AV '17 KONFERENCE ASFALTOVÉ VOZOVKY 2017

THE CONCEPT OF PERPETUAL ASPHALT PAVEMENTS

The Next Level in The Theory of Evolution of Flexible Pavements

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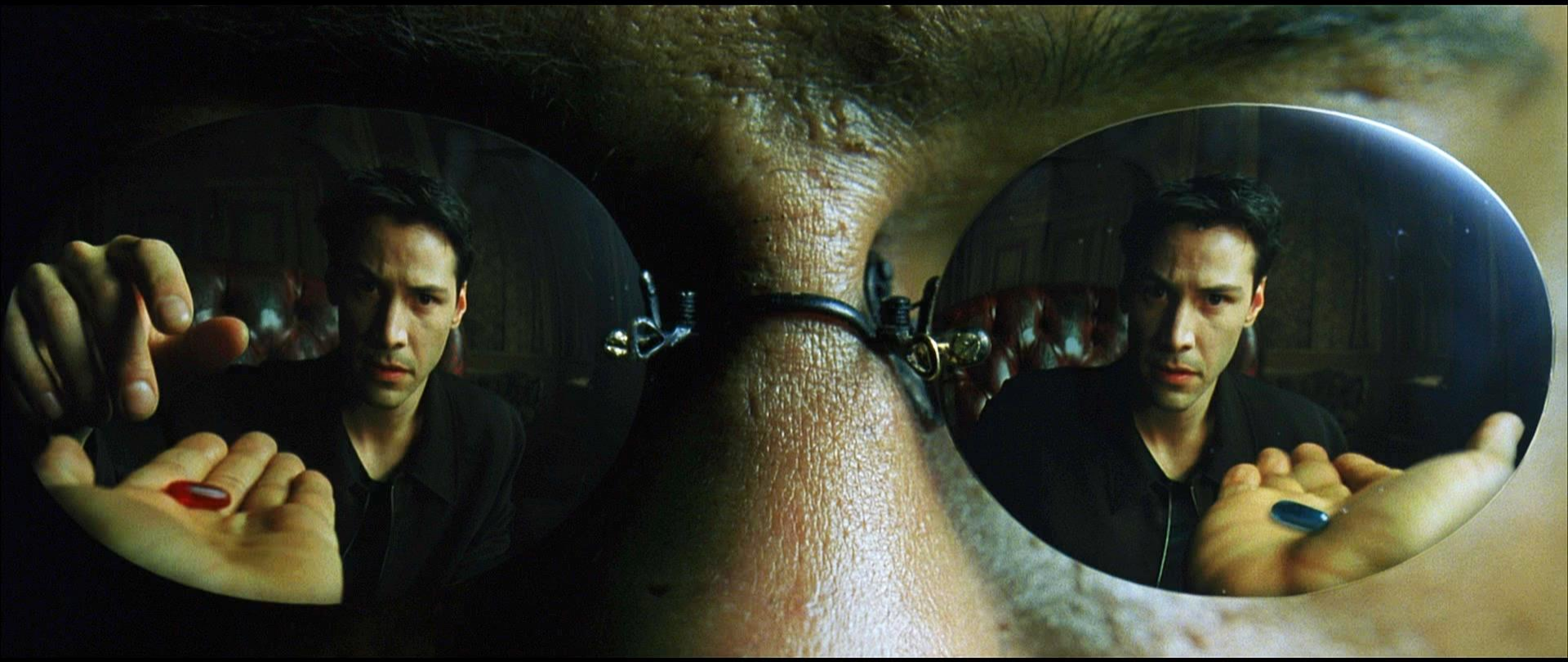
28. – 29. listopadu 2017, České Budějovice

Motto: Asfaltové vozovky – bezpečná cesta k prosperitě

SDRUŽENÍ PRO VÝSTAVBU SILNIC
ČESKÁ SILNIČNÍ SPOLEČNOST CZECH ROAD SOCIETY
EAPA
PRAGOPROJEKT
TPA

ARE YOU READY TO HEAR THE TRUTH?



