Maintenance and Rehabilitation

Asphalt reinforcement interlayers as reflective cracking mitigation system in rehabilitated pavements

Fabiana Leite-Gembus[1], Andreas Elsing[1], Patricia Amo[2]
[1]Huesker Synthetic GmbH Germany, [2]HUESKER Geosintéticos S.A. Spain

Abstract

The conventional method for rehabilitation of cracked pavements is the installation of new asphalt layers. This procedure is often not an effective solution, as the action from external forces, such as traffic and temperature variations, contributes to the rapid propagation of the cracks from the deteriorated asphalt layers to the surface of the new overlay. This phenomenon, known as reflective cracking, is one of the major modes of failure in rehabilitated pavements. In order to delay the development of reflective cracks asphalt reinforcement interlayers have been largely used in the last decades, providing consistent results in the addressing the issue of crack propagation. Similarly, different researches have shown a significant reduction in reflective cracking associated with the use of geosynthetics. Through basic theory and practical experiences this paper will demonstrate the success and extended pavement life that can be achieved by using asphalt reinforcement interlayers in highway applications. Special attention is given to the performance on site, e.g. the loss of tensile strength due to the paving procedure and the importance of using alkali-resistant materials when in direct contact with concrete or cement stabilized materials. Additionally, requirements and relevant characteristics presented in the currently available guidelines are described. The increased pavement life achieved by the use of this technology not only prevents excessive disruption to traffic flow and local business, but it also demonstrates strong environmental and economic benefits.

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1. INTRODUCTION

The propagation of an existing cracking pattern from the old pavement into and through the new asphalt overlay is very common, especially in rigid and semi-rigid pavements. Expansion joints from concrete slabs or cracks from a cement-treated layer can rise to the surface over a short period. This occurs mainly by the movement of the concrete slabs beneath the asphalt surface due to thermal or moisture changes and shrinkage in the case of a cement stabilized base [1]. Water infiltration in this case can cause loss of aggregate interlock, pumping, layer separation and localized deterioration of the pavement along the crack [2].

In order to delay the development of the reflective cracks, an asphalt reinforcement interlayer can be placed before the resurfacing. The use of asphalt reinforcement interlayers can considerably extend the pavement service life and therefore increase the maintenance intervals of rehabilitated asphalt pavements [3, 4]. Currently there are a number of different products and systems made of different raw materials (e.g. polyester (PET), glass fiber, polyvinyl alcohol (PVA), carbon fiber and polypropylene (PP)) available in the market. It is not disputed that each of these systems has a positive effect in the battle against reflective cracking [5, 6]. However, there are differences in the behavior and effectiveness of each system.

The purpose of this paper is to provide the reader sufficient information to introduce the concepts of using asphalt reinforcement interlayers in the pavement rehabilitation. The European standard and existing relevant guidelines regarding this application are presented and important characteristics to be considered by the selection of a reinforcement product are highlighted. Additionally typical practices and limits for the use of asphalt reinforcement interlayers, described by basic theory and project experiences, will be demonstrated.

2. REFLECTIVE CRACKING

Reflective cracking consists on the propagation of cracks from a deteriorated layer to the surface of a new overlay and is the major modes of failure in rehabilitated pavements [7]. It is well known that cracks appear due to external forces, such as traffic loads combined with temperature variations. The temperature influence leads to the binder content in the asphalt becoming brittle, so that cracking starts at the top of a pavement and propagates down (top-down cracking). On the other hand, high stresses at the bottom of a pavement from external dynamic loads lead to cracks that propagate from the bottom to the top of a pavement (bottom-up cracking).

When a wheel load passes over the road construction, localized bending and shear stresses appear on the existing crack and cause the origin and further development of cracks [3, 6]. The shear action occurs twice by each load application, while the bending action occurs only once (Figure 1).

Figure 1: Critical loading cases in a pavement crack

A conventional rehabilitation of a cracked flexible pavement involves milling off the existing top layer and installing a new asphalt course, but cracks are still present in the existing (old) asphalt layers. As a result of the horizontal and vertical movements at the crack tip, the cracks will propagate rapidly to the top of the rehabilitated pavement.

In a similar case, deteriorated concrete pavements are typically rehabilitated by installing new asphalt layers over the old concrete slabs. The temperature variations lead to a rapid crack propagation especially at the expansion joints to the top of the new asphalt overlay. As summary, it can be stated that simple hot mixed asphalt (HMA) overlays are not cost-effective against reflective cracking [7].

