CONSTRUCTION ASPECTS – PAVING WITH HPCM

TRA08 Workshop

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Ljubljana, April 2008

What is HPCM?

HCPM is an innovative material and production characteristics are not very well known.

Its composition is advanced and highly optimised, though all components are commonly used in ordinary concrete production

Risks Associated with the use of HCPM

Risks of construction failures may be identified in the following production phases:

1. Batching and mixing of HPCM
2. Transportation of the material
3. Paving of the mortar
4. Application and bonding of the coarse aggregate chippings

1. Batching and Mixing of HCPM

Some problems have been identified regarding batching and mixing of HCPM in production, i.e.:

- All silos for constituent materials, i.e. cement, aggregate, additives and micro-silica must be emptied and cleaned before production starts
- Laboratory test indicate the need for high-shear mixers
- Required mixing time is long
- The completed mix is characterised by a certain degree of stickiness, which may impact the discharge of the material

However, possible solutions have been defined:

- When market demand justifies investments in dedicated production units for HPCM, such plants may be designed for production of these materials exclusively
- Batching sequence of constituents may be optimised

2. Transportation of the Materials

The risks associated with the transportation of the materials can be mitigated by:

- Ensuring that transportation will only take place in truck mixers
- Development of thixotropic characteristics to facilitate an acceptable discharging time and assure complete discharge of the load of the truck mixer

3. Paving of the Mortar

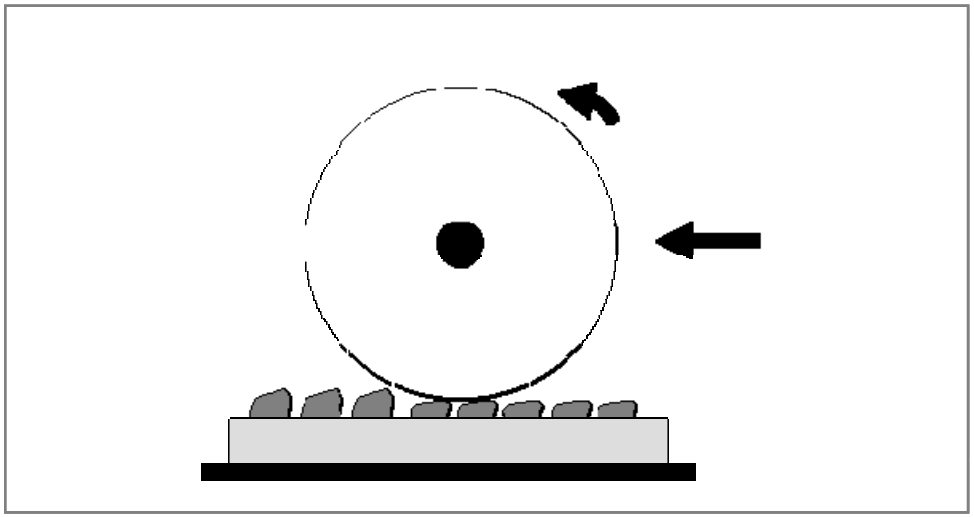
Need for innovative paving solutions:

- Equipment of paving a 12 mm thick layer of HPCM is not directly available on the market
- However, concrete paving equipment as e.g. Bidwell Pavers could probably be modified to perform the task satisfactorily

4. Application and Bonding of the Coarse Aggregate

Skid resistance requires a rough surface:

- Technologies known from spreading aggregate chippings on bituminous surface dressings seem to lend themselves to spreading of aggregates
- Technologies to secure a proper embedment of the aggregates into the HPCM layer must be developed.
  - it may be assumed that a light rolling of the surface could be sufficient



Full Scale Trial Sections

Production related objectives of a full-scale trial section:

- Establish work instructions for pre-treatment of asphalt, mixing of HPCM, transportation and paving
- Create confidence in the process
- Establish the basis for a realistic cost estimation

Concept related objectives of a full-scale trial section:

- Demonstration of performance compliance with expectations, particularly
  - control bonding HPCM/Asphalt
  - establishing of record of relation between temperature and transverse displacement
  - pavement response to varying conditions of traffic

Conclusions

- Production of HPCM wearing course require introduction of technologies, which are not yet developed
- Development of innovative solutions based on conventional technologies seems possible
- However, a number of minor full-scale trials will be necessary to indicate the best ways forward