European survey on the use of RAP

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Outline

- Context
- Scope
- Current situations and trends
- Conclusions

Context

- Recycling of asphalt pavement getting more and more attention, particularly in Europe
- Major concern of the European Union
  - Road Authorities launching projects to assess issues involved in recycling materials in asphalts
- Standardization: EN 13108 on bituminous mixtures and material specifications
  - Part 8 describing RAP or any mix production surplus used as components of mixtures prepared in HMA plants

Scope

- Framework: RILEM TC ATB (Advanced Testing of Binders) - TG5 on Recycling of bituminous materials
- Main objective of TG5:
  - Evaluate test and mix design methods for the use of materials with bituminous materials from the road (RAP), cold & hot in view of sustainable development
  - Propose recommendations
- Main objective of this European survey
  - To make an overview of the current practices in terms of usage of RAP (Reclaimed Asphalt Pavements)
  - Countries involved in the survey
    - Belgium, Czech Republic, France, Germany, Italy, The Netherlands, Nordic countries (Denmark), Spain, Switzerland, United Kingdom

Regulations - Common practice

- No country with obligation to use recycled asphalt materials but the Netherlands
- Most road administrations encouraging the use of RAP
- Some contracts preferring company's able to recycle
- Most countries adopting EN 13108-8

Regulations - Specific situations

- National specifications facilitating the use of RAP in some countries
  - UK, Czech Republic,Spain
- Specifications at regional level in other countries
  - Belgium, Switzerland
- The Netherlands : EN 13108-8 and national RAW 2005 specifying
  - RAP amount & homogeneity
  - Type of technique

Recycling techniques - Common situation I

- RAP mainly used in hot techniques
  - In surface course, binder course and base
  - Maximum amount permitted up to 10% in surface course and up to 50% in all other layers
  - Additional performance testing required when %RAP above 5 to 10 weight % depending on the country
  - 10% RAP appearing as the norm
- Most suppliers do not exceed 30% RAP
  - Manufacturing restraints within the plant
  - Modern mixing plants now capable of handling 70% RAP

Recycling techniques - Common situation II

- Cold or warm bitumen emulsion/foam mix technology can incorporate up to 100% recycled aggregate content.
- Quality: asphalt with RAP have to meet asphalt mix specifications as for fresh mixes

Recycling techniques - Specific situations

- Germany: recommendations according to the asphalt type
- Belgium: rules concerning the RAP quality (Origin, homogeneity and handling)
- Nordic countries: RAP usage will increase in the future

Recycling techniques - Trends

- The increased use of recycled and secondary aggregates in highway construction: a key policy goal of the Highways Agencies.
- Several countries looking for 100% RAP in mixes, in the long term future,
  - all seek for using more recycled asphalt in road paving and particularly in new pavements
- Belgium and even more the Netherlands taking the lead in encouraging RAP usage

Type of mixes – Common situation

- RAP generally used in dense mixes.
  - However, NLD using RAP also in open porous friction courses.
  - Excluded from SMA, but Germany considering incorporating RAP in SMA
- Added Binders:
  - Mostly normal paving grades
    - Selection accounting for the hardening of the aged RAP binders, according to classical blending rules on pen and R&B
  - Sometimes PmB's:
  - Rejuvenator: very occasional

Type of mixes - Specific situations

- NLD: importance of the healing factor
- Germany recommendation on the aged binder quality
  - Care to be taken with extracted binder featuring softening point higher than 70°C, cautiously used
- France using RAP in EME (high modulus mixes)
  - Taking advantage of the hard binder coming from aged porous asphalt
- Denmark recommendation on the fresh binder quality with respect to its ageing potential:
  - Point of particular importance considering bituminous materials Life Cycle Analysis

Conclusions

- **Growing use of RAP in Europe** to overcome bitumen cost increase & aggregate shortage - Country dependant
- **RAP use not mandatory but pressure from highway agencies**
- **Main techniques involving hot recycling**
- **Cold recycling growing** - prevalent in some countries
  - Potential to increase % RAP – part. for tar contaminated mixes
- **RAP content limits for hot recycling often below 50%**
  - Usually < 30% - No testing < 10%
  - Cold recycling up to 100% RAP
- **Main usage in base and binder layers**
  - New in wearing courses for SMA and dense mixes
- **Rejuvenators :** not so much used
- **PmB** more and more used

Thank you for your attention !