HRVATSKO ASFALTERSKO DRUŠTVO

CROATIAN ASPHALT ASSOCIATION

CONTINUOUS VOID CONTENT MEASUREMENT DURING COMPACTION. A NEW MODEL OF SAMPLE PREPARATION

KONTINUIRANO MJERENJE SADRŽAJA ŠUPLJINA TIJEKOM ZBIJANJA. NOVI MODEL PRIPREME UZORAKA

MATTHIAS MARTUS, INFRATEST

9. MEĐUNARODNA KONFERENCIJA ASFALTNI KOLNICI 2025

9. INTERNATIONAL CONFERENCE ASPHALT PAVEMENTS 2025

OPATIJA 08. – 09. 05. 2025.

A new model of sample preparation

Agenda

1. There is a new kid in town
2. The roller sector compactor principle
3. Why do we need compacted asphalt samples
4. EN 12697 Part 33/ TP Asphalt-StB Teil 33
5. Compaction displacement controlled/ load controlled
6. Void controlled Compaction

1. There is a new kid in town

Low temperature asphalt

(Its new, cool and has some unknown behavior)

1. There is a new kid in town

Where can we see how different additives influence the compaction ?

How can we combine field and lab testing ?

Can we use the existing models ?

Old models meet new asphalt

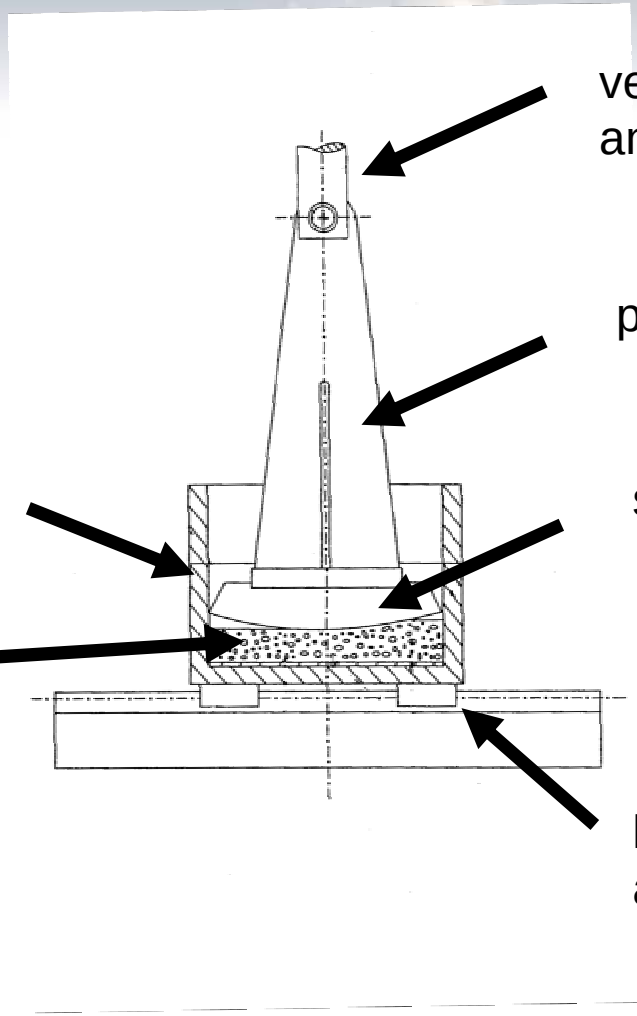
1. There is a new kid in town

Our most important and used compaction test method is the Roller Sector compactor

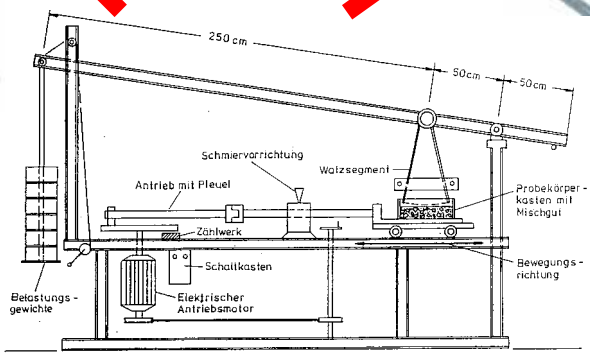
Can we use the method for low temperature asphalt ?

If yes ? How ?

2. Basic elements of RSC



2. Different designs of the RSCs on market

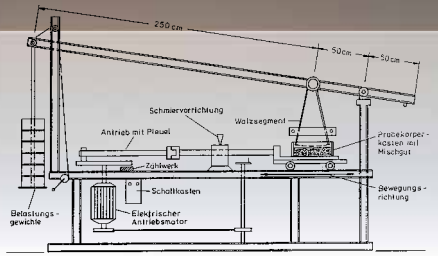


... et al.