In order to delay the propagation of cracks into the new asphalt layers, there are several techniques to rehabilitate cracked pavements. However, one of the most popular method among new techniques recommended is the use of interlayer systems between the old pavement and the new overlay, such as geosynthetics [8].

3. ASPHALT INTERLAYERS

For more than 40 years geosynthetics have been used in road construction and rehabilitation as anti-reflective cracking system. The idea of an asphalt reinforcement interlayer for road construction emerged in the early 1970s. The initial intention was that the embedded geotextile layer was able to pick up the tensile stresses in the asphalt and prevent cracks from forming. However, it was soon realized that this principle did not work, but the product proved very useful at delaying the formation of reflection cracks in resurfaced carriageways.

Asphalt interlayers can act as reinforcement, stress relief and/or interlayer barrier [9]. However, certain products only perform a single function and others can perform several functions from a single product. Basically, there are three types of geosynthetics to be used as asphalt interlayers: geotextiles (nonwovens), geogrids (grids) and geocomposites (composites).

Geotextiles or nonwovens serve as stress absorbing membrane, which allows slight differential movements between the two layers, providing stress relief. Moreover, in conjunction with a tack coat, the nonwoven act as a barrier to the ingress of water, preventing or delaying the deterioration of the pavement.

While the stress relief function concerns to soft products to dissipate strain energy by deforming itself, the reinforcement function regards stiff products, such as grids, to compensate the lack of asphalt tensile strength [7]. In providing reinforcement, the grid structurally strengthens the pavement section by changing the response of the pavement to loading [10], reducing the peak shear stresses at the edges of the cracks in the existing old pavement. The reinforcement also provides a normal load to the crack surfaces, thereby increasing the aggregate interlock (shear resistance) between both crack surfaces and thus increasing the resistance to reflective cracking.

Composites are products which combine generally nonwoven and grid, providing stress relief, moisture barrier and reinforcement function. Many products have been promoted as a reinforcement when in fact these products serve only a separation, moisture barrier, function. Designers should have a clear understanding of the limitations all the different asphalt interlayer products offer in terms of position and stress-strain characteristics within the pavement structure [11].

With the purpose of analyse and quantify the improvement of the crack resistance when using an asphalt reinforcement, several studies have been developed during the last decades. Montestruque [3] performed at the Aeronautics Technological Institute in Sao Paulo in Brazil a full testing program to evaluate crack reflection potential. An asphalt wearing course was applied over an existing crack and both the bending mode and the shear mode were investigated under dynamic fatigue loading conditions. Moreover, numerical simulations were performed using the Finite Element Method (FEM) to interpret the results obtained from the tests. The results indicate that a bitumen coated polyester grid attached to an ultra-light nonwoven considerably delayed the through-penetration of cracks generated due to shear stresses and bending stresses. Compared to the unreinforced material, the reinforced asphalt layer was subjected to up to 6.1 times the number of dynamic loading cycles before a crack reached the surface. The crack pattern clearly shows that the reinforcement takes up and distributes the tensile forces (Figure 2). The numerical simulation allowed a better understanding of the crack propagation mechanism observed in the laboratory. The grid absorbs part of the applied load, interrupting the propagation of the reflective crack. Once the reflective crack problem is controlled, the durability of the overlay and the appearance of new cracks became a function of the asphalt concrete fatigue characteristics.

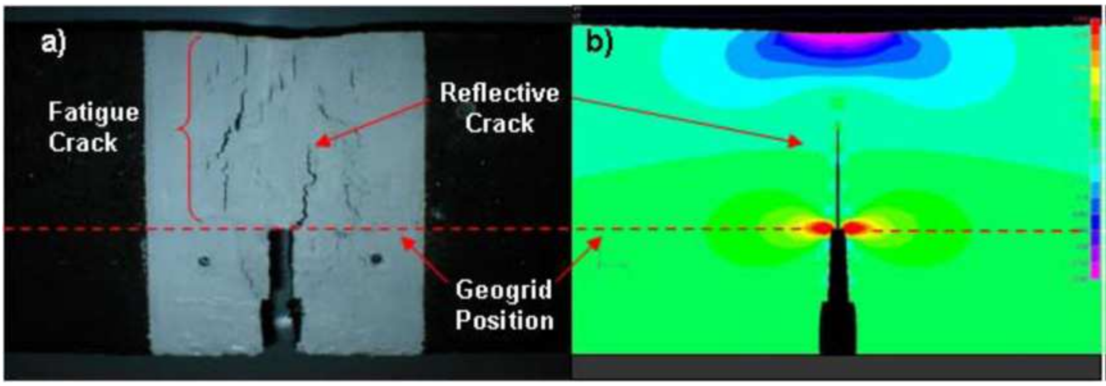

Figure 2: Comparison between the laboratory and the numerical simulation results [3]

