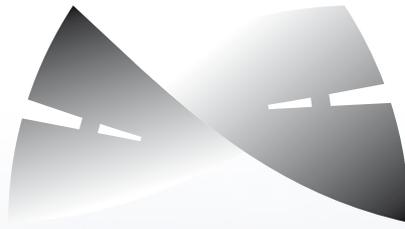


E&E EVENT 2018

EURASPHALT & EUROBITUME



14 & 15 JUNE 2018

BERLIN

#eeevent2018

PREPARING THE ASPHALT INDUSTRY FOR THE FUTURE

ANDEL'S HOTEL | BERLIN | GERMANY



EVENT SUMMARY

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SUMMARY OF SESSION 1

TOMORROW'S WORLD, TOMORROW'S ROADS, TOMORROW'S ASPHALT!

The aim of this session was to look to the future and anticipate what changes we should expect to have biggest impacts on our industry.

SPEAKERS

How Will Technology Such as Digitalisation, Connectivity and Autonomous Driving Impact Our Roads in the Future

Guillaume Bastien
Commercial & Business Development Manager
Colas Europe

Transport Focus Road Users Survey and Strategic Road Investment Plan 2020-25

Arash Khojinian
Pavement Materials Team Leader HE
Highways England, UK

5th Generation Road Programmes

Nicolas Hautiere
Deputy Director
IFSTTAR (The French Institute of Science and Technology for Transport, Development and Networks), France

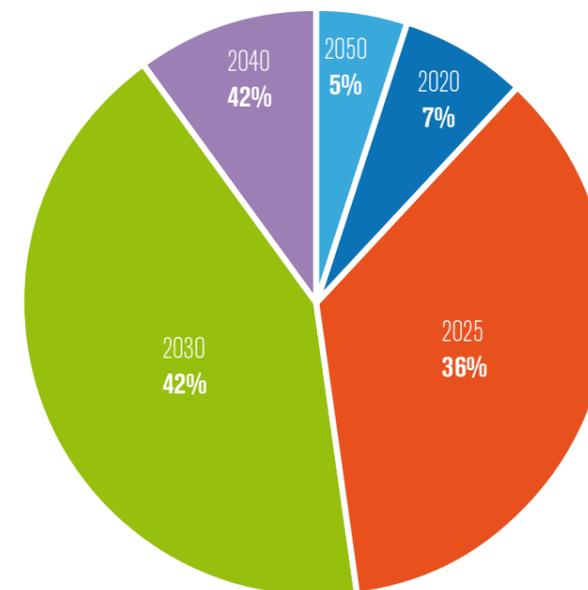
STAR: Strategic Asphalt Research Symposium 2017 Output

Ralph Shirts
Chairman AiF
Asphalt Institute Foundation, USA

OPENING POLL QUESTION:

How long from now do you think we will see significant changes in the requirements for roads impacting the asphalt industry?

Majority of respondents believe we will see significant changes by 2030.



KEY TAKEAWAYS

- The consensus was that our industry continues to remain conservative and cautious towards changes, this culture needs to be reviewed when you considered that the speed of change is exponential, particularly concerning technology and digitalisation.
- We also need to get more involved in the discussions with stakeholders directly engineering and implementing these changes.
- In the Connected and Automated Driving debate, automotive industry is not including the opinion and experience from a key player in the road materials sector ie: the asphalt industry – why? Maybe the industry itself needs to be much more proactive in making sure it is being included!
- Very clear that change should be driven by evidence-based data and a longer time perspective – as an industry we can develop evidence-based arguments and benefits over a long-term demonstrating added value at different levels and not only cost.
- Anticipated that there will be an evolution in the value chain as the margins will be very tight - more creativity is needed to maximise (financial) benefits for industry.
- Question should be: what will drive value - we need to put strategy ahead of tactics.
- We need to be asking ourselves what will be the definition of value in the future and chasing that value, for society and for business. Common themes of future development work include sustainability, technology implementation, durability.
- Greater awareness of end user perceptions – in asphalt the end users are the public as well as commercial drivers. We should be think of ways to aligned with their needs and adapt ourselves to connect better and gain more public understanding.
- Generally, across all industries there needs to be an awareness of changes in public perception. Lots of big, global issues are embedded in roads! Environment, education, food, energy, poverty...
- We need a system approach - a smart road is part of a smart city!
- Road authorities need to be more open and catch up with the speed of change.
- Long-term and evidence-based approach is critical to determining where energy is put by the industry in the future – example from UK agency (Highways England) which identified eight KPIs including efficiency!
- Procurement and the way this will function is very important – could sets the context for some of the big issues like sustainability!
- Mobility based upon alternative energy concepts will impact on the sourcing/use of raw materials - what will electrification of cars do to refinery outputs?
- With everyone working together on tackling the big issues of the near and far future, who is responsible for driving it? Who should take the 1st initiative? To tackle this, industry should think more about getting people sitting together in an 'ecosystem' to plan for the future!
- A lot of innovation has already come from industry. Industry and authorities have different needs and different constraints therefore they need to try and bridge that divide to look at those needs from each other's perspective; also understand the differences in the speed of regulation and in standardisations.

SUMMARY OF SESSION 2 FINANCING SOLUTIONS FOR ROADS

The goal of the session was to provide solutions for financing road infrastructure and on the barriers to overcome. Furthermore, to explore ways to form dialogues with target audiences to support both the need & solutions for better road funding.