ALL WE THOUGHT ABOUT MAKING A ROAD PAVEMENT WAS WRONG

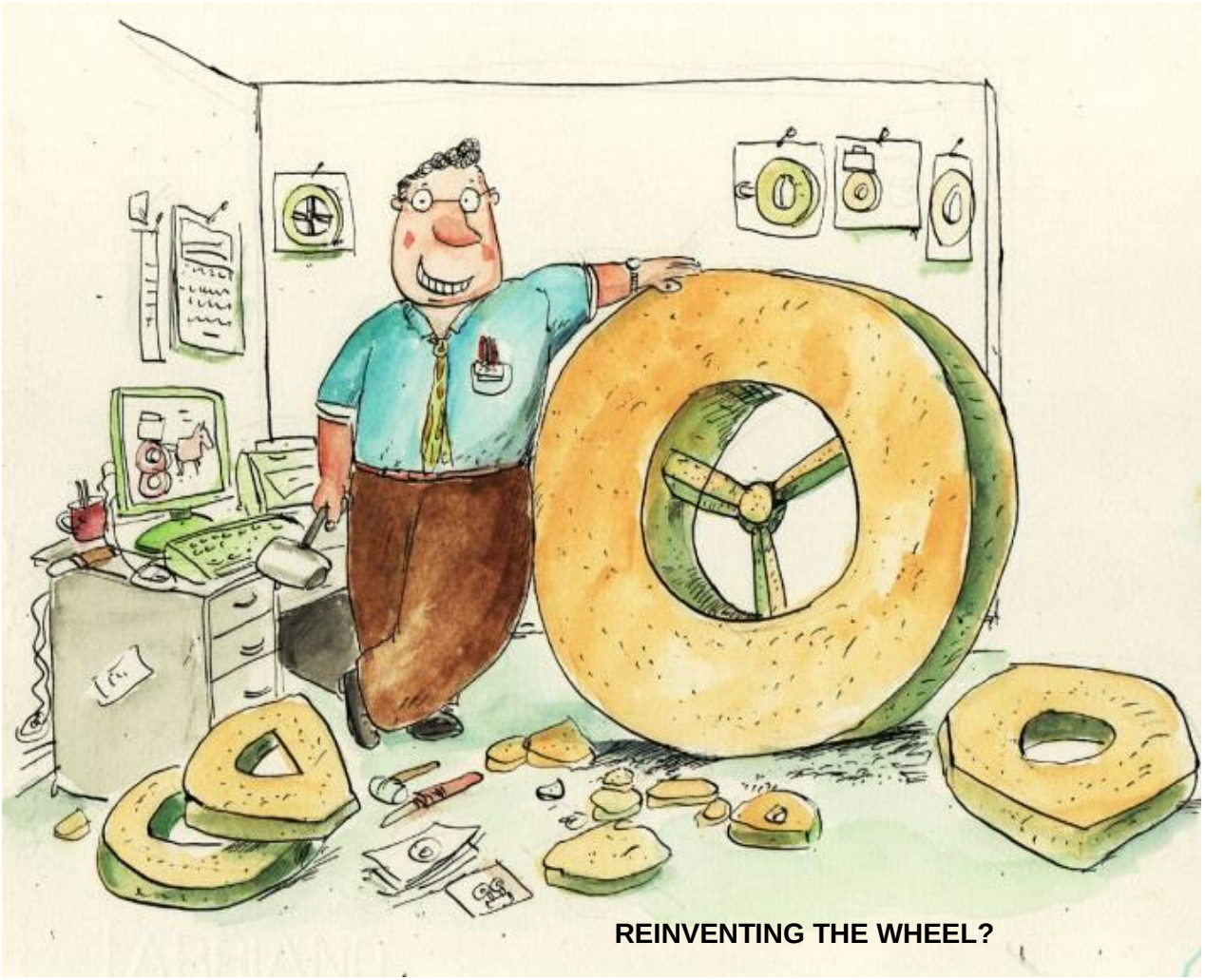
WE HAVE TO EVOLVE OUR THINKING

WE NEED TO FORGET WHAT WE KNEW

NOW

DISCLAIMER

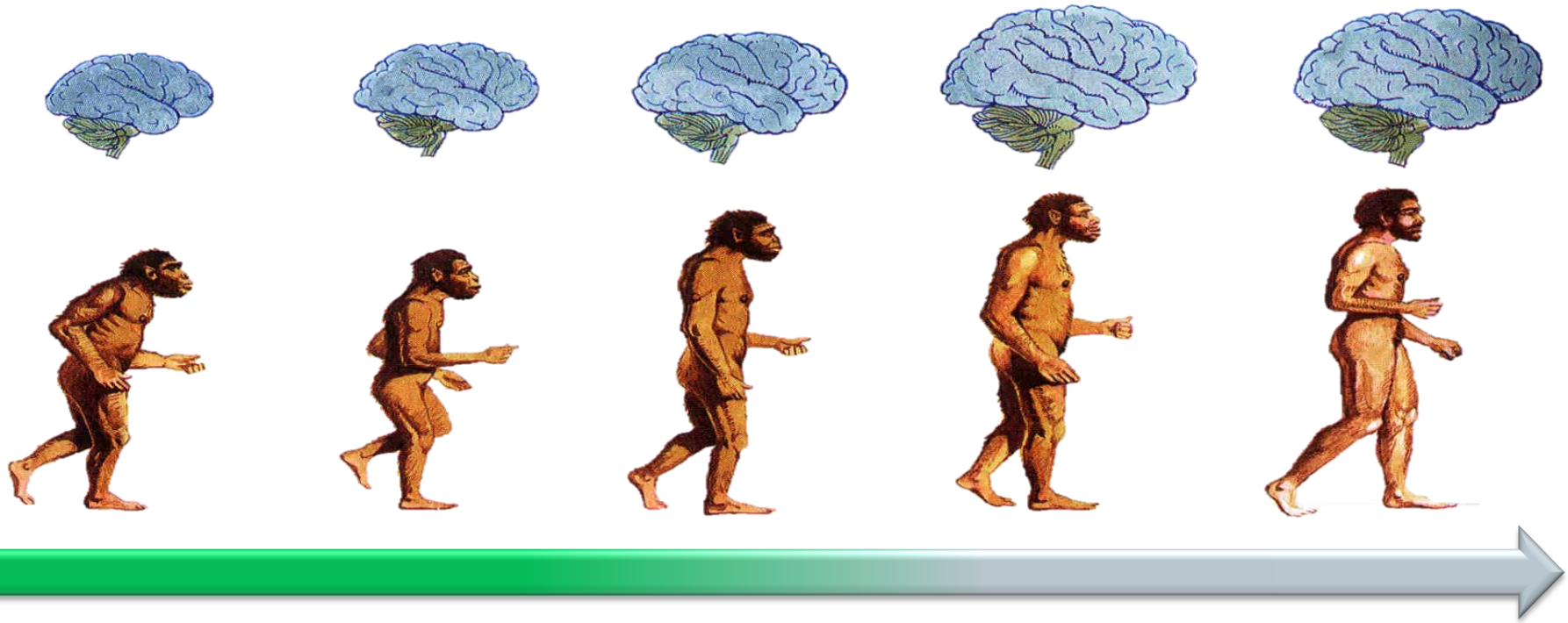
Contrary to media reports, authors did not invent the perpetual pavements ☺



REINVENTING THE WHEEL?

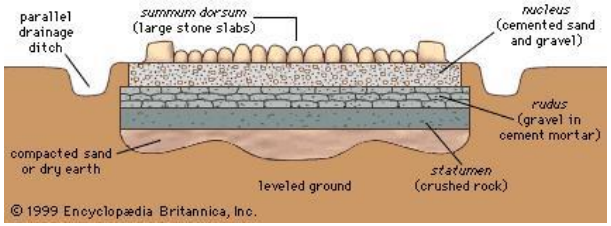
TPA STRABAG TEAMS WORK.

DEVELOPMENT OF THE FIRST ROAD STRUCTURE TECHNOLOGIES



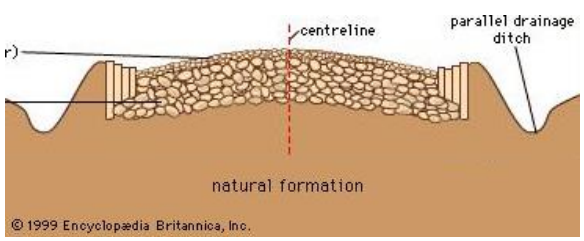
Roman roads

IV-II B.C.



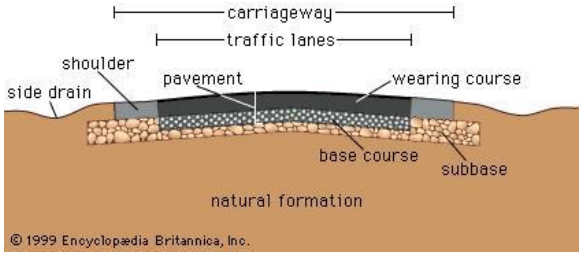
MacAdam

XVIII-XIX A.D.



Modern roads

XX A.D.



