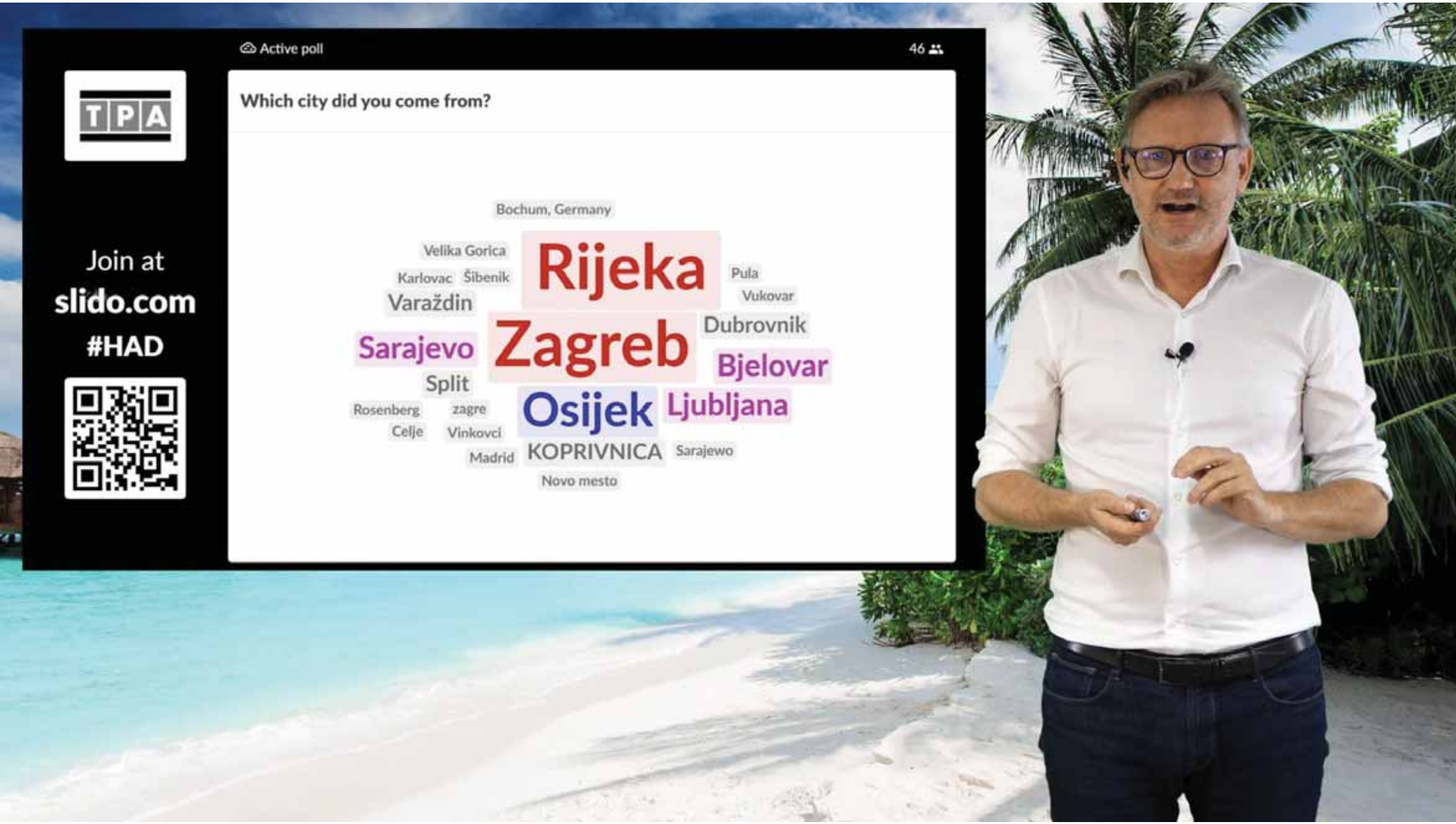
WHY TO INTRODUCE THE ASPHALT MIX PERFORMANCE TESTS?

TPA STRABAG TEAMS WORK.


Active poll
46
Which city did you come from?
Bochum, Germany
Velika Gorica
Rijeka
Pula
Karlovac
Šibenik
Vukovar
Varaždin
Dubrovnik
Sarajevo
Zagreb
Bjelovar
Split
Osijek
Ljubljana
Rosenberg
zagre
Celje
Vinkovci
KOPRIVNICA
Sarajewo
Madrid
Novo mesto
Join at
slido.com
#HAD

