AAPA 2012 Study Tour of Europe – Feedback Session
5th E&E Congress – overview and general

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- Three Day Congress held every 4 years
- Premier European event for binders & asphalt
- Over 1000 delegates
- Moderated sessions & selected presentations
- Eight sessions covering the selected paper themes
- 267 papers, 11 moderator reports

Themes

- Societal impact
- Financing road infrastructure and maintenance
- Responsible sourcing and green procurement
- Improving health and safety
- Energy & Carbon
- Adapting to climate change
- Resource use & recycling
- Durability & Performance – mixtures & binders

Road transport is necessary, but not sustainable, Why?

- Traffic accidents,
- Air and noise pollution,
- Traffic congestion,
- Consumption of non-renewable natural resources (26% of energy resources)

The cost of transport externalities ranges between 4-8 per cent of the GDP in the OECD countries

Mode Choice and Income
Energy & Carbon:

Jan van der Zwan: How to minimise the carbon footprint of asphalt roads

Session 2

CO2 emission and Asphalt

- CO2 emission transport app. 4700 Mton
- Global annual asphalt production 1600 million ton/year
- Equals app. 36 Mton CO2
- <2% of emission road transport

Asphalt and other products

- Carbon footprint asphalt 80 g CO2e/kg
- Carbon footprint orange juice 1600 g CO2e/kg
- Carbon footprint cheeseburger 6000 g CO2e

Other possibilities?

- Highest emissions by traffic
- How to influence energy use by traffic?
  - Reduce rolling resistance
  - Reduce aerodynamic resistance
  - Traffic management
  - Speed
Strategy approach to climate change: risk identification and adaption (Bull-Wasser, 2012)

Durability & Performance:
Andre Molenaar:
Durability, a prerequisite for sustainable asphalt pavements

Health & Safety in the 21st century:
Carl Robertus: Bitumen Health & Safety

Quickest Way to Reduce CO₂ is by Using less Asphalt Concrete
- Thinner Structures and Longer Lifetime
- Better Quality
- Extension lifetime by use of e.g. “Beauty Creams”
- High RAP ½ in new mixtures
- Warm asphalt mixtures (foam) especially in combination with recycling

CAN WE DO THIS?
Observations - binders

- Wide range of modifiers & additives
  - Shale oil residue, polyphosphoric acid, synthetic wax, oxidised and distilled bitumen, SBS, cross linked SBS.
  - Organoclay, prepolymers or supermolecular:
  - Clay modified bitumen emulsions
- Permanent deformation by the MSCRT
- New tests & techniques for:
  - Fatigue, low temperature fracture, thixotropy

New Tests & Techniques

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New Tests & Techniques

- Annular Shear Rheometer (ASR)
- Double Edge Notched Tensile (DENT)
- Bitumen Bond Strength (BBS)
- Atomic Force Microscopy (AFM)
Observations – mixtures

- Importance of adhesion
  - Contact angle measurements on bitumen
  - Bitumen-aggregate
    - Rolling bottle & static water storage tests
    - Direct tensile strength – rolls pulled from aggregate
  - Asphalt mixture
    - Indirect tensile test, direct tensile strength & H₂O conditioning

Conclusions:
- Strength test could not separate adhesion and cohesion
- Distinguishing between binders possible with drops on glass
- Static water storage test did not result in binder detachment

Observations – mixtures 2

- Importance of adhesion
  - CEN Ad-hoc Group on Adhesion-Durability
    - Numbers of tests undertaken – no easy test found
  - Pull-out test – embedded aggregate on steel plate
    - Alternate to the Vialit plate test – no conclusion

Conclusions:
- Clear that tests on binder alone is insufficient
- Even binder & aggregate tests give an incomplete picture

Observations – mixtures 3

- Additives & Polymers
  - Important role in improving bitumen performance
    - Highly modified for durability
    - Polymer powder used for small batches to improve mix
    - Crumb rubber improvements in fatigue & rutting
    - Polypropylene fibres increased stiffness & rut resistance
    - Hydrated lime reduced stripping potential, improved ageing
    - Polyphosphoric acid improved stiffness & ageing properties
Sustainability is a challenge, not a threat
- Three pillars in balance: environment, society and economy
- Durability, a prerequisite for sustainable pavements
- WMA is the way of sustainability
- Adapting to climate change: focus on adhesion & durability
- Good road network essential to the development of regions
- Asphalt is 100% recyclable
- Asphalt is not “trashfalt”: look to the consequences, now and the future
- Optimal RAP management needed for full potential of RAP
- Road authorities: if you want higher quality, ask for it
- We need to change attitude and move forward

Recommendations
1. Treat the requirement for more sustainable practices and products as an opportunity and not a threat.
2. Improve sustainability through more durable pavements.
3. Improve sustainability by using cost effective products with lower CO₂ and energy footprints.
4. Preserve non-renewable natural materials by maximising their reuse and recycling.
5. Do not use asphalt or binders as a “dump” for undesirable materials.