SPEAKERS

Financing Infrastructure and Roads With Private Money

Thomas Bayerl

Head of Team Infrastructure Dept Capital

MEAG MUNICH ERGO Asset Management GmbH, Germany

Financing Road Infrastructure of the Future in Germany

Torsten R. Böger

Managing Director

VIFG (Germany's Transport Infrastructure Financing Company), Germany

Miles Better - An Awarded New Idea to Finance Roads

Gergely Raccuja

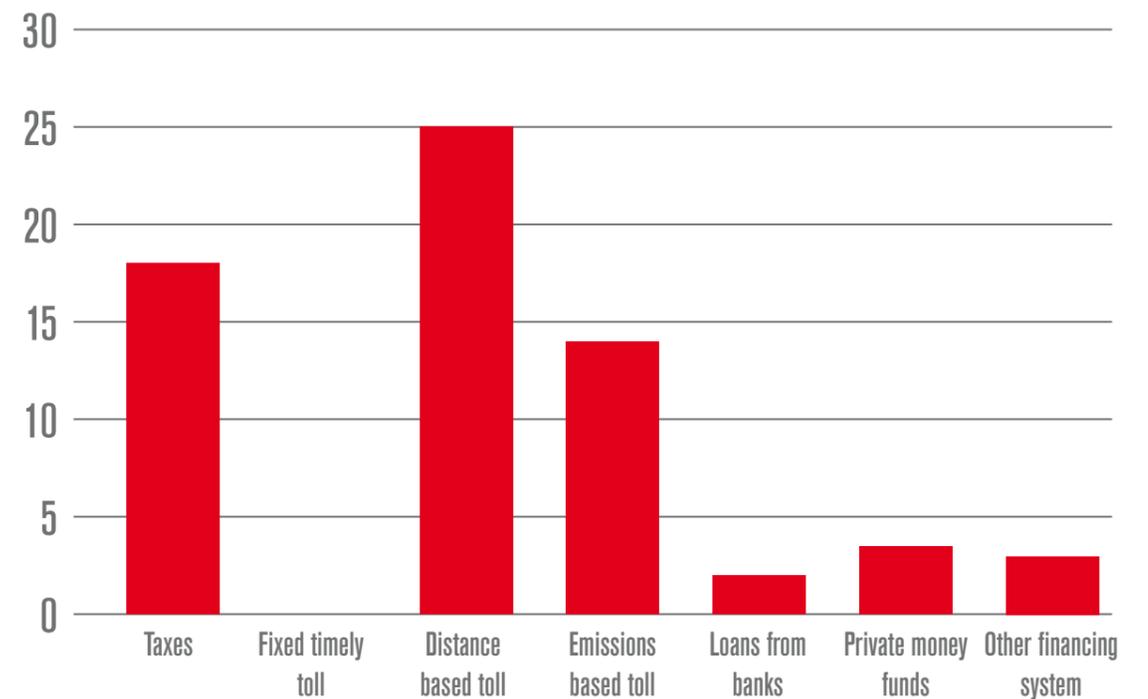
Economic Wolfson Prize Winner

Amey Consulting, UK

OPENING POLL QUESTION:

Are there good enough tools to finance road infrastructure in Europe?

The results from the respondents showed majority preferred distance-based toll charging.



THOMAS BAYERL, explained how institutional investors like MEAG are able to invest in a wide range of infrastructure projects like economic infrastructure (transport, utilities, renewable energies, communication) and social infrastructure (hospitals, schools, universities). Institutional investors are driven by liabilities; hence the infrastructure investments need to match several important criteria e.g. long duration and declining risk over time. Banks and institutional investors have different business models and therefore different preferences for project criteria. He showed the streamlined investment process to match the needs of sponsors and projects and gave some examples for realised road infrastructure projects.

PROF. TORSTEN R. BÖGER, gave an overview of VIFG and explained that it is a stakeholder in the financing of federal highways as well as roads and is a competence centre for public-private-partnership (PPP) in the transport sector. He showed the classification of long-term contracts in Germany for concession and PPP and gave some examples for projects. He concluded with the lessons learned on network and the project level of PPPs and summarised their efficiency.

GERGELY RACCUJA, explained the “Miles Better” concept - a new way to pay for road use for which he was awarded with UK’s Wolfson Economic Prize in 2016. Miles better is a new, sustainable tax linked to vehicle kilometres. Insurance companies are the collecting agents which keeps the implementation and the running costs low and it compromises a statutory guarantee, that a % of all revenues from the new tax are reinvested in roads (ring-fencing).

During the panel discussion, Thomas Bayerl further explained how financing with private money does offer benefits and that Brexit will principally impact the attractiveness of the UK for infrastructure investment from institutional investors. Torsten R. Böger explained who pays for the bankruptcy of a PPP or concession road and that Germany will have a toll-system for all roads and all types of vehicles soon. In several questions Gergely Raccuja explained in more detail his “Miles Better” idea and he removed the fear of the auditorium that a distance-based system could possibly lead to the most damaging vehicles being overloaded in order to avoid charges.

KEY TAKEAWAYS

- Insurance companies offer a new approach to banks in terms of investment in infrastructure and are working on strategic partnerships with market participants. They test project plans for sustainability and conduct due diligence, putting together relevant people to discuss and mitigate the risks.
- In Germany, where big part of investment comes from tolls, it’s not so much a question of more money being needed, but of more management competence and the issue of risk responsibility that comes with private investment.
- The question we must ask ourselves is how to invest efficiently - should be an economic and not just technical approach.
- New model MILES BETTER - in response to declining revenue from fuel tax that declines with lower emissions. The approach is based upon the idea that when I use a public good, I should pay more when I use it i.e. ‘Pay as you go’. This leads to question: will society have a bigger engagement in framing finance and be willing to pay?
- A proportion of the MILES BETTER revenue generated can then be reinvested into the roads, especially as the future looks like having less cars, but more miles.

SUMMARY OF SESSION 3

SUSTAINABILITY – REDUCING CO₂ EMISSIONS

De-carbonisation will play a very important role in the future as will the expected change of mobility. The aim of the session Sustainability was to demonstrate and explain why the asphalt industry is already very aware and prepared for the challenges to manage the increasing targets and expectations to reduce CO₂ emissions during production, paving and use phases of asphalt pavements.

SPEAKERS

Reducing CO₂ Together in the Transport Sector - A Horizontal Approach

Tim Breemersch
Senior Researcher
Transport & Mobility Leuven, Belgium

Sustainable Asphalt Pavements for the Future

Mats Wendel
Innovation Strategist
Peab Asfalt AB, Sweden

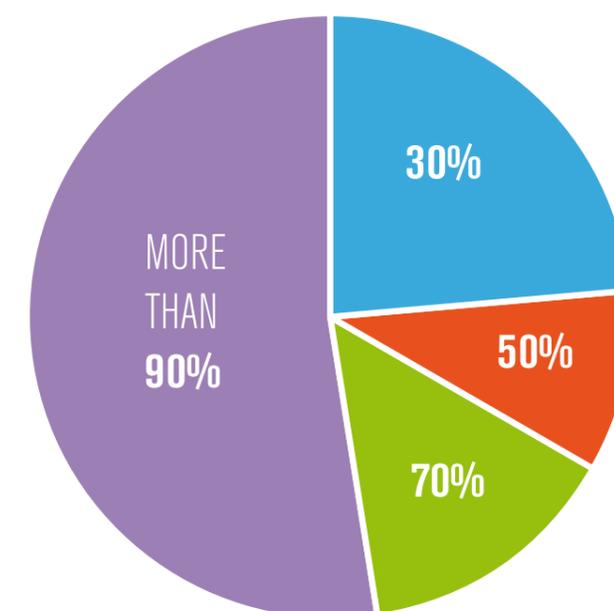
Low Rolling Resistance Asphalt Pavements to Reduce CO₂

Bjarne Schmidt
Senior Consultant
Teknologisk Institut, Denmark

OPENING POLL QUESTION:

What percentage of the whole CO₂ emissions of a pavement over its service life is related to the use phase?

The results showed a majority of the respondents believed that more than 90% of the whole CO₂ emissions of a pavement over its service life are related to the use phase, which was the correct.



TIM BREEMERSCH, showed how different stakeholders of the road freight transport sector can contribute in an integrated approach to the reduction of CO2 in the transport sector, because major CO2 reductions needed (up to -80%). The indicated areas are vehicle (engine efficiency, aerodynamics, tyres, ...), operations, fuels, and infrastructure. Most promising approaches are powertrain efficiency, electrification & renewable fuels as the main sources, but important contributions can come e.g. from proper road maintenance, that provides a smooth and even road surface.

BJARNE SCHMIDT, gave the technical background on reducing CO2 emissions with low rolling resistance pavements. He explained that texture (MPD) and evenness (IRI) of the asphalt surface influence the fuel consumption of the cars driving over it, thus a well-maintained road infrastructure and new surface layers developed and constructed with the aim of lowering rolling resistance can contribute to a reduction in CO2 emission. There should still be a high focus on road safety (skid resistance), but especially on durability of the pavement surface. He concluded that the implementation of such solutions is a shared responsibility for politics to invest in Europe roads, the public authorities to prioritise pavements types that contributes to a better environment and contractors to provide the technology and knowhow of handling new pavement materials and providing the quality.