Norambuena-Contreras et al. [6] tested eight different types of geosynthetics used as anti-reflective cracking systems. The reflective cracking test results showed that the use of an asphalt interlayer produced a reduction on the average crack opening in all cases evaluated. Nevertheless, it was found that products that present high tensile strength do not necessarily present a high contribution on retarding the crack propagation in asphalt pavements. Additionally, it has been seen that the resistance to deterioration of materials that composes the geosynthetic is a more decisive factor on their subsequent behavior than the material itself.

As found by De Bondt [12], the bonding of the material to the surrounding asphalt plays a critical role in the performance of an asphalt reinforcement. If the reinforcement is not able to sufficiently adopt the high strains from the peak of a crack, the reinforcement cannot be effective. In his research, de Bondt determined an equivalent “bond stiffness” in reinforcement pull-out tests on asphalt cores taken from a trial road section. The equivalent bond stiffness of a bituminous coated polyester grid was found to be the best of all the commercial products investigated.

A study in the University of Texas regarding geosynthetic-reinforced asphalt systems evaluated the crack propagation in reinforced and unreinforced asphalt overlay specimens. The experimental research was conducted using a fatigue loading mechanism able to induce tensile and shear stresses and, in addition, an image acquisition system was used to track propagation of cracks during overlay tests. The effectiveness of four different geosynthetics in retarding the reflective cracking from an old asphalt into a new overlay was verified. The products tested presented the same mesh size and the same coating to better see the influence of the raw material. Table 1 presents the characteristics of the asphalt reinforcement interlayers investigated.

Table 1. Asphalt reinforcement types analysed

Property	Reinforcement type			
	1	2	3	4
Raw material	PVA	PET	Glass	Glass
Tensile strength [kN/m]	50	50	50	100

Overall, the reinforced asphalt specimens showed better fatigue performance than the unreinforced ones. The PVA and PET fibers are more compatible with the asphalt concrete and these products showed better results in the interaction with the asphalt specimen at later fatigue life. The normalized load of the PVA reinforcement was the highest, indicating the best performance of this material in enhancing the shear resistance of the asphalt concrete. The PET reinforcement shows second best results, close to them of PVA. So it is clear that there are different factors influencing the efficiency of an asphalt reinforcement besides the stiffness.

4. EUROPEAN STANDARD AND LOCAL PRACTICES

The European Standard EN 15381:2008 “Geotextiles and geotextile-related products - Characteristics required for use in pavements and asphalt overlays” [9], specifies the relevant characteristics of a geosynthetic for the Declaration of Performance (DoP) and CE-marking. According to the function of the product – reinforcement, stress relief or interlayer barrier – specific characteristics have to be declared. This standard can also be used by designers to define which product functions and conditions of use should be considered in the project, when using asphalt reinforcement grids.

In Germany, it was published in 2013 the technical working paper FGSV 770 [18] from the Road and Transportation Research Association regarding the use of asphalt interlayers in pavements. In this document important definitions of terms, application fundamentals, operating principles, types of products as well as their properties, testing procedures and reference values are presented. Moreover, it outlines information on the proper and professional installation of asphalt interlayers and may also be used by engineers for definition and specification of relevant functions and performance of reinforced of asphalt.

In the UK it was published in 2012 a new code of practice from the Road Surface Treatment Association (RSTA) [19] to provide highway authorities, designers and contractors a thorough understanding of asphalt interlayers. The code contemplates important aspects for the installation, information about different types of asphalt interlayers and reflective cracking.

4.1. Tensile strength

The EN 15381 specifies that the tensile strength of asphalt reinforcement grids should be carried out according to the EN ISO 10319 "Geotextiles – Wide-width tensile test" [13]. If this method is not suitable for a certain product type, it can be tested using a different standard. However, the tensile strength shall be always performed on finished products.