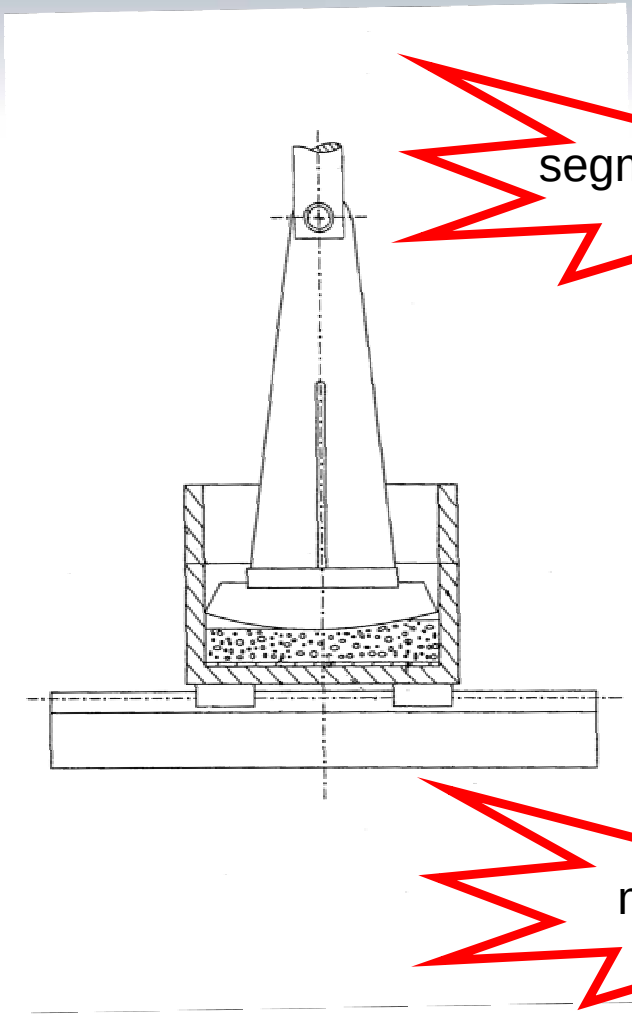
infraTest TESTING SYSTEMS

2. Actuators

- mechanical (by weights, crankshaft drive, …)
- Pneumatic cylinders
- Hydraulic cylinders
- Servo-motors and ballscrews



2. Critical parts of the RSC

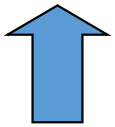
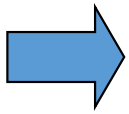
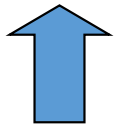
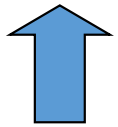
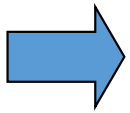
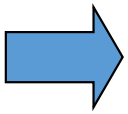
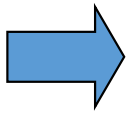
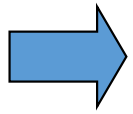
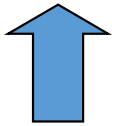
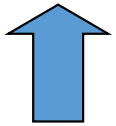
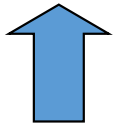
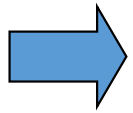
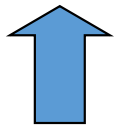


segment-actuator

control

mould-actuator

2. Comparison of actuators

Actuator	Accuracy of force	Accuracy of displacement	Reliability / maintenance	Investment costs low	Working costs low
by weights					
pneumatic cylinder					
hydraulic cylinder					
servo-motor & ballscrew					

3. Hamburg wheel tracking

3. TSRST behaviour in cold temperatures

3. 4 point bending

3. 2 point bending samples

3. Indirekt tensile test

4. EN 12697 Part 33 and TP Asphalt Part 33

5. Displacement controlled and load controlled

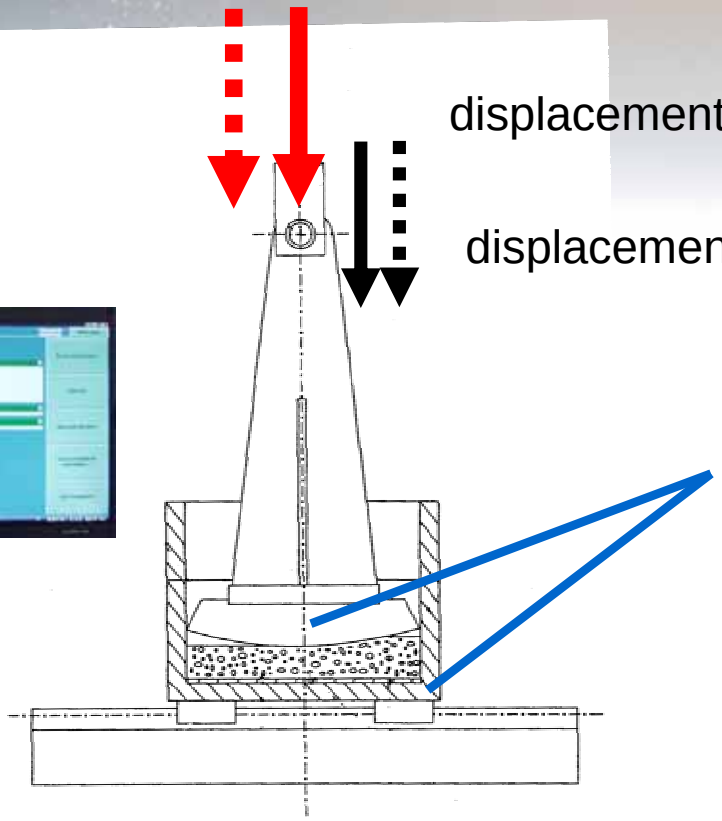
force = const.

force = f (mould motion)

&

displacement = const.

