5th E&E Congress overview & general
• 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
**Wednesday 13 June 2012 (Day 1)**

08.00 - 18.00  
Registration

08.30 - 18.00  
Exhibition and posters

09.00 - 10.00  
**Opening Session**  
**Session Chair: Simon van der Byl**  
Welcome by president of Eurobitume on behalf of EAPA and Eurobitume  
Alberto Madella  
Welcome by Turkish minister of Transport  
Binali Yildirim  
Welcome address by president of EAPA  
Jean-Louis Marchand

10.00  
Opening of Exhibition

10.00 - 10.30  
Coffee break

10.30 - 12.30  
**Session 1: Introduction to congress themes by keynote speakers**  
**Session Chair: Mike Southern**

- **Social issues**  
  *Prof. Dr. Mustafa Karasahin*  
  [Roads and Their Social Impacts CV](#)

- **Social economic impact**  
  *Vinrid Fernoen*  
  [The positive impacts of roads Underestimated and ignored in decisionmaking? CV](#)

- **Financing of road infrastructure and maintenance:**  
  *André Broto*, Vice-President of Cofiroute in France  
  [Financing of road infrastructure and maintenance CV](#)

- **Responsible sourcing and green procurement**  
  *Shamir Ghumra (Aggregate Industries - Head of Sustainability)*  
  [Responsible Sourcing and Green Procurement CV](#)
Road transport is necessary, but not sustainable, Why?

- Traffic accidents,
- Air and noise pollution,
- Traffic congestion,
- Consumption of non-renewable natural resources (25% of energy resources)

<table>
<thead>
<tr>
<th></th>
<th>Energy (GJ/km)</th>
<th>CO₂ (metric tons/km)</th>
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<tbody>
<tr>
<td>Traffic</td>
<td>1,500,000</td>
<td>100,000</td>
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<td>Lighting</td>
<td>14,000</td>
<td>400</td>
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<tr>
<td>Coating mixes</td>
<td>3,200</td>
<td>190</td>
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<tr>
<td>Asphalt</td>
<td>1,100</td>
<td>60</td>
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Period: 50 years / Traffic: 20,000 vehicles per day

Source: USIRF, France

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

Asphalt, the sustainable road to success
Mode Choice and Income

Sperling, 2002

Asphalt, the sustainable road to success
Before and After Metrobus

Asphalt, the sustainable road to success
Metrobus System in İstanbul

- Time saving: 109 min/day/person
- Travel cost saving: 61%
- Number of public transport out of service: 209 buses, 1,296 minibuses
- Accident reduction: 64%
- Savings from fuel: 242,000 lt/day
- Number of cars out of traffic: 80,000/day
- Decrease in CO2 emission: 623,000 kg
- Average number of passengers: 500,000/day
Energy & Carbon:
Jan van der Zwan: How to minimise the carbon footprint of asphalt roads

Q&A
12.30 - 14.00 Lunch
14.00 - 15.30 Session 2: Introduction to congress themes by keynote speakers
Session chair: Egbert Beuving

Energy & Carbon
Jan van der Zwan, DVS, The Netherlands
*How to diminish the carbon footprint of asphalt roads CV*

Adapting to climate change
Rudi Bull-Wasser, BASf, Germany
*Adapting asphalt roads to Climate Change – Views and needs of the Road Authorities CV*

Resource use & recycling
John Barritt, WRAP (Waste & Resources Action Programme), UK
*Resource efficiency, regulation and recycling CV*

Durability & Performance
Prof. Dr. Ir. André A.A. Molenaar, Delft University of Technology, the Netherlands
*Durability, a Prerequisite for Sustainable Asphalt Pavements CV*

Q&A
15.30 - 16.00 Coffee Break
16.00 - 17.30 Session 3: Health Safety & Social issues
Session Chair: Harry Roos
IARC Decision
Henri Molleron
CO2 emission and Asphalt

- CO2 emission transport app. 4700 Mton
- Global annual asphalt production 1600 million ton / year
- Equals app. 96 Mton CO2
- ~2% of emission of road transport
Asphalt and other products

- Carbon footprint asphalt
  60 g CO2e /kg
- Carbon footprint orange jus
  1600 g CO2 e/kg
- Carbon footprint cheese burger
  6000 g CO2 e
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

Q&A
12.30 - 14.00  Lunch
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Durability, a Prerequisite for Sustainable Pavements

André A. A. Molenaar
Delft University of Technology
The Netherlands
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 % in new mixtures
- Warm asphalt mixtures (foam) especially in combination with recycling

CAN WE DO THIS?