4.2. Installation damage

According to the EN 15381, damage during installation of an asphalt reinforcement grid is influenced by the paving procedure and by the compaction of the asphalt. After an asphalt reinforcement product is placed, many asphalt delivery trucks may have to pass over the grid. Additionally there is the compaction of the hot mix asphalt, during which the individual filaments or strands of the asphalt reinforcement are largely influenced by the movement of aggregates, in particular of coarse and sharp-edged aggregates. Next to the reinforcement characteristics (flexible or brittle raw materials), the degree of installation damage by roller compaction not only depends on the number of passes and the type of compaction (e.g. rubber tired, static, dynamic). The degree of installation damage is additionally influenced by the weight of the compactor and the condition of the base layer (e.g. smooth, rough or milled).

To successfully counteract reflective cracking, placed reinforcement products must resist the installation influences without damage and as much as possible without serious loss of strength. A detailed research was carried out by the RWTH Aachen University in Germany [14] to analyse and quantify the residual tensile strength of asphalt reinforcement grids after the influence of installation damage. Site tests were performed and two asphalt reinforcement products with different raw materials (polyester and glass fiber) were tested.

The results showed, that the potential of installation damage on asphalt reinforcement materials can vary depending upon the adopted product (Figure 3). The polyester grid lost max. 30% of its tensile strength after loading from truck passes and asphalt compaction. In contrast to this the glass fiber grid showed a loss of strength up to approx. 90%. This revealed that brittle raw materials can be damaged significantly more compared to a polymer grid reinforcement.

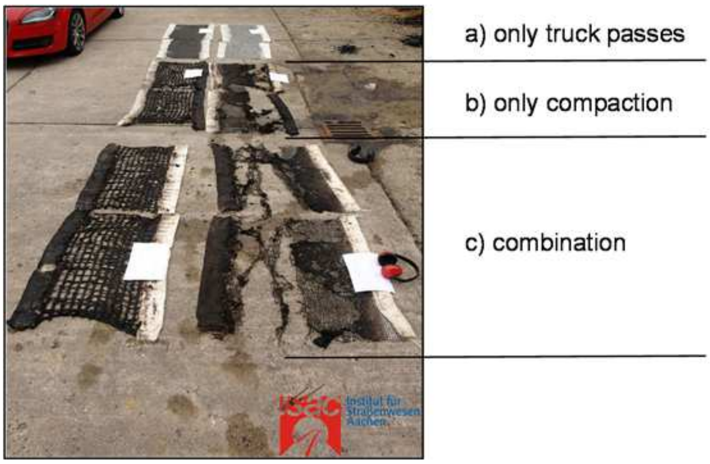

Figure 3: Results of installation damage test (left: polyester grid; right: glass fiber grid) [14]

Due to this good resistance to mechanical influences, polymer materials can be installed directly on milled surfaces. In contrast, fiber glass grid products usually require an asphalt levelling layer before the installation.

To summarize, all asphalt reinforcement undergoes installation damage caused by the combination of different activities during the pavement construction. This damage has the effect of reducing the available post-construction strength of the reinforcement and, subsequently, it is important to know the residual strength of a product. Installation damage can be simulated by the use of the testing procedure detailed in EN ISO 10722 [15].

4.3. Durability

The durability of an asphalt reinforcement grid, i.e. its resistance to chemical degradation, will depend mostly on the type of raw material that is used and on the environment conditions. The standard EN 15381 specifies some important durability aspects, such as weathering, alkaline resistance and melting point, which should be considered when using asphalt reinforcement grids.

If a product is to be used in direct contact with an unprotected concrete or cement stabilized surface, alkaline resistance is needed. For example, grids made of polyvinyl alcohol (PVA) have a high strength and stiffness and a good resistance to alkalis, lower concentrations of acids, and oils. Otherwise, glass fiber grids are sensitive to hydrolysis and when exposed to concrete, progressive loss of stiffness and weakening of the grid can be expected [16].

Regarding the material stability, polymer products must have a higher melting point than the temperature of the installed asphalt. According to Norambuena-Contreras et al. [6], the resistance to deterioration and installation damage of materials that composes geosynthetics is the most decisive factor on their subsequent behavior in the pavement rehabilitation.

4.4. Interlayer bonding

To mobilize tensile forces in the reinforcement a good bonding between the asphalt layer and the integrated asphalt reinforcement interlayer is essential. If the grid is not able to sufficiently adopt the high strains from the peak of a crack, the reinforcement cannot be effective. The Leutner shear test is a static testing method developed in Germany in the late 1970s to assess the asphalt layer bond in road construction. The bonding effect of the layer surface is determined on 150 mm diameter cores, either taken from a pavement or produced in the laboratory. The test specimens must be at least double-layered and conditioned at 20°C for 12 hours. The test is described in the German guideline TP Asphalt-StB Teil 80 [17].

Based on the German guideline ZTV Asphalt-StB 07/13 the shear force within the testing procedure according to Leutner should not be lower than 15 kN between the binder course and the surface layer. The German working paper document regarding the use of asphalt reinforcement FGSV 770 stipulates a shear bond force of at least 10 kN between the asphalt layers, when using an asphalt reinforcement. Table 2 shows the results of drill cores tested at the University RWTH Aachen in 2018. The results show that the bonding strength is not significantly influenced by a polyester asphalt reinforcement grid with an ultra-light nonwoven, coated with polymer modified bitumen.

Table 2. Comparison of shear forces of unreinforced drill cores and HaTelit reinforced drill cores

Temperature	Without reinforcement (mean values)		With reinforcement (mean values)	
	Shearing force [kN]	Shearing distance [mm]	Shearing force [kN]	Shearing distance [mm]
20°C	26.1	3.9	24.9	3.8

In order to provide an example of long term bonding strength using polyester asphalt reinforcement grid, the project Rosenstrasse located in the German town of Ochtrup is presented. The Rosentrasse is a highly trafficked road, being one of the main connections to the nearby border of the Netherlands. Before its rehabilitation in 1996 the road revealed severe alligator cracking, longitudinal and transverse cracking in large scale. The rehabilitation comprised to mill off the cracked wearing course, install a high modulus polyester grid as asphalt reinforcement over the cracked binder course and resurface with a 50 mm thick asphalt overlay. In context of a masters-thesis in 2013 the condition of the Rosenstrasse have been evaluated and drill cores have been taken [18]. Between the asphalt binder course - polyester reinforcement - and wearing course a maximum shear force of 24 kN according to Leutner was measured. After evaluating the whole data record it was found, that the pavement condition after a lifetime of 17 years was still very good.

5. PRACTICAL EXPERIENCES

The following projects shall give an example of the successful use of asphalt reinforcement in roads.

5.1. Wundtstrasse, Leipzig, Germany

The road Wundtstrasse in Leipzig, Germany, is a major traffic artery, with northbound lanes heading into the city centre and southbound lanes towards Borna, Altenburg and Chemnitz. According to Leipzig‘s Transport and Public

Works Department, Wundtstrasse ranks as a Class Bk32 (10-32 million 10-tonne axles) and partly Class Bk100 (> 32 million 10-tonne axles) vehicular pavement.

The external action traffic and temperature fluctuations had resulted in reflective cracking through propagation of the concrete slab expansion joints into the asphalt overlay. As a result, in 2011 the Wundtstrasse was badly in need of repair and a pavement rehabilitation was required.

The planned rehabilitation initially required the existing 120 mm asphalt overlay to be milled off so as to expose the original concrete pavement. The concrete base was then cleaned and a crack filler was used to seal the open concrete joints (Figure 4).

Figure 4: Milled concrete surface and filled joints

To effectively retard the future propagation of expansion joints into the new asphalt overlay, an asphalt interlayer was used. The chosen material was an asphalt reinforcing composite comprising a biaxial geogrid made from high-modulus polyvinyl alcohol (PVA) in combination with a 130 g/m² polypropylene (PP) nonwoven fabric. Unlike other raw materials, PVA offers very high resistance to alkaline environments, making it ideal for concrete pavement rehabilitation with asphalt overlays. Both the reinforcement grid and the nonwoven have a bituminous coating which contributes to a high bond between the layers and the reinforcement. The reinforcing action of the grid is complemented by the stress relief and sealing function of the bitumen saturated nonwoven.

A bitumen emulsion with 70% bitumen content was first sprayed onto the milled concrete base at a rate of approx. 2 kg/m². The asphalt reinforcing composite was then installed in accordance with the manufacturer's guidelines (Figure 5). Once in place, the asphalt interlayer was overlaid with an 80 mm binder course (AC 16 BS) and a 40 mm asphalt surface course (SMA 11 S).

Figure 5: Installation of asphalt reinforcing composite SamiGrid

Five years after the rehabilitation, the reinforced area in the Wundtstrasse still does not show any indication of cracking (Figure 6).

Figure 6: Pavement condition in 2016

The use of asphalt reinforcing composite prevented the propagation of reflective cracks developing from the joints and cracks of the concrete slabs and proved to be an effective solution. The technique of introducing a polymeric reinforcement into bituminous pavements has been demonstrated to extend the working life of asphaltic pavements by up to three times. It is therefore anticipated that a similar benefit is expected to be achieved on this project. This will help to minimise any traffic diversions and disruption caused by this type of remedial work, as well as reducing future maintenance costs.

5.2. Autovía A-4, Puerto Lápice, Spain

The Autovía A-4 is one of most important motorways of Spain road infrastructure. It is part of the European Route E05 and the main means of communication between the centre and the south of the Iberian Peninsula. In 2013 the concrete pavement section between the km 67.500 and 133.494, close to the municipality of Puerto Lápice, was predominantly classified in very poor to fair condition and a rehabilitation was required to improve the riding quality.

The existing pavement was comprised of concrete slabs with approximately 350 mm of thickness. The rehabilitation design previewed an asphalt overlay. However, before the resurfacing, different measures were carried out according to the damage degree of the pavement:

1. Demolition and removal of deteriorated concrete slabs, showing many cracks and structural breaks. After recuperation of the base layer, the area was filled with concrete asphalt type AC32G and compacted up to the planned reprofilling layer.
2. Injection under the slabs presenting continuous cracks between joints and faulted or depressed joints. The technique consisted in sealing the cracks and joints, drilling the corners and subsequent injection of cement grout until achieving stabilization of the base.

After concluding these interventions, two different rehabilitation configurations were considered according to the pavement state of conservation. In sections classified as very poor to fair a regulating asphalt layer of 2 cm thickness was initially placed over the concrete slabs. Afterwards tack coat was sprayed and an asphalt reinforcing grid with ultra-light nonwoven backing was placed. In the sections showing less important functional distresses or superficial irregularities tack coat was sprayed and the asphalt reinforcing interlayer was placed directly on the concrete slabs.

The specification of geosynthetic reinforcement for asphalt application was intended to mitigate joint reflection cracking from the concrete slabs. The chosen reinforcement material is made from polyvinyl alcohol (PVA) yarns, presenting very high tensile stiffness coupled with low creep and high resistance in alkaline environments (e.g. concrete surfaces). Moreover, the product used present a polymer modified bituminous coating to enable a good bond between the asphalt layers.

The concrete asphalt overlay was placed after the complete installation of the geosynthetic reinforcement. It was composed by two layers: a 4 cm binder layer type AC22 and a 2 cm wearing course type BBTM 8A. The road rehabilitation was carried out in June 2013. Figure 7 and 8 illustrate the installation of the asphalt reinforcement interlayer.

Figure 7: Detail of the sealed concrete pavement joint, asphalt regulating layer and PVA asphalt reinforcing grid with ultra-light nonwoven

Figure 8: Rehabilitation of the Spanish Motorway A-4

Six years after the rehabilitation, the reinforced area in the Spanish motorway A-4 still presents a good performance and the crack propagation could be retarded.

5.3. Perth Airport, Australia

Perth Airport is the fourth busiest airport in Australia in terms of passenger traffic, operating 24 hours a day, seven days a week. In 2009, after repeated maintenance works over many years, an effective rehabilitation of the extensively cracked Runway 06 Threshold was required to restore its serviceability. The existing pavement consisted of 300 mm concrete slabs constructed in 1960, which were later overlaid with 20 mm asphalt surfacing.

Due to the severely cracked condition of the existing pavement, resurfacing by using just a thin asphalt overlay was not expected to provide a long-term success. To solve this problem, the propagation of existing cracks and expansion joints from old concrete slabs into the new asphalt overlay needed to be prevented.

To effectively retard reflective cracking and thus extend the service life of the rehabilitated pavement, an asphalt interlayer was used. This solution comprises a flexible reinforcement grid made from high-modulus polyester yarns with an ultralight nonwoven backing for ease the installation. Both the grid and the nonwoven have a polymer-modified bituminous coating (with a minimum of 65% bitumen content) to enable an optimum bond between the asphalt layers.

The rehabilitation procedure involved firstly texturing of the existing asphalt surface and construction of a 25 mm thick asphalt layer. Subsequently, the asphalt reinforcement was placed in accordance with the installation guidelines, and then covered with a 40 mm asphalt wearing course. Figure 9 presents the detailed rehabilitation cross-section.

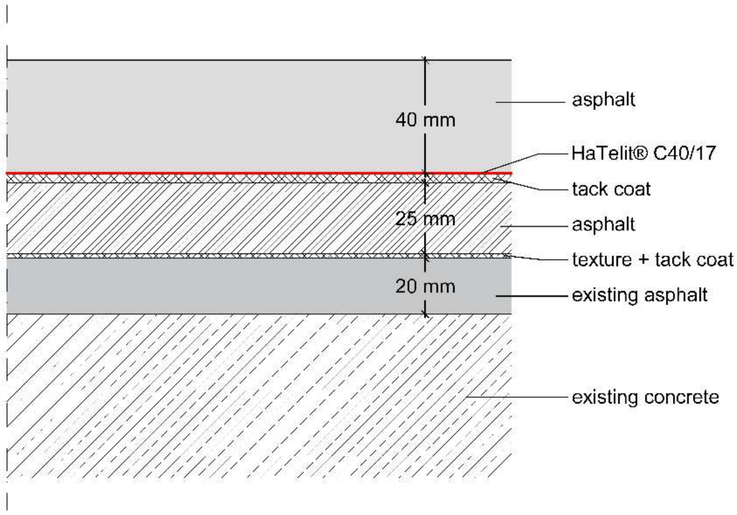

Figure 9: Design for the pavement rehabilitation

In 2017, approximately 8 years after the rehabilitation, the condition of the Runway 06 was checked during a visual inspection (Figure 10a-b). The pavement was found to be in an extremely good condition, without the propagation of the existing cracks and joints, well exceeding the expectations. Airport authorities have confirmed the asphalt reinforcement solution to be highly successful in rehabilitation of what was once known as a very challenging runway pavement.

(a) **(b)**

Figure 10: Pavement condition in 2009 prior to rehabilitation (a) and 8 years after rehabilitation (b)

6. LIMITS IN USING AN ASPHALT INTERLAYER

There are limits in using asphalt reinforcement, with no system available on the market able to increase the bearing capacity. In most cases, the expectation of strength or bearing capacity improvements from the use of these materials is unrealistic [11]. The pavement structure must have sufficient bearing capacity to carry the future traffic loading, alternatively it has to be replaced or strengthened. When having a poor quality subgrade, it is necessary to carry out other measures, e.g. base reinforcement or increasing the pavement thickness. Morevoer, the integrity of the surfacing must be adequate to support the asphalt reinforcement without disintegrating.

It is generally difficult to prevent crack propagation resulting from large vertical movements (e.g. concrete slabs which are not stable in their position, frost heave), even when using an asphalt reinforcement system. At some point a reinforcement can become unnecessary. In such cases it is therefore necessary to eliminate, respectively minimize, the movements prior the installation of a reinforcement grid and the new asphalt layers (e.g. undertake injection below the slabs, or “crack and seat” the slabs to achieve a stress relief).

Although there are a number of laboratory tests, research modelling and trials showing the effectiveness of asphalt reinforcement grids, it is important to understand the possible causes of existing cracks and other pavement distress. Maintenance or rehabilitation should only be instituted once the correct mechanisms that lead to failure / distress have been identified.

7. CONCLUSIONS

Reflective cracking occurs in concrete pavements rehabilitated with a simple asphalt overlay. To delay the development of reflective cracks, an asphalt reinforcement interlayer can be placed before the new asphalt wearing course. The presented case studies has showed that the use of an asphalt reinforcement made of high tenacity polyester or polyvinyl alcohol in concrete pavement rehabilitation can be advantageous. The use of asphalt reinforcement interlayers has to date prevented the propagation of expansion joints and cracks through the new asphalt overlay. However, before choosing the appropriate repair solution, it is important to know the structural conditions of the existing pavement, if there are signs of pumping, excessive vertical movements or weak subgrade, for example.

Based on the observed performance, it is possible to conclude that the asphalt reinforcement is an effective treatment against reflective cracking in asphalt overlays, resulting in an extension of the service life of a rehabilitated concrete pavements.

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