displacement = f (mould motion)



temperatures

number of crossings
motion free programmable
force of mould motion

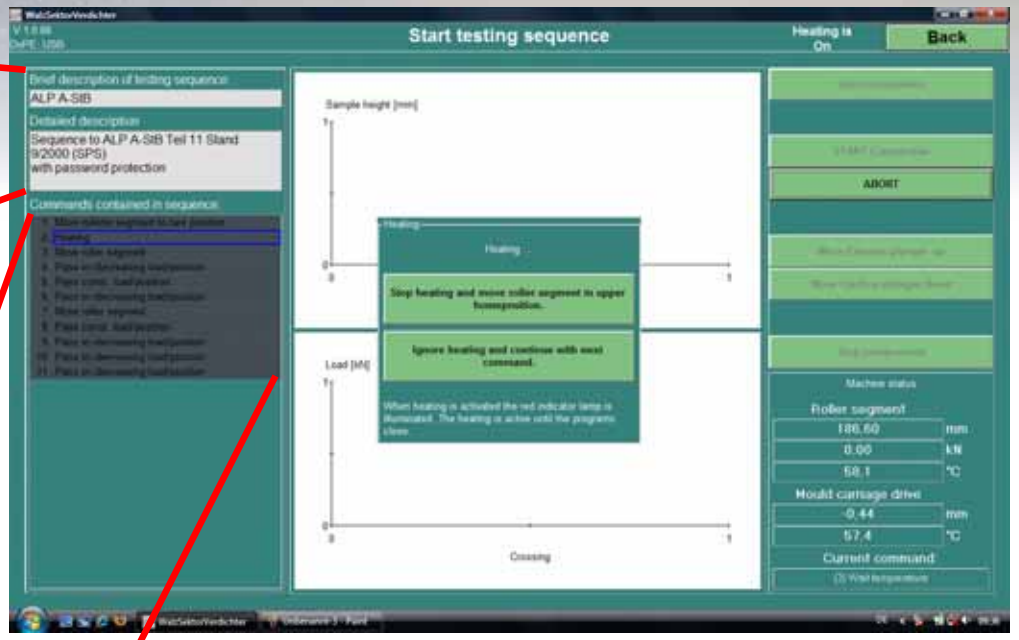
5. Displacement controlled and load controlled

Brief description of testing sequence:

ALP A-StB

Detailed description

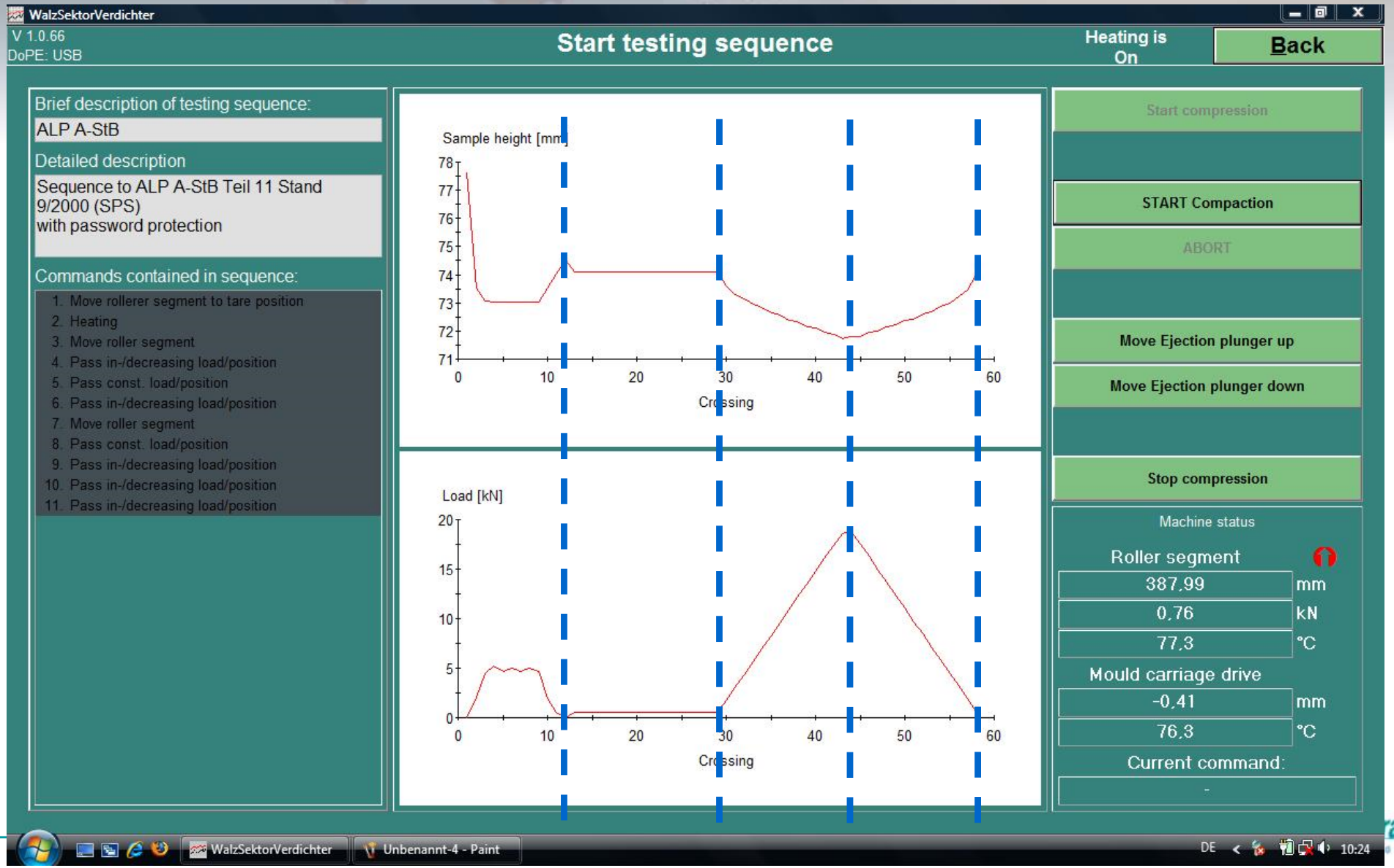
Sequence to ALP A-StB Teil 11 Stand 9/2000 (SPS)
with password protection



