Overview of French Research Project on Cold Mix Asphalt Recycling for Road Construction / Maintenance

Vincent GAUDEFROY

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Cold mix asphalt properties

- Time-dependent behaviour
  - Strong behaviour changes during its life from unbound material to HMA behaviour: curing and cohesion build-up

- Local competences
  - Mix design and manufacture are empirical
  - Many difficulties to 'spread' CMA processes over French territory

Research program
- Assess pavement layer behaviour versus time
- Develop mix design methodology

Experimentation

- Assess pavement layer behaviour versus time
  - Construction and monitoring of experimental sections
    - Departmental Road n°20, October 2006 (with local authority CG31)
    - Departmental Road n°44, July 2008 (with local authority CG35 and French Union of Road contractors USIRF)

Experimentation

Internal instrumentation (CMA Layer)

- CMA internal behaviour
  - Gauge responses
  - Temperature and moisture evolution

External instrumentation (climatic conditions)

- Climatic conditions (rainfalls, wind, solar UV, atmospheric IR radiations)

Objective

Globally assess local weather features and correlate them with in situ curing of the GE
Additional assessment

- CMA internal behaviour
  - Cored and sieved samples to check binder characteristics and mixes mechanical performances (EN 12697-26) over time

Methodology used

- Constituents and worksite control
  - Aggregate and grave-emulsion characteristics
  - On site workability (French gyratory compactor PCG2)
  - Jobsite mix cohesion characterization (workability test and torque measurement)

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Deflexions decrease with time

Research subjects on CMA

- Monitoring jobsite behaviour
  - Classical in situ behaviour assessment (coring, mechanical perf.)
  - Links with binder ageing (extraction methodology, …)
  - External auscultations and in situ instrumentation

- Laboratory characterization methodology
  - Correlate materials time-dependent behaviour with climatic conditions
  - Develop lab methodology (especially curing conditions) to achieve CMA characterization

This study is in progress since 2007 (internal works at IFSTTAR and collaborative project with Private Industry)

CONCLUSIONS

- Great interest of Road Companies and French Administration for these environmentally friendly techniques with regard to sustainable development

- Researchees to check cold asphalt mixes properties
  - Very short term : Equivalent to unbound materials
  - Short term : bound materials (GSC, Modulus, Rutting, …)
  - Long term : Properties durability (Fatigue)

- Develop a collaborative mix and pavement design methodology (including specific tests – and experimental conditions evaluation dedicated to CMA assessment)

- Standardization (French and European levels) of cold mixes
Outputs

- 4 MLPC methods as helping tools to design CMA treated with bitumen emulsion (2011 - in French)
  - MLPC 74: Coating quality and consistency
  - MLPC 75: Hydrous stability of CMA (manufacturing, transport, storage)
  - MLPC 76: Cohesion evolution (workability, torque measurement)
  - MLPC 77: Aggregate reactivity of emulsion/aggregate couple

Collaborative project with the French Union of Road contractors
- 14 communications in a French journal « RGRA » (2011 to 12)
  → from manufacturing process in lab to CMA mechanical properties
- Special issue available for the next congress Eurasphalt and Eurobitume (June 2012 - in English)

IDRRIM French working group
- Guide in progress on « Materials treated by emulsified bitumen and foamed bitumen »

Thank you for your attention!

contact :
vincent.gaufroy@ifsttar.fr