Use of reinforced asphalt concrete in road maintenance
(VSS2007/702)

Einsatz von Asphalzbewehrungen im Erhaltungsmanagement

Funding: National (Switzerland)
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Status: Complete with results

Background & policy context:
Recently, different methods of reinforcement have been used to repair asphalt pavements with the aim of reducing costs and increasing the time between routine maintenance. The results from the first Swiss studies have shown that the use of reinforcements in asphalt pavements as a maintenance measure is not always successful. Long term performance evaluations are not available and the specific features of different reinforcements are not well known.

Objectives:
This pilot study aimed to summarise the state-of-the-art of experience and knowledge regarding national and international applications of reinforcement for asphalt maintenance. First, conclusions for the application of reinforcement in asphalt maintenance in Switzerland were sought; where possible, providing recommendations as well identifying gaps in existing knowledge.

Methodology:
The methodology comprised undertaking a broad literature review to develop a basic understanding of asphalt reinforcement (term systematization, design methods, summary of decisive parameters such as material, function and various building structures).

Further research was carried out to validate accelerated in situ traffic load simulation (Accelerated Pavement Testing - APT) tools. There is a definition of requirements and constraints for implementing an advanced research. This concerns, among other things:

- The number and size of to be examined test tracks;
- Testing and evaluation program of test tracks (Accelerated in situ traffic load simulation APT);
- Construction of structures to be examined;
- Explanation of the variables to be examined and their evaluation standards;
- Demands on the cooperation of the Research Centre, exporting company and manufacturer of grid interlayers and road operators.

Related Projects:
VSS2008/505 "Révision des méthodes de dimensionnement et renforcement des chaussées" (REDIRE) (Revision of pavement design and reinforcement methods). Research organisation: Swiss Federal Roads Office; Research Roads-Bridges-Tunnels


Parent Programmes:
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Key Results:  
The investigation of products and applications showed that asphalt interlayers are manufactured from various materials and composed in various structures. Asphalt interlayers consist of materials such as plastics, glass, carbon or steel. They feature structures which are either grid shaped (geogrids), plane (nonwoven geotextiles), or a combination of both (geocomposites). A simplified market search turned out the availability of at least 18 products consisting of 10 geocomposites, 7 geogrids and 1 nonwoven geotextile. Apart from certain applications with steel mashes and synthetics the most used materials for asphalt interlayer in Switzerland are glass fiber and carbon. The SN 670 092 EN ISO 10318 defines a product nomenclature, specifying GTX-N for nonwoven geotextiles, GGR for geogrids and GCO for geocomposites.  

For pavements, asphalt interlayers are applied within maintenance treatments as overlays and replacements. Three major fitting types could be identified. With type 1, the asphalt interlayer is fitted between the old and damaged asphalt wearing course and the new wearing course (overlay). Type 2 is used for renewal of the pavement (replacement). Type 3 is used for pavement renewal in the sense of partial or total structural replacement (replacement).  

With all three fitting types, the asphalt interlayer exists in a composite with bituminous courses of the pavement. The characteristics and functionality of asphalt interlayers – such as reinforcing, sealing and strengthening – do not only depend on the asphalt interlayer itself but also on its interaction with the neighboring layers. Various laboratory tests have assessed the shearing force on drill core samples with and without asphalt interlayers.  
The experiments yielded that asphalt interlayers are capable of compromising the composite. The exact causes have yet to be concluded. In order to gather experience regarding the application and long-term performance of asphalt interlayers, interviews with road agencies and product manufacturers in Switzerland have been conducted.  
The following questions regarding application and effectiveness of asphalt interlayers for maintenance remained unanswered and are therefore of great interest:  

- Bridging (penetration of cracks, progress over time)  
- Crack pattern (distribution, gap size, etc.)  
- Shear/adhesion (forces and effects, progress over time)  
- Rigidity/deformation  
- Moisture at crack area (water intrusion)  

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Technical Implications  
The objective for long term and object related research consists of the development of criteria for an application assessment of new products. In order to validate various products on-site, the effectiveness
and life span of asphalt interlayers within pavement course systems shall be assessed practically and with the required laboratory measurements.

Documents:
Final-report.pdf (Final report)

STRIA Roadmaps: Infrastructure
Transport mode: Road transport
Transport sectors: Passenger transport, Freight transport
Geo-spatial type: Other