MATS WENDEL, spoke about new and recycled materials as well as additives that have to be carefully designed with special consideration to workers health, safety, and future reuse of the material. He stressed that it is also important to pay attention to technical lifetime of the pavement. The dominant energy consumer in an asphalt plant, is the drying and heating process and heavy vegetable-based bio-oil, wood pellets or light bio-oil can help to reduce CO2. He mentioned Environmental Product Declarations (EPD) as a possibility for a road owner, that buy the asphalt pavements, to verify the climate impact. In his conclusions Wendel gave a five point plan for the asphalt industry to become even more greener: Upgrade our equipment and machinery to use sustainable fuels, use RAP to reuse our important recourses, address the responsible use of additives and recycled material, develop EPDs so the road owner can find trust in environmental performance and finally address the need of environmentally interested buyers in order to make the great industry progress.

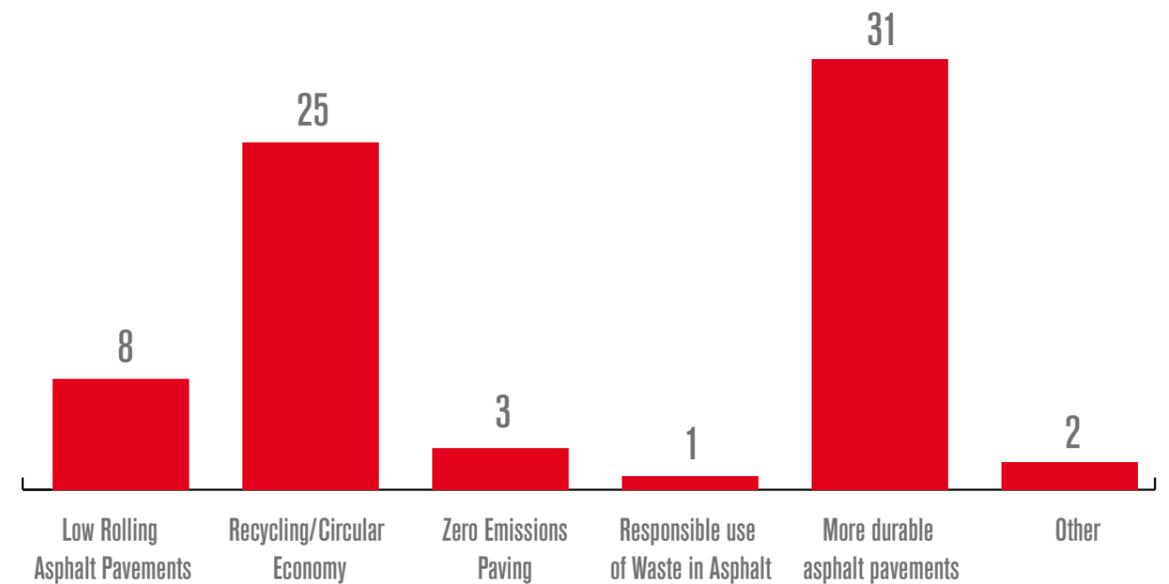
In the open panel discussion it was highlighted that recycling of asphalt, even if it is done for decades, is still an important issue and that the asphalt industry should continue to recycle responsibly (re-use asphalt on high level). Mats Wendel claimed again that asphalt industry has to be careful what to put in new asphalt. Asphalt should never be used as a dumping ground for other people's waste. EPDs could be a tool to steer and realise the green potential of the asphalt industry. Tim Breemersch explained the background if electrification really reduces emissions, or if it simply moves them from the transport sector to power generation sector.



AT THE END A SECOND POLL QUESTION WAS ASKED:

In which field do you think the Industry has the most potential to become more sustainable?

The majority of respondents believed high-durable asphalt pavements would contribute the most.



KEY TAKEAWAYS

- New EU-based vehicle approach based upon vehicle efficiency (energy efficiency, aerodynamics, low rolling resistance, hybridisation/ electrification).
- Decarbonisation getting more and more important also for asphalt sector.
- Low Rolling Resistance pavements have socio-economic benefits.
- Road pavement needs to be at the optimum level as this contributes to reducing emissions, a proper maintenance is essential.
- The durability of asphalt pavements matters for sustainability.
- Circular Economy: Reclaimed asphalt pavement (RAP) is greatest source of reused material, recycling is still an important topic for industry. Future reuse means we need to think about additives and tech lifetime and health & safety (responsible use of additives required!).
- There is a lack of political awareness - industry needs to "shout more" and position itself better as it has a good, evidence-based story to tell!

SUMMARY OF SESSION 4

HEALTH & SAFETY WITH FOCUS ON FUTURE REQUIREMENTS FOR WORKERS, USERS AND THE ENVIRONMENT

The goal of this session was to show that our industry is continuously improving the protection of the workers, best practices exist and could be extended to other countries, the second was devoted to the future challenges of the industry, monitor future trends in health & safety regulations to identify important areas and challenges for the industry to work on together and be better prepared.

SPEAKERS

Best Practice: Medical Checks on Roads Workers in Germany

Reinhold Rühl
 Chair of the German Bitumen Forum
 BG Bau, Germany

Safety of Workers: The Vision of the Chemical Industry, Expected Evolution

Steven Van de Broek
 Responsible Care and Supply Chain
 CEFIC (European Chemical Industry Council), Belgium

Best Practice: Tank Truck Drivers Training

Leopold Tzeuton
 General Manager
 ATPH (French Association for Prevention in Hydrocarbon Transport), France

Safety of Workers: The Vision of INRS

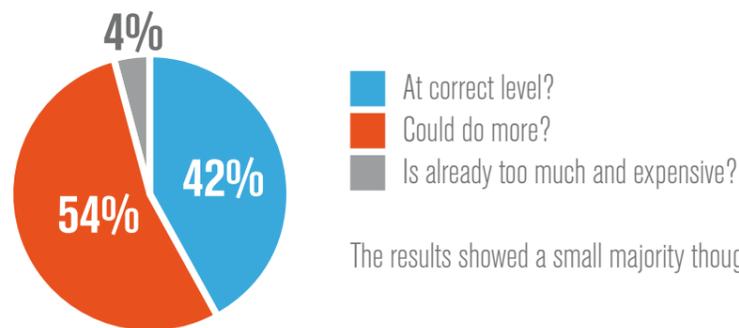
Cosmin Patrascu
 Department Expertise and Technical Advice
 INRS (French National Research and Safety Institute for the Prevention of Occupational Accidents and Diseases), France

Best Practice: HAZOP Training and Safe Delivery Trainings

David Giles
 Director Eurobitume
 Eurobitume, UK

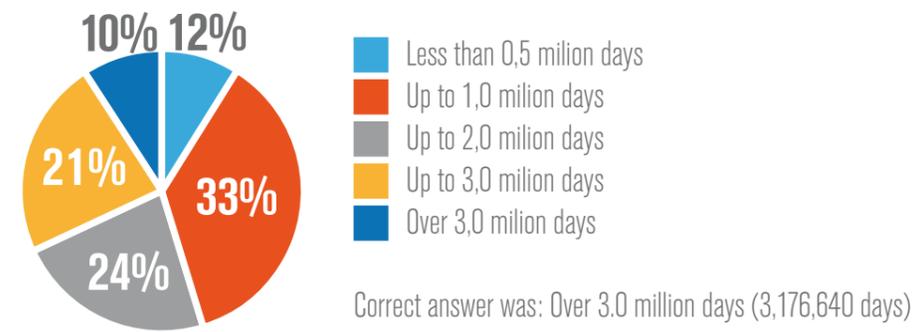
A SET OF FOUR OPENING POLL QUESTIONS WERE ASKED TO ASSESS THE EXISTING VIEWS OF THE PARTICIPANTS:

Health and safety regulations in Europe are stringent but does the industry protect the workers?