Asphalt, the sustainable road to success
Health & Safety in the 21 century:
Carl Robertus: Bitumen Health & Safety

**Table of Session 3**

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<td>Coffee Break</td>
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<tr>
<td>16.00 – 17.30</td>
<td>Session 3: Health Safety &amp; Social Issues</td>
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<td><strong>IARC Decision</strong></td>
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<td>Henri Molleran</td>
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<td></td>
<td><strong>Summary of animal skin carcinogenicity test results with bitumen fume condensate samples</strong></td>
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<td>James Freeman</td>
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<td><strong>Status of bitumens under the REACH regulation</strong></td>
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<td>Peter Boogaard</td>
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<td><strong>Moderator report</strong></td>
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<td>Christine Leroy</td>
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<td>PowerPoint Slides</td>
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<td><strong>Simulation of tyre/road noise as a tool for the evaluation of the acoustic behaviour of road surfaces</strong></td>
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<td>Thomas Beckenbauer</td>
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<td><strong>An assessment of the evolution of the skid resistance of proprietary asphalt surfacings in the UK</strong></td>
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<td>David Woodward</td>
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<td><strong>Q&amp;A</strong></td>
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**Thursday 14 June 2012 (Day 2)**

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<td>08.45 – 18.00</td>
<td>Exhibition and posters</td>
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<tr>
<td>09.00 – 10.30</td>
<td>Session 4: Sustainability, Energy use and Climate Change</td>
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<td><strong>Session Chair:</strong> Sophie Limborg</td>
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Bitumen
Health & Safety

Carl Robertus
Eurobitume
Conclusions

Health
• Bitumen is not classified as hazardous to health or to the environment
• Hazards of working with bitumen are now defined
• Risks are very low and can be reduced further through exposure reduction

Safety
• Bitumen is usually handled and applied hot
• Workers can be adequately protected by
  – following good practices and
  – using the right equipment (PPE)

Environment
• Bitumen is Green
• 100% recyclable
• known eco footprint
Durability & Performance: Binders
Gordon Airey: Moderator Report

Session 7: Durability & Performance: Binders

Session Chair: Antonio Paez-Duenas

Moderator report
Gordon Airey
PowerPoint Slides

Bitumen chemical modification by thiourea: rheological behaviour at low in-service temperatures and microstructure
Javier Navarro

Comparing cold performance results using Fracture Toughness test, Asphalt Binder Cracking Device, Fraass Breaking point and Bending Beam Rheometer
Erica Jellema

Moderator report
Ignacio Perez
PowerPoint Slides

Thin film oxidative aging and low temperature performance grading using small plate dynamic shear rheometry: An alternative to standard RTFO, PAV, and BBR
Michael Farrar

Bitumen emulsions: Meeting the pavement preservation challenge
Etienne Lebouteiller

Q&A

10.30 - 11.00
Coffee Break

11.00 - 12.30
Session 8: Durability & Performance: Mixtures

Session Chair: J-P Michaut

Moderator report
Ann Vanhelstevaert
Session 7. Durability & Performance: Binders Moderator’s Report

Gordon Airey
NTEC, University of Nottingham
Themes (key observations)

- Rheological testing
  - 3 papers
- Rheological characterisation (modification & performance)
  - 5 papers
- Permanent deformation – binder parameters
  - 6 papers
- Fatigue & fracture
  - 5 papers
- Ageing of binders
  - 4 papers

- Importance of robust testing techniques
- Wide range of modifiers
- Increased interest in MSCRT
- New devices/techniques to measure fatigue, fracture & thixotropy
- Work to be done on long-term laboratory ageing
Durability & Performance

- Development of new tests and techniques.
  - More than 10 new or not widely known tests
- Binders characterization
  - Performance properties related to mix properties
- Validation with asphalt mixes
  - Different experiences at laboratory and field level
- Development of new binders
  - New promising additives (organoclays, prepolymerms or supramolecular)
Observations - binders