1. Move rollerer segment to tare position
2. Heating
3. Move roller segment
4. Pass in-/decreasing load/position
5. Pass const. load/position
6. Pass in-/decreasing load/position
7. Move roller segment
8. Pass const. load/position
9. Pass in-/decreasing load/position
10. Pass in-/decreasing load/position
11. Pass in-/decreasing load/position

5. Displacement controlled and load controlled

5. Displacement controlled and load controlled



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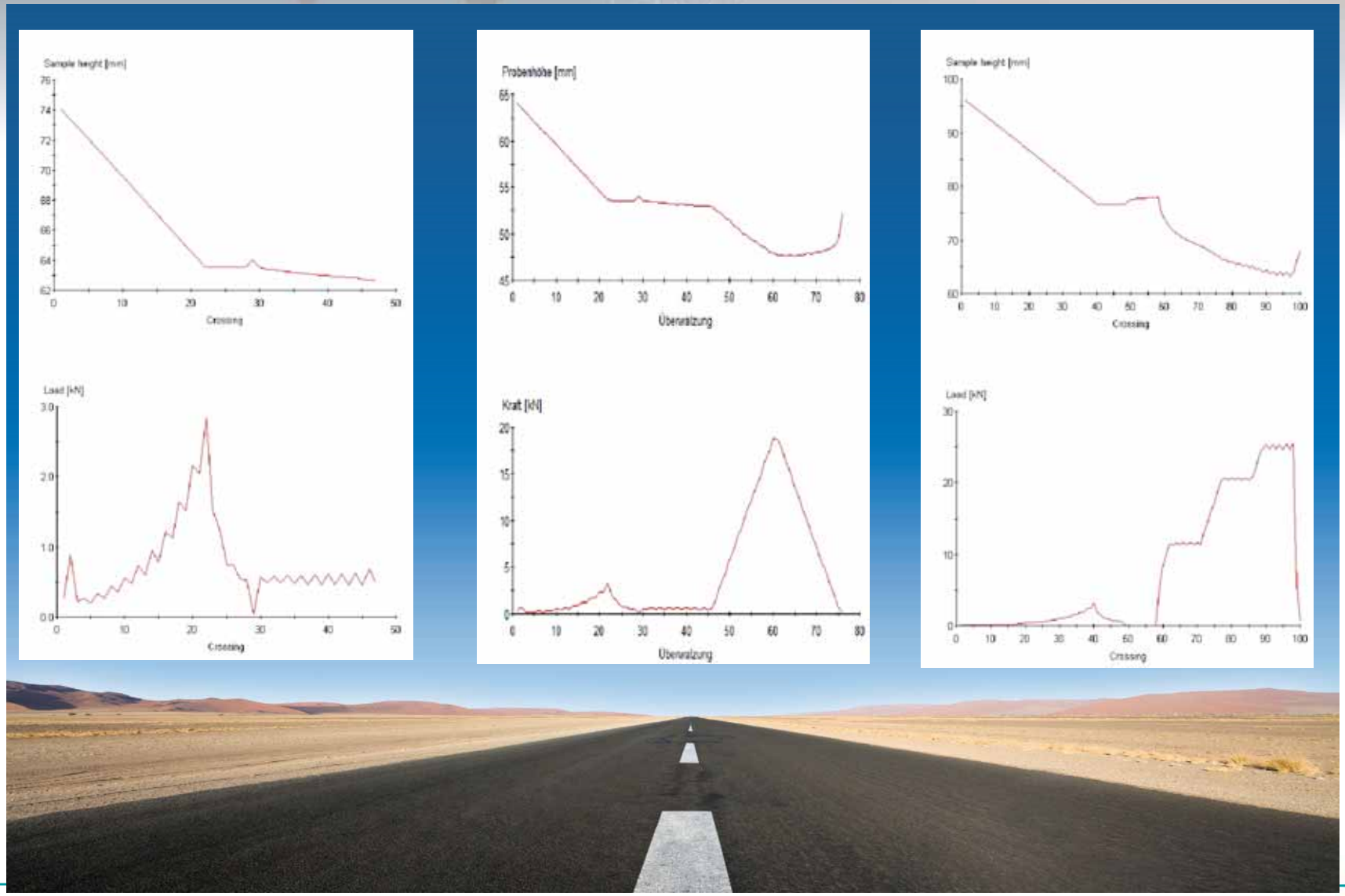
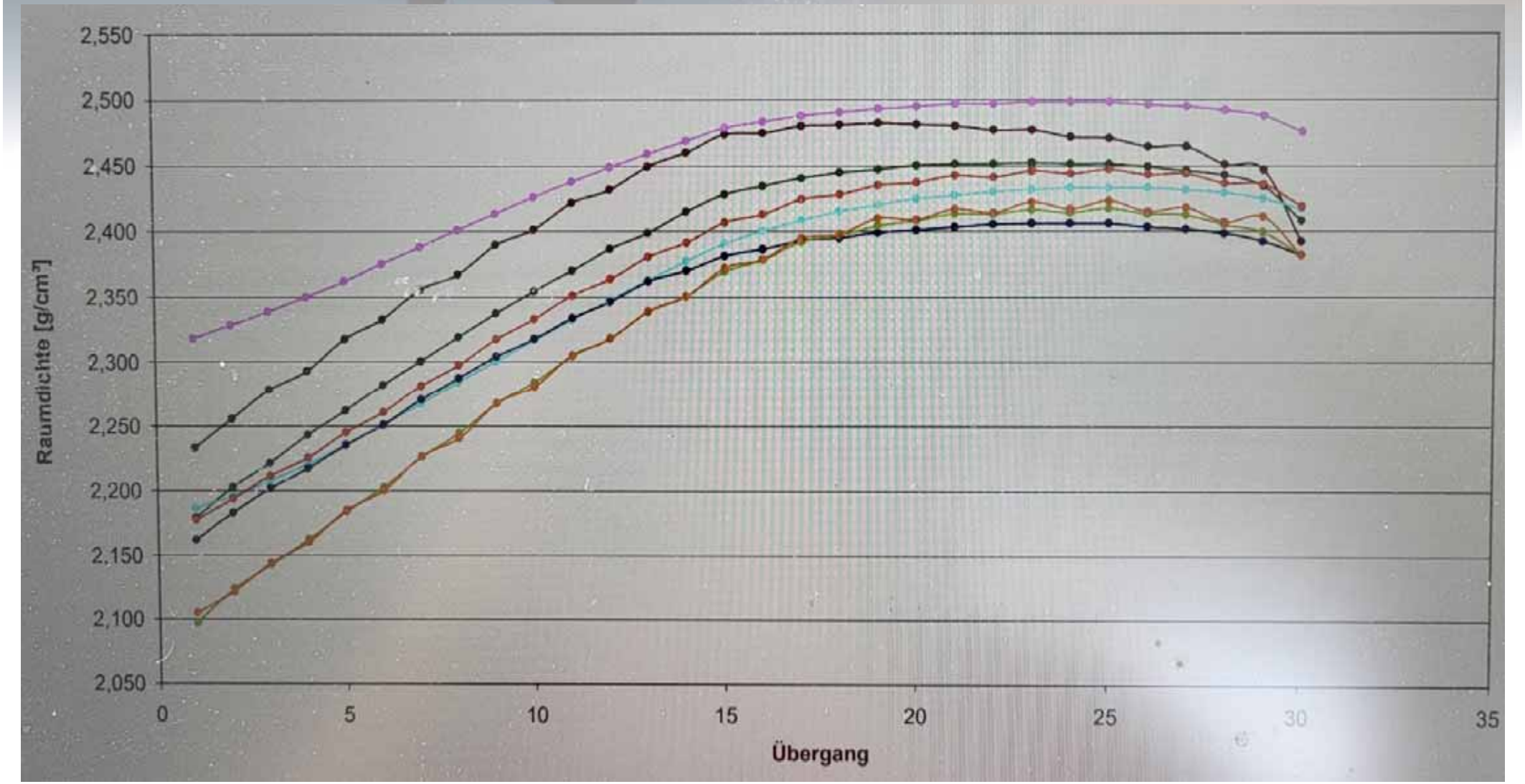
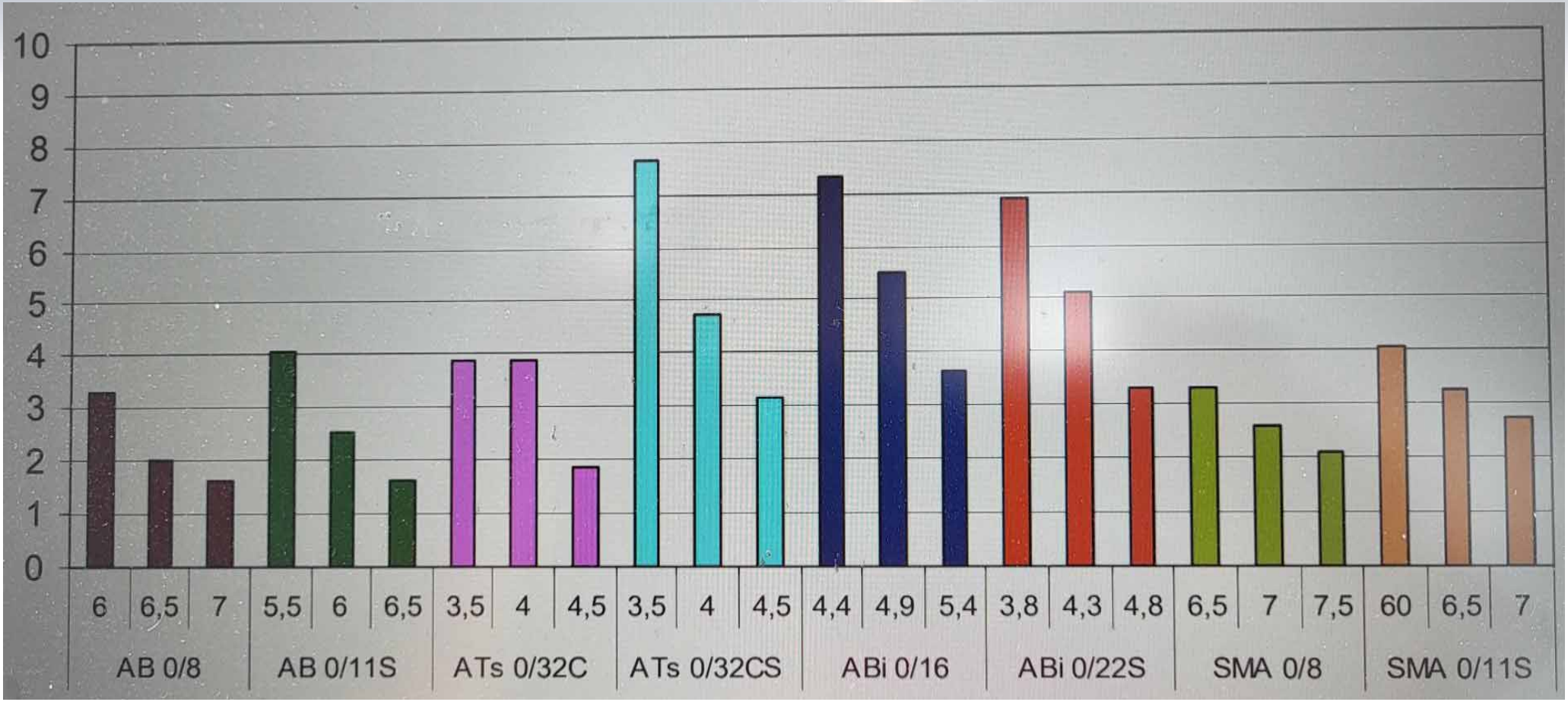


