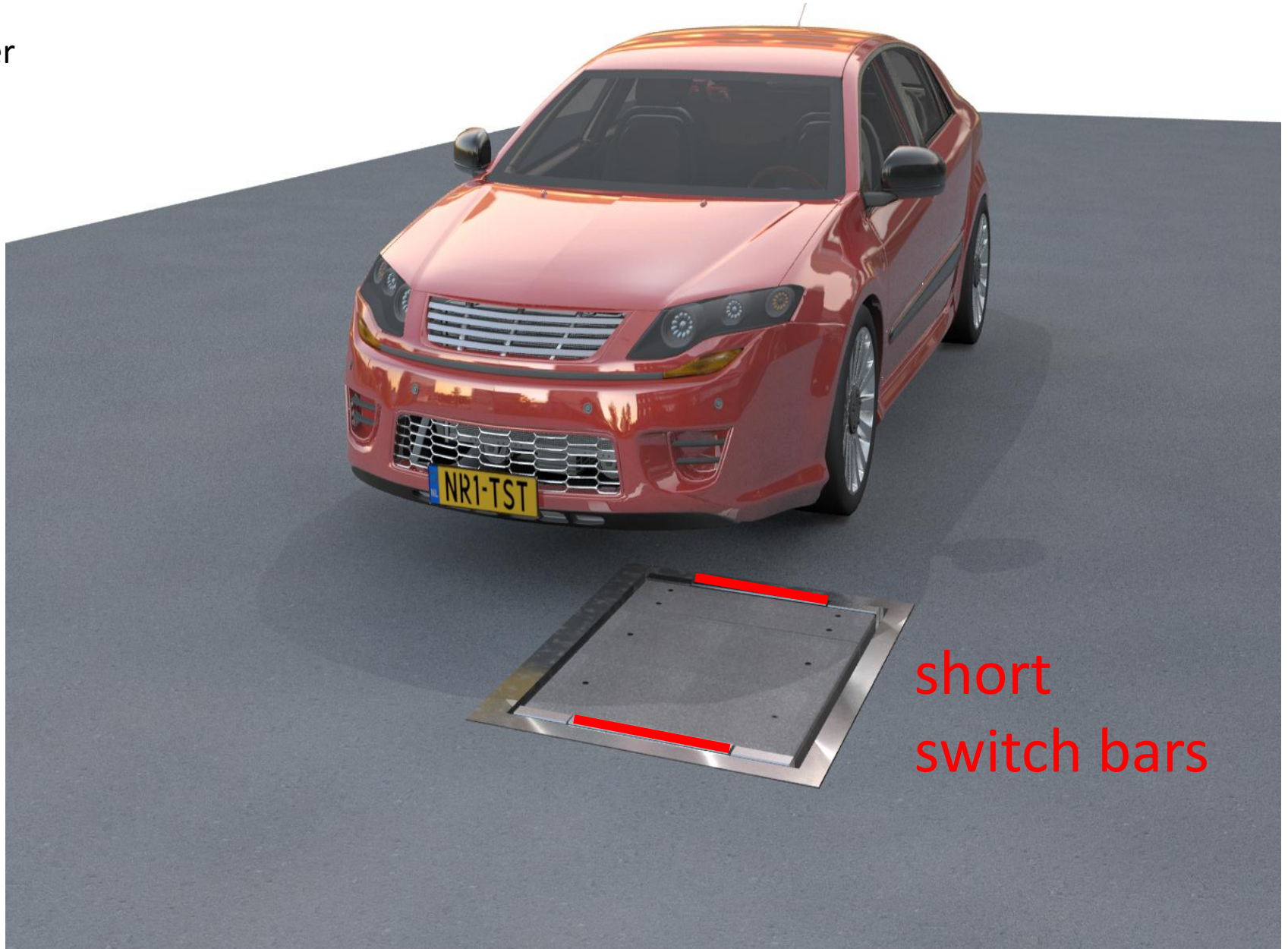




## Side slip tester



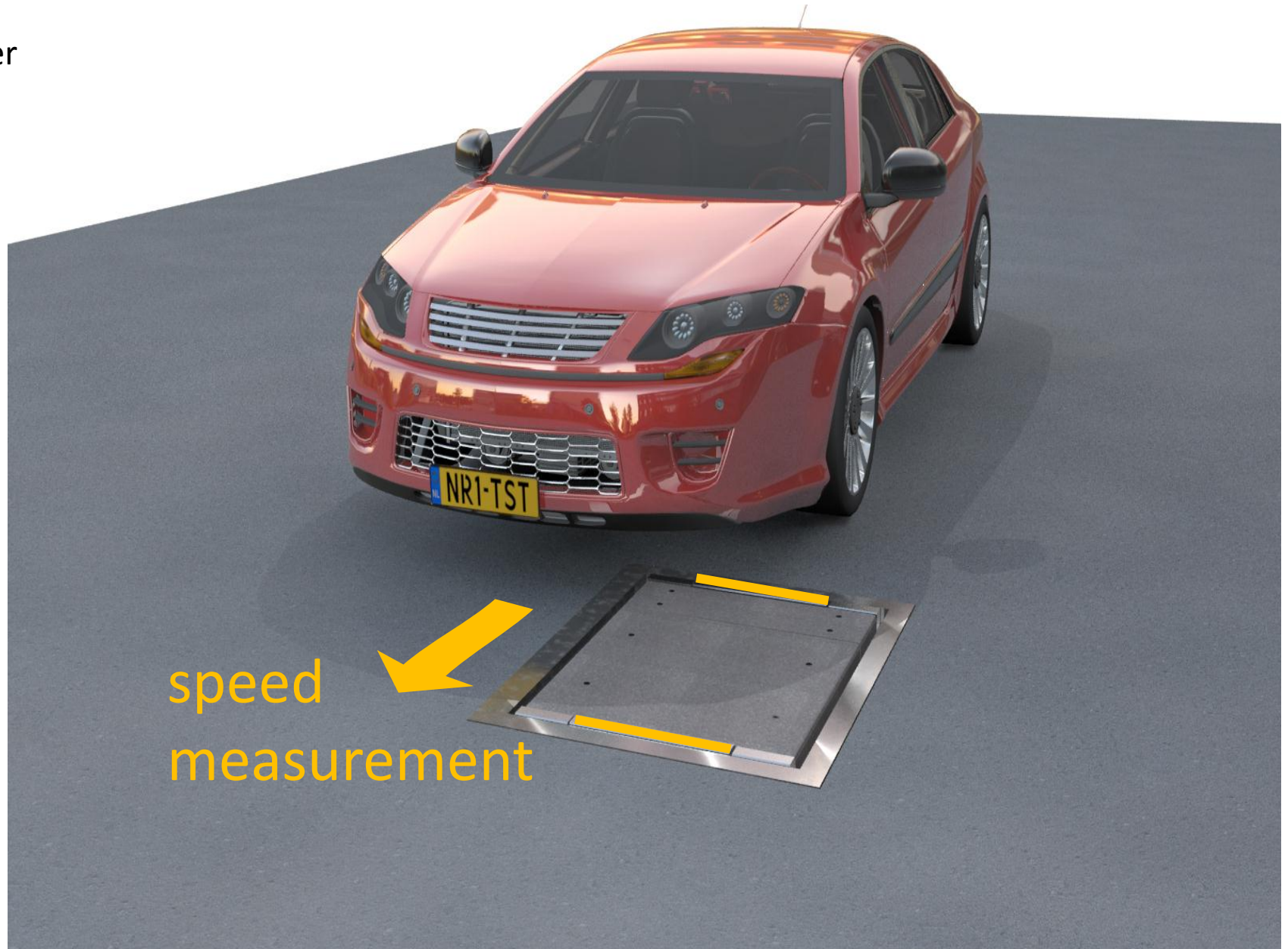
## Side slip tester



short  
switch bars

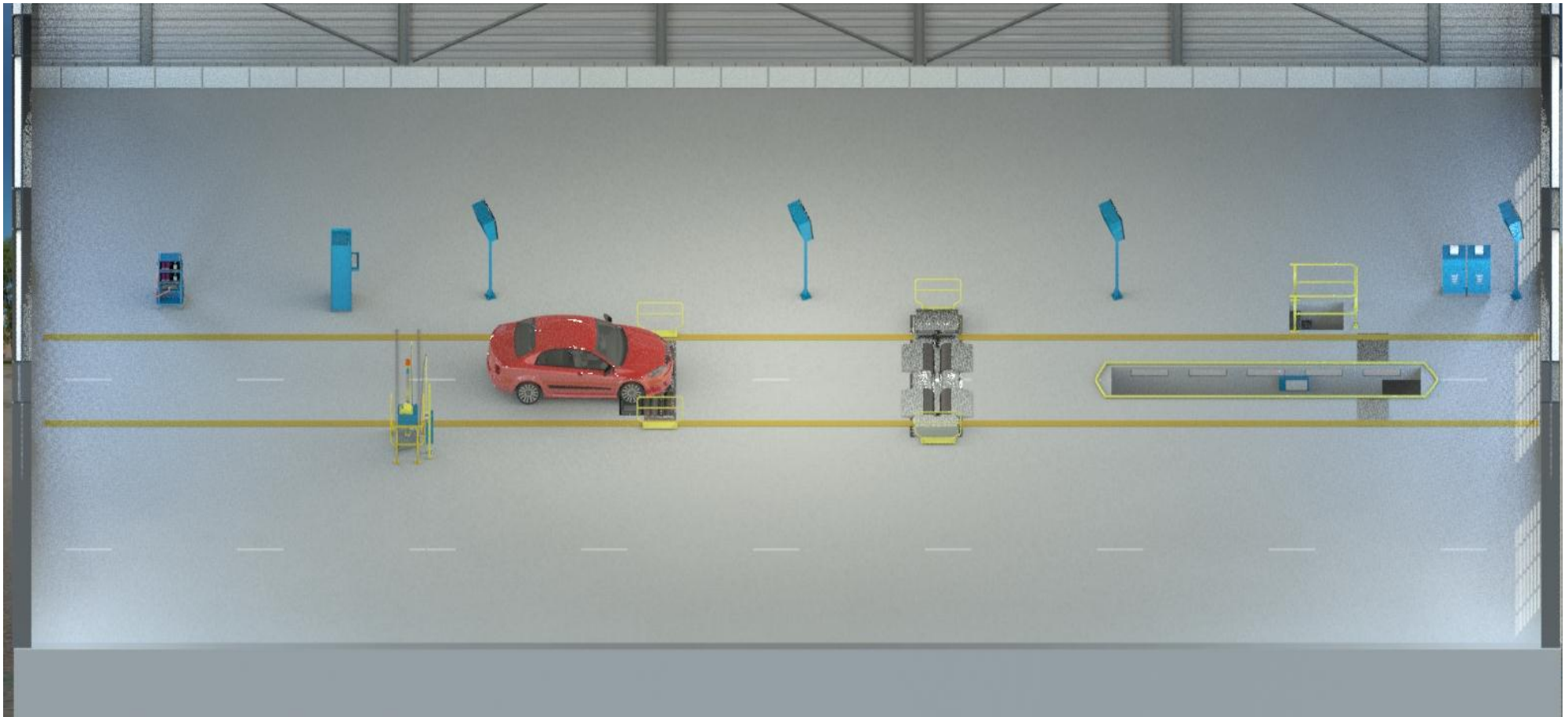


## Side slip tester



speed  
measurement

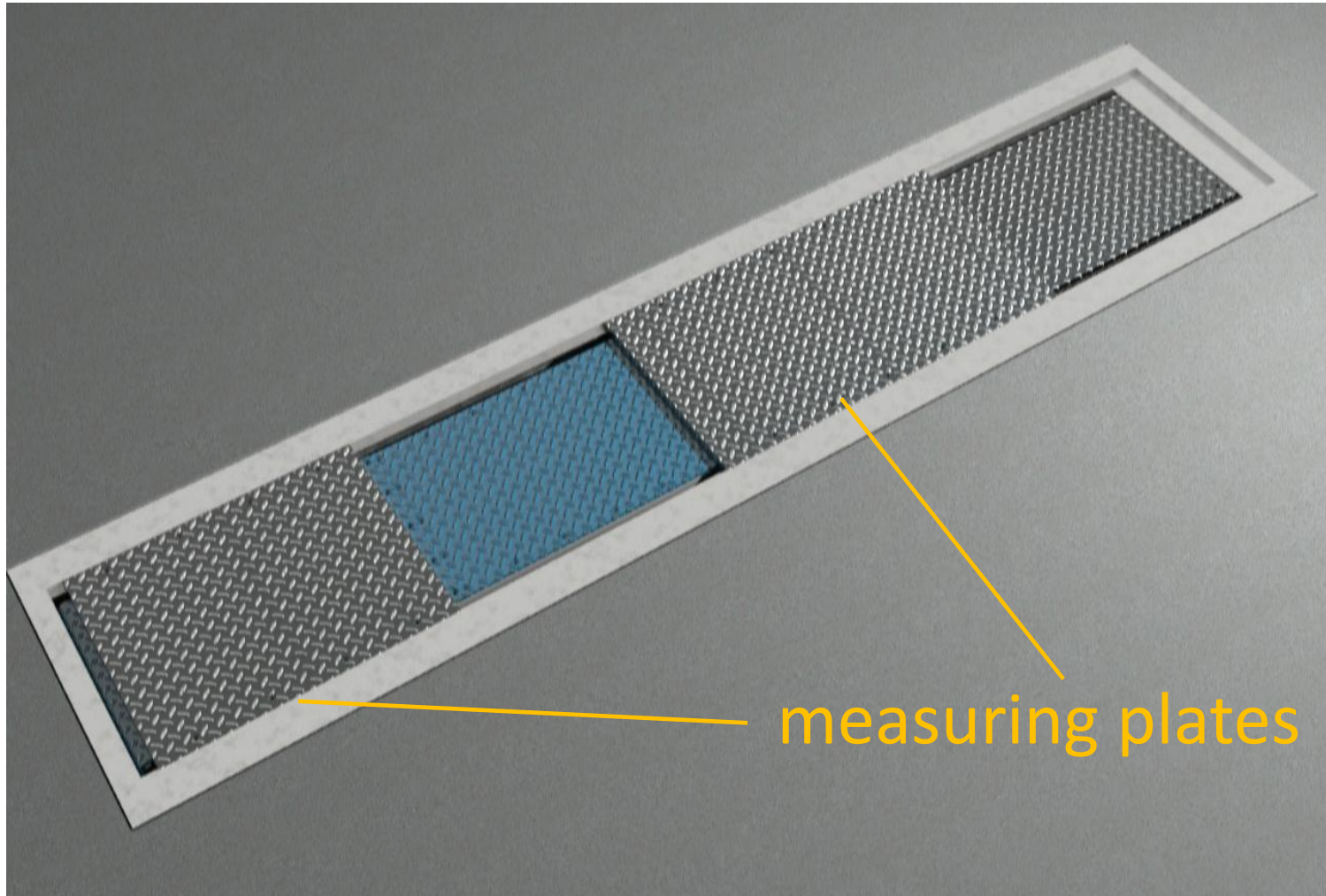
## Stage 2, suspension tester





## Tracking system controlled cover plates

Movie clip