• Wide range of modifiers & additives
  o Shale oil residue, polyphosphoric acid, synthetic wax, oxidised and distilled bitumen, SBS, cross linked SBS.
  o Organoclays, prepolymerms or supermolecular
  o Clay modified bitumen emulsions

• Permanent deformation by the MSCRT

• New tests & techniques for:
  - fatigue, low temperature fracture, thixotropy
New Tests & Techniques

Annular Shear Rheometer (ASR)

3 displacement transducers at 120°

Axial sinusoidal loadings to piston

To load cell

Specimen (bitumen or mastic)

Aluminum hollow cylinder

e = 5 mm

40 mm

95 mm

Aluminum core

ASR

Thermal chamber
New Tests & Techniques

**Double Edge Notched Tensile (DENT)**

![Diagram of Double Edge Notched Tensile (DENT)](image)
New Tests & Techniques

Bitumen Bond Strength (BBS)
New Tests & Techniques

Atomic Force Microscopy (AFM)

Figure 8. Bitumen AFM Topography for (a) AC-30 and (b) AC-30 modified with SBS(A)

Figure 9. AFM Topography for AC-30 Modified with Banana Bags
Durability & Performance: Mixtures
Ann Vanselstraete: Moderator Report

10.30 - 11.00 Coffee Break

11.00 - 12.30
Session 8: Durability & Performance: Mixtures

Session Chair: J-P Michaut

Moderator report
Ann Vanselstraete
PowerPoint Slides

A single rheological model to describe low temperature behaviour of asphalt mixtures assessed in different laboratory test methods
Stephan Büchler

Interlaboratory experiment of asphalt concrete using indirect tensile fatigue test
Safwat Fadhil Said

Moderator report
Lothar Drueschner
PowerPoint Slides

LOT Winter Damage Theory: Validation and Understanding of Winter Damage in Porous Asphalt
Rien Huurman

Laboratory tests for internal cohesion and raveling of thin and ultra-thin wearing courses
Joëlle De Visscher

Q&A

12.30 - 13.00 Closing session

Short speech by Eurobitume president Alberto Madella
Summary of the Congress
Best Poster Award
Best Picture Award
Speech by EARA President, Jean-Louis Marchand and the announcement of the location and date of the 6th E&A Congress
Durability & Performance: Mixtures

Moderator report

Ann Vanelstraete
Belgian Road Research Centre
Adhesion
Binder - aggregate

Paper 197: M. Wistuba et al.
- The rolling bottle test EN12697-11 (part A) is a suitable procedure
  - Visual estimation of the stripping degree is a drawback of the method, which can be overcome by the use of digital images
- The static method of EN12697-11 (part B): standard testing conditions were inappropriate (e.g., longer times are needed)

Paper 141: M. Hugener et al.
Static method EN12697-11 (part B): suggestions for better differentiation:
- Lower mixing temperature (-15 °C)
- Water conditioning: 40 °C instead of 19 °C or longer times
- Recommendations taken up in revised EN12697-11
General overview

- About 45 papers in total (so not possible to mention all papers here)

- Subtopics:
  - Testing methods to assess performance and durability
    - Tests for adhesion is an important item
    - Testing of: fatigue, stiffness modulus, permanent deformation, low temperature cracking, ageing
    - New testing methods and equipment
  - Performance models: few papers
  - Products added to bitumen or mix to improve performance
  - Importance of production, laying and approval system
  - Monitoring of durability in the field
Observations - mixtures

• **Importance of adhesion (HiMA/EME) - tests**
  - 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 & H$_2$O conditioning

Conclusions:

• strengths 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
  o CEN Ad-hoc Group on Adhesion-Durability
    • Numbers of tests undertaken – no easy test found
  o 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
• Additives & Polymers
  o 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
Social impact / issues

Prof. Dr. Mustafa KARAŞAHİN

- A good road network is essential for the development of regions
- The asphalt industry has their challenges to create more sustainable pavements and to lower rolling resistance
Congress - Concluding remarks

- 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
Thank you for your attention
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 CO$_2$ 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.