REMIXING PLUS- A MAINTENANCE AND REHABILITATION METHOD AT SWEDISH AIRFIELDS

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ABSTRACT
In the middle of the 1990´s Swedish Civil Aviation Administration (SCAA) started with remixing as a maintenance and rehabilitation method. The experience started at Sundsvall-Harnosand airport in Sweden where remixing was performed in 1996. Out of the remixing method the remixing plus method has developed.
In the summer 2002 two asphalt pavement maintenance works have been done with the remixing plus method. At Norrkoping airport the works have included runway, taxiway and apron. A taxiway was also done at Lulea airport. The rehabilitation at Norrkoping airport will serve as an example in this paper.
The equipage that have been used in remixing plus works 2002 contents remixer machine, heater machine, asphalt vehicle and rollers. The remixing plus process starts with milling of the existing asphalt pavement. Heating is needed down to milling depth. The old pavement is gathered up and addition of new bitumen takes place. The asphalt mass then leads to a mass distributor that forms a new wearing course. New asphalt is added from a asphalt vehicle to the remixer machine and spread out in the second mass distributor. That forms a top layer above the layer formed of the first mass distributor.
Compared with for example the maintenance method with milling with addition of a new wearing course the remixing plus method has 1/3 of the cost for that method. The length of life will be around 10-13 years with remixing plus and approximately 12-15 years with the other method.
The airport in Norrkoping was open for air traffic during the whole rehabilitation period. Only the night traffic was moved to another nearby airport. Working periods at Norrkoping was found with respect to the air traffic timetable.
There are some differences regarding requirements between airfield and road works. The differences are valid especially for texture mean depth, friction value, pavement regularity and crossfall. Among other differences is the adjustment of working periods to the air traffic timetable. For workers who stay at the airside area at an airport it is of great importance with safety and orderliness instructions. Training for all that personnel is compulsory.

KEY WORDS :
PAVEMENT / MAINTENANCE

RESUME
Au milieu des années 90, l'Administration de l'Aviation Civile de Suède (SCAA) a développé le recyclage en place comme méthode de maintenance et de restauration des chaussées. L'expérience a débuté à l'aéroport Sundsvall-Harnosand en Suède, où le recyclage en place fut effectué en 1996. Issu de la méthode de recyclage en place, la méthode améliorée de recyclage en place fut développée. À l'été 2002, deux chantiers de maintenance de chaussées bitumineuses ont été effectués avec la

méthode améliorée de recyclage en place. À l'aéroport Norrköping, les travaux incluaient la piste d'envol, la voie de circulation et l'aire de trafic. Une voie de circulation fut également construite à l'aéroport Lulea. La restauration à l'aéroport Norrkoping servira d'exemple dans ce document.
L'équipement utilisé dans les travaux 2002 de recyclage en place se composait d'un malaxeur, d'un système de chauffage, d'un véhicule d'épandage et de compacteurs. Le processus amélioré de recyclage en place débute par le fraisage de la chaussée existante. Le chauffage est nécessaire sur toute la profondeur de fraisage pour faciliter l'extraction. Les matériaux de l'ancienne chaussée sont ramassés et un nouveau bitume y est ajouté. Cette masse d'enrobés est acheminée vers un distributeur de masse et va donner une nouvelle couche de base. Un nouvel enrobé est ajouté dans le malaxeur et l'enrobé est alors envoyé dans le second distributeur de masse. Ce dernier ensemble donne alors la nouvelle couche de roulement placée au-dessus de la première couche issue du premier distributeur de masse.
En comparaison à la méthode classique de maintenance avec fraisage et ajout d'une nouvelle couche de roulement, la méthode améliorée de recyclage en place représente un tiers (1/3) des coûts de cette méthode. La durée de vie de la méthode améliorée de recyclage en place s'échelonnera sur environ 10 à 13 ans et sur environ 12 à 15 ans avec l'autre méthode classique.
L'aéroport de Norrköping fut ouvert au trafic aérien pendant toute la durée des travaux de restauration. Seul, le trafic nocturne fut déplacé vers un autre aéroport voisin. Les périodes de travaux à Norrköping ont été fixées en respectant l'horaire du trafic aérien.
Il existe quelques différences d'exigences entre les travaux sur aérodrome et les travaux routiers. Les différences sont significatives sur la profondeur moyenne de la texture, la valeur de friction, la régularité de la chaussée et la pente transversale. Parmi les autres différences, notons l'ajustement des périodes des travaux aux horaires du trafic aérien. Pour les ouvriers qui oeuvrent sur la piste d'un aéroport, il est extrêmement important de se conformer aux consignes de sécurité et d'ordre. La formation pour tous les membres du personnel est obligatoire.