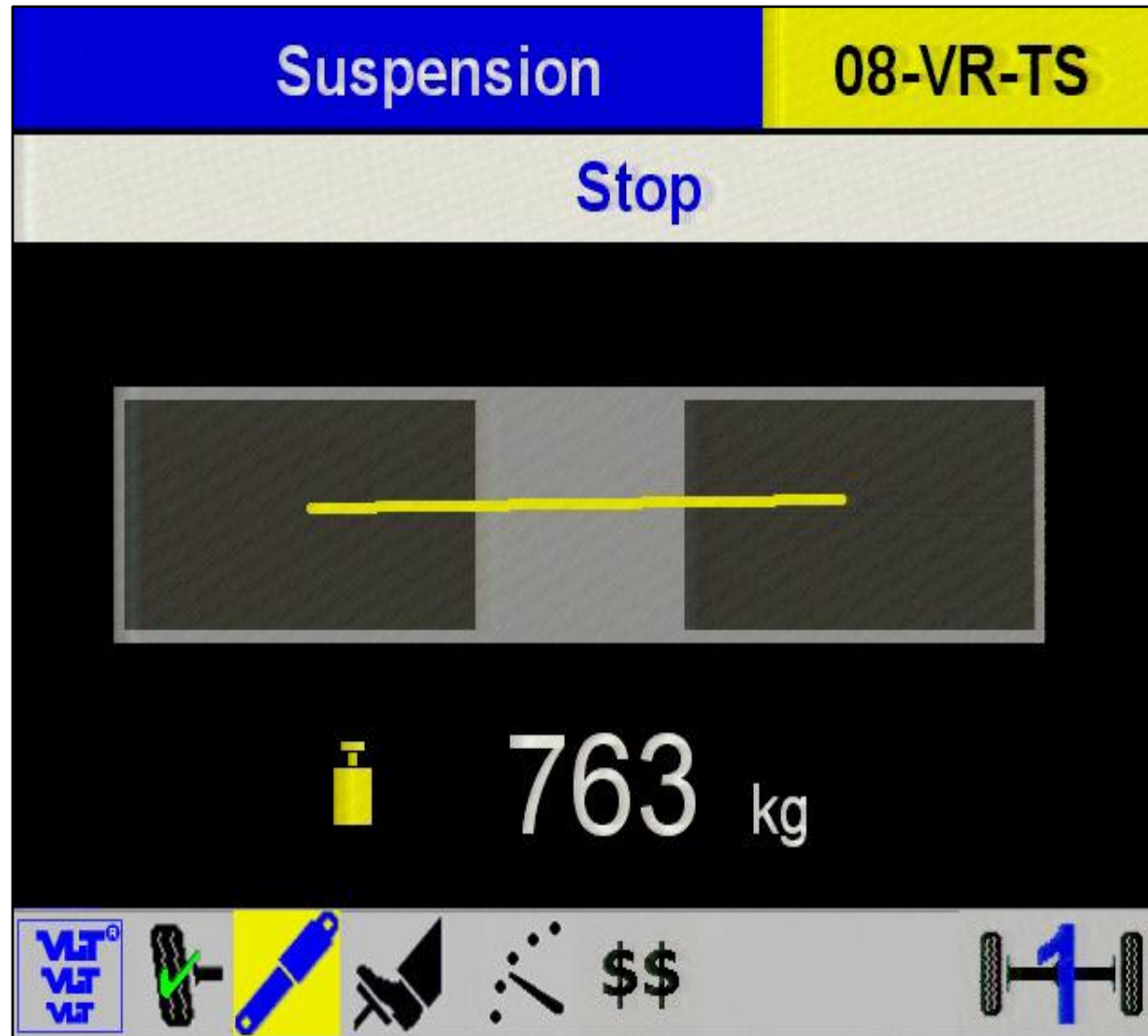


measuring plates

## Misalignment



## Axle position indication



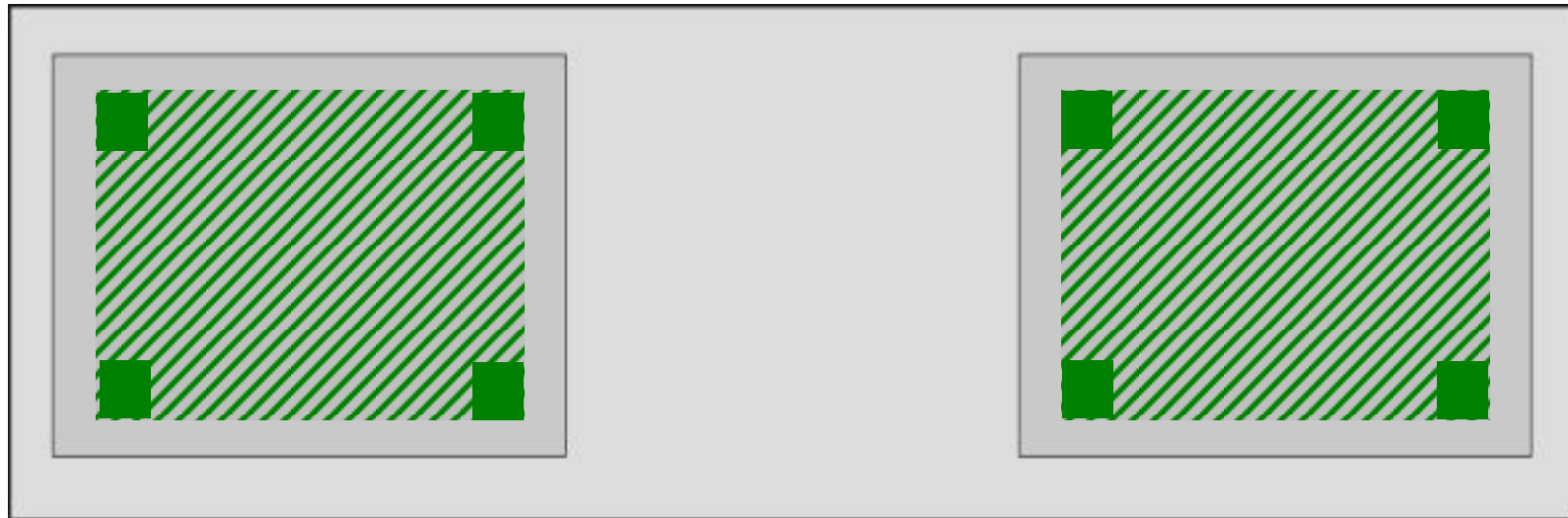
## Wheel position check



allowed wheel position area



weight load cell















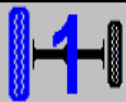




Weight and position change check during suspension test

Suspension

5-VPT-02