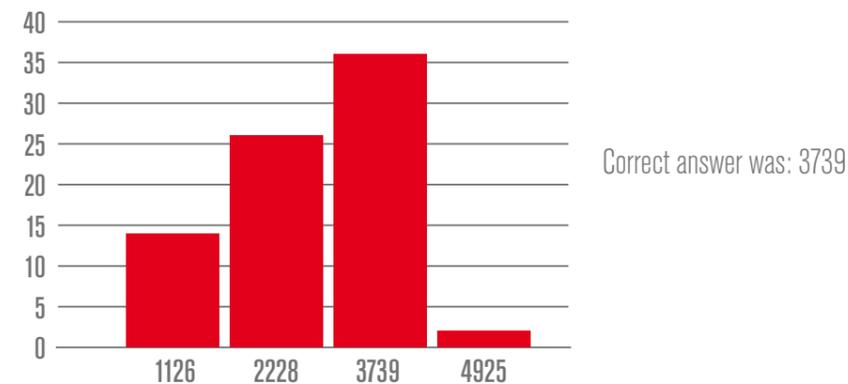


The results showed a small majority thought the industry could do more.

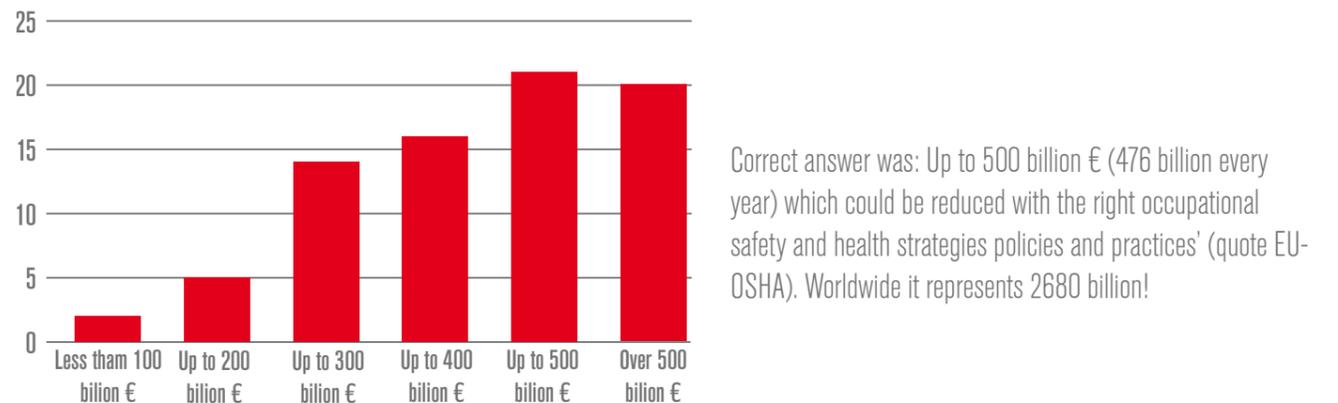
Based on the last available figures how many days were lost in the EU due to occupational accidents which cause a loss of more than 4 days of work?



Based on the same statistics how many fatal issues were registered?



What are the work-related accidents and injuries costs in the EU according a new global estimation published by the European Agency for Safety and Health at Work (EU-OSHA) together with the International Labour Organisation?



REINHOLD RÜHL showed the difficulty to comply with the DNEL for exposure to bitumen aerosols and fumes and how all the involved stakeholders, gathered in the Bitumen Forum agreed on a solution to reduce the risk for the workers: The asphalt-workers are examined every two years for occupational medicine to determine whether health effects occur at work above the DNEL.

LEOPOLD TZEUTON showed how the training of drivers can optimize the drivers behaviour, one of the main risks of accidents in the bitumen business. Different training tools contribute to raise awareness and minimise the risk.

DAVID GILES showed how EB UK in association with MPA (mineral products association = the contractors association in UK) promotes and drives safety standards. The accurate reporting of incidents and near misses during the delivery of bitumen and their quarterly lead to a reduction of incidents. EB UK organises also a delivery training scheme for tank truck drivers with the delivery of a drivers passport. In a day session Process Hazard Analysis (PHA) tools such as HAZard and OPerability (HAZOP) are used in a one day session to identify potential undesirable events that could lead to hazardous scenarios. The consequence is a dramatic reduction of personal injuries.

After these 3 examples of good practices that could be extended to other countries, 2 presentations showed the evolution that can be expected regarding protection of workers.

STEVEN VAN DE BROECK from CEFIC (chemical industry association) how the chemical industry is moving to a modernised approach of the health and safety regulations, taking in account the constraints of the chemical regulation. The position of the chemical industry is to be proactive and not to wait for a European regulation before... **“go further than the regulation”**.

COSMIN PATRASCU from INRS, Institut National de Recherche Scientifique (the French Institute for Research and Science) the mission of INRS to contribute to the prevention of occupational accidents and diseases through studies and research, in order to identify occupational risks and highlight hazards, analyses their impact on health and safety at work, develop and promote the means to control these risks out in the companies.

Cosmin showed a new method to measure the exposure to bitumen fumes. The improved method will better collect the fumes and the possible health effects.

KEY TAKEAWAYS

- Health and safety of the workers is a permanent concern of the industry, good practices exist already in different countries and they can be extended to other countries.
- For the future, the message is also positive: new possibilities exist to still better protect workers and HSE can be considered as a real opportunity for the industry, not a burden as the reduction of accidents has also a positive side effect = reduction of the costs!

SUMMARY OF SESSION 5 TECHNOLOGY

The goal of this Technology session was to identify some of the obstacles for technology implementation and the audience was invited to be involved in answering the question how these obstacles could be tackled.

SPEAKERS

What Road Authorities Need in the Future

Rudi Bull-Wasser

Head of Section Asphalt Pavements

BASt, Federal Highway Research Institute, Germany

What Asphalt Sector Can Provide

Knut Johannsen

Head of MPA (Material Prüfungs Anstalt)

Eurovia Services GmbH, Germany

What Technology Can Offer

Seirgei Miller

Researcher in the Asphalt Paving Research and Innovation Unit (ASPARi)

TU-Twente, the Netherlands

RUDI BULL-WASSER explained what road authorities need in the future.

He gave an overview of innovations introduced in Germany in recent years and explained items that trigger innovations and sometimes block innovations. He also explained what could be done to stimulate implementing innovations.