MOT-CLES :
CHAUSSEES / MAINTENANCE

Background

In the middle of the 1990´s Swedish Civil Aviation Administration (SCAA) started with remixing as a maintenance and rehabilitation method. The experience started at Sundsvall-Harnosand airport where remixing was performed in 1996. The method was also performed several times at Gothenburg-Landvetter airport in the late 1990´s. Out of the remixing method the remixing plus method has developed.

Remixing plus performance

In the summer 2002 two asphalt pavement maintenance works have been done with the remixing plus method. At Norrkoping airport the maintenance works have included runway, taxiway and apron. A taxiway was also done at Lulea airport. The rehabilitation at Norrkoping airport will serve as an example in this paper.

Preparation works

It is very important with a careful planning and preparatory work before maintenance works can start at an airport. This planning is based on the Pavement management system (PMS) valid for all airports owned by the SCAA. The preparatory works include test of core samples from the existing asphalt pavement, hardness control of existing binder and control of existing stripping effects. In this way the right compound of addition of new asphalt and bitumen in the remixing project can be defined.

Remixing plus method

The equipage that have been used in remixing plus works 2002 contents remixer machine, heater machine, asphalt vehicle and rollers. The remixing plus process starts with milling of the existing asphalt pavement. Heating is needed down to milling depth. The heating constitutes of bottled gas-heating along the whole equipage and the temperature is 130-140 °C near the asphalt mass distributor.

The old pavement is gathered up and addition of new bitumen take place. The addition of bitumen depends on the binder content in the existing pavement. Adhesive additive can also be added in this process. The asphalt mass then leads to a mass distributor that forms a new wearing course with a width of 5-6 m. New asphalt is added from an asphalt vehicle to the remixer machine and spread out in the second mass distributor. That forms a top layer above the layer formed of the first mass distributor. Thereafter rollers are used to compact the asphalt pavement.

Compared with for example the maintenance method with milling with addition of a new wearing course the remixing plus method has 1/3 of the cost for that method. The length of life will be around 10-13 years with remixing plus and approximately 12-15 years with the other method.

Remixing plus at Norrkoping airport

In the remixing plus project at Norrkoping airport the asphalt pavement was milled down to a depth of 40 mm. This corresponds the wearing course layer. It is of great value to not mill in the base course that creates much poorer quality. Experiences from Sundsvall airport in 1996 shows that asphalt pavement got a decreased length of life.

To the recycled asphalt bitumen 160/220 and adhesive additive was added and a layer with 40 mm thickness was formed in the first mass distributor. The distributor width was 5 m. The new asphalt added constitutes of a polymer modified asphalt with stone aggregate up to 16 mm. Polymer modified asphalt has showing better resistance against deicing chemicals. The top layer over the recycled wearing course has a thickness of 20 mm.

Air traffic during working period

The airport in Norrkoping was open for air traffic during the whole rehabilitation period. Only the night traffic such as air-mail service was moved to another nearby airport. Working periods connecting to remixing plus works at airports should be at least three hours depending on the time to establish equipment on the working place. Working periods at Norrkoping was found with respect to the air traffic timetable. In the Norrkoping case the time to be established on the runway amount to 20-60 minutes. About 15-20 minutes was needed to go off the runway after a working period has ended. The establishing time depending to great degree on the weather situation. Cold and humid circumstances result in more time is needed for the heating process.

Differences between airfield and road works

There are some differences regarding requirements between airfield and road works. The differences are valid especially for texture mean depth, friction value, pavement regularity and crossfall. The SCAA requirements content a texture mean depth of 0,75-0,90 mm. There are no texture mean depth requirements regarding that in connection with road works.

According to friction value, pavement regularity and crossfall the requirements are unequal. A friction value of 0,6 with a measuring speed of 95 km/h is valid for SCAA airfield works. There are also requirements of 3 mm on 3 m straight-edge valid for booth the longitudinal and the transversal direction.

Among other differences is the adjustment of working periods to the air traffic timetable. For workers who stay at the airside area at an airport it is of great importance with safety and orderliness instructions. Training for all that personnel is compulsory.