PERFORMANCE TESTS

DIFFERENT NAMES

fundamental approach

mechanistic-empirical approach

simulation tests

empirical approach

mechanistic approach

performance tests

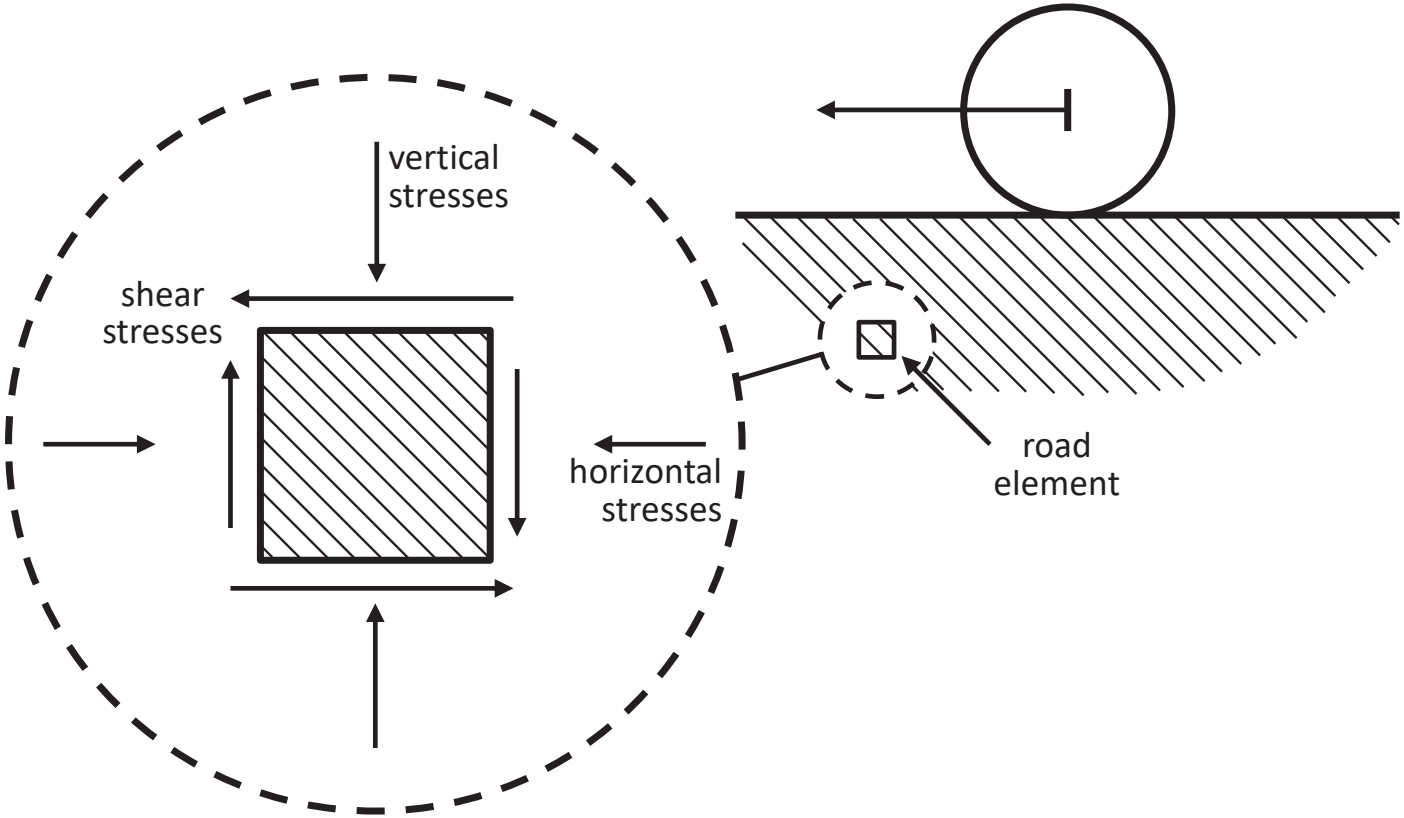
performance prediction

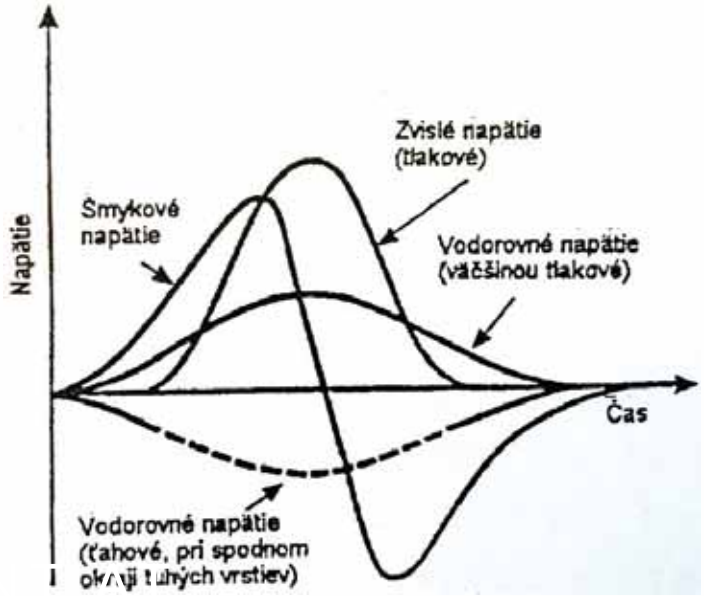
performance based tests

performance related tests

PAVEMENT PERFORMANCE

TRIAXIAL STRESS CONDITION CHANGING IN TIME

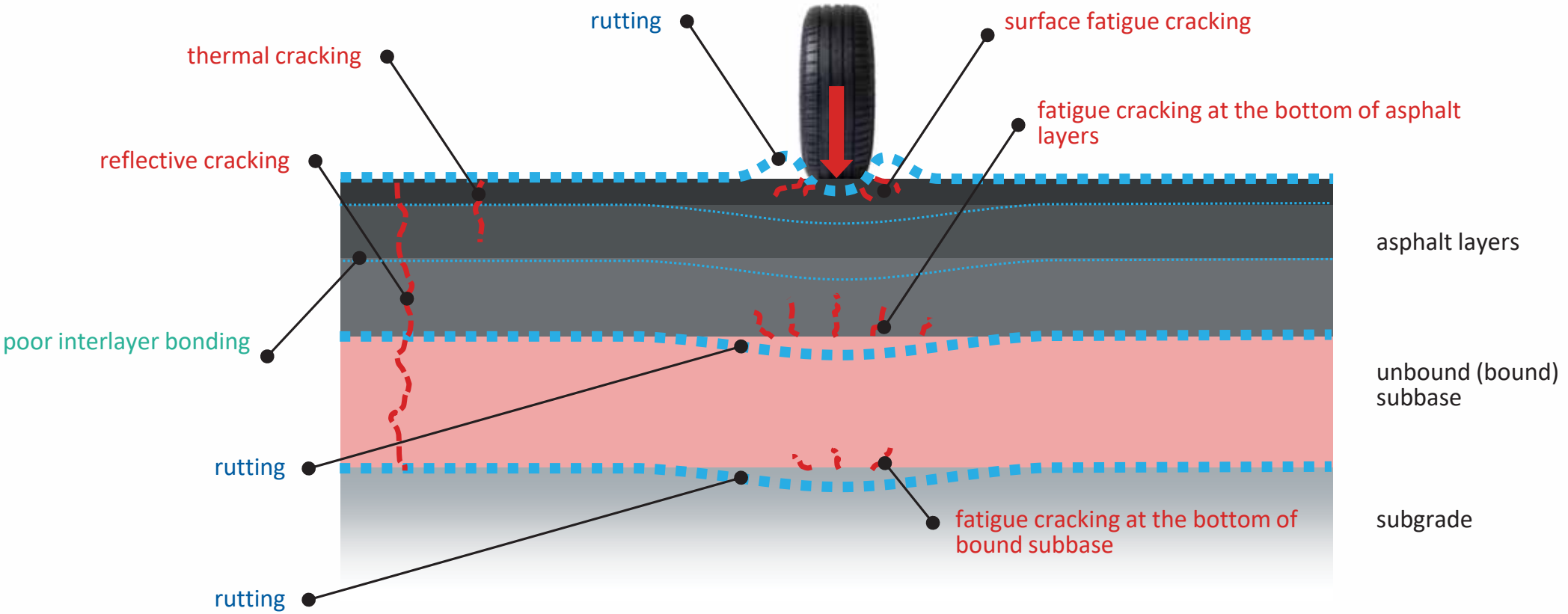




TPA STRABAG TEAMS WORK.

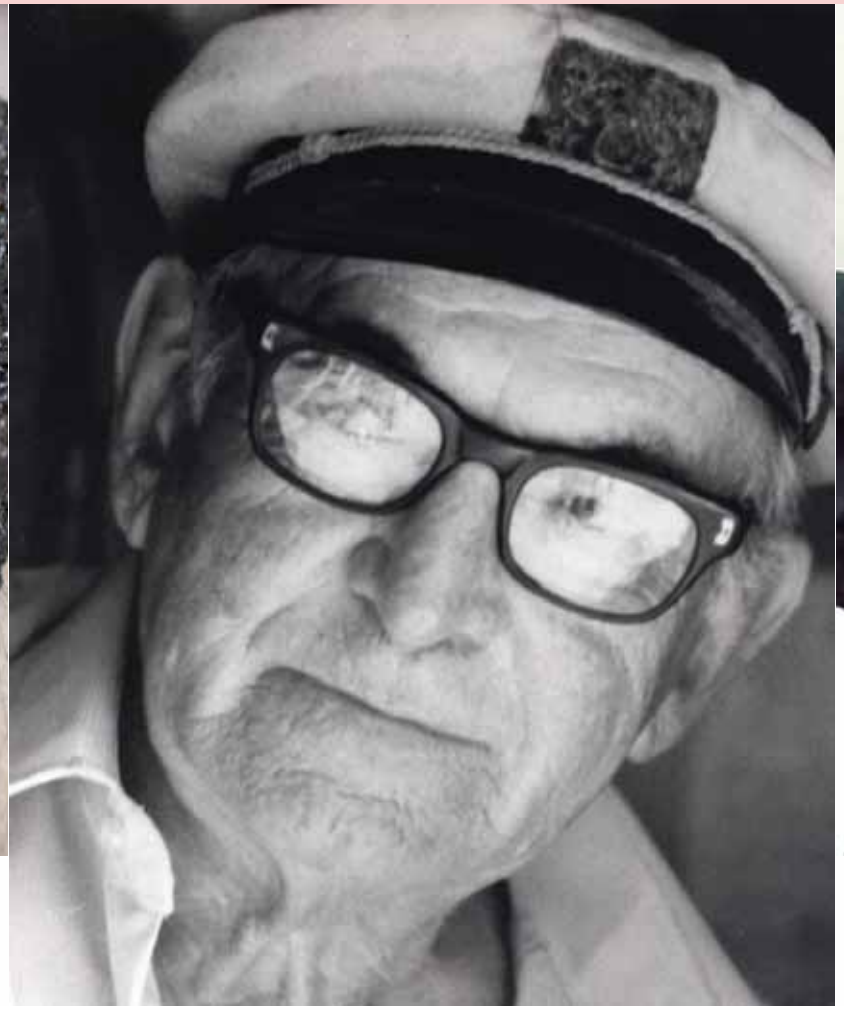
PAVEMENT PERFORMANCE

STRESSES & DISTRESSES



EMPIRICAL APPROACH

BRUCE G. MARSHALL (1908-1977)



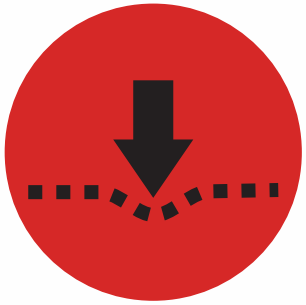
TPA STRABAG TEAMS WORK.


PAVEMENT ENGINEERING
THE ART OF MOLDING
MATERIALS
WE DO NOT WHOLLY
UNDERSTAND
INTO
SHAPES
WE CANNOT PRECISELY ANALYZE,
SO AS TO WITHSTAND
FORCES
WE CANNOT REALLY ASSESS,
IN SUCH A WAY
THAT THE COMMUNITY AT
LARGE HAS NO REASON TO
SUSPECT OUR
IGNORANCE

PERFORMANCE TESTS IN PAVEMENT AND MATERIALS DESIGN

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS IN PAVEMENT AND MATERIALS DESIGN



RUTTING RESISTANCE

WATER SENSITIVITY

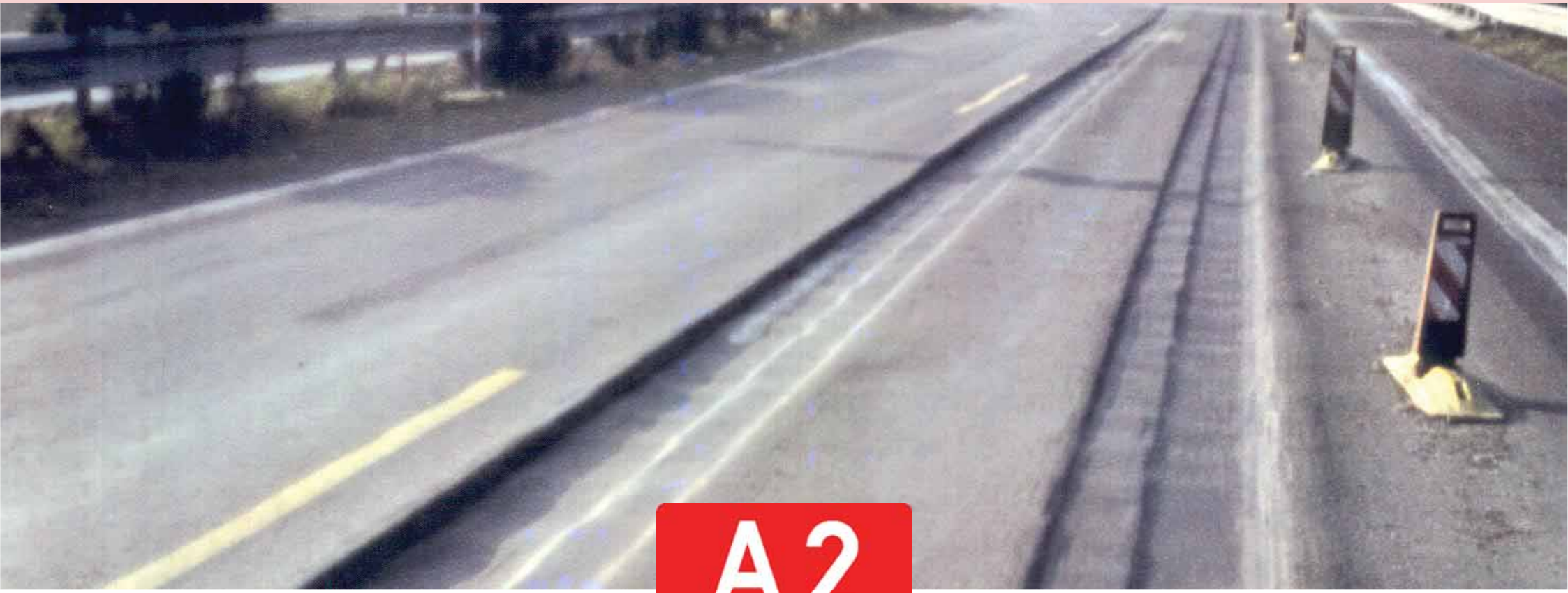
LOW TEMPERATURE RESISTANCE

STIFFNESS & FATIGUE RESISTANCE

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

RUTTING



1995

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

WHEEL TRACKING TEST (EN 12697-22)

SMALL DEVICE

11.5 t/axle

LARGE DEVICE

13.0 t/axle

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

NO RUTTING ANYMORE

A2

currently

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

WATER SENSIVITY

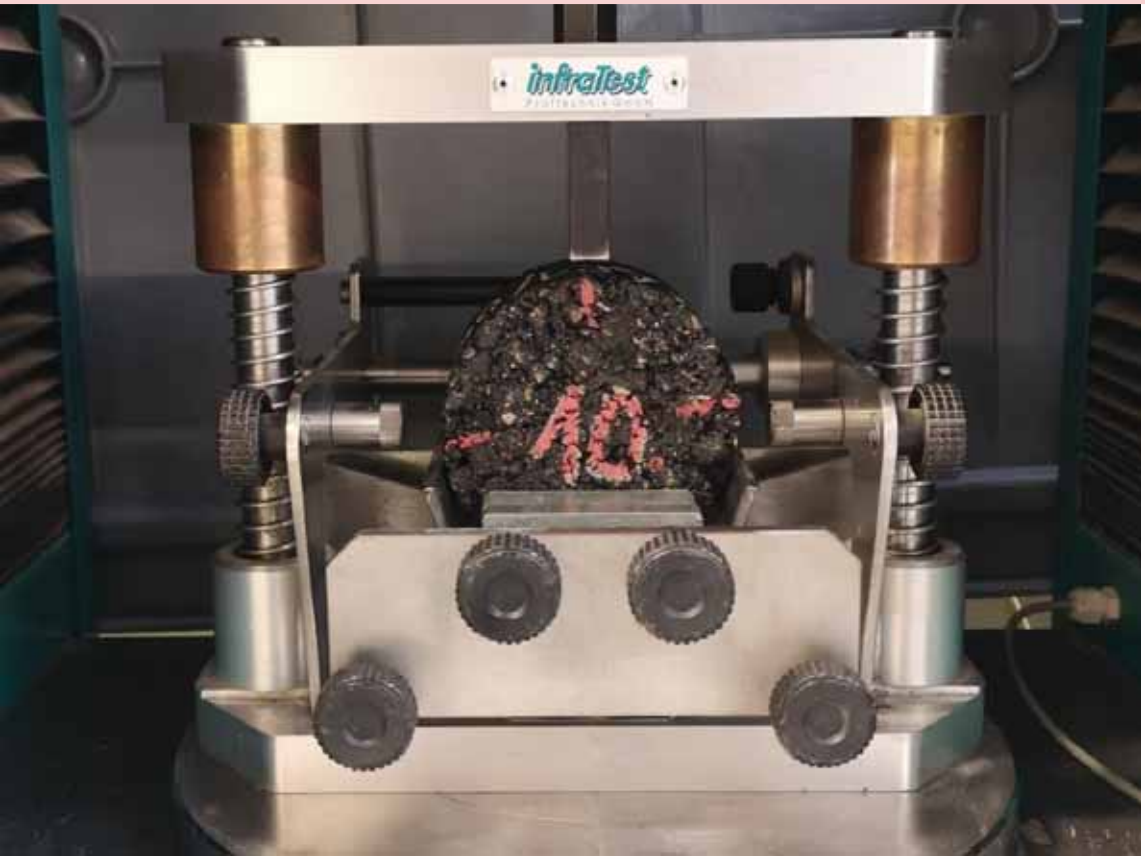
A2

2003

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

WATER SENSITIVITY TEST – ITSR (EN 12697-12)

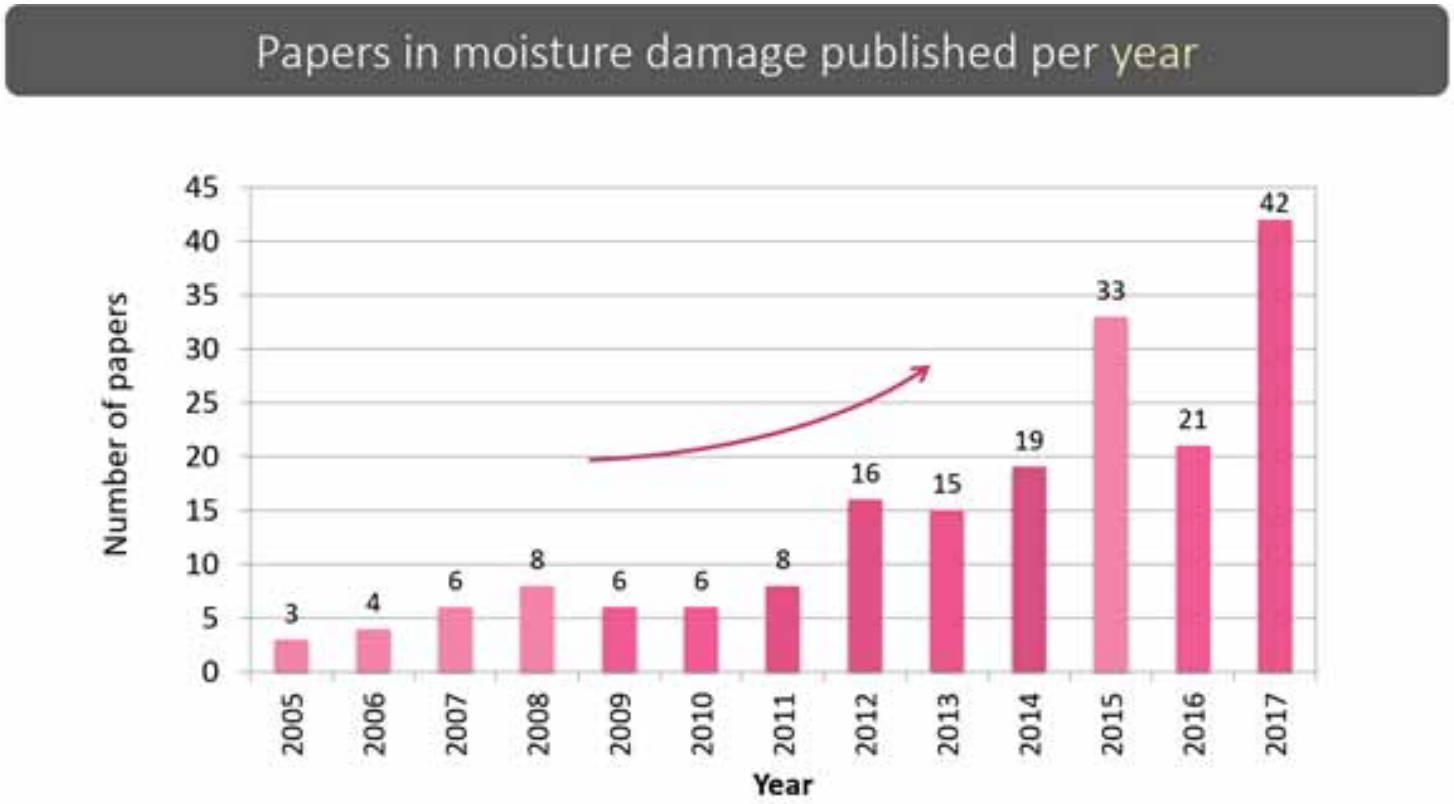


ITSR
(**I**ndirect **T**ensile **S**trength **R**atio)

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

TRENDS IN MOISTURE DAMAGE RESEARCH



TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

LOW TEMPERATURE CRACKING

A2

2012

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

LOW TEMPERATURE CRACKING TEST (EN 12697-46)

TSRST

(**T**ensile **S**trength **R**estrained **S**pecimen **T**est)

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

NO MORE LOW TEMPERATURE CRACKING

A2

2012

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

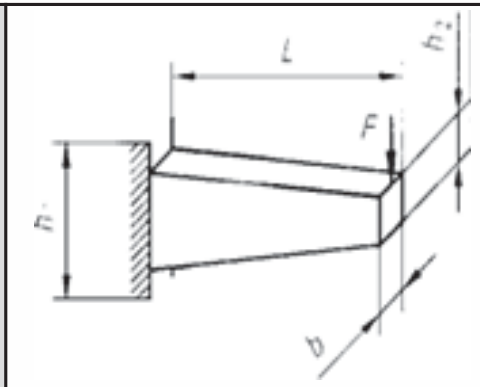
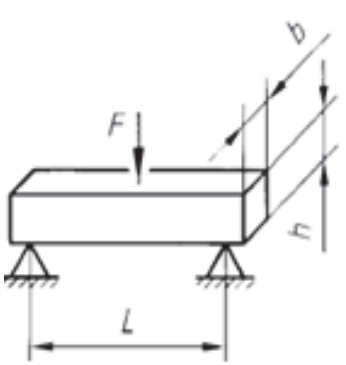
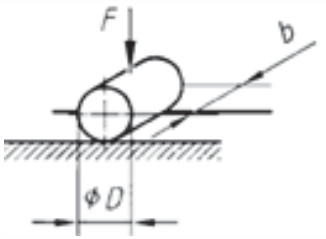
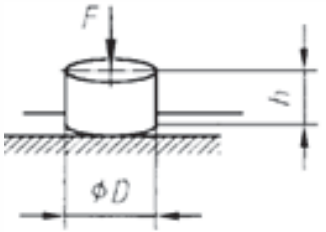
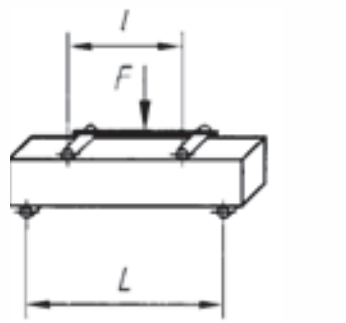
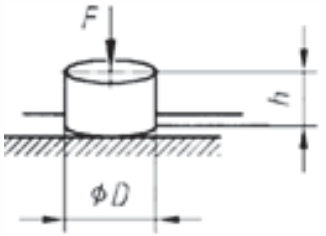
STIFFNESS AND FATIGUE RESISTANCE

...

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

STIFFNESS (EN 12697-26) FATIGUE RESISTANCE (EN 12697-24)

2PB-TR		**3PB-PR**		**IT-CY**	
				DTC-CY	
		**4PB-PR**		**DT-CY** **DT-PR**	

BUT WHICH ONE?

PAVEMENT DESIGN

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

PERPETUAL PAVEMENT

DESIGN
&
BUILD

S8

2013-2015

TPA

STRABAG
TEAMS WORK.

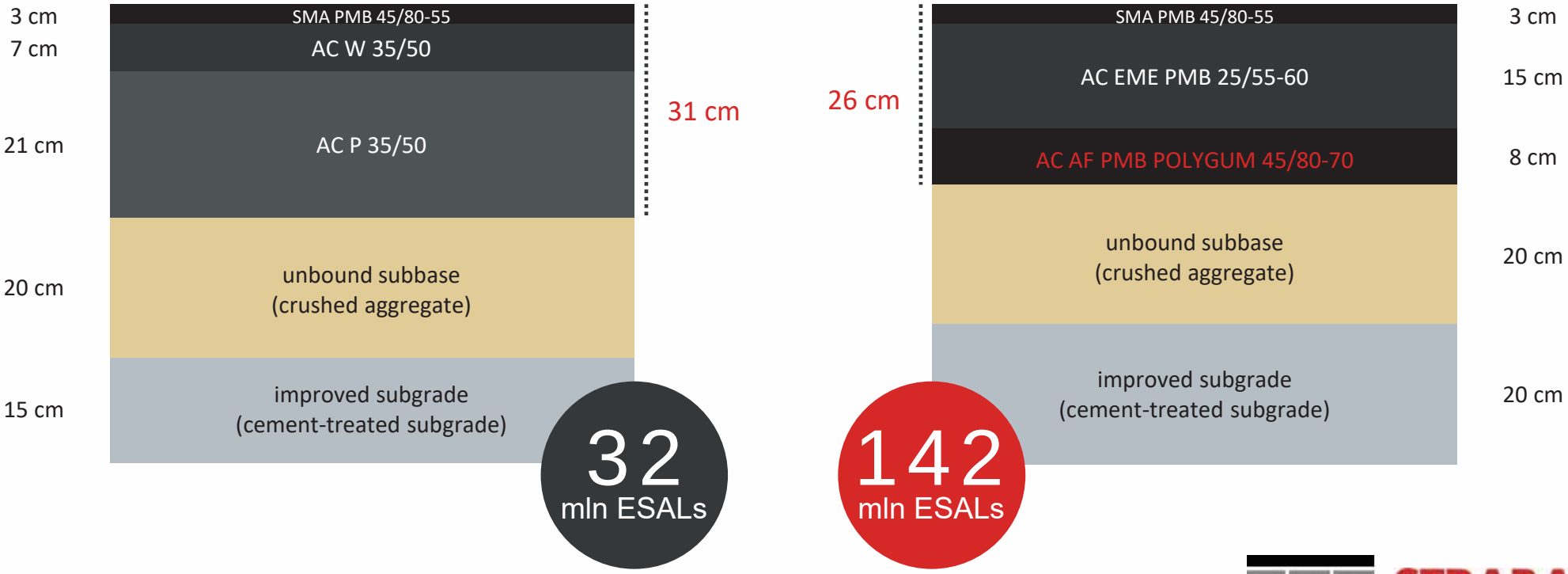
PERFORMANCE TESTS

PERPETUAL PAVEMENT

ORIGINAL DESIGN

S8

PERPETUAL DESIGN



TPA STRABAG TEAMS WORK.

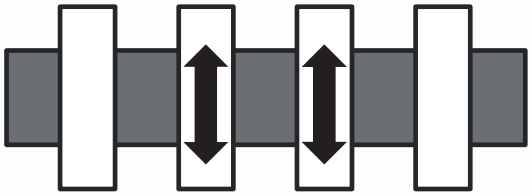
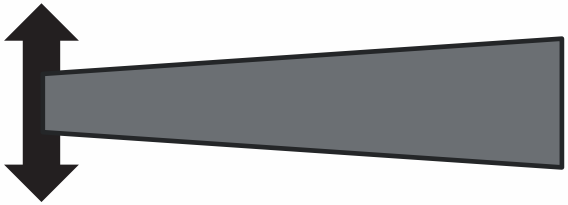
PERFORMANCE TESTS

4PB-PR VS 2PB-TR

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

4PB-PR VS 2PB-TR

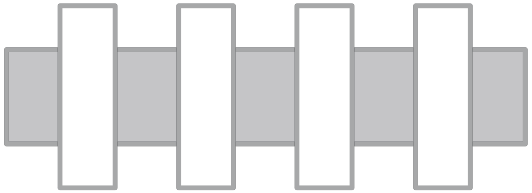
	4PB-PR (POLAND)	2PB-TR (FRANCE)
		
STIFFNESS	T = 10°C | f = 10 Hz	T = 15°C | f = 10 Hz
FATIGUE	T = 10°C | f = 10 Hz	T = 10°C | f = 25 Hz

TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

4PB-PR VS 2PB-TR

4PB-PR (POLAND)

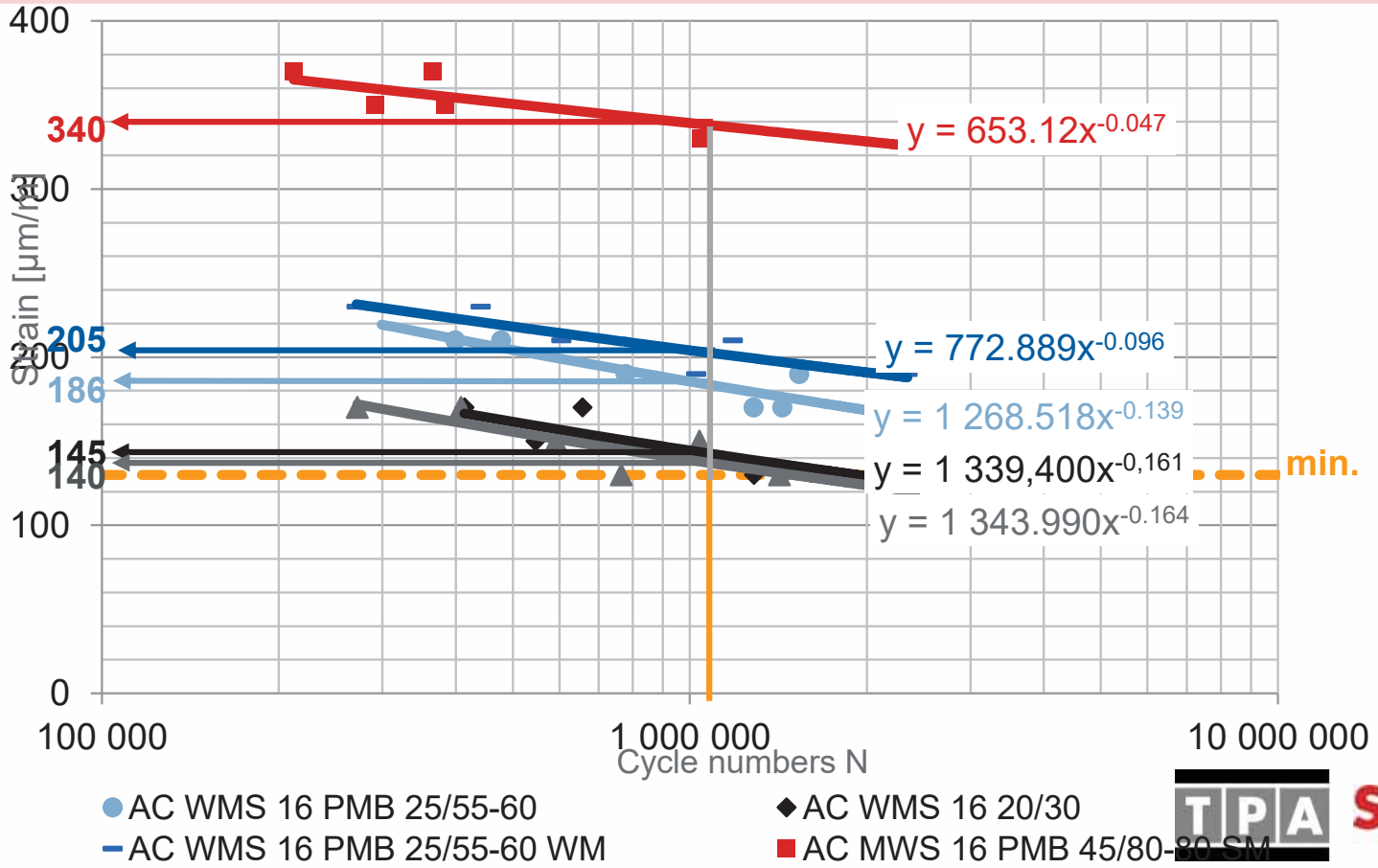


2PB-TR (FRANCE)

PERFORMANCE TESTS

NEW MATERIALS

4PB-PR (10°C, 10 HZ) ACC. EN 12697-24

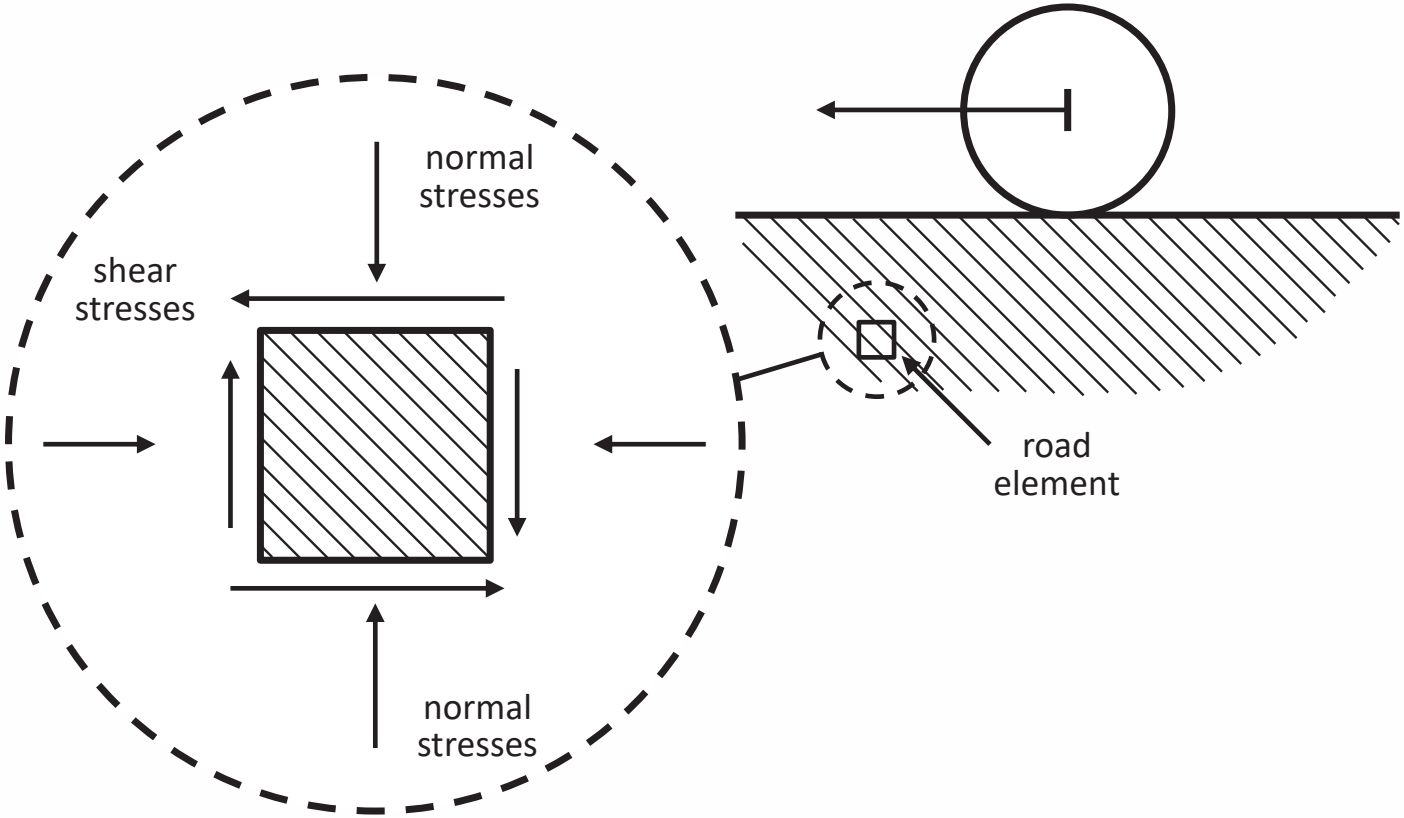


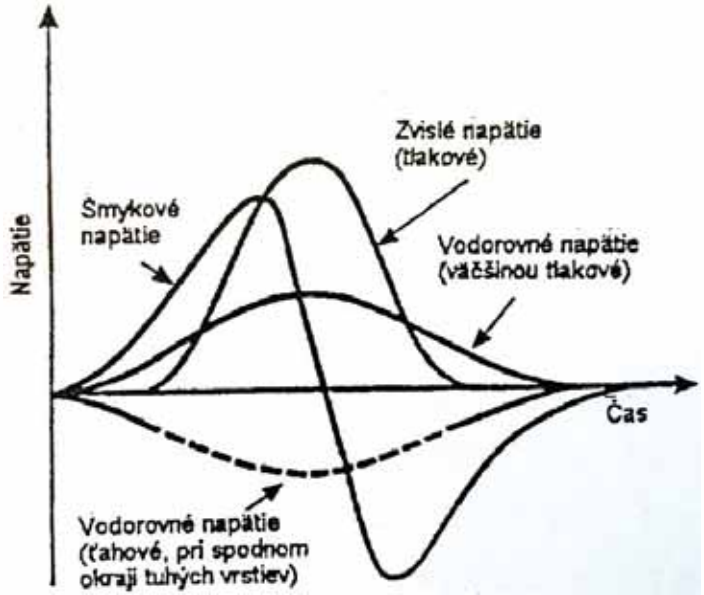
TPA

STRABAG
TEAMS WORK.

PERFORMANCE TESTS

TRIAXAL TEST SYSTEM

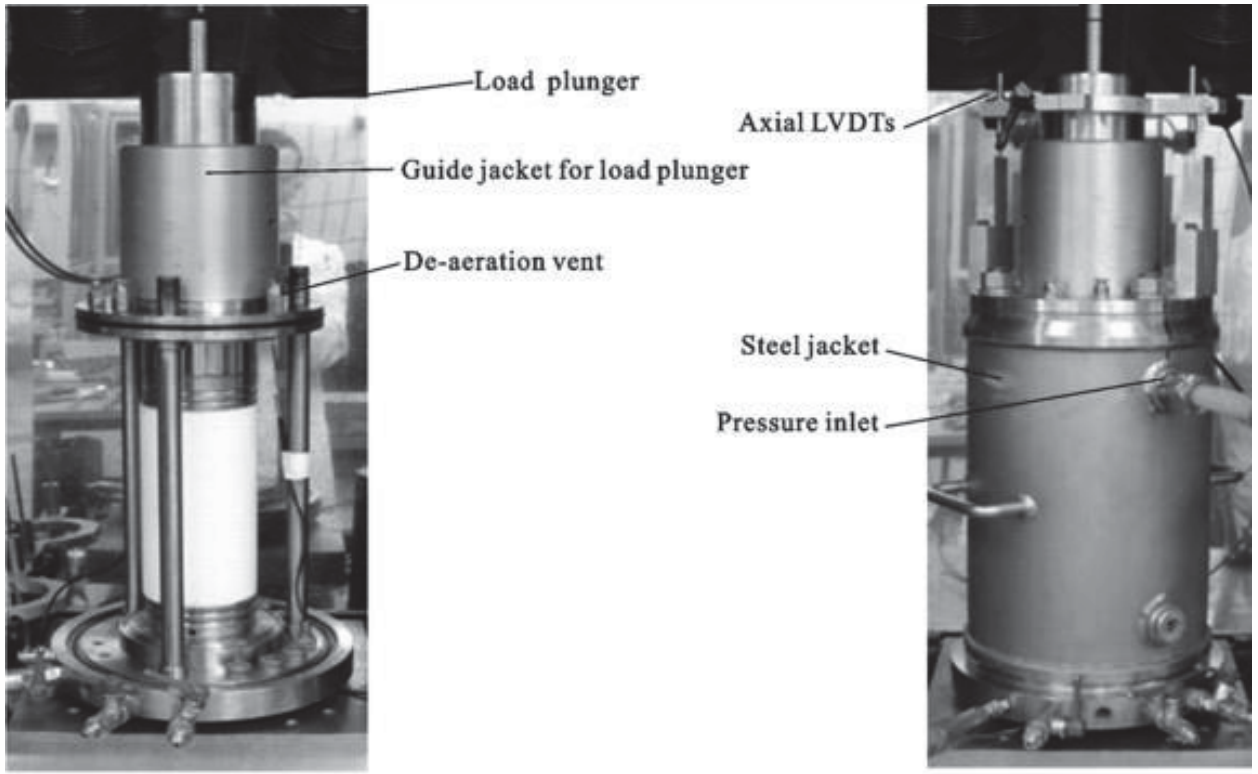


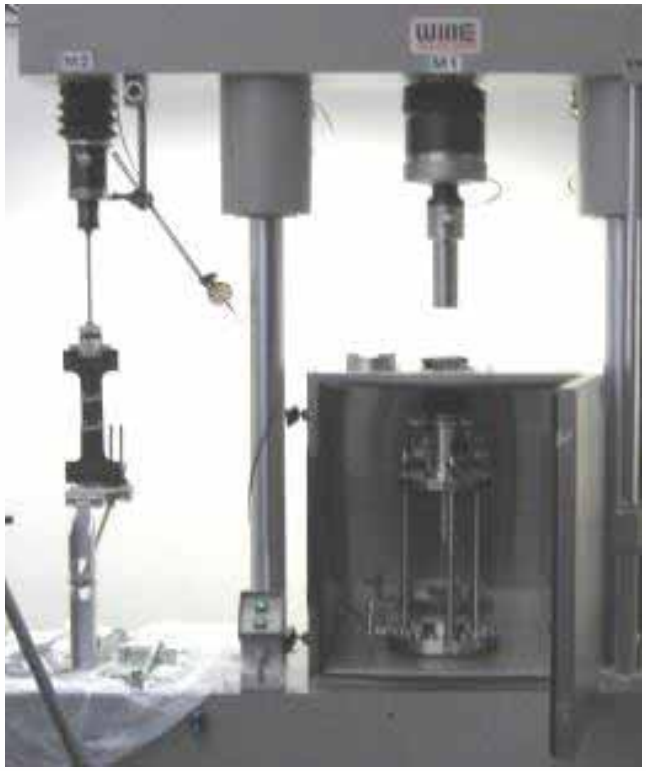


TPA STRABAG TEAMS WORK.

PERFORMANCE TESTS

TRIAXIAL TESTING ISN'T EASY





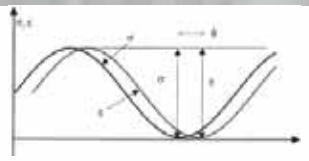
IN NEED OF SIMPLIFICATION

SPT@MEPDG

TPA STRABAG TEAMS WORK.

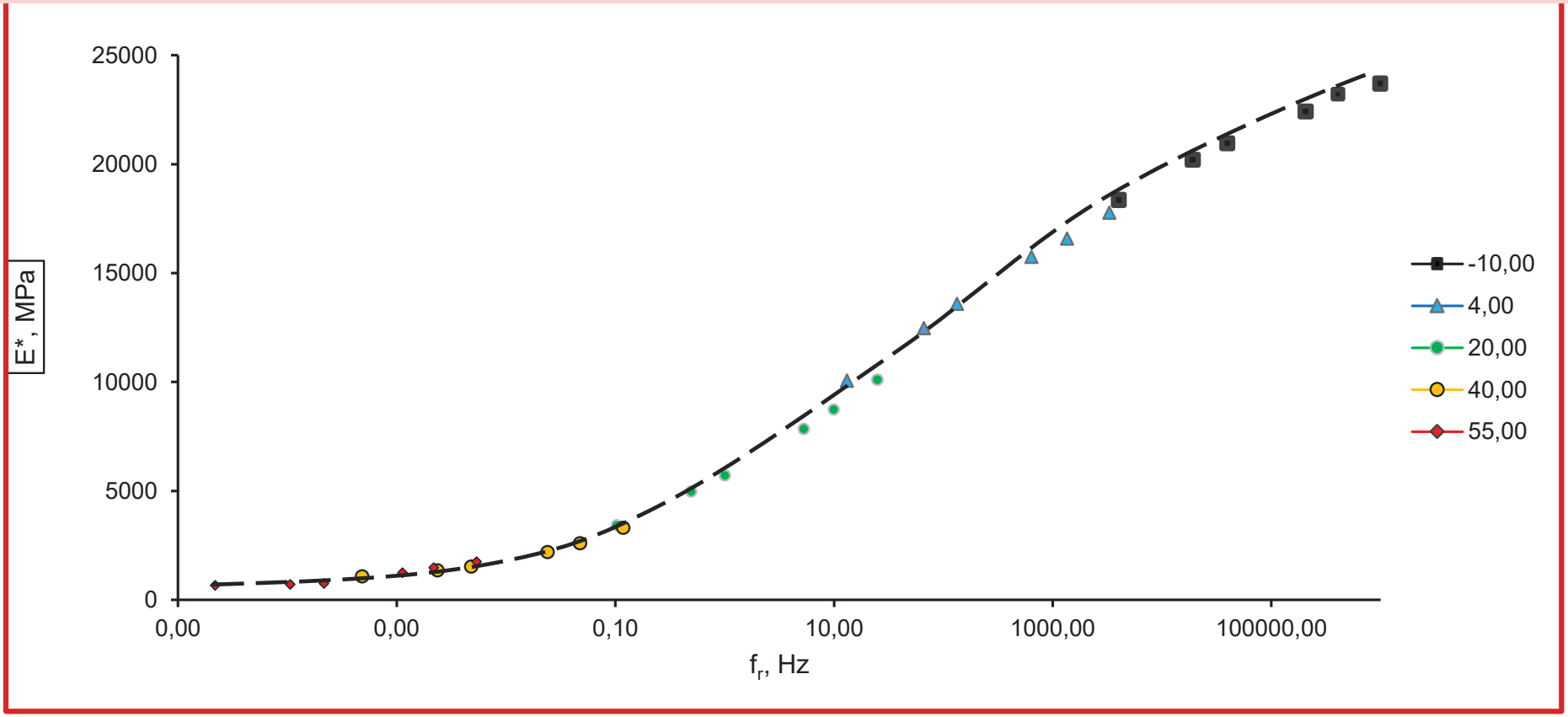
MEPDG

SPT – SIMPLE PERFORMENCE TEST(S) (AASHTO TP 79)



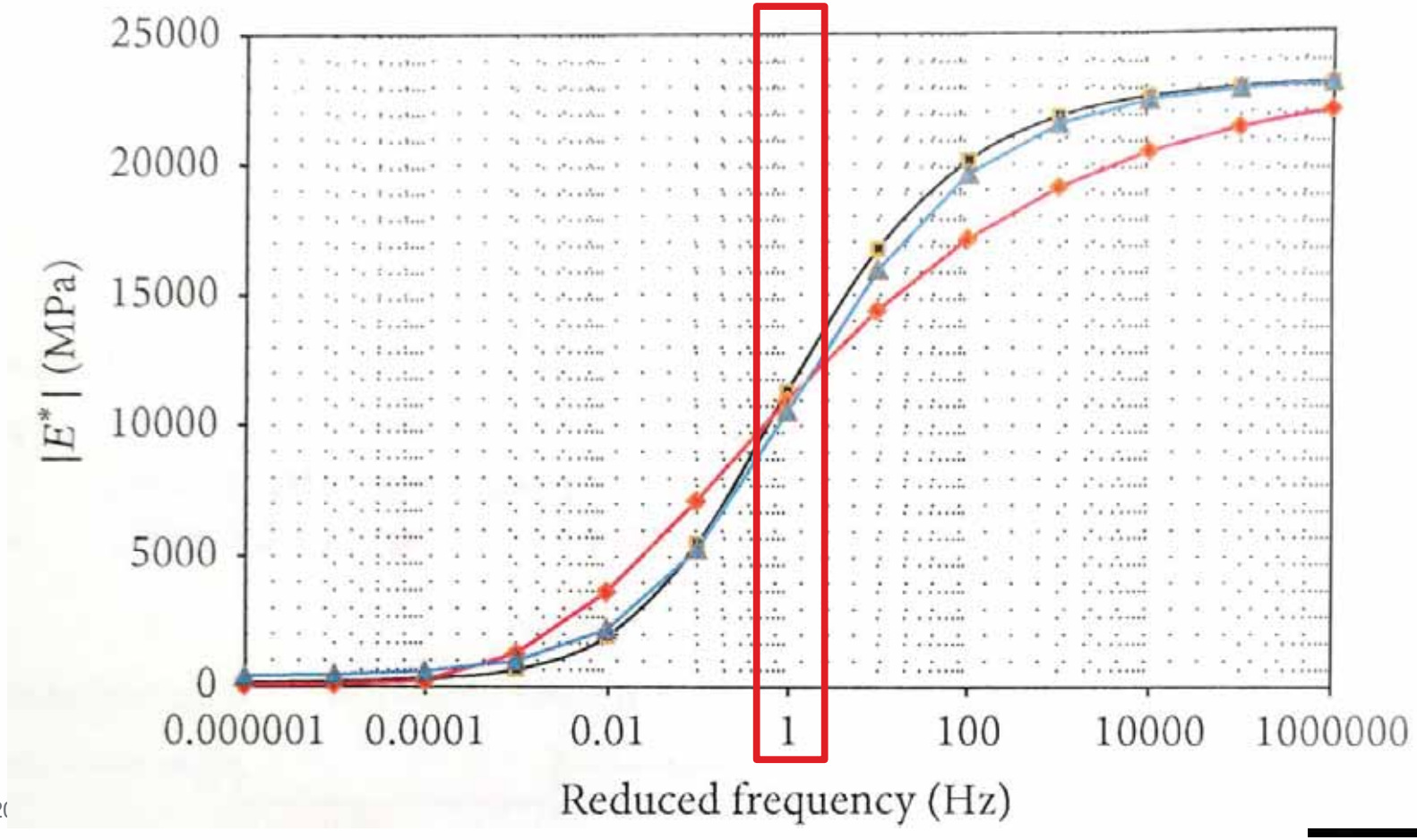
MEPDG

DYNAMIC MODULUS MASTER CURVES (AASHTO TP 79)



SIMPLE PERFORMANCE TESTS

DYNAMIC MODULUS MASTER CURVES (AASHTO TP 79)

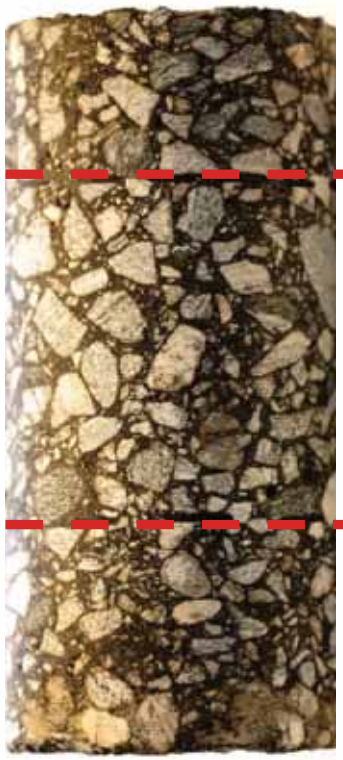


STRABAG
TEAMS WORK.

INDIVIDUAL PAVEMENT DESIGN

TRIPLE SMA HD PAVEMENT AT REFINERY GDANSK

TRIPLE SMA



SMA 16 PMB 45/80-80
5 CM

SMA 22 W PMB 25/55-80
9 CM

SMA 16 P PMB 45/80-80
6 CM

TPA STRABAG TEAMS WORK.

WHICH WAY TO GO?

TPA STRABAG TEAMS WORK.

WHICH WAY TO GO...?

ADVICE FROM OBSERVED TENDENCIES

LOOK FOR NEW SIMPLE AND QUICK TESTS

e.g. tests using new models like **Simplified Viscoelastic Continuum Damage Model** (S-VECD)

USE BETTER EXISTING TESTS

e.g. advanced analysis of **Dynamic Shear Rheometer (DSR) test** or **Bending Beam Rheometer (BBR)**

AVOID EMPIRICAL TESTS

e.g. resign from indirect tests due to their low accuracy

TPA STRABAG TEAMS WORK.

WHY TO USE PERFORMANCE TESTS?

TPA STRABAG TEAMS WORK.

WHY TO USE PERFORMANCE TESTS?

TAYLOR MADE DESIGN

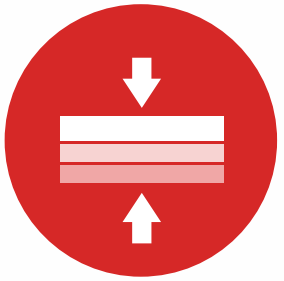
direct usage of results in pavement design and better performance prediction

ROOM FOR INNOVATIONS

comparison and performance prediction for new or innovative materials

LCA & LOWER LCC

usage of more durable materials in order to decrease life cycle costs



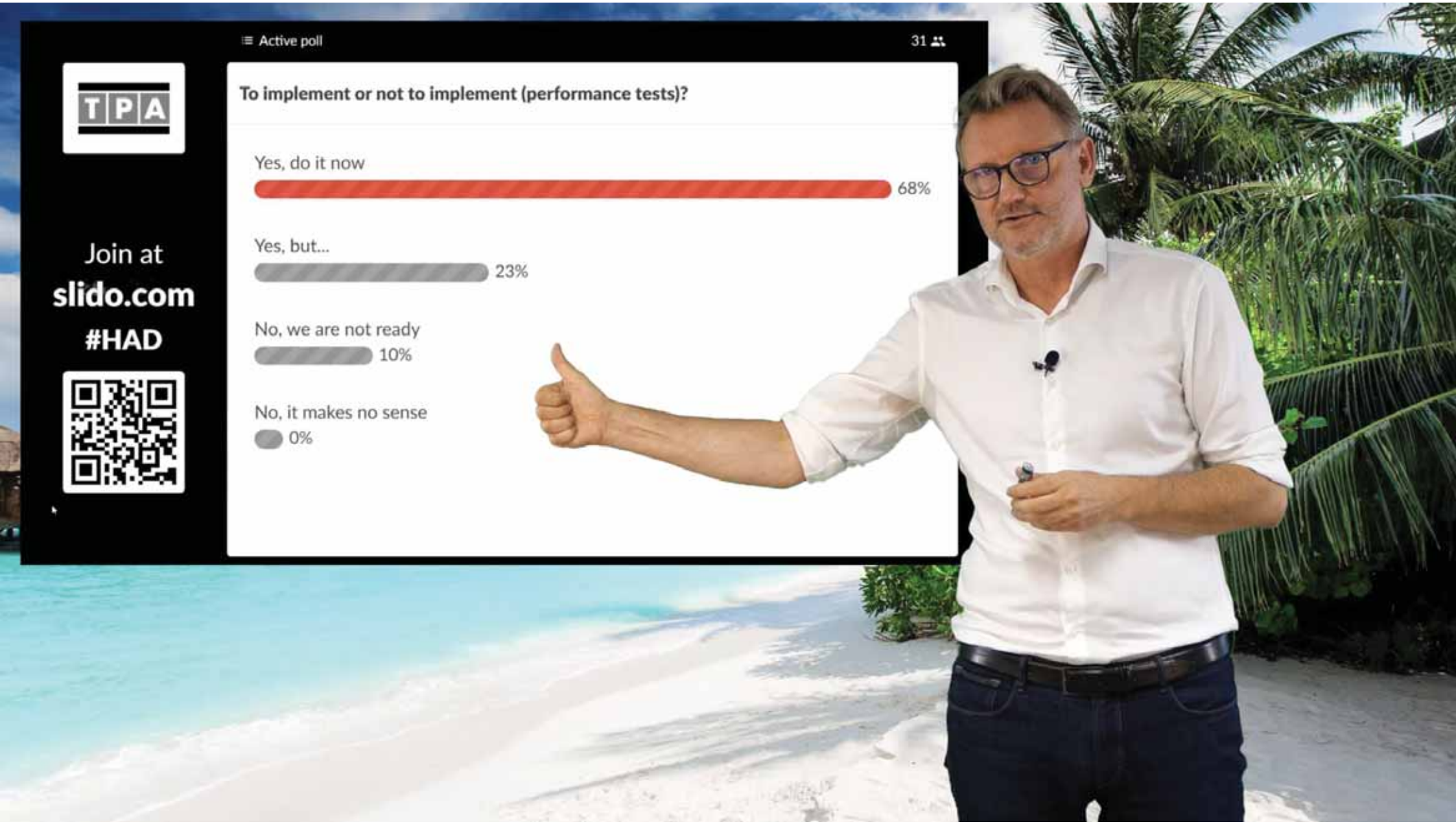
LESS MATERIAL USED

optimized pavement design utilizing better safety factors and better materials

LOWER ENVIROMENTAL IMPACT

lower CO_2 foot-print during production and transportation, recycling

TPA STRABAG TEAMS WORK.


Active poll
31
TPA
To implement or not to implement (performance tests)?
Yes, do it now
68%
Yes, but...
23%
No, we are not ready
10%
No, it makes no sense
0%
Join at
slido.com
#HAD

”

ALL MODELS ARE WRONG BUT SOME OF THEM ARE USEFUL

– George Box

THANK YOU

IGOR.RUTTMAR@TPAQI.COM