The use of smart data will help to improve the works and the sustainable use of materials. Next to that we should promote more the things we are doing to promote our industry. He also mentioned that when the road authorities want a better quality, they should ask for it.

SEIRGEI MILLER showed what technology can offer.

He explained why the road construction sector needs to innovate and why the asphalt industry does need to innovate. The most important items in asphalt construction are Temperature homogeneity and Compaction consistency. Here technologies can help in obtaining that.

He concluded by mentioning that it is the time to be bold! Several technologies have been available for a while and off-the-shell technologies are available to improve process control. We need to adopt and integrate new technologies much faster. The road authority should give more responsibility to the contractors.

If we do not take the opportunities, we run the risk of losing our future. Digitalisation is a huge opportunity for us. As an example he mentioned that eight big road building companies in the Netherlands are building a new uniform software system (PIM - Pavement Information Modelling) to better ensure the building / realisation process and maintenance of pavements. The role of this PIM is comparable with BIM used in the building industry, modelling and visualisation of projects.

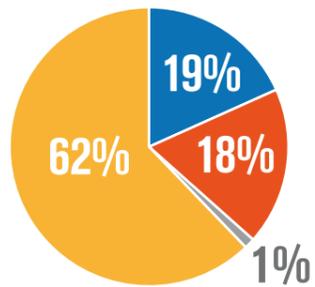
KNUT JOHANNSEN of Eurovia Services GmbH, Germany mentioned what asphalt sector can provide.

He gave examples of successful innovations as well as less successful innovations.

In his summary he suggested to introduce new technologies / innovations in small projects first where contractors can try new things.

THE THREE PRESENTATIONS WERE FOLLOWED BY THREE POLLS:

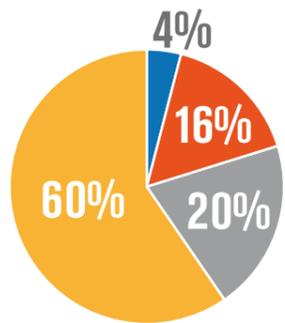
What are the main reasons for not using new technologies (yet)?



- The asphalt industry has not found the need yet to use new technology
- The system will not give the contractor savings
- Technology has been used against the asphalt industry
- The road authority is not asking for it / for the results

Most attendees indicated that the main reason for not using new technologies (yet) is caused by the fact that the road authority is not asking for it or for its results.

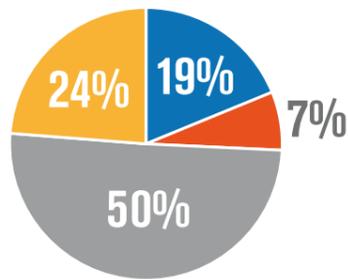
What can the road authority do to stimulate the use of new technologies?



- Ask for more quality control data
- Ask for better quality / more durable pavements
- Give a bonus for better quality
- Change the tendering procedure and use best "quality/price" ratio

To stimulate the use of new technologies the road authority should change the tendering procedure and use best "quality/price" ratio.

What should the contractor do regarding the use of new technologies?



- Convince the road authority that they can save money with new technologies
- Use it to save money
- Talk with the road authorities and ask for contracts that stimulate innovations
- Move to a modern and innovative industry and quality thinking

The contractor should talk with the road authorities and ask for contracts that stimulate innovations, in order to stimulate the use of new technologies.

KEY TAKEAWAYS

- The audience was informed on the new developments that will have an impact in the future.
- Many viable solutions and technologies are already available and can be used tomorrow. The use of these existing technologies should be encouraged and they will support the profile of the asphalt industry as an innovative sector.
- The road authorities have an important role in stimulating the use new technologies and they should ask for it and for the results new technologies can provide. A possibility to stimulate the use of new technologies is changing the tendering procedure by using best "quality/price" ratio.
- In all case the contractors and road authorities have to come together to discuss contracts that stimulate innovations and the use of new technologies. They both need each other and together they can develop plans to make steps forward to come to a modern industry that can provide the road authorities products / solutions they are looking for.
- In the discussion it was mentioned that France has a price for the best innovation each year and that the asphalt paving industry should become funkier.



SUMMARY OF SESSION 6

COMMUNICATION & EDUCATION

HOW TO ATTRACT NEW RECRUITS TO OUR INDUSTRY?

The aim of this session is to embrace the need for stronger communication and education activities to be involved in Tomorrow's World more effectively. This includes both promoting the use of asphalt but also to increase the attractiveness of the industry by new professionals.

There is a general concern across Europe that as an industry we are failing to attract new and the best candidates available. This will be the main question that will be addressed during this session.

SPEAKERS

Katrina Sichel
Communication Consultant, Europe

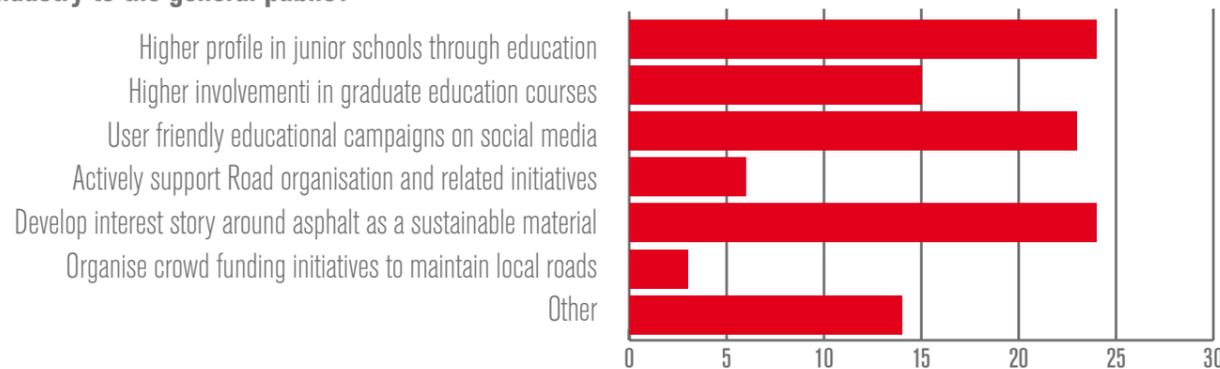
Martins Zaumanis
Project Manager, Latvian State Roads, Research Management and Development Dpt.

KATRINA SICHEL, professional moderator presented her view on why communication is important.

DR MARTIN ZAUMANIS shared his experience of improving his communication skills – both digital and presentations - to get important messages across to various stakeholders.

