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Long Life Surfaces for Busy Roads

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The economic benefits of two advanced materials for long-life wearing courses and conclusions of Phase II

by

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Epoxy Asphalt Costs

- Costs estimates were sought from from member countries, but only few could respond to questionnaire
- EA is supplied mainly as proprietary material, hence
- Cost information from suppliers were only available on a 'laid per sq m' basis
- Indicative total price for milling an existing surface course and repaving with EA can be expected to be in the 25 to 45 € per sq m range
- Responses indicated current costs (April 2007) for best traditional surfacing to be in the 13 – 25 € per sq m range

Indicative costs of Epoxy Asphalt surfacings

Epoxy Asphalt Surfacing (30 mm)	Indicative Cost Euros per sq. m
Milling	0.75 – 1.25
Binder course	6 - 10
Tack/bond coat	0.25
Wearing course materials	n.a.
Sub-total: cost of mixed material, incl. mixing transport and laying	*18 - 33.5*
Indicative Total Costs of EA wearing course	**25 – 45**

HPCM Costs

- No supplier experience yet with this material, hence
- Production and laying costs more difficult to estimate than for Epoxy Asphalt
- Material, mixing and transport cost can be evaluated based on current experience in member countries, but
- Paving costs more difficult to assess if new or modified paving equipment has to be developed

Indicative Cost of HPCM Matrix

HPCM matrix with chippings		**Cost**
Materials	Quantity and cost	€ per m3
Silicious sand	**890 kg @ 15 €/ t**	**13.35**
Cement, CEM I	**1.020 kg @ 90 €/ t**	**91.80**
Microsilica	**205 kg @ 270 €/ t**	**55.35**
Water	**220 kg @ 10 €/ t**	**0.22**
Superplaticiser	**3 kg @ 6 €/ kg**	**18.00**
Steel fibres	**230 kg @ 3 €/kg**	**690.00**
Sub-total		868.72
Contingency for waste etc.		**31.28**
Cost of material per m3		**900.00**

HPCM Surfacing Production Cost per m^2

Production cost categories	**€ per m^2**
HPCM materials, 0.01 x 900 (10 mm thickness)	9.00
Mixing HPCM, 0.01 x 50	0.50
Transport to site, 0.01 x 20	0.20
Paving incl. Chippings	5.00
Total direct cost per m^2	*14.70*
Overhead, site management, risk and profit	3.30 – 7.30
Estimated cost per m^2	**18.00 – 22.00**

Indicative Cost Estimates: Comparison of EA, HPCM & Reference mixes

TYPICAL SURFACING COSTS IN €/M2 FOR WESTERN EUROPE				
Description	**Epoxy Asphalt 30mm wearing course**	**HPCM 10mm wearing course**	**Conventional 30mm asphalt solution**	
Expected Lifespan	~30 years	~30 years	7-15 years	
Milling 50-100mm	0.75-1.25	0.75-1.25	0.75-1.6	
Binder course (50mm)	6-10	8-12	6-12	
Tack/bond coat	0.25		0.1	
Wearing course	18-31	20	6-12	
Total costs	25-42.5 [1]	29-33	13-25 [2]	

[1] Cost of restoration (once) of skid resistance during the service life not included
[2] Costs of minor repairs during 15 years of service not included

Interpretation of Indicative Cost Estimates

- Significant benefits were expected if long life surfacings cost no more than around 3 times conventional surfacing costs
- Indicative costs of an advanced surfacing could be between 2 and 3 times the cost of a conventional resurfacing treatment.
- These estimates are broadly consistent with the Phase I cost envelope, suggesting significant benefits in their use.
- These cost premiums for the EA and HPCM wearing courses, by comparison with conventional surfacing costs, are probably less than assumed for the Phase I study, due in part to:
  - **better understanding of the costs and production processes involved**
  - **the significant increase in the cost of asphalt surfacing, particularly in Western Europe, in recent years**.

Phase II project: Conclusions

- The project has succeeded in demonstrating the scope for significant advances in surfacing materials that are not normally considered in the traditional thinking for highway pavement development.
- The expectations for the long-life capabilities of the materials are based on extrapolations of observations made during the testing, but nobody can give full guarantees for the behaviour of materials in the extrapolated time domain.
- If the potential economic benefits of these advanced technology pavements types are to be realised, then the innovation process must be taken to the next phase, in which the materials are tested in larger scales under real traffic on roads or off roads.

Phase II project: Conclusions (continued)

- Field Trials are necessary if the potential economic benefits of these materials and techniques are to be realised
- The project has progressed to the point where limited Field Trials under traffic - either on the road network or off-road - are the logical next phase
- As always, with such larger-scale trials of new materials and techniques, there are risks.
- Nevetheless, some road authorities, perhaps in partnership with industry, will probably be prepared to take this step.

Phase III Field Trials: Overall Aims

The overall aims of a coordinated programme of field trials of the Epoxy Asphalt and HPCM surfacings are:

- To demonstrate that the performance envisaged on the basis of the laboratory tests and the accelerated testing will hold within the period of the trial under real traffic and environmental conditions.

- Collateral aims include to: develop construction methods, improve cost estimates, optimise material mixes and increase contractor experience levels.

Recommendations for Phase III

The Report from Phase II recommends that:

- Interested road authorities be invited to register with the JTRC Secretariat their interest in joining the proposed trials as soon as possible after the publication of this report
- When at least three trial offers have been received involving use of Epoxy Asphalt or HPCM surfaces, a preparatory meeting be called by the host organisation.
- Such preparatory meetings will appoint a coordinator and agree on the plans and principles for the management of the trials.
- Participants may begin trials whenever it suits their plans after the preparatory meeting, but not later than May 2009.
- The trials must last a minimum of 2 years and must be terminated no later than May 2011.

Recommendations for Phase III (continued)

- Participants are to deliver their final report within 3 months after their trials have been completed and no later than in July 2011.
- Coordinators to prepare consolidated reports for the two pavements types in cooperation with participating countries

The Report further recommends that:

- The JTRC assumes the role of the host organisation and calls the meetings of the participants in this Field Trial phase.
- Funding and management of the field trials as well as recording and disseminating the results rests are the responsibilities of the sponsoring organisations, participants and project coordinators.

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