Test Stopped - Weight Changed











							
	-	kg	-	kg	-	kg	
	-	N/mm		-	%	-	N/mm
	-	% @ - Hz		-	%	-	% @ - Hz
	-	° @ - Hz		-	%	-	° @ - Hz








Suspension

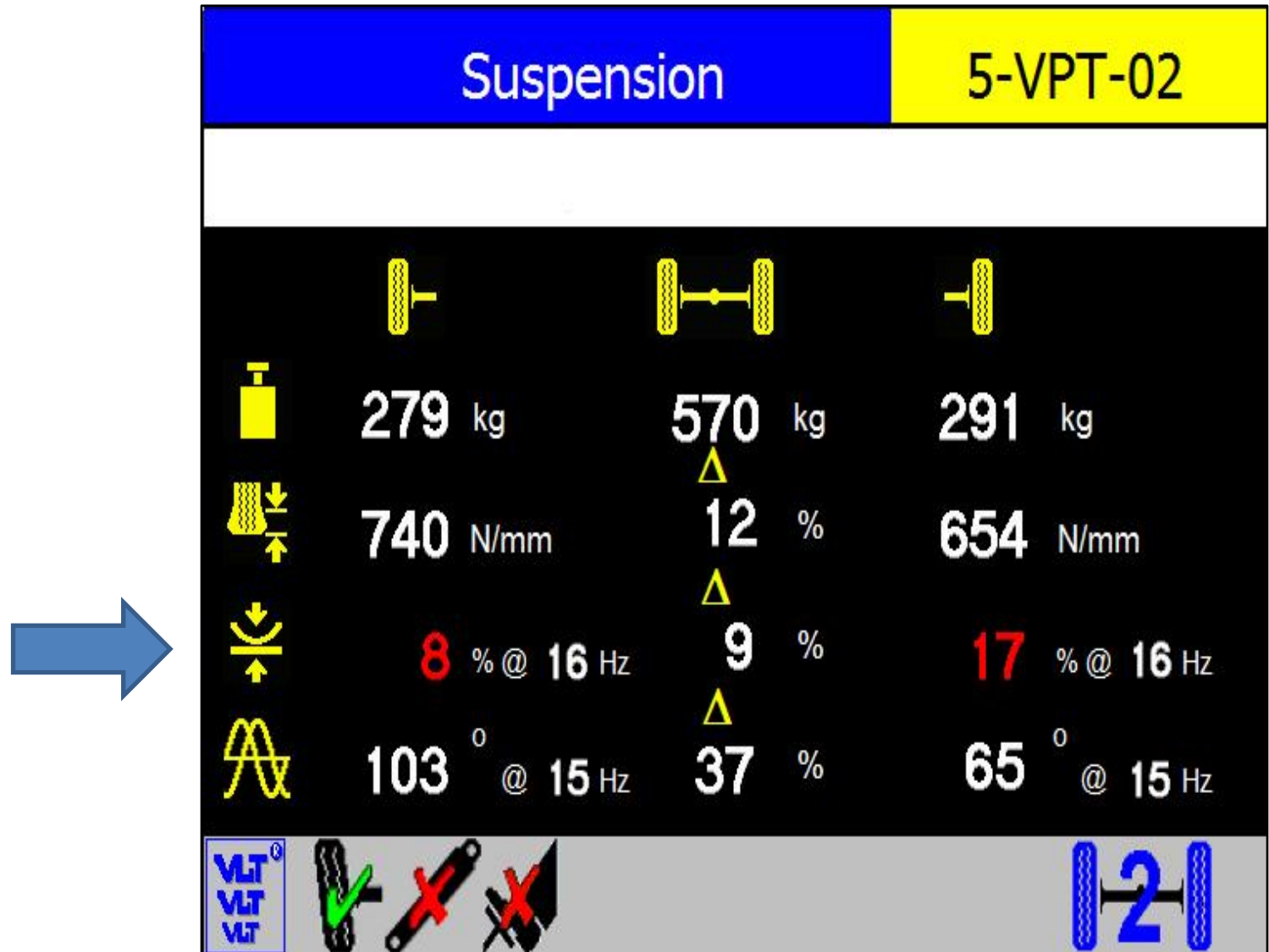
5-VPT-02

Test Stopped - Vehicle Moved

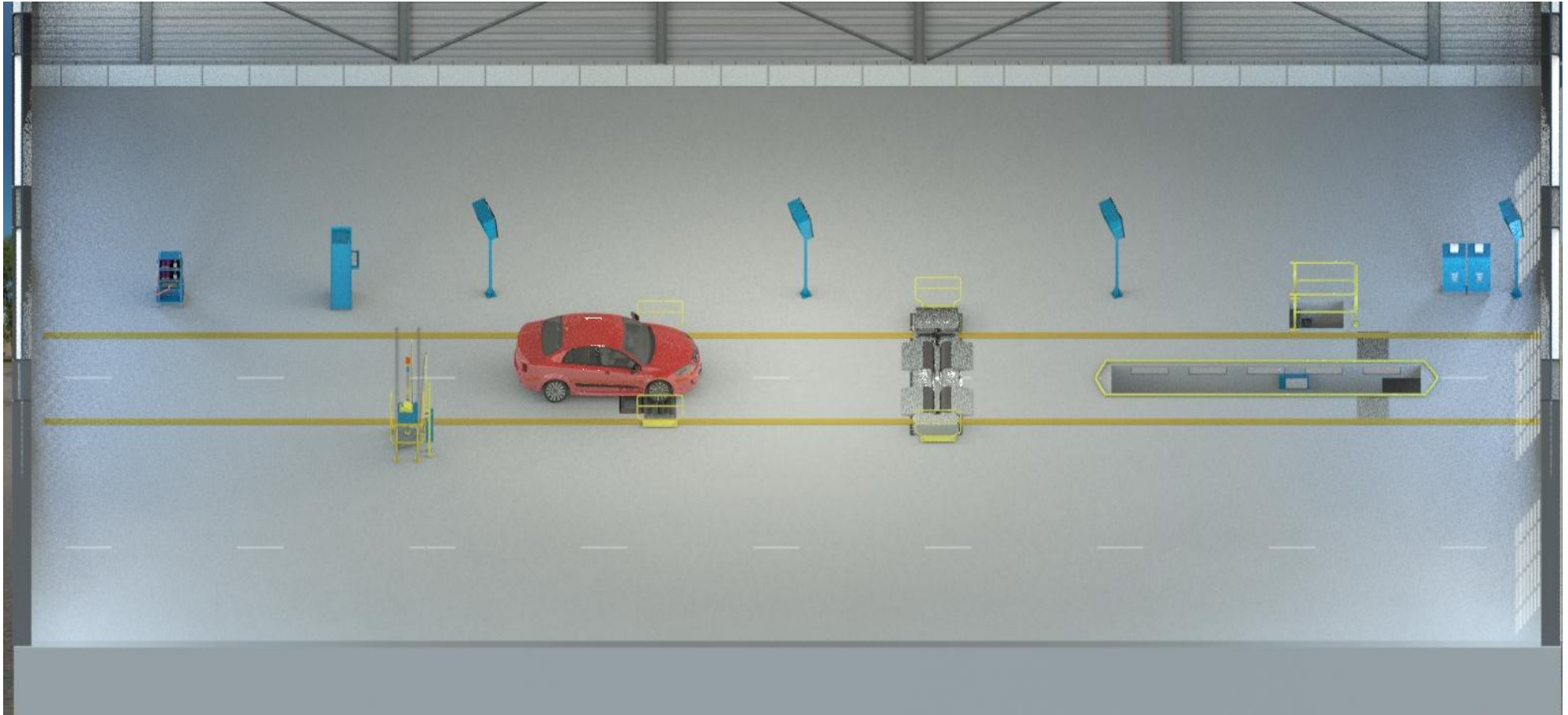
							
	-	kg	-	kg	-	kg	
	-	N/mm		-	%	-	N/mm
	-	% @ - Hz		-	%	-	% @ - Hz
	-	° @ - Hz		-	%	-	° @ - Hz



Judgement against absolute values, so not only left/right comparison

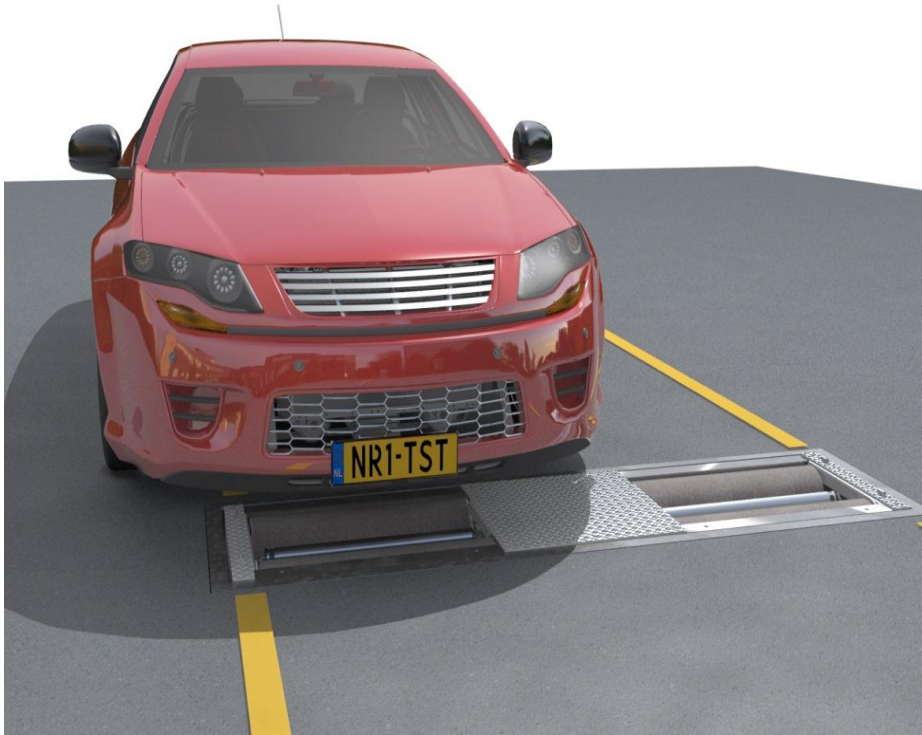


## Stage 2, roller brake tester



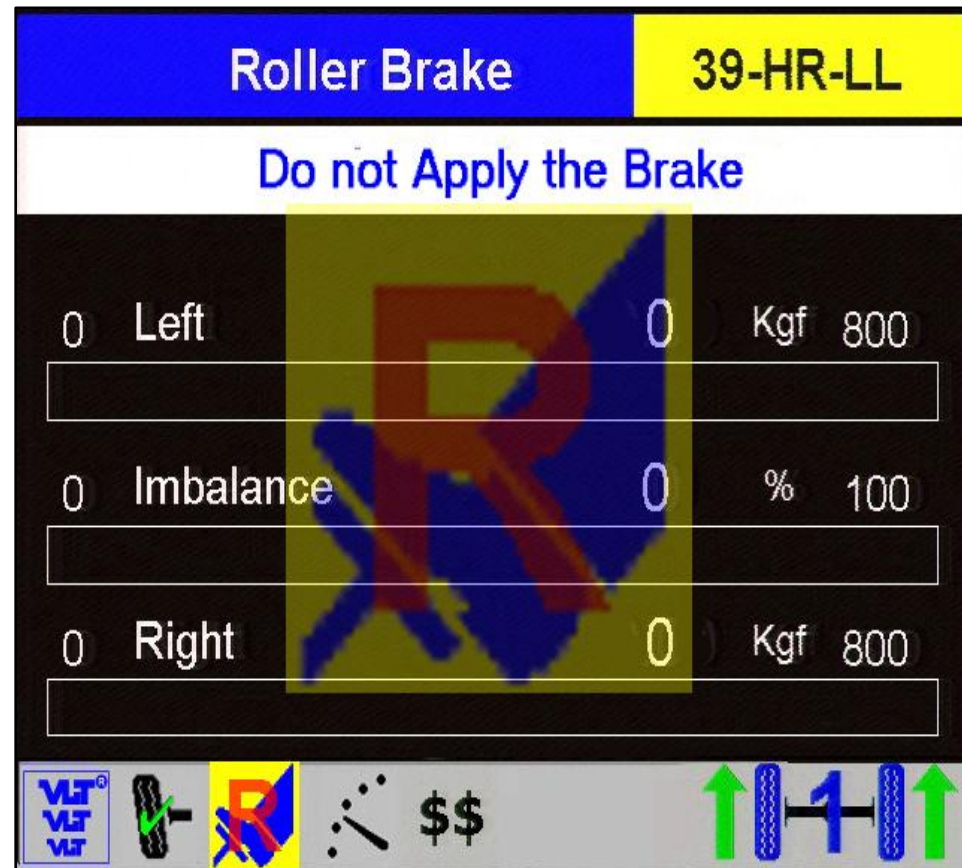
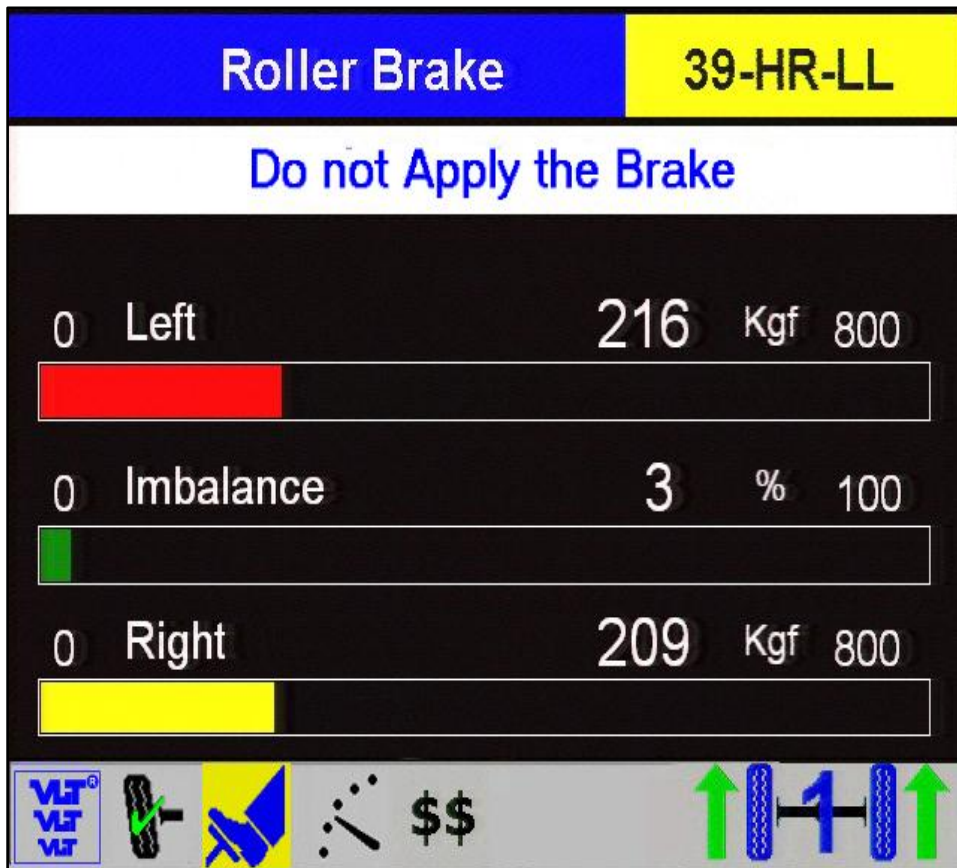
# Anti-Manipulation Measures

‘Safety’ barriers around brake tester



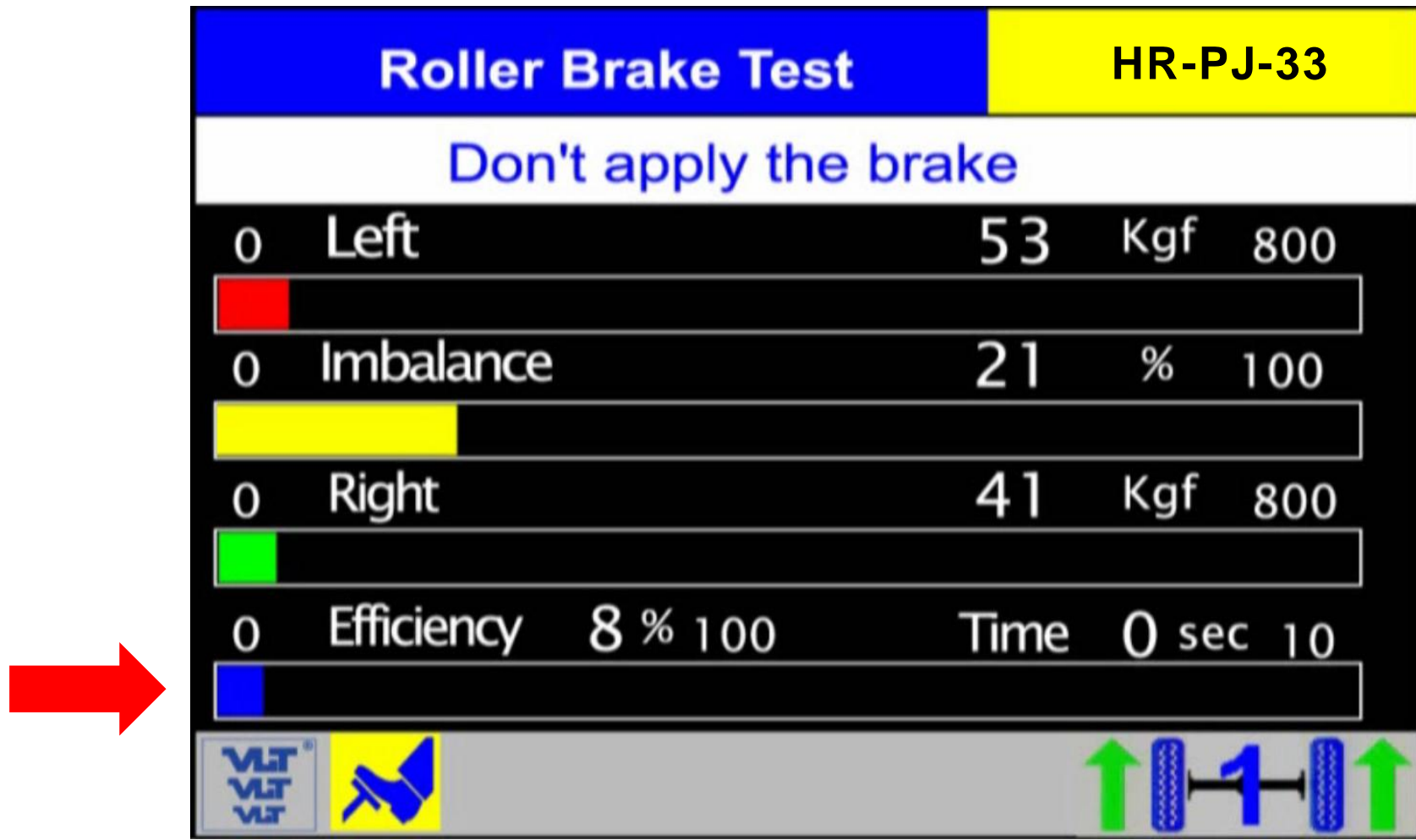


## Automatic triggering of retest



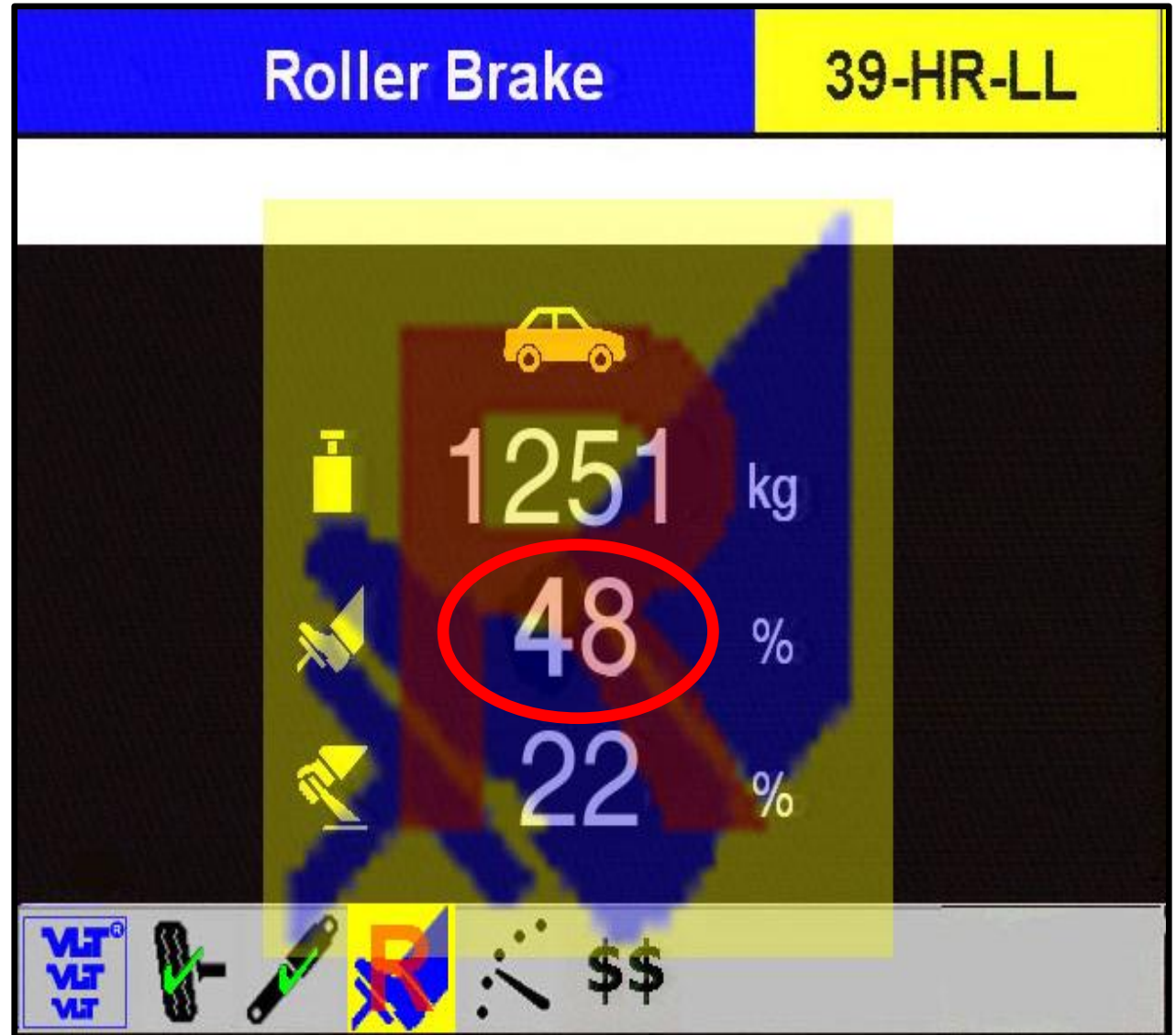
Progressivity check to prevent slamming on the brakes

Movie clip



## Automatic re-test

In this example:  
requirement = 50%



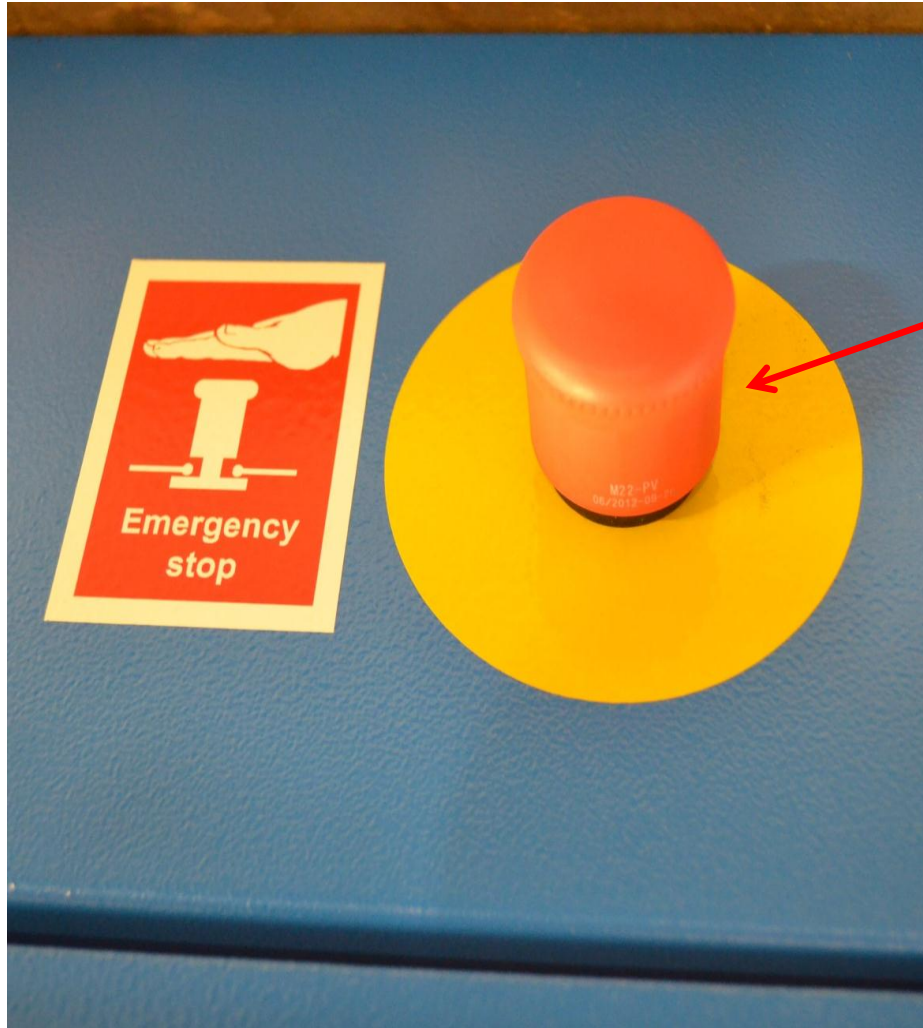


## Use of emergency stop detection

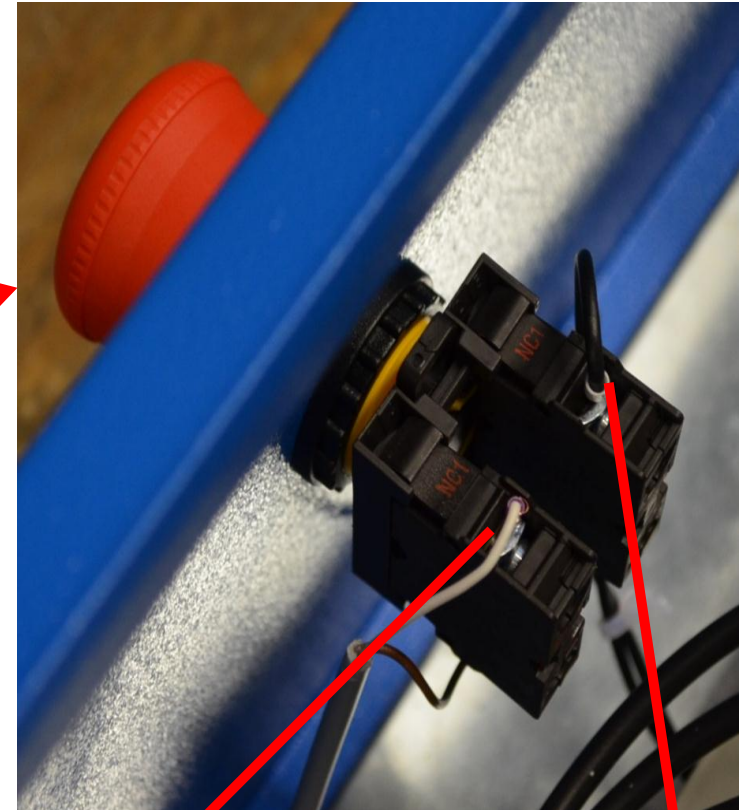
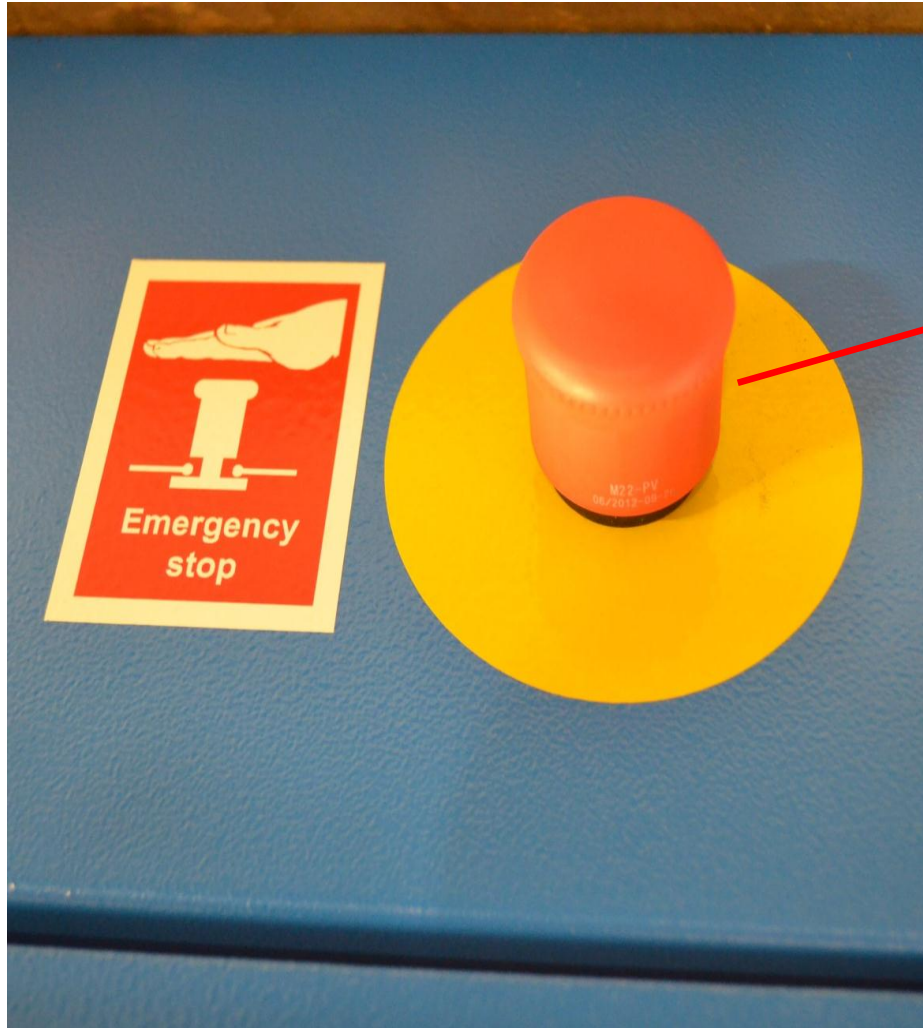




## Use of emergency stop detection



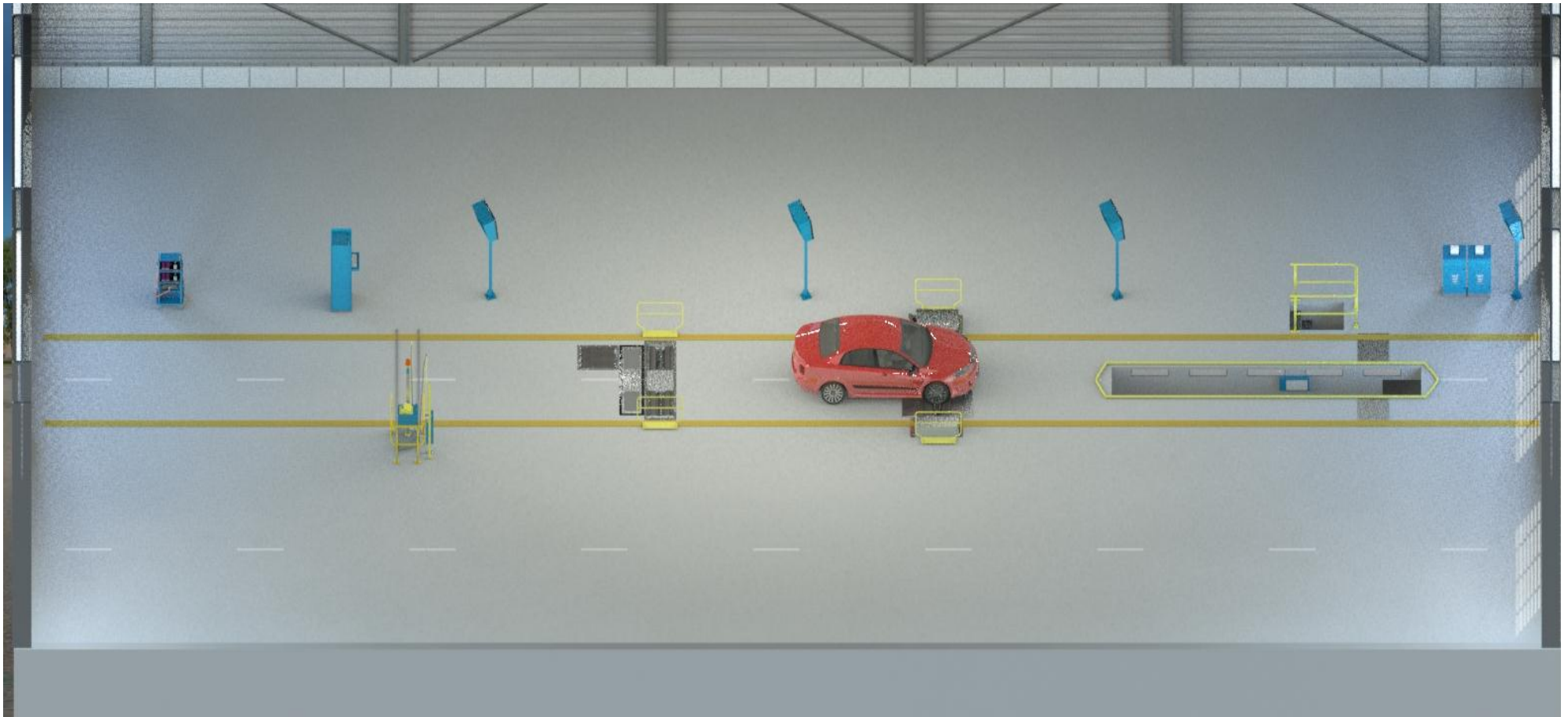
## Use of emergency stop detection



software trigger

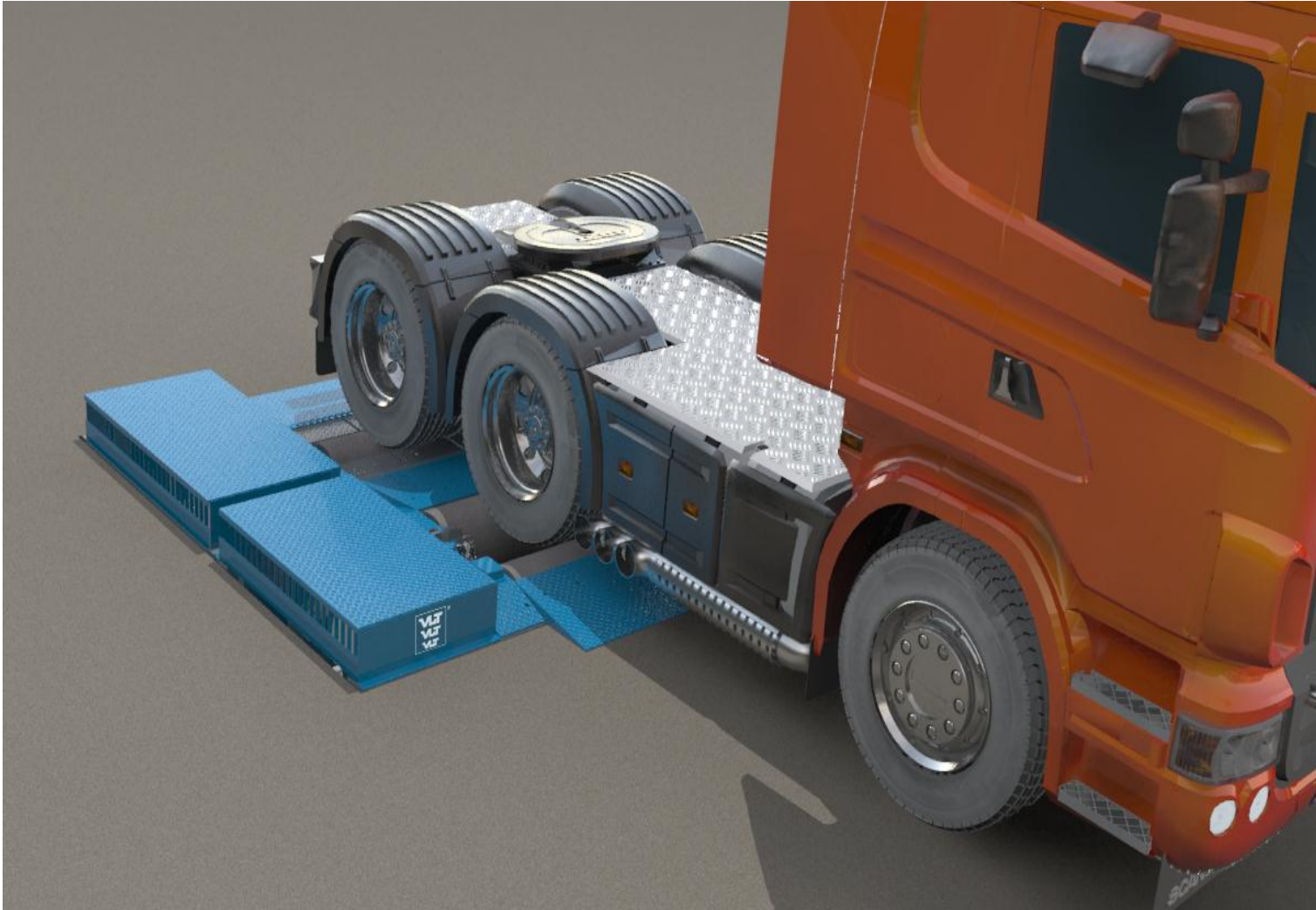
power cut

## Stage 3





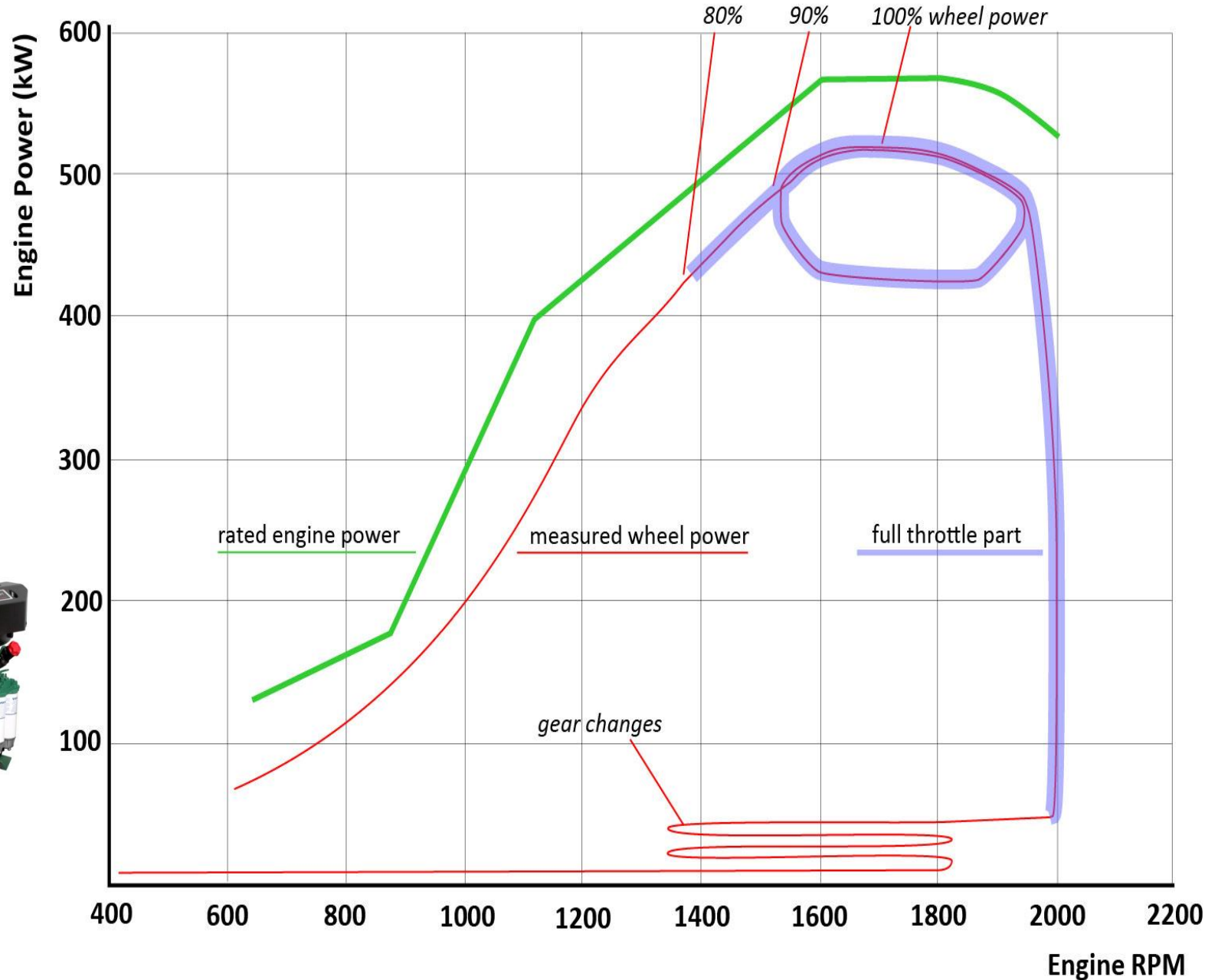
Stage 3, diesel smoke test under full load with CDST



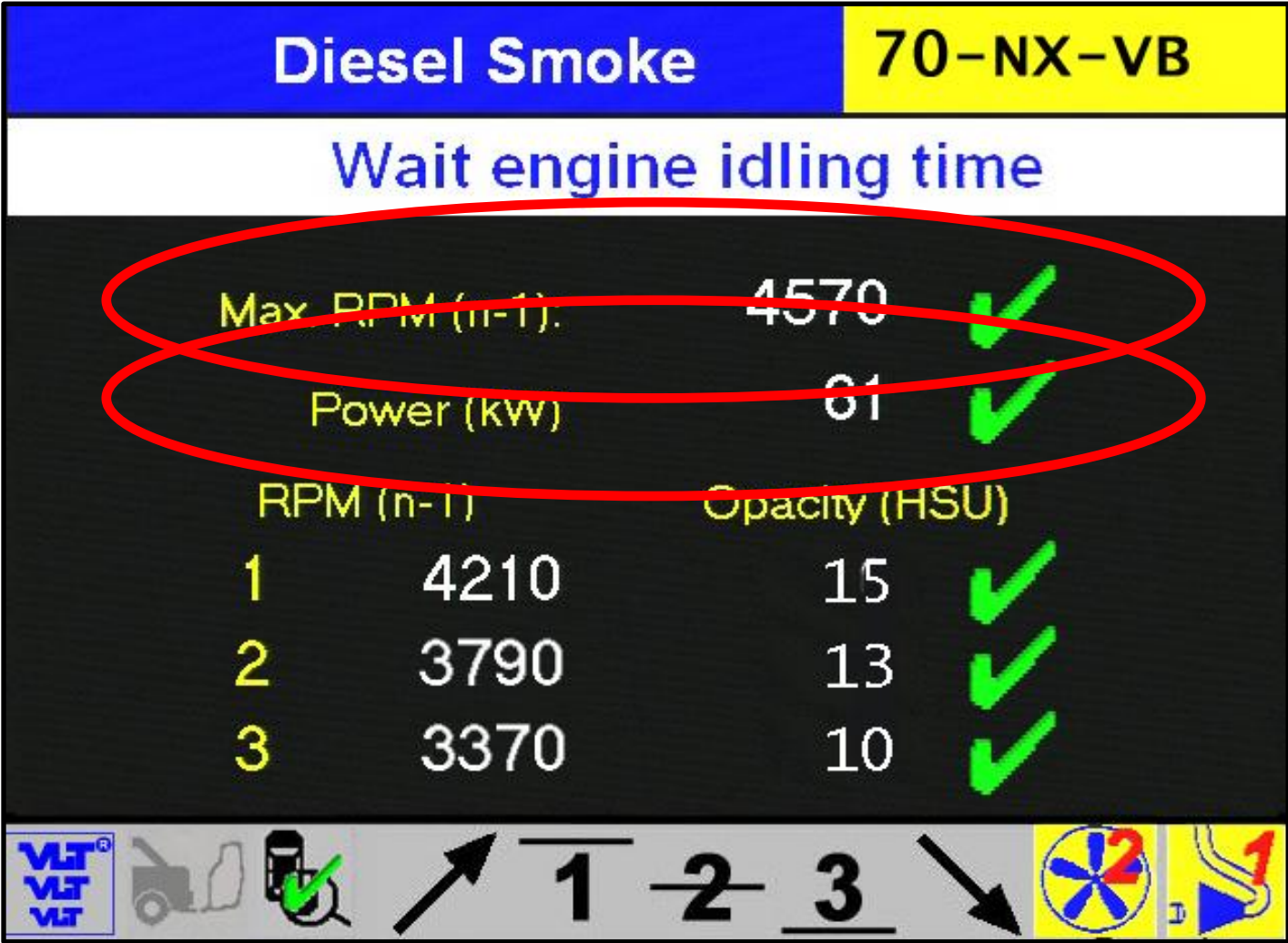


# Anti-Manipulation Measures

Controlled  
test cycle on CDST



Checks on engine rpm and power



## Speedometer test on CDST

No actual speed indication  
at speedometer test

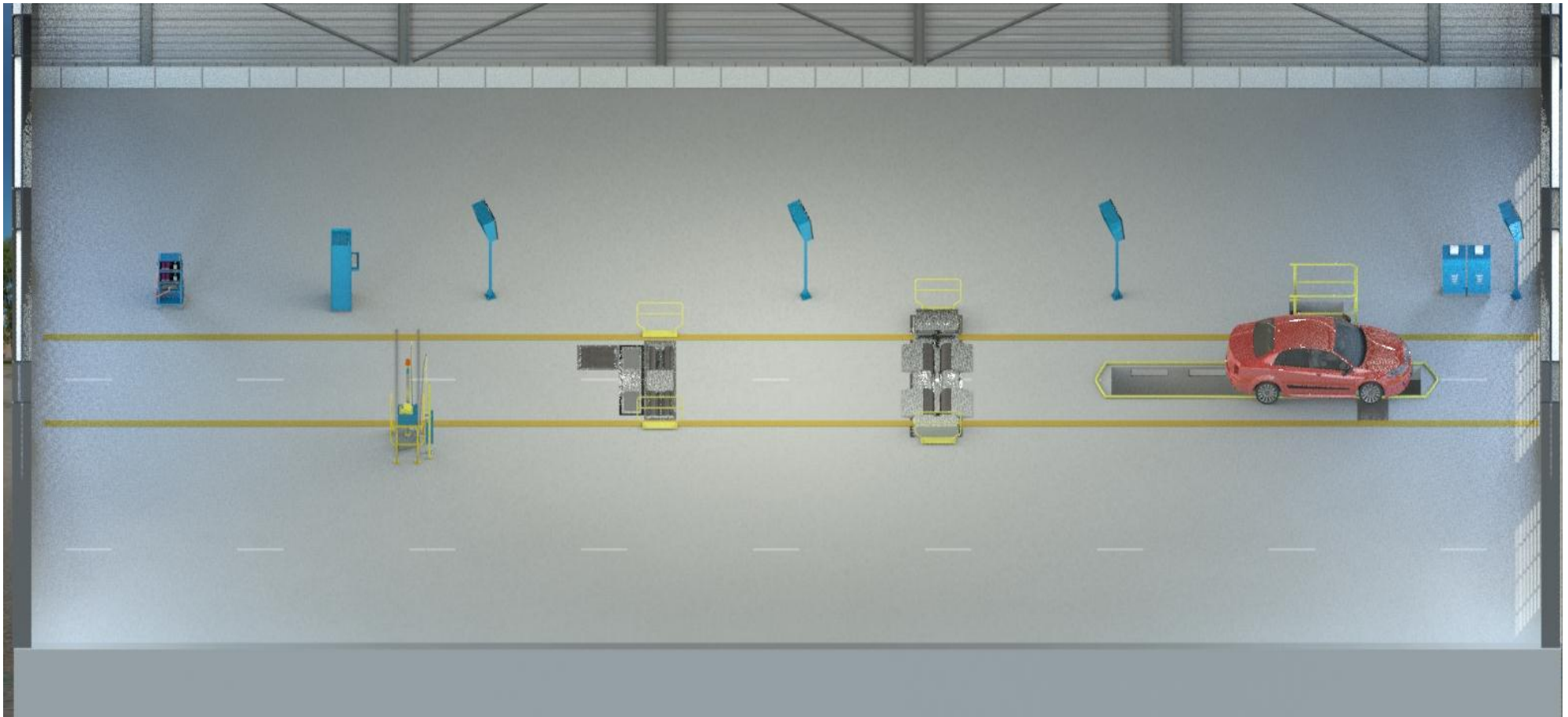


Aircon-test: both temperature and air flow measurement





## Stage 4



Inspector identification with RFID tag at each test stage



## Comparison of test results between inspectors

### Inspector vehicle fail rate report by equipment

Inspectors	[REDACTED]	
From:	27-12-2012	To: 27-01-2014

Inspector	Performed Test	Total passed	Total failed
[REDACTED]	Above Carriage Inspection	106	4
[REDACTED]	Above Carriage Inspection	2793	309
[REDACTED]	Above Carriage Inspection	1318	66
[REDACTED]	Above Carriage Inspection	1216	14
	<b>Total Above Carriage Inspection</b>	<b>5433</b>	<b>393</b>
[REDACTED]	Under Carriage Inspection	6	0
[REDACTED]	Under Carriage Inspection	1143	11
[REDACTED]	Under Carriage Inspection	549	1
[REDACTED]	Under Carriage Inspection	568	1
	<b>Total Under Carriage Inspection</b>	<b>2266</b>	<b>13</b>
[REDACTED]	Diesel Smoke Test	78	7
[REDACTED]	Diesel Smoke Test	2213	109
[REDACTED]	Diesel Smoke Test	965	48
[REDACTED]	Diesel Smoke Test	1103	4
	<b>Total Diesel Smoke Test</b>	<b>4359</b>	<b>168</b>
[REDACTED]	Emission Test	26	0
[REDACTED]	Emission Test	562	1
[REDACTED]	Emission Test	21	0
[REDACTED]	Emission Test	17	0
	<b>Total Emission Test</b>	<b>626</b>	<b>1</b>
[REDACTED]	Roller Brake Test	571	966



Test lane output  
fraud sensitive documents

TEST CERTIFICATE

No. \_\_\_\_\_

Land Transport Authority

THE ROAD TRAFFIC ACT  
(CHAPTER 276)

This is to certify that motor vehicle with registration No. \_\_\_\_\_ was examined under section 90 of the Road Traffic Act and that at the date of examination the prescribed statutory requirements were complied with in relation to the vehicle.

Date of issue : 02/09/2004

Reference No : A2020904-00

KEEP THIS CERTIFICATE SAFELY

CHECK carefully that the particulars specified above are correct. A test certificate showing any alteration should not be issued or accepted as this may delay the renewal of a vehicle licence.

PERAKUAN PEMERIKSAAN  
BUTIR-BUTIR KENDERAAN YANG DIPERIKSA

SIRI SERIAL No 8652551

NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

BUTIRAN MODEL / MAKE/MODEL:	NO. PENDAFTARAN / REGISTRATION:
TARUN DIPERBUAT / YEAR MANUFACTURED:	TARIKH PENDAFTARAN / DATE OF REGISTRATION:
NO. ENJIN / ENGINE NO.:	KATEGORI KENDERAAN/KOD BADAN / (VEHICLE CATEGORY/BODY CODE)
NO. CASSI / CHASSIS NO.:	TARIKH PEMERIKSAAN / (INSPECTION DATE)
SIRADU ENJIN / (ENGINE CAPACITY)	JENIS PEMERIKSAAN / (TYPE OF INSPECTION)
BAHAN BAKAR / FUEL TYPE:	KOD PUSAT / (CENTRE CODE)
BERAT TANPA MUATAN (BTM) / (UNLOADED WEIGHT)	KOD PEMERIKSA / (EXAMINER CODE)
BERAT DENGAN MUATAN / (PERMISSIBLE LOADED WEIGHT)	SAH SEHINGGA / (VALID UNTIL)

PERAKUAN PEMERIKSAAN

NO. SIRI/SERIAL NO.: No 8652551

NO. PENDAFTARAN/REGISTRATION NO.: \_\_\_\_\_

SAH SEHINGGA/VALID UNTIL: \_\_\_\_\_

NO. ENJIN/ENGINE NO.: \_\_\_\_\_

NO. CASSI/CHASSIS NO.: \_\_\_\_\_

TARIKH LULUS/DATE OF PASS: \_\_\_\_\_

KOD PUSAT/CENTRE CODE: \_\_\_\_\_

TEST CERTIFICATE

No. S \_\_\_\_\_

Land Transport Authority

THE ROAD TRAFFIC ACT  
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Date of issue : \_\_\_\_\_

Reference No : \_\_\_\_\_

Authorised Signatory \_\_\_\_\_

KEEP THIS CERTIFICATE SAFELY

CHECK carefully that the particulars specified above are correct. A test certificate showing any alteration should not be issued or accepted as this may delay the renewal of a vehicle licence.

For the purpose of renewing road tax, this Certificate must be presented within **3 months** from the date of issue.

**WARNING:** A test certificate should not be accepted as evidence of the satisfactory mechanical condition of a vehicle offered for sale.



## Lockable printer cabinet


























































test certificates

test reports



An aerial view of a simulated driving environment. The scene is a wide, grey road with white dashed lane markings. On the left side, there are several blue and yellow obstacles, including a small blue car-like shape and a larger blue structure. In the center, there are two yellow and black obstacles, one of which is a larger, more complex structure. On the right side, there is a red car, a yellow and black obstacle, and a blue and yellow obstacle. The background shows a grey wall with a grid pattern.

Station overview screen  
for station manager

VEHICLE STATION OVERVIEW															
Traffic on vehicle test lanes															
	Stage 1				Stage 2				Stage 3				Stage 4		Inspection type
Lane 1															Car lane
Waiting 02															
KGS-883 MWE-927	SZ-23-45				HR-PJ-33				BDR-284				FC-35-HS		
Lane 2															Car lane
Waiting 00															
GT-43- KD					FS-HK-58				-				HR-32-JY		
Lane 3															Universal lane
Waiting 02															
HD-29-LK JSJ-836	LP-LK-74				VR-OM- 73				HS-JJ-54				NWS- 320		
Lane 4															Universal lane
Waiting 01															
HDS-937	ND-93-NS				LKS-824				TS-38-JS				-		
Lane 5															Motorcycle lane
Waiting 00															
	-				MZ-VT-64										



Station overview screen with real-time test lane overview screen





An aerial, isometric view of a large industrial facility, likely a vehicle testing center. The facility is a large, flat, light-grey area with yellow lane markings. Numerous vehicles are positioned on various test rigs and platforms. These include large trucks (one yellow, one green, one white), a red bus, several cars (black, white, red, orange), and a motorcycle. The rigs appear to be for engine testing, emissions testing, or other performance evaluations. The background is a plain white sky.

# Thank you for your attention

Please feel free to contact  
us for detailed information.

**Van Leeuwen Test Systems  
B.V.**

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E-mail: [sales@vltest.com](mailto:sales@vltest.com)