AirTAP Airport Technical Assistance Program

AirTAP Briefings

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Pavement preservation: protecting your airport's biggest investment

An airport owner or operator is responsible for maintaining many elements on the airport property. One such element, a paved runway, is an airport's most valuable asset as well as its most expensive liability. A pavement, like a house, car, or airplane, needs maintenance to sustain its condition and value.

This article provides background information on pavement preservation and preventive maintenance, as well as describes maintenance techniques for a variety of pavement distresses and conditions. It also shows you how to read, interpret, and use a pavement inspection report.

What is preventive maintenance?

Increasing budget constraints require that all of us perform more work with less money. Historically, our emphasis has been on building new runways and taxiways, but in today's world, our focus should be on maintaining and preserving current pavement surfaces. This shift has resulted in three types of pavement maintenance operations:

Preventive maintenance: Applied to surfaces to improve or extend a pavement's functional life.

Corrective maintenance: Performed after a deficiency occurs in the pavement, such as friction loss, rutting, or extensive cracking.

Emergency maintenance: Performed for an emergency situation, such as a severe crack that needs repair immediately.

All of the above are needed in a comprehensive pavement maintenance program. Preventive maintenance is generally the least expensive type of maintenance, and emergency the most. Emphasizing preventive maintenance will keep pavement in good condition and prolong the time until corrective maintenance is required.

A **pavement preservation program** is designed to preserve a pavement structure, enhance its performance, extend pavement life, and meet user needs. An effective program integrates many preventive maintenance strategies and rehabilitation treatments with the goal of cost-effectively and efficiently enhancing pavement performance.

Preventive maintenance activities can include conventional treatments, such as crack sealing, sand sealing, rut filling, and thin overlays, and micro-surfacing applications. Aside from crack treatments, these treatments leave the pavement with a new wearing surface.

Why do it?

Pavement preservation has many benefits, the most important of which is preserving a pavement's structural integrity and realizing a substantial maintenance cost savings over the life of the pavement. Critical elements of a successful preventive maintenance program are:

1. Identifying and assessing the severity of pavement distresses for each section of pavement
2. Determining the cause of the distress
3. Identifying and completing the correct treatment

To be cost-effective, pavement preventive maintenance treatments should be applied early in the life of a pavement. It is much less expensive to repair a pavement when distresses are just beginning to appear. Maintaining a pavement's structural integrity by sealing cracks and preventing water from infiltrating the underlying layers will prolong its life and allow the airport owner to budget more efficiently for maintenance throughout a pavement's life.

Figure 1 shows how a $1 investment in rehabilitation saves $3 to $4 in repair costs later on. This is due to the high cost of reconstruction or total rehabilitation, which is needed if pavements are not properly maintained.

Note also that pavement maintenance is eligible for Airport Improvement Program

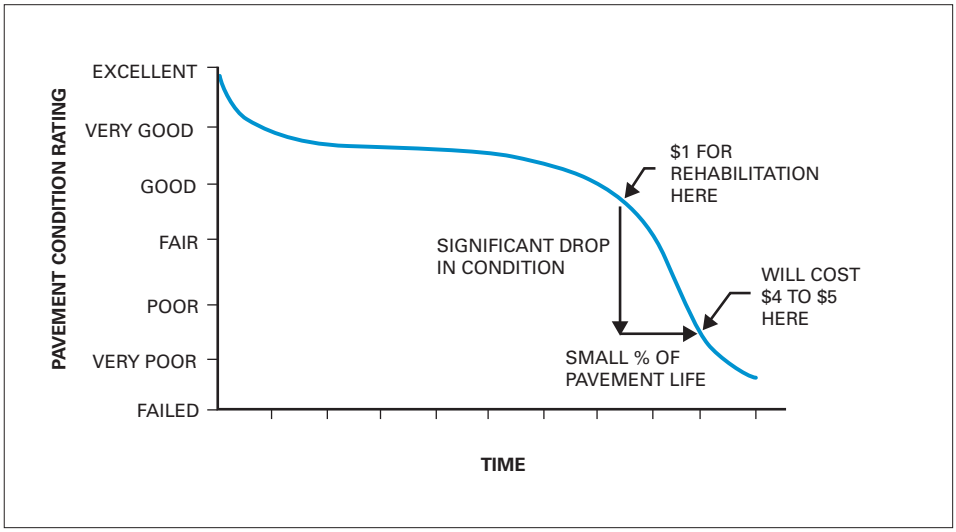

Figure 1. Preventive maintenance preserves the condition of the pavement and costs significantly less than rehabilitation.

Continued on back

funding at some airports; to determine if it's eligible at yours, check with your Mn/DOT regional engineer.

A simple case study

Historical cost data show that routing and sealing cracks on a 75-foot-wide runway costs anywhere from $2,000 to $5,000 per 1,000 feet. So maintaining a 5,000-foot runway could cost up to $25,000 for each crack repair project alone. This type of maintenance is done periodically over the life of the pavement, and may be repeated several times. Routing and sealing cracks prevents water from infiltrating the underlying pavement layers and helps preserve the structural integrity as well as maintain a smooth ride.

After several years, a thin overlay may be needed to address weathering or drying out of the pavement surface. Costs for this type of maintenance range from $40,000 to $50,000 per 1,000 feet. If the preventive maintenance program over a 20-year period included three crack-sealing projects and a 2-inch overlay, the airport owner would have spent approximately $325,000 for maintenance; at the end of the 20 years, however, the pavement would still be in good condition. Reconstruction might not be needed for many years.

Without maintenance over a 20-year period, total reconstruction may be needed, at an estimated cost of about $140,000 to $315,000 per 1,000 feet. That same runway would cost anywhere from $750,000 to $1,375,000 to replace. The costs of a no-maintenance strategy are at least two times higher in this simple case study.

Spreading the word

An important way to get support for a pavement preservation program is to educate those responsible for funding airport improvements. Pilots and other airport users often misunderstand the purpose of preventive maintenance and will complain when they see work crews fixing a pavement surface that seems to be in fine shape. They may perceive that the airport is not using funds appropriately to take care of pavements needing repair.

To effectively implement a pavement preservation program, use this article to inