

EFFECTIVE MAINTANANCE OPTIONS OF ASPHALT CONCRETE AERODROME OPERATING AREA

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Summary: Air safety is closely related to the topic of maintenance and repair of airport operational areas. Proper maintenance of airport operational areas is not just an occasional mowing of grass on lawns and snow and ice removal in the winter. Runway is the most fundamental element of the airport and without it, it could not work. It is therefore necessary to effectively carry out maintenance of paved surfaces at the airport and to the actual construction, to repair joints and potholes. Infrared heating with its rapid application and use of recycled material from the repaired road is suitable to ensure smooth air traffic and reduction of the often high financial charges for the airport. The article outlines why the aviation safety is so important, how it can be significantly influenced and how security relates to the maintenance at the airport. I analyzed the main legislation that provides security at the airport, and which must be implemented on each airport.

Keywords: Rescue and firefighting services, special of the airport fire vehicles, categories airports.

1. INTRODUCTION

To be able to use runway with asphalt concrete cover as long as possible, we need just to keep proper maintenance in working order, which ensures its durability and safety in operation not only in summer but also in winter. Carrying out regular evaluation of surface characteristics of air pathways in time would prevent possible risk of insufficient conditions of surface. In the end, I present and analyze three chosen methods, how it is possible to repair potholes and damage caused by the use of airport surfaces.

Runway - It is bordered by a technically modified surface (RWY) on a land aerodrome that is used for the landing and takeoff of aircrafts. The track must be adapted and used for existing aircraft types, and therefore must meet specific physical conditions adapted to the size, weight and capacity of the aircrafts.

For construction of the runway we use, according to category, reinforced materials such as concrete, asphalt.

Taxiways - Their task is to link the RWY to the check surfaces. It must be properly designed, ensuring the smooth operation of the organization at the airport. It exhibits even greater intensity of service due to slow-moving or standing aircrafts.

Airport apron – It is the area planted at the terminals platform. Boarding and disembarking of passengers takes place here, cargo and mail handling, and operation of aircraft to prepare the aircraft for flight.

Maintenance of asphalt concrete aerodrome operating areas

It is to be observed throughout the whole year regardless of weather conditions - from cleaners, sweeping access roads and trunk, cutting, cleaning RWY lights to winter maintenance performed with snow plows and sanding.

1. MAINTENANCE OF ASPHALT CONCRETE SURFACES

Local maintenance and repair - sealing cracks and expansion joints, patching local cracks, repair broken down corners and edges of the tracks, repair and replacement of damaged drainage channels.

Overall surface maintenance and repair - applying of asphalt emulsions for renovation and rejuvenating of asphalt surface, grinding and grooving the beaten areas caused by aircraft breaking, the total demolition and renovation of the runway, sweeping, cleaning and flushing the contaminants from the runway.

Snow and ice removal – It is really necessary to have permanent technical and personal resources during winter operation of the airport. As the winter season is challenging the number of precipitation in the form of snow showers, it is necessary to ensure immediate removal of snow, ice, and snow drifts at the airport.

Effective repair and reconstruction options of airport operational areas with asphalt concrete covers

For repairs and maintenance of asphalt concrete surfaces, there are many different techniques and ways that we can choose according to the necessary criteria and the amount of our budget.

2.1 Classical method of potholes repair

It is the one of the most common methods used to repair potholes roads today. It is used to repair sidewalks, roads and playgrounds. It can be used for local repairs of potholes, but also to adjust the pavement after the implementation of the road ditches utilities, or laying new communications. The disadvantage of this method is that it requires great handling equipment, number of personnel and milling of the roadway. That creates large amount of construction waste. This method can be carried out by hot or cold asphalt mixture. When repairing with cold asphalt mixture, special blend of binder and gravel aggregate admixture with diluents and chemicals to the asphalt is added, which makes it usable in freezing weather (-10 ° C).

Classical method procedure

Place of performance have to be cleaned from impurities. Subsequently, the damaged place around potholes is milled and gets rid of residual damaged material. Cut is treated with a sealer to ensure better adhesion of the old with the new surface asphalt mixture. The asphalt mixture is heated up and prepared with asphalt heater. It heats the mixture with the help of thermal oil heated by gas burner spiral. This mixture is poured into the prepared cutout with constant temperature level, and compacted by vibratory rollers or plate.

Benefits

- The possibility to repair large potholes or whole areas,
- Laying new sections, not only reconstructing the old ones.

Disadvantages

- High expectations for number of staff,
- A lot of mechanical work thus increasing price,
- Generation of waste, which must be disposed.

2.2 Patchmatic method of potholes repair

It's a modern, increasingly popular system of road maintenance that is today's companies attempt to maximize the cost reductions. Patchmatic method (gluing) is used for removing small potholes, with crumbling asphalt road surface, irregularities or mild cavities and cracks. The basis of this method of correction is to repair potholes by jet technology. Utilizing this technology is preventing further expansion of faults or fractures and surface life extension.

In the first phase, it is necessary to clean the total area of damage with air pressure and performing initial spraying with cationic emulsions for better grip. Later, the potholes are filled with a mixture made of asphalt binder and aggregate under pressure with special machine. These machines are equipped with double chamber for the distribution of stone of different thickness and tank heated asphalt mixture. The mixture is made in machine on the spot, and it is not necessary to ensure the

movement of materials. Just two workers are needed to operate the machine - one manipulates the jet hose, because it would be impossible for the machine control to ensure the accuracy of spraying.

Benefits

- Relatively prompt repair without milling,
- The possibility of correcting even very small (1 cm) incurred cracks,
- Thanks to the dual cartridge option, there is possibility of mixing the mixture according to the specific requirements in place,
- Low limiting of airport operation,
- There is no waste.

Disadvantages

- Inability to repair larger areas,
- Applicability only to repair cracks and joints and small start-up potholes, Work can only be done at a minimum temperature of 10 ° C.

3 INFRARED HEATING METHOD OF POTHOLE REPAIR

Maintenance of asphalt surfaces is carried out with the help of specially designed machines with infra heating extension. The advantage of using this technology is the possibility of using recycled material. The main advantage is possibility to do maintenance also during the winter, even in temperatures below zero. This is an advantage in terms of time, when it is not necessary to wait for warmer weather and you can make a correction immediately in the winter months. Roadway acquires the properties of a new road without violation of surface, without cutting and connects the old and the new surface. Infra heating is actually recycling of original damaged asphalt mixture.

Why use infra heating method to maintain aerodrome operating areas?

- Possibility of using residual waste created during milling of surface = reducing the cost of used materials. The recycled material is heated to a temperature in the range 150-160 ° C whereby heated asphalt is not burnt and its quality is not decreased.
- The advantage is the environmental side of this method, as it is carried out by recycling old material from the roadway. Thereby amount of waste is lowered to minimum.
- Use in subzero temperatures and the possibility of carrying out repairs on the outside temperature -10 ° C.
- It is not necessary to wait for warmer weather and deal with "patch" repairs of acute damage on tracks, while this correction will be necessarily performed again under better conditions, which increases the total cost of the repair.
- Operation of infra heating machine is simple and after the training, it can be performed by anyone, with just two workers.
- Reducing the risk of imbalances arising from the milled boards and pouring new resin surface of improper compaction and cracking joints. The connection of old with the new material is progressed by heating both surfaces at the same temperature, such that the joint is uniformly encapsulated.
- Using this method reduces the risk of dust and no demolitions of old surface are needed, also noise performance is decreased.
- The fix is quick and there is no longer-term interruption or restriction of air traffic.
- Machine operation and performance fixes are powered by LPG fuel, which can be refueled at almost any gas station.
- This method can be used not only in violations like crack or potholes, but also in inequality or corrugated surface.
- The repair site will last at least three years, even during the low operating temperatures.



Figure 1 Infrared Asphalt Heaters

4 CONCLUSION

Infra heating method procedure - the entire repair is made using special infrared heaters on the rear face of the machine. They are equipped with special heat box used to heat the recycled asphalt. Machine can heat up the whole mixture to 150-180 ° C in 3-5 hours with the help of timers and thermometer, the mixture is ready for use next day. Magazine stand is divided into eight separate parts, so it is possible to heat the mixture gradually according to maintenance schedule and site of performance.

Maintained surface must be cleaned of impurities in the form of dust, dirt and debris. Damaged place on the surface is heated up and top layer is milled to a depth of 2.5 to 5 cm, which is gradually filled up with new material. Warmed mixture is all sprayed with a special spray to restore the chemical properties of the asphalt, which have been lost over the years. The surface is gradually modified by roller to a flat surface. At the final, surface is treated with protective compound by spraying in order to prevent and avoid the penetration of water into the repair until the asphalt solidifies.

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