PARTICIPANTS WERE ASKED TO DISCUSS THREE QUESTIONS (WORK GROUP TABLE INTERACTIVITY):

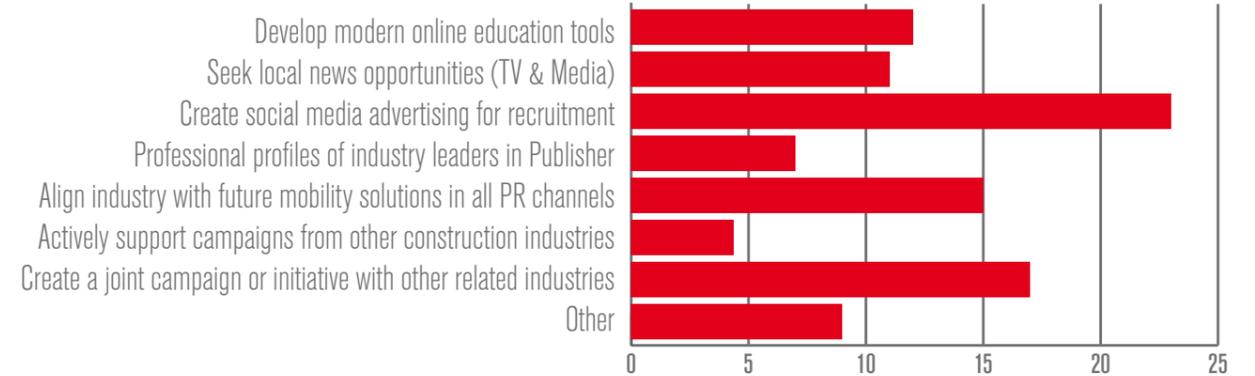
What top three actions could our industry implement to have an influence on improving the image of our industry to the general public?



Three top answers were:

- Develop interest story around asphalt as a sustainable material
- Higher profile in junior schools through education
- User friendly educational campaigns on social media

What top three actions can be implemented to improve the interest of joining our industry from potential new recruits across all disciplines?



Top three answers were:

- Create social media advertising for recruitment
- Create joint campaigns or initiatives with other related industries
- Align industry with future mobility solutions in all PR channels

As an industry (bitumen/asphalt) how can we be more effective and efficient in our communication activities?



Top three answers were:

- Develop common clear messages and communicate them locally
- Offer communication training for technical functions
- Create an industry communication forum

QUESTIONS FROM SLIDO SESSION 1

Questions: @Guillaume

1. Do you have any examples of solutions on mobility issue that Colas is currently involved in?
2. You mentioned a lot about cars & the changes in their use. What about trucks? What is the forecast for heavy trucks & the impact on asphalt?
3. The fleet renewal of cars is a lot faster than the upgrading of road networks (size, public funding, ...) Cars will be the future? Any thoughts?
4. Any innovation coming up from Colas? What will be the next breakthrough in pavement?

Questions: @Nicolas

5. What do you see as the biggest physical change in infrastructure to manage digitalisation?
6. Looking at the State of the roads in FRANCE, we should put more emphasis in road maintenance of the 4th génération?
7. How do we make customers interested in R&D like R5G and not only price, price and price?
8. Where do asphalt roads fit in your future challenge of climate change?
9. You mentioned 5G roads need safer road markings. Unless the markings are there for connectivity, why are road markings needed w/ autonomous cars?

Questions: @Arash

10. Your success criteria looked like they were yearly (?). Wouldn't it be more relevant with long time life cycle criteria?
11. What is the impact on safety of reducing the lighting of the SRN?
12. Is the survey 'what do our customers want?' published?
13. How many of the RIS1 KPIs are on target / already achieved?
14. How much money of the £11million goes to R & D?
15. Why don't you survey the 8-year-olds (tomorrow's road users)?
16. Excellent as you touched base with ASPHALT. We can be proud of what we're doing as asphalt is a high-tech product. Make people aware of that.
17. If the public prefer asphalt will HE replace all concrete roads and stop building with concrete.
18. What's your thinking on the need for disruptive innovation in materials and readiness to fail fast?

19. Have you considered the Scandinavian and Dutch tendering mechanisms that reward construction companies for innovative and sustainable roads lasting 30 y?
20. How do you anticipate KPIs evolving, if at all?
21. Is there a step by step project plan? I hear and see a lot of visions but it would be interesting how you are planning to get there.
22. Is higher quality and longer lasting pavements in your vision of tomorrow's roads?
23. I agree that the industry has to be in front, you can't rely on government.

Questions: @Ralph

24. What makes a research focus area strategic for asphalt?
25. The four pillars of STAR seem to be far away from the vision of Nicolas and Guillaume. Does the Bitumen industry have a different vision for the future?
26. Give some examples of strategic asphalt research needs.
27. Have there been any research projects generated from the STAR Symposium?
28. AIF's goals and mission: any relation with environmental impact?

Questions: @ALL

29. Autonomous cars may possibly require better road and more maintenance... But do you forecast even disruptive scenarios without any need for bitumen?
30. What impact on bitumen/asphalt demand do you foresee?
31. As Electric Vehicles enter the market less money (combustible taxes) for governments. Any scenario available for the budget expenditure in roads?
32. Priority number one for us - intelligent use of RAP. Bitumen is not endless - it's in our roads... think about it. For the sake of the next generation(s).
33. Roads are lasting longer than politics. Are local authorities really caring about innovation for roads and do they see value to justify higher R&D costs?
34. When will all of Europe shift road ownership to the contracting parties, where longevity, maintenance, co2 performance and innovation are rewarded in tenders?
35. What are the plans or what are your thoughts when you think about the word BIM. How does BIM affect your daily work with asphalt projects now?
36. Road authorities follow EU standards so progress is driven by the standards development. Should we start to look into the flexibility of the regulations?

Questions: @ALL

37. When we talk about roads usually we don't think about streets. Don't you think the future of roads will begin with streets? Streets need to change faster?
38. How will mobility based on alternative energy concepts impact the raw material situation for bitumen and asphalt based industries?
39. Communication & cooperation is key. How do we get all sectors (authorities, bitumen, asphalt, contractors & users) working together?
40. Do autonomous cars need less asphalt?
41. What does future-proofing mean in practice?
42. What is the OEM point of view about road digitalization? They are an important stakeholder
43. What about growing empowerment of the final users through social media?
44. Roads do not stop at country borders. How does Europe play a role in ensuring quality roads across borders?
45. Future is targeting on more efficient cars, roads and materials, less costly in an economic sense. What's the price we will pay on pollution?
46. Do you think the asphalt industry can support and/or require bio-polymers for PMB?
47. In the future will there still be a need for the same size of road networks?
48. Who leads this change? Industry or Authorities?
49. Can recycling be part of road future business?
50. What about growing empowerment of the final users through social media?

**QUESTIONS FROM SLID.O SESSION 2****Questions: @Thomas**

1. How does financing with private money offer benefits?
2. Will Brexit impact the attractiveness of the UK for infrastructure investment from SVPs?
3. What is the average interest?
4. The Finance department says they can finance cheaper than Funds because there is no extra "layer" (= a Fund). How can you add value?
5. Capital is one piece. How does finance relate to construction warranties/bonding?
6. Who pays for the bankruptcy of a PPP or concession road?

Questions: @Gergely

7. Is the contractor free to choose the construction he thinks best so innovations can be stimulated?
8. What reaction from other stakeholders to your Wolfson Prize concept for road financing?
9. As an economist why did you focus on road financing?
10. How does Miles Better cope with shared/no ownership cars?
11. How do we calculate/track the vehicle miles travelled?
12. What is the optimum % of ring fencing required to fund or overcome the UKs massive multi-billion maintenance back-log?
13. How does Miles Better cope with „mobility as a service“?
14. Privacy? Take an Uber and look at the detailed trip logs/map. Why the public outcry here?
15. Would a distance-based system possibly lead to the most damaging vehicles being overloaded in order to avoid charges?
16. How are the actual mileages for each vehicle verified and reported?
17. Have you had any Government interest or feedback on your idea?
18. Low income people may drive more to reach their work place. Bigger powerful and heavier cars damage more the road. Does Miles Better addresses it?
19. What would happen if one of insurance companies collecting the taxes goes bankrupt?
20. Any thoughts how Miles Better would work when you travel outside of your country?
21. How would the rate per vehicle weight be established? Isn't it both the rate of damage to roads and convenience provided that should be considered?