5. Density by volume versus crossings



5. Void content in (V%) after compaction



5. Old models meet new asphalt

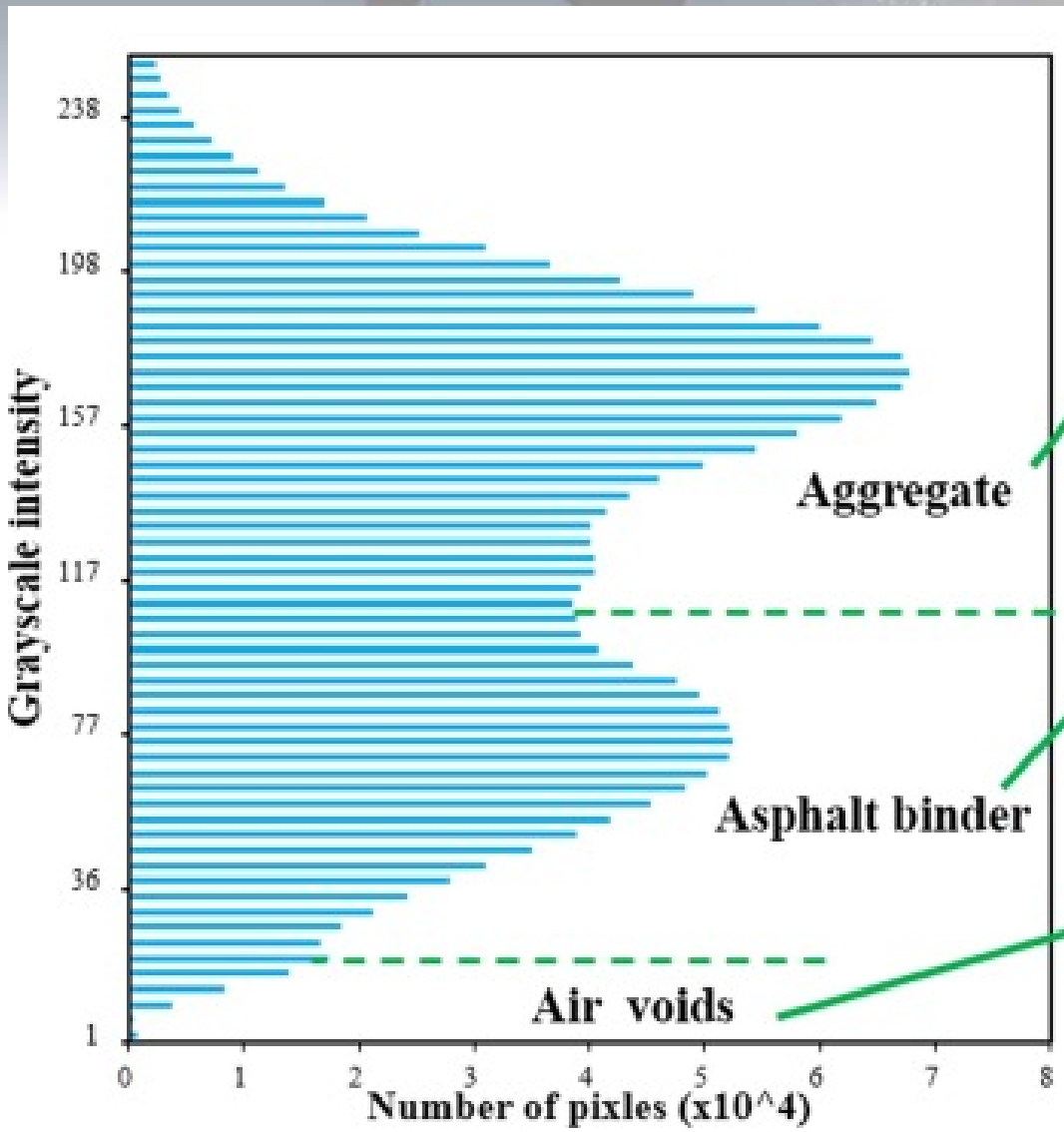
The type of asphalt has no influence on the prefixed compaction sequence

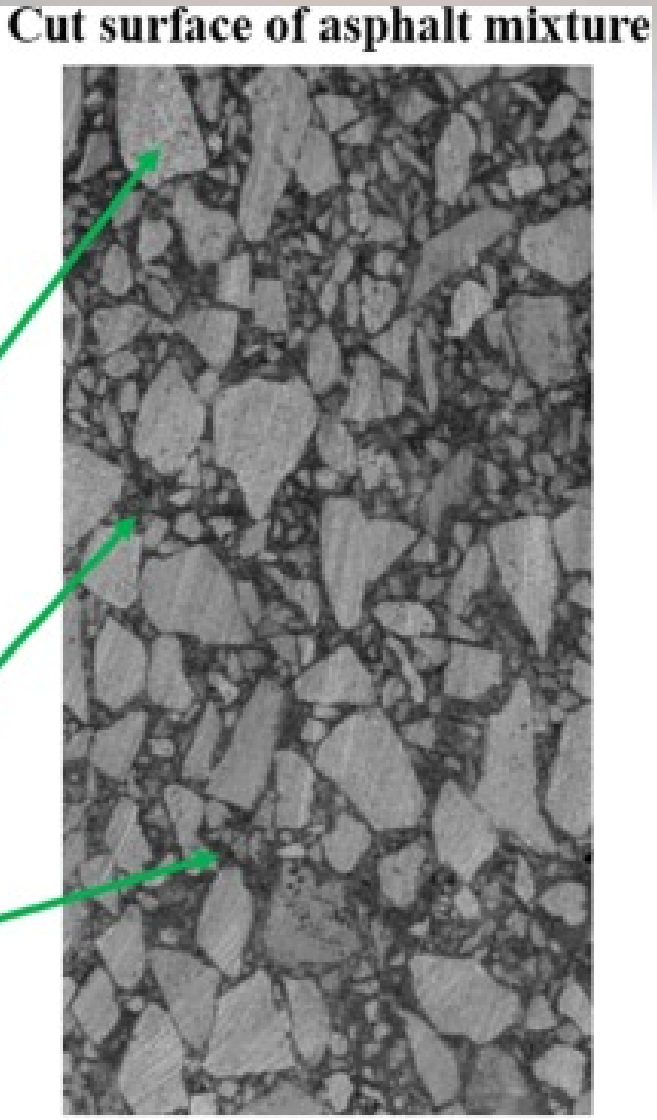
6. So whats new ?

When passing the sample center line the void content is measured.

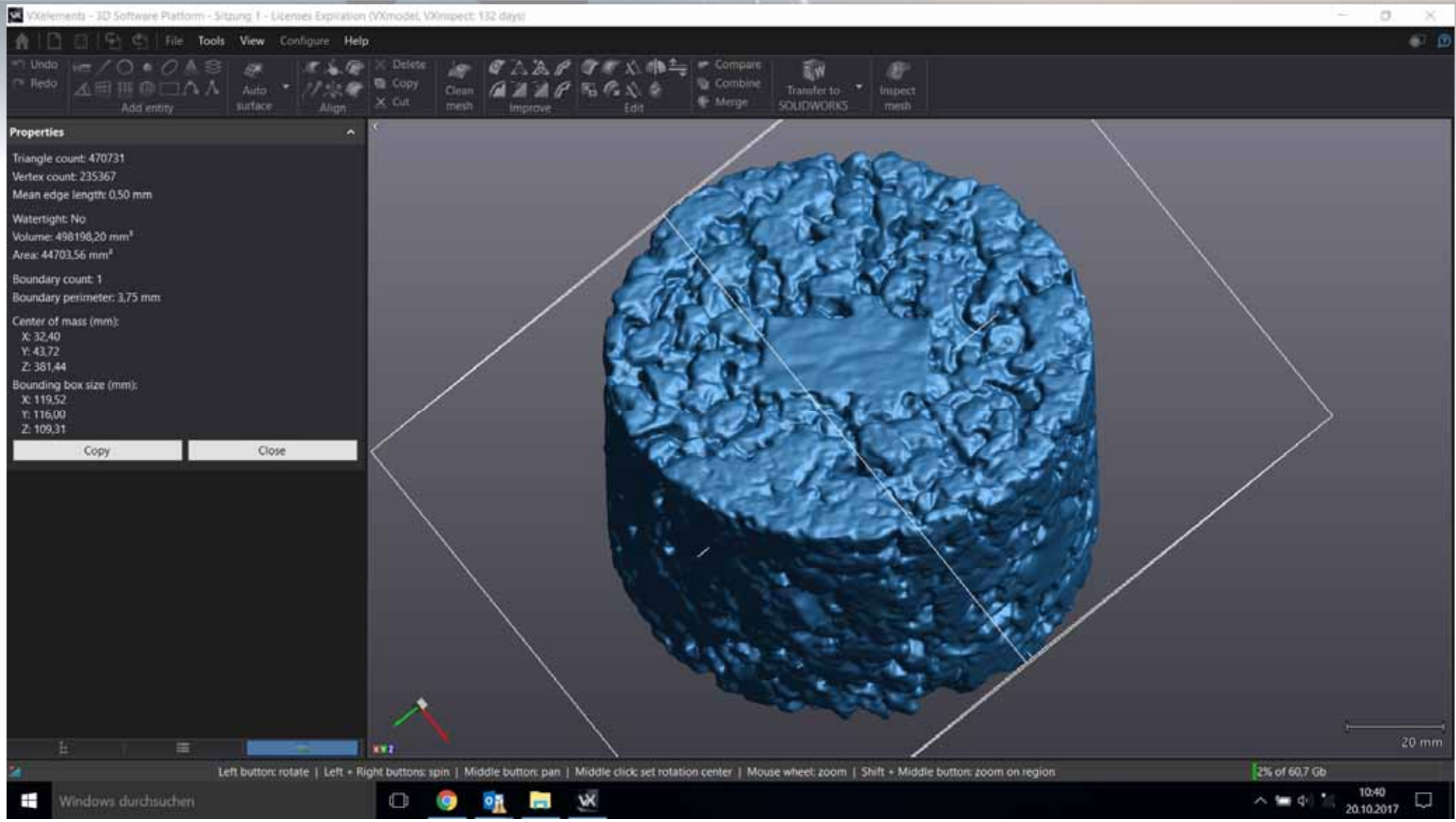
The software is calculating the next action according to this value

6. Void vontent controlled compaction





6. Void vontent controlled compaction



6. Void vontent controlled compaction

sector heating

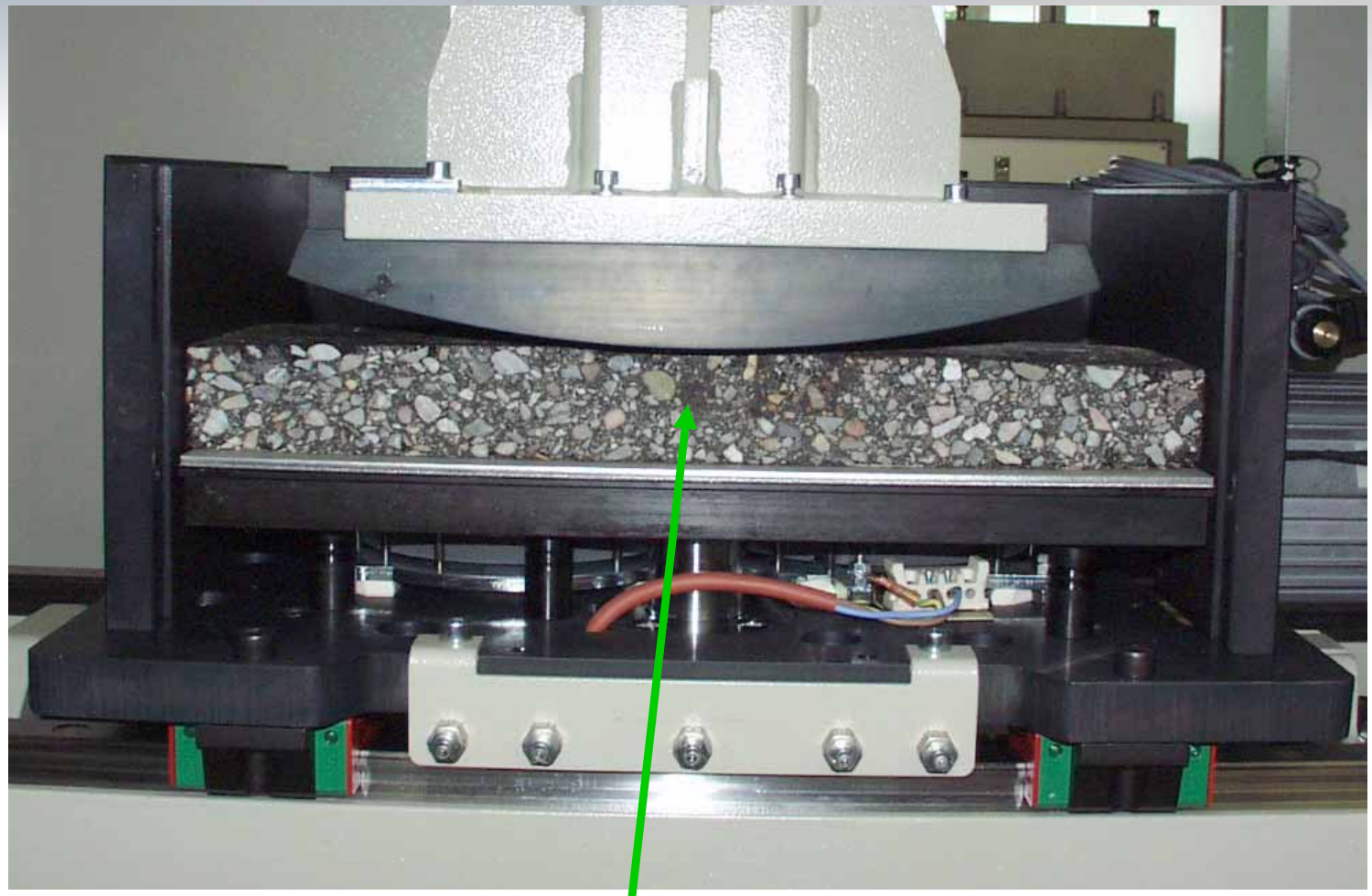
mould heatings

base plate free to move

Sensors for void content

pair of hydraulic cylinders

Measurement of void content during compaction and automated adjustment of compaction sequence



Future: correlation between lab and field

Thank you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Testing the future
ALWAYS 2 STEPS AHEAD ...
20.05.2025