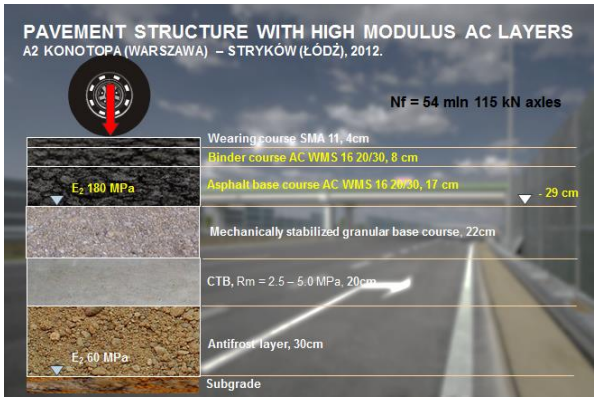
TPA STRABAG TEAMS WORK.

EVOLUTION OF MODERN ROADS

Nf = 15M 115kN ESAL

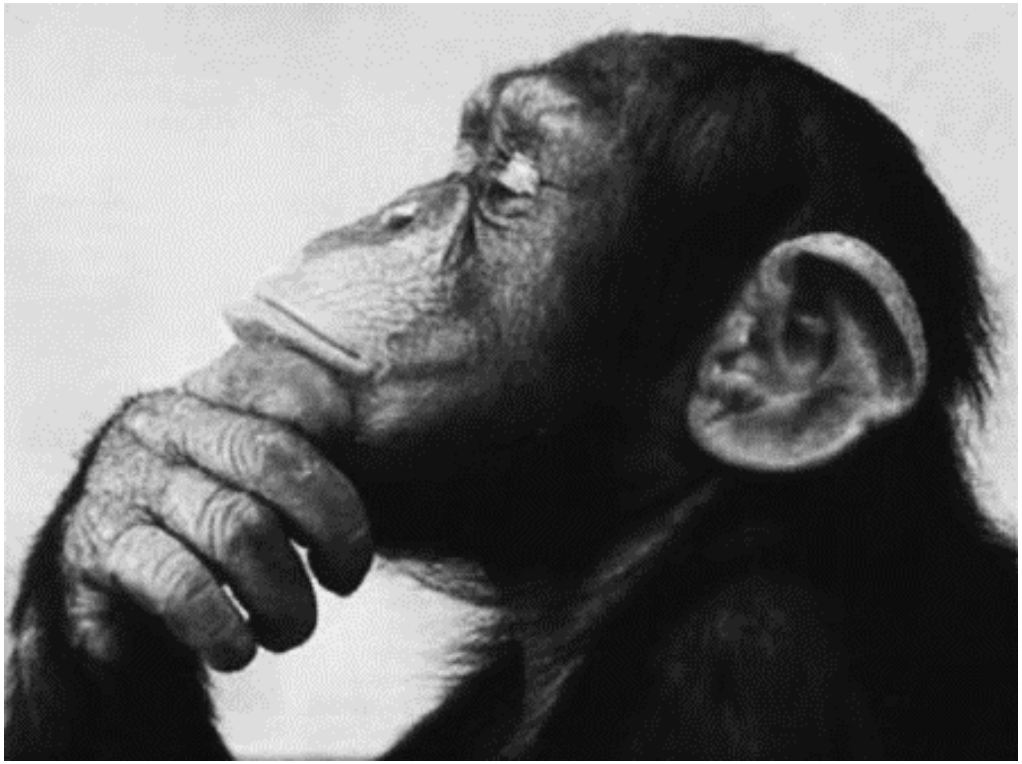
Nf = 16,5M 115kN ESAL

Nf = 54M 115kN ESAL



PAVEMENT WITH THICK AND STIFF ASPHALT BASE LAYER

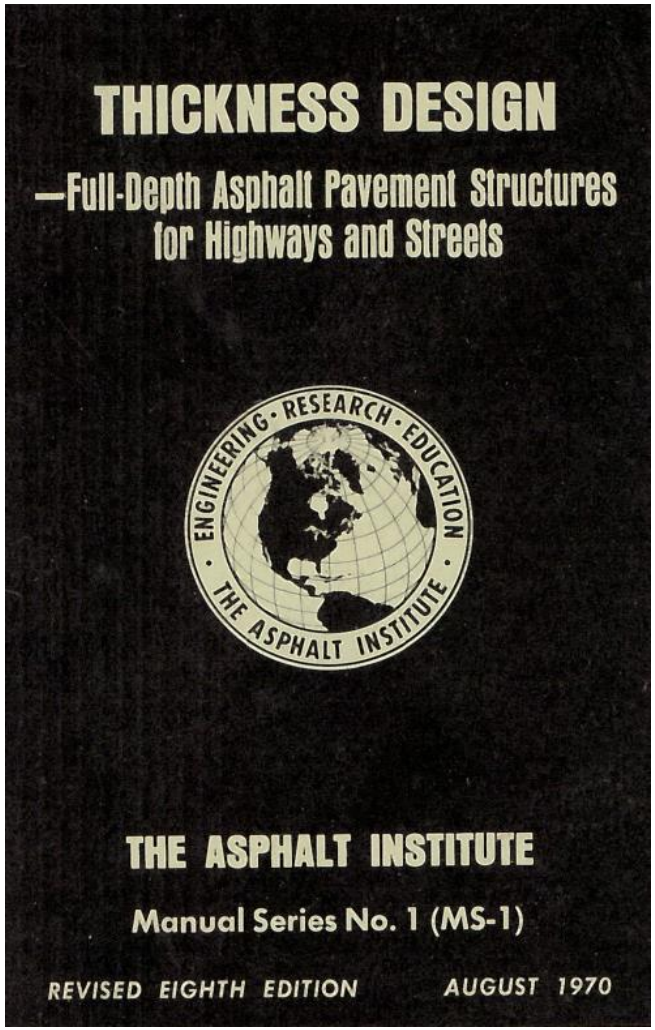
IS THIS REALLY THE BEST SOLUTION?

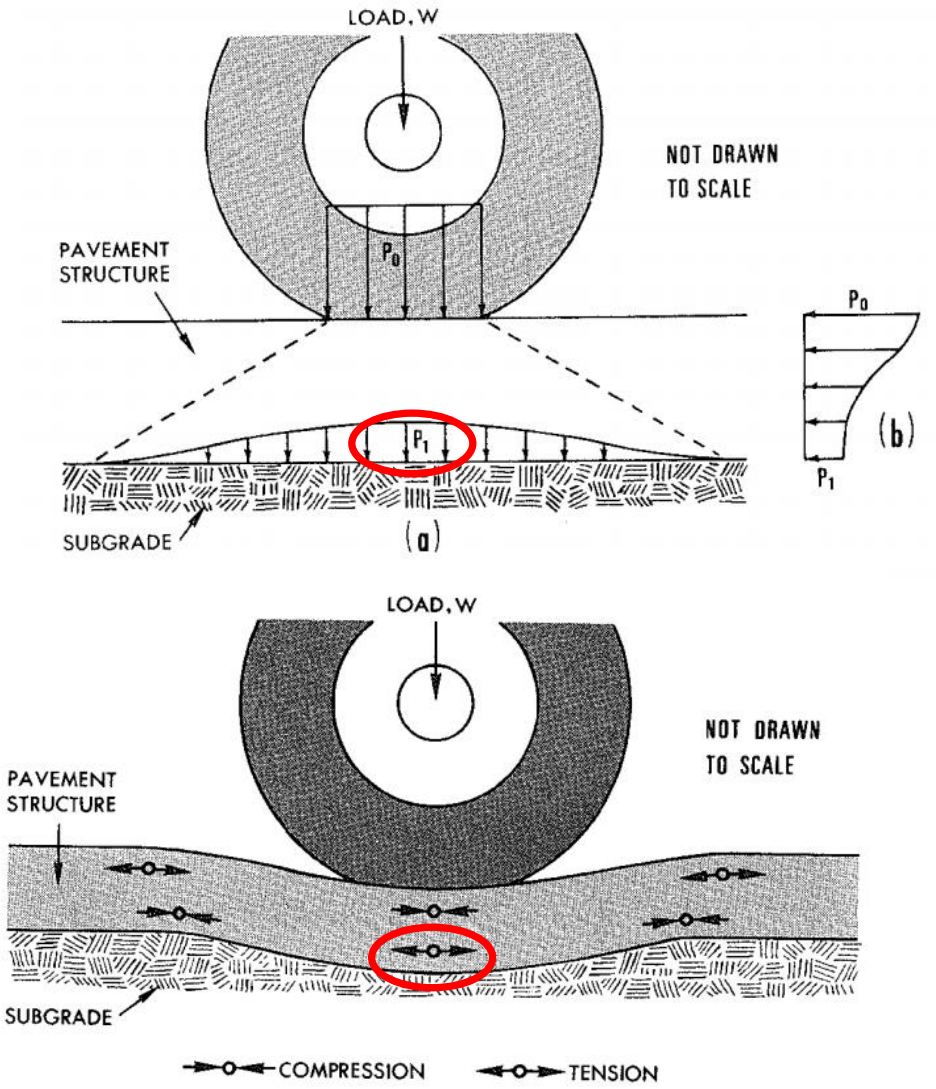


Source: Internet

TPA STRABAG TEAMS WORK.

HOW DOES THE FLEXIBLE ASPHALT PAVEMENT WORK?





TPA STRABAG TEAMS WORK.

HOW TO MAKE ROADS MORE DURABLE?

FATIGUE FAILURE CRITERION, MEPDG (NCHRP 1-37A)

$$\uparrow N_f = C\left(\frac{1}{\varepsilon_t}\downarrow\right)\left(\frac{1}{E}\downarrow\right)$$

$$C = 10^{M}$$

$$M = \left(\frac{V_b\uparrow}{V_a + V_b}\right)$$

$V_a + V_b$ — ***VMA*** ↓

N_f = number of load repetitions to fatigue cracking

ε_t = tensile strain at critical location

E = stiffness of material (HMA)

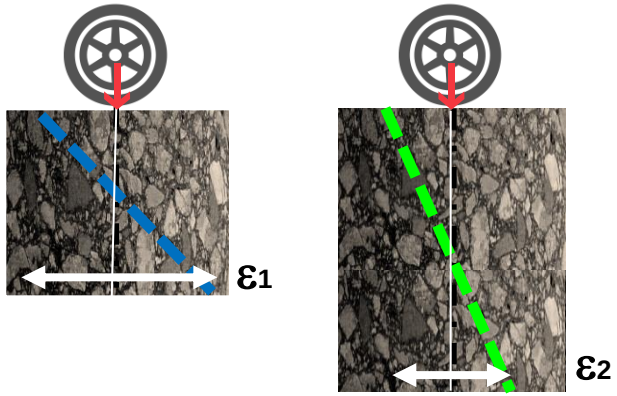
V_b = effective binder content (%)

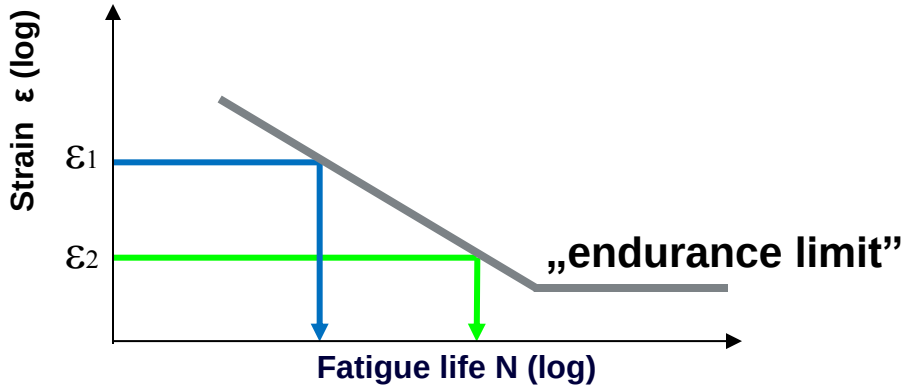
V_a = air voids (%)

TPA STRABAG TEAMS WORK.

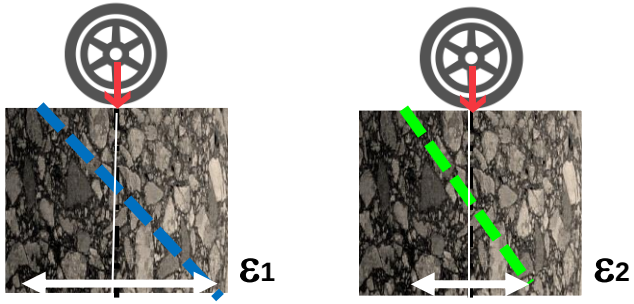
TWO WAYS TO OBTAIN LONG-LIFE ASPHALT PAVEMENT

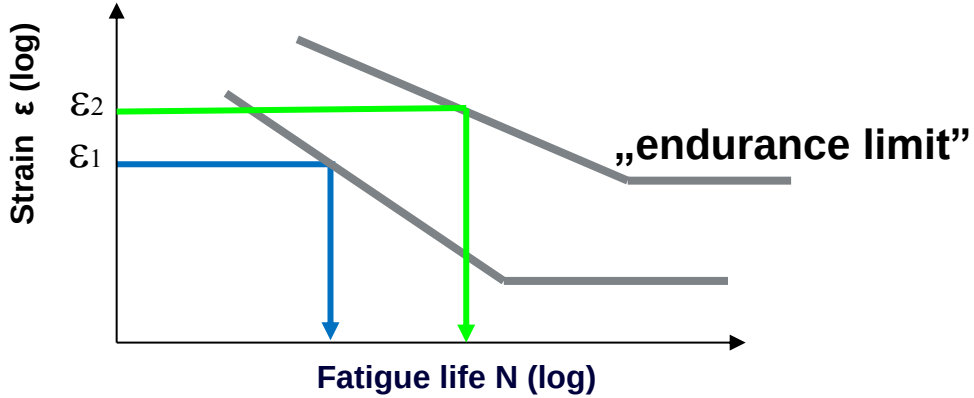
- Increase of the asphalt layers thicknnes





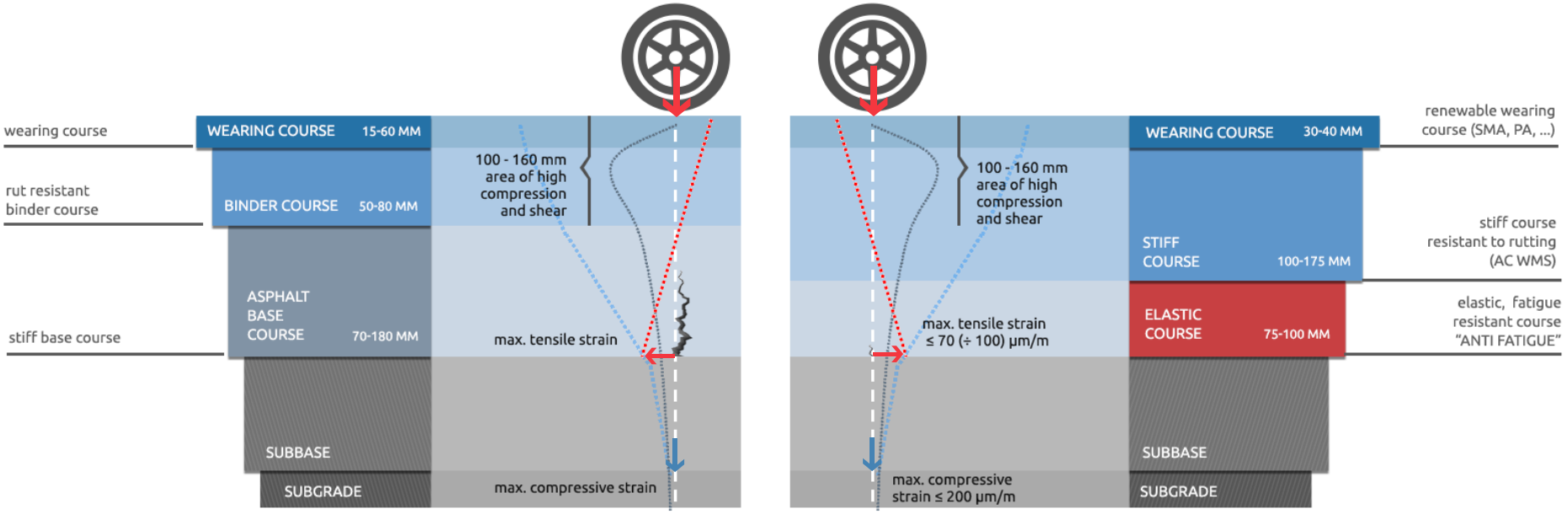
- Higher quality materials in the asphalt base





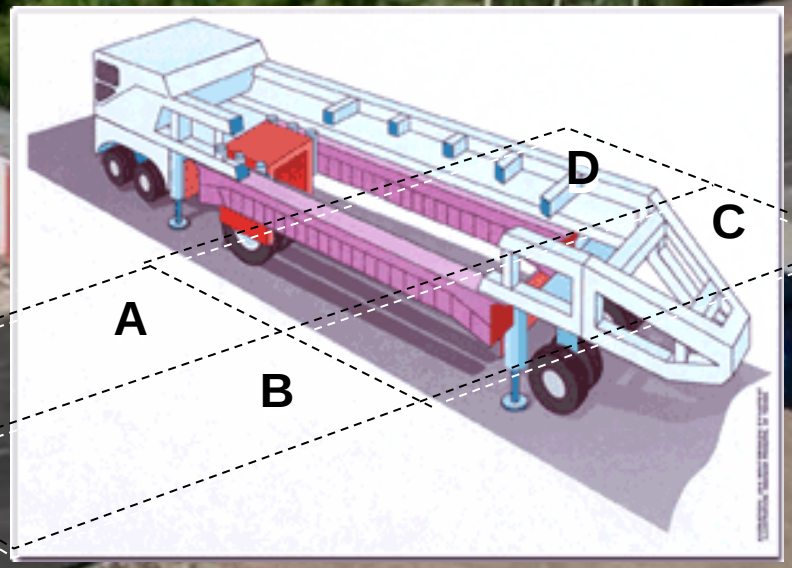
TRADITIONAL ASPHALT PAVEMENT

CRITICAL STRAIN AT BOTTOM – FATIGUE FAILURE

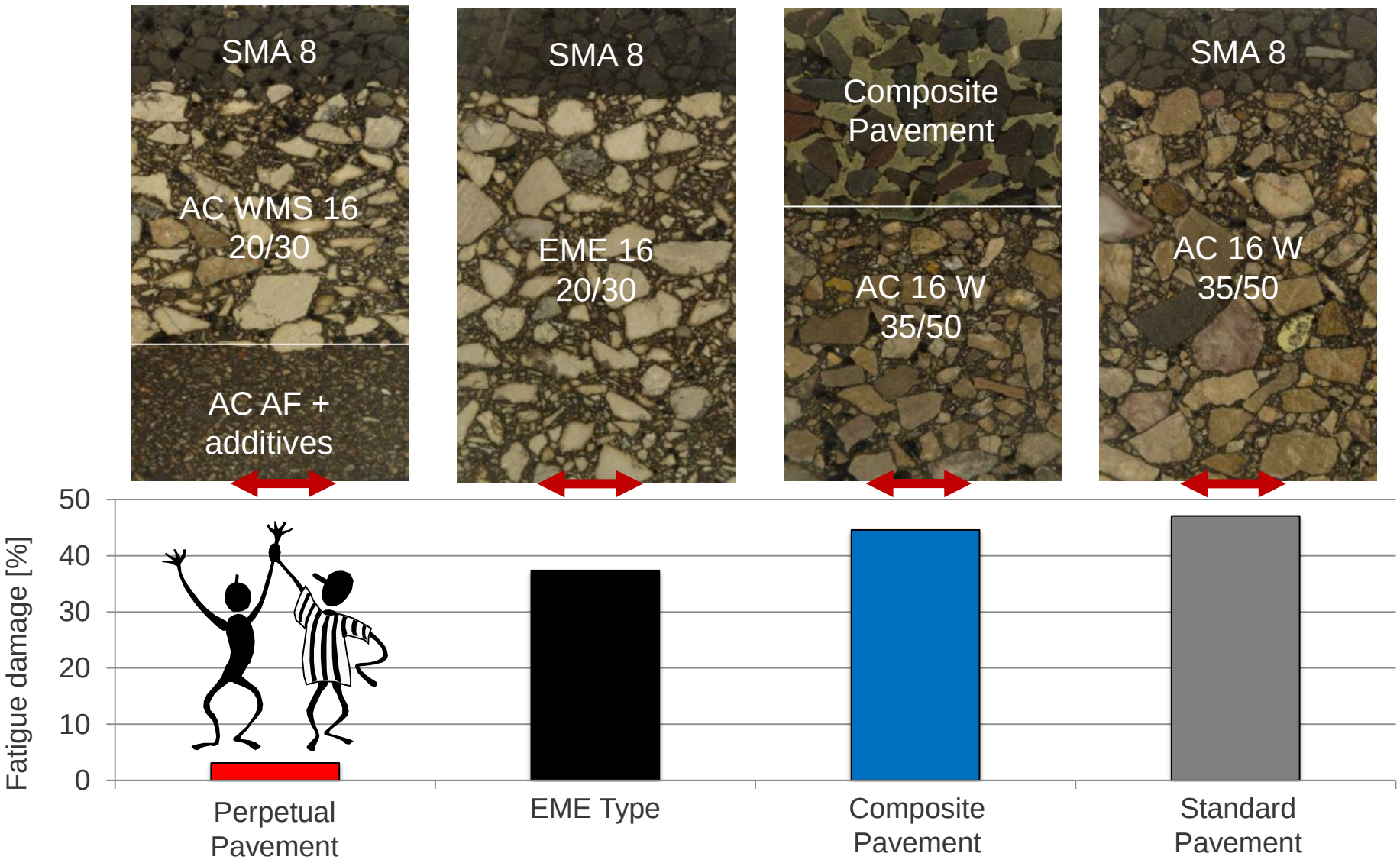


TPA STRABAG TEAMS WORK.

HEAVY VEHICLE SIMULATOR HVS IN POLAND 2008 R.



SPENS PROGRAM, 2008

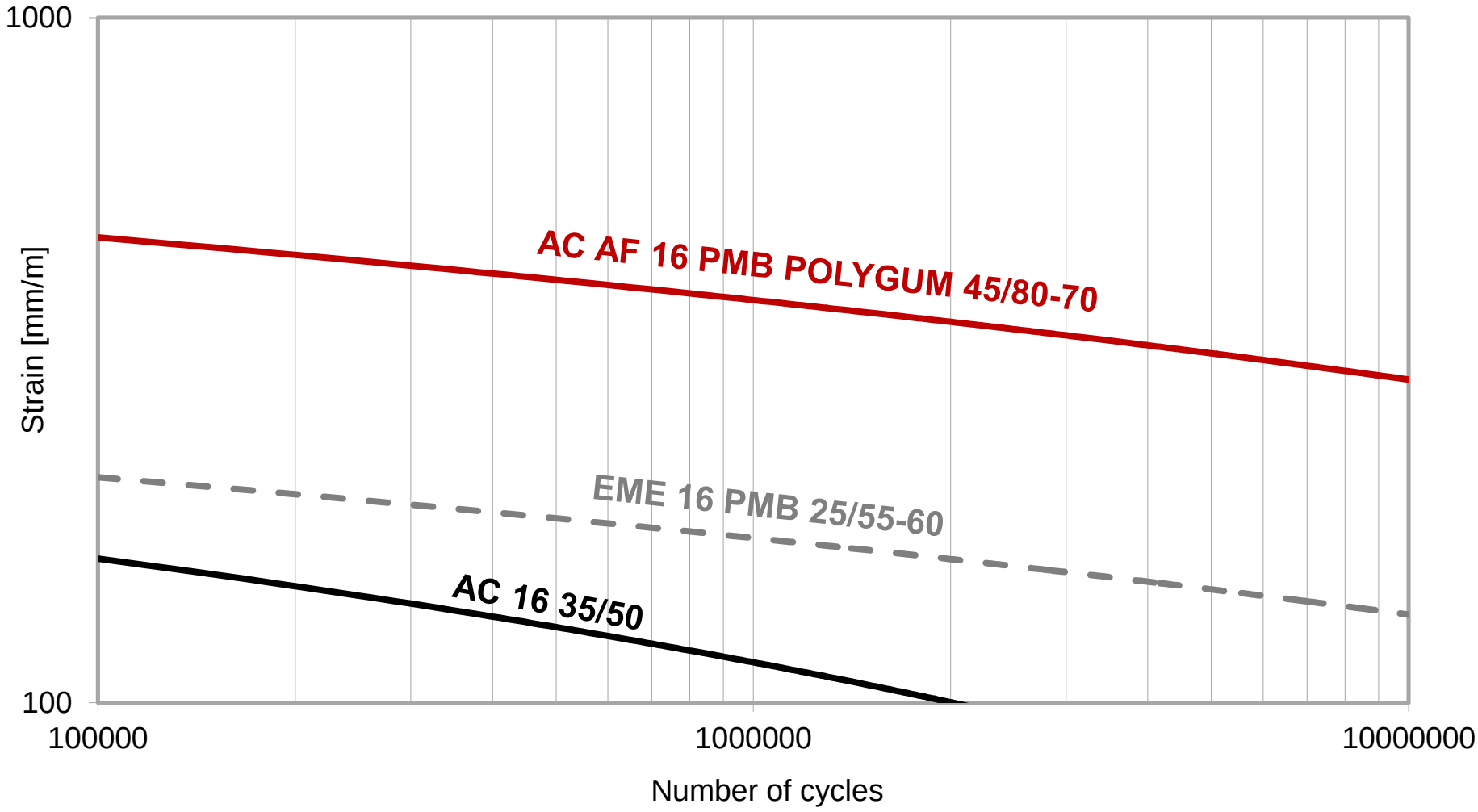


FIRST TRIAL OF PERPETUAL PAVEMENT, PRUSZKÓW 2013

TPA STRABAG TEAMS WORK.

FATIGUE RESISTANCE

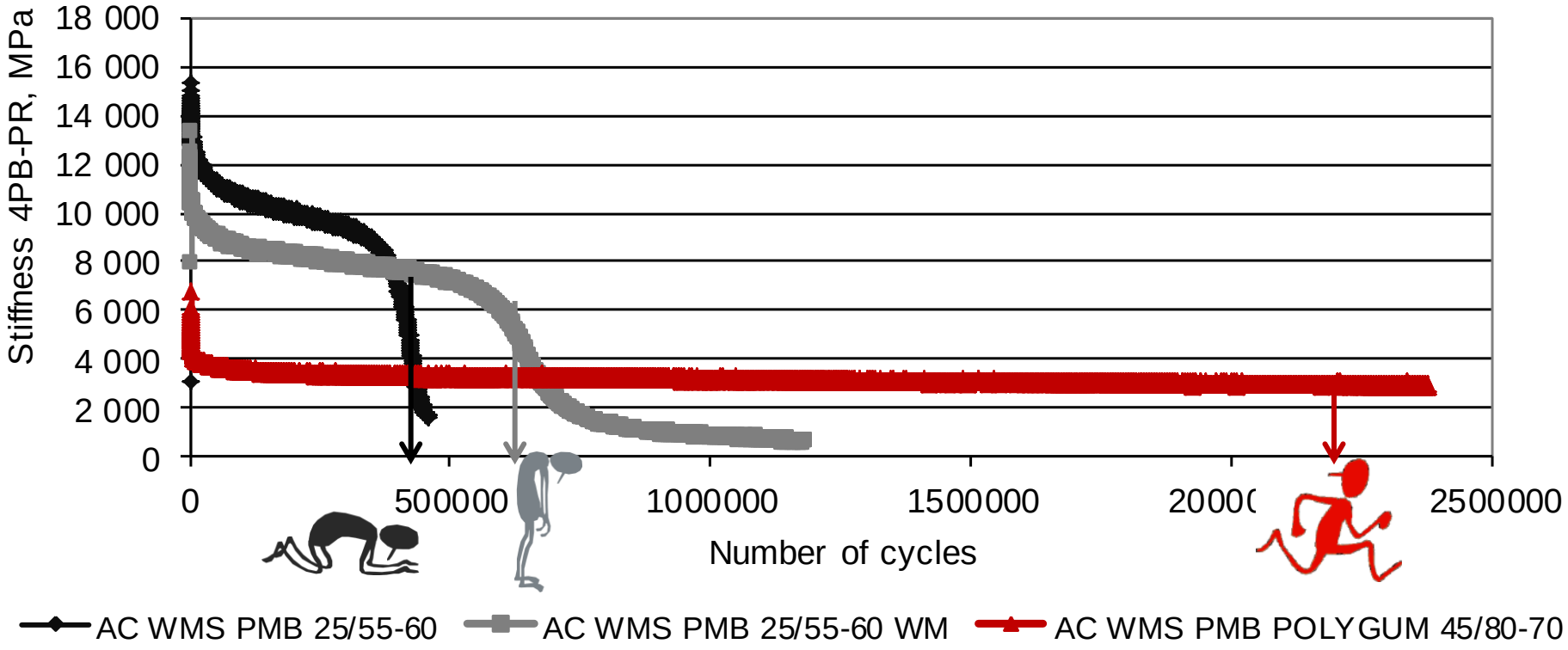
4PB-PR METHOD (10 °C, 10 HZ)



TPA STRABAG TEAMS WORK.

FATIGUE RESISTANCE

4PB-PR METHOD (10 °C, 10 HZ)



TPA STRABAG TEAMS WORK.

FIRST PERPETUAL PAVEMENT WITH ANTI-FATIGUE LAYER, 2013 - 2015

Client:

GDDKiA

Engineer:

ECM GROUP AUSTRIA

idom

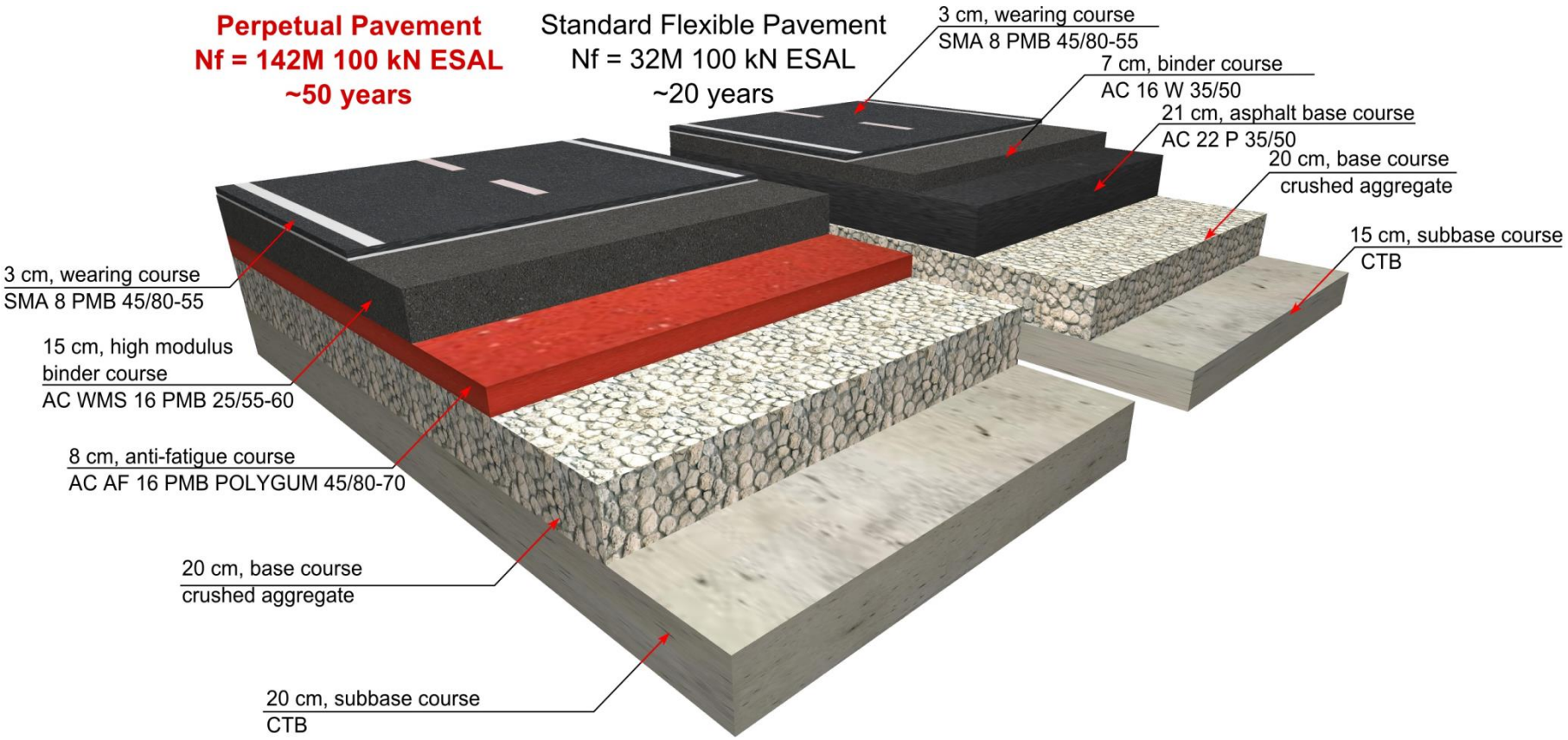
Contractor:

STRABAG TEAMS WORK.

S8

TPA STRABAG TEAMS WORK.

FIRST PERPETUAL ASPHALT PAVEMENT IN POLAND



TRIAL SECTION OF ANTI-FATIGUE LAYER, 2014

S8

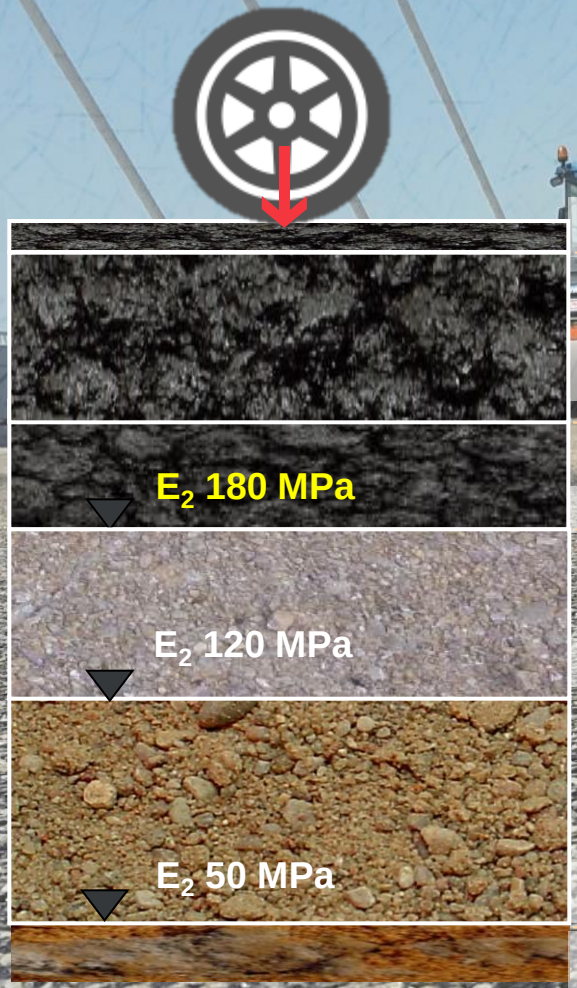
TPA STRABAG TEAMS WORK.

FIRST PERPETUAL ASPHALT PAVEMENT IN POLAND

S8

TPA STRABAG TEAMS WORK.

CROSS SECTION OF ASPHALT PAVEMENT FOR SECTION “TRASA NOWOHUCKA”, 2017



Wearing course SMA 8 Rubber Asphalt Binder, 3cm

Binder course AC WMS 16 PMB 25/55-60, 17 cm

- 26 cm

Anti-fatigue course AC AF 16 PMB 45/80-80, 6cm

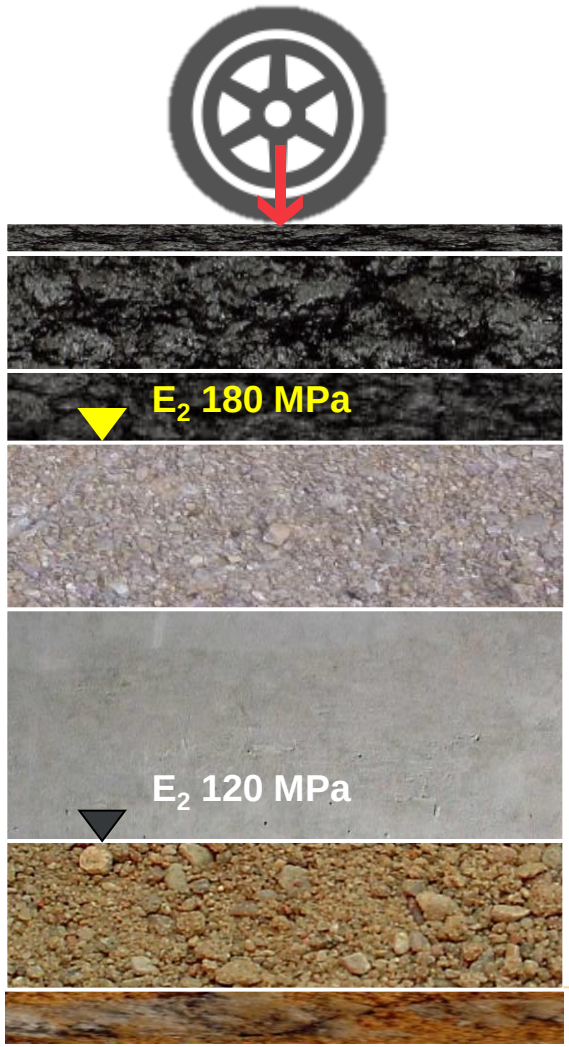
Mechanically stabilized granular base course, 20cm

Antifrost / drainage layer, 37 cm

Subgrade

S7 TPA STRABAG TEAMS WORK.

CROSS SECTION OF ASPHALT PAVEMENT FOR USTRONIE MORSKIE – KOSZALIN



Wearing course SMA 8 Rubber Asphalt Binder, 3cm

Binder course AC WMS 16 PMB 25/55-60, 12 cm

Anti-fatigue course AC AF 16 PMB 45/80-80, 7cm ▽ **- 22 cm**

Mechanically stabilized granular base course, 15cm

CTB $C_{3/4}$, 22cm

Drainage layer, 15cm

Subgrade

S6 TPA STRABAG TEAMS WORK.

EVOLUTION TOWARDS THE FUTURE

THANK YOU FOR YOUR ATTENTION

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