Questions: @Torsten

22. Will Germany ever have a toll-system for all roads and all types of vehicles - when?
23. For PPP projects, what are primary cost drivers (ease of maintenance, etc.) for selecting pavement over the life-cycle? For example, choosing asphalt?
24. Could a financing organisation consider the financial risk associated with a diminution in capital value of a road pavement due to poor maintenance?
25. Does PPP financing give adequate scope for the innovation that we heard about this morning?
26. Interesting information. But how can we make sure that the asphalt industry will get the biggest piece of the cake? That one's for all of us!
27. Local roads authorities have insufficient money. Should they lead on PPP?

**QUESTIONS FROM SLI.DO SESSION 3****Questions: @Tim**

1. Does electrification of vehicles really reduce emissions or just shift them to another location?
2. ERS & Platooning would need a more durable road, is there collaboration between EAPA to help deliver this?
3. You don't speak about the Hydrogen engine that is tested by a lot of car builders?
4. Bitumen Beyond combustion project by Alberta Innovate is addressing these challenges. Any learnings on CO2 reduction?
5. Does electrification really reduce emissions, or does it simply move them from the transport sector to power generation sector?
6. Can you make a more direct or practical connection with this interesting topic to asphalt pavements?

Questions: @Bjarne

7. Is there a correlation between fuel consumption and noise reduction?
8. Is there a risk that lowering rolling resistance could compromise skid resistance?
9. Is there something that tyre manufacturers can also contribute to safely reduce rolling resistance?
10. If 25m, 60 tonne trucks cut CO2 and other emissions, improve productivity and reduce road wear as claimed, should road specialists support their wider use?
11. No mention on solar energy option, is there any realist application to transport?
12. With more modern cars: is current skid resistance specification over engineered (risk adverse) - does this need rethinking?
13. Co2 reduction is a positive aspect. To what extent does reducing rolling resistance affect safety and noise reduction?
14. @Bjarne - could the transport sector finance this research area (rolling resistance reduction)? They can save enormous amounts of fuel...

Questions: @Mats

15. Excellent! "We need to be careful what we put in asphalt" Asphalt should never be used as a dumping ground for other people's waste.
16. With respect to asphalt formulations how will REACH and similar regulations for chemicals impact current and future technologies?
17. Will EPDs ever become a genuine procurement differentiator? Or is it just a tick in the environment box?
18. Every RAP is different so the asphalt mix design has to be carefully studied but there is not any European guide or standard. Do you think that we need one?
19. Is not lifetime of a pavement one of the most critical aspects to reduce environmental impact?
20. @Mats do the heavy bio-oils still have a significantly lower carbon footprint, given that they are from crops requiring the use of fertilisers in production?
21. Isn't that nen-en 13108-08?
22. I perfectly agree with you Ian! We need standards for all material in the asphalt.
23. Reclaimed Asphalt (rap): NEN-EN 13108-8.
24. What is your opinion on the level/ breakpoint for the amount of added RA in warm mix Asphalt to reach the same level of reduction as for change of fuel?

QUESTIONS FROM SLI.DO SESSION 4

Questions: @Reinhold

1. Mastic asphalt is handled at higher temperatures & workers are closer to the materials, so why is the exposure lower?
2. Industry institutions developed the approach "out of the dilemma" you presented - will authorities (federal, regional (16), local (100s)) support this approach?
3. MAK Commission is not focusing on bitumen, but emissions from hot bitumen. Did they take the Bitumen Forum developments into account?
4. Is there provisional data available from the few hundred workers?
5. In the German medical assessment, how will exposure be assessed?
6. What about effect of Warm Mix Asphalt?
7. Are the exposure values shown maximum or typical? How could you apply the task based levels in comparing with the 8 hours limits?
8. What is an OEL ?
9. Is Warm Mix Asphalt healthier than Hot Mix Asphalt for the workers?
10. How would you say industry is doing to help authorities understand worker exposure risks?
11. Do you think that the exposure to sun may be more dangerous for road workers because it can produce skin cancer?
12. How can we make sure that the same workers come back after 2 years?
13. What is the German bitumen industry doing to promote reduction of exposure of bitumen fumes?
14. What are the results on medical examination of the few hundred workers so far?
15. What are the most significant measures industry have taken to reduce worker exposure?



Questions: @Leopold

16. What about combined trainings including dangerous goods?
17. What does ADR mean?
18. Do you have a combined programme including both « road safety » and « dangerous goods knowledge »?
19. Is ATPH video available online?
20. How do you solve the problem of different languages?
21. What about accommodation opportunities close to your technical centre?
22. Good approach to driver training. Is there a plan to open this up to wider European participation?
23. What are ATPHs results regarding driving so far?
24. How do you address the issue of languages in your international programme?
25. How many accidents and incidents are due to driver behaviour, in % ?
26. In addition to safe driving training, are you also addressing the risks linked to products being loaded?

Questions: @David

27. What are the predominant gauges used in the UK which have caused so many faulty near misses? Seems like this should be a top priority to correct.
28. Design of storage tanks in quarries doesn't seem to have changed in 20 years. We need to ensure level & temperature control is improved significantly.
29. A very good example! How are you working on an EU level with these matters?
30. Is there anything available to help prevent Asphalt burns? Training? Safety aids?
31. How sure are you that you collect all incidents?
32. If high level alarm failures are falling, what have MPA members done to make them more robust?



Questions: @Steven

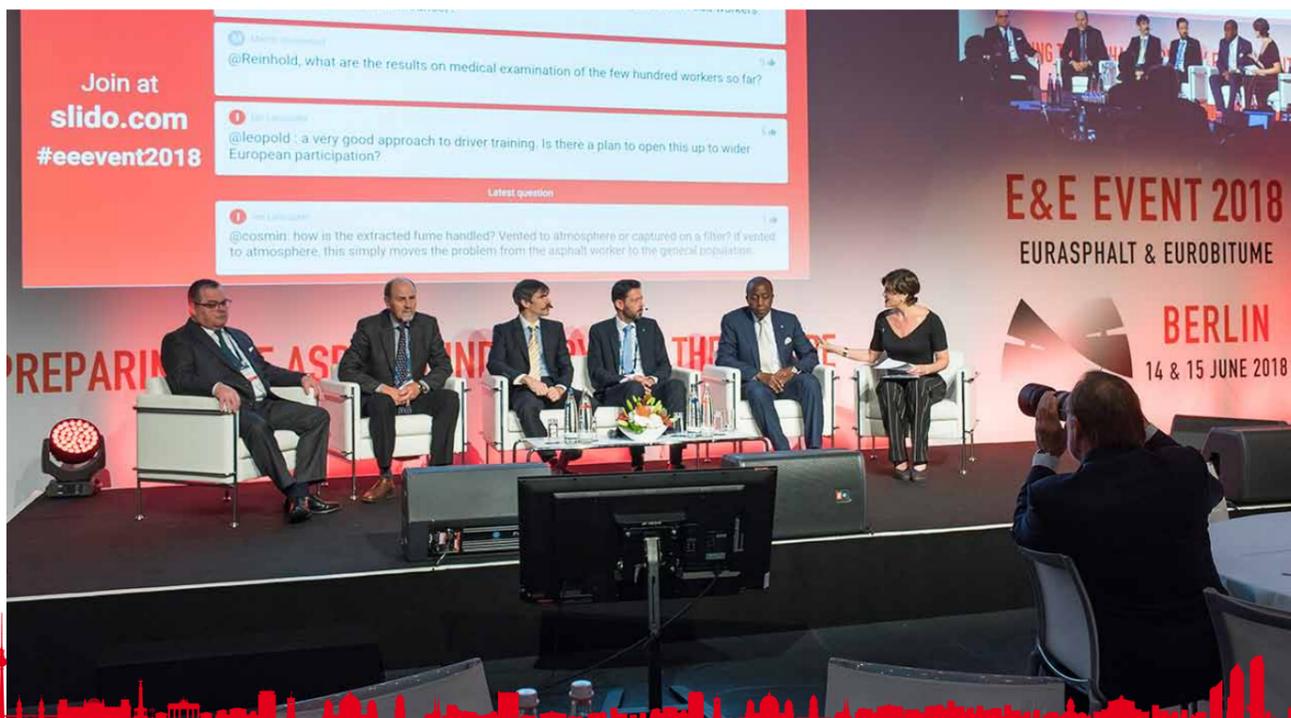
33. Do you think that your industry protects enough?
34. How do you see the alignment with REACH, as ex the SVHC Roadmap?
35. You mentioned a focus on hot materials & PAH. What is the timescale for this?
36. The deaths for lung, trachea and bronchus cancer per 100.000 inhabitants is less than 50 in Spain, over 70 in Hungary and over 60 in Holland in accordance to Eurostat.
37. What is the driver of the chemical industry only safety ? Or Safety = money :) ?

Questions: @Cosmin

38. @cosmin: how is the extracted fume handled? Vented to atmosphere or captured on a filter? If vented to atmosphere, this simply moves the problem from the asphalt worker to the general population.
39. How does EU legislative action relate to IARC findings?

Questions: @ALL

40. What is done to educate the workers on h&s and let them understand the need of medical exams?
41. EU proposed legislation for cancer initiatives, INRS research, MAK commission efforts, IARC monographs - where is the collaboration?
42. @Ruhl @Patrascu: Why are french exposure measurements (0-4 mg/m3) so much lower than German measurements (4-20)?
43. @Cosmin and Reinhold: Measured/reported exposure values are different for Germany and France. One reason is that monitoring methods are different. Would it not be better to try to find a harmonised monitoring method on a EU/global level?

**QUESTIONS FROM SLIDO SESSION 5****Questions: @Rudi**

1. How do you think a Bonus system could look like so the constructor will spend more money on technologies in order to produce high quality pavements? We as the tax payers and users are interested in having perfect roads with a long-life span.
2. There are several "rejuvenators" available in the market. Is there a need to have a common approach to assessment of their effectiveness?
3. Would be a solution for giving more space for innovations: performance based specifications and incorporate the service life into the contract?
4. Instead of "Big Data" should we not think of „Big Information“? Too much data can hide the useful information to actually do the job well?
5. How can standardisation guide innovation?
6. You mentioned that the client can not ask for a special aggregate or binder for the Asphalt. Do you mean that relevant properties according to product standards for aggregate and binder is not allowed to be specified by the client?
7. Is there already a project running on regulations for use of rejuvenators in Germany? In Europe?
8. There are different types of rejuvenators. Can they all be assessed the same way?
9. Autonomous Solutions in asphalt pavement technology seems to be multi-beneficial even more for maintenance or reconstruction of roads (Avoiding human (mistake) factor, possibility to work around the time, safety by working next to traffic stream etc.). When do you expect the first applications?
10. What will be the impact of the new highway entity on technical requirements or technical documents? Will there be a parallel system applied?
11. How does standardization and enforcement enhance or promote technological innovation? Seems counterintuitive!
12. Which (smart) data is needed for BIM in road construction?
13. In German we say „Tu Gutes und rede drüber“ - how are we going to do that to make people aware of how innovative our industry really is?

Questions: @Seirgei

14. Yesterday we said that high quality and longer lasting pavements help both with budgets and emissions. What innovations do you see that improve the quality of asphalt pavements?
15. With the new entity being responsible for highways only, do you see a risk that the view on the overall road network might change? Thinking of co-operations/links between authorities and responsibilities.
16. In your opinion, what should be the general approach for the further development of new innovative bitumen products? Is it improvement of polymer modification, or may be chemical modification, or optimisation of bitumen chemical composition and crude slate?
17. Will BIM data be freely available to all contractors or will there be a fee for access?

18. What existing forms of contract encourage innovation?
19. You said that asphalt industry has bad image, and I absolutely agree. How do you want to change this fact, when the conditions during paving will be minimum 5 years similar or slightly better than now?
20. Any information on quantifying value or longer pavement life with these paving technologies? Or will that come w/big data and analytics?
21. What should authorities do to stimulate using these systems to get to a better laying process? Are there Best Value contract examples?
22. Basically the speaker is right about integration of compaction, but who is going to pay. Client only looks at price
23. What are the steps for an agency to implement temperature and compaction measurement in projects to improve quality?
24. Do you see the robotization in paving asphalt industry as possible option instead of human workers? The lack of workers could be a big problem in future.
25. How well can improved temperature and compaction control during construction be related to long-term performance and cost?

Questions: @Knut

26. Innovation should be on the agenda of all road network clients for the good of the public funding and citizens. Could you present what is coming on in FRANCE?
27. How to find the optimal duration of timing for development of new product? Yes, 5 years is too much, but 1 month is not enough.
28. Isn't the previous German approach on temperature reduction a best practice example then on how to proceed with innovations? Long-term research, proven performance, closing the gap before regulations being available, and all stakeholders working openly together on solutions for questions.
29. You mentioned fast research, yet it often take several years before we see the result if a new type of pavement works well or not. How to get results faster?

Questions: @ALL

30. What innovations on bituminous binders do you expect in the future?
31. What could/should be the role of academia and public research centres in the development of our industry?
32. For me the main reason to approach a process of digital transformation in our sector is the improvement of the associated security in the works. Do you agree?
33. The ageing workforce & low entry is a huge problem. As an industry we must do more to appeal to younger people. We must explain & celebrate innovation & opportunity
34. When can we offer in the public tender the best technique available (same with risk) and will be a PLUS from our customers? We need to stimulate the innovation!!
35. Does asphalt need a simple, high level vision that the public and customers can understand?
36. Are we an innovative industry in reality? We seem to work on evolution not revolution...?

QUESTIONS FROM SLID.O SESSION 6

Questions: @Katrina

1. Communications - Very inspiring presentation - What advice can you give on measuring the effectiveness, including checking outcomes have been achieved - return on investment?
2. If we want to digitally transform our sector, we must first digitize ourselves as individuals. A first step for this, may be the use of social networks. Do you use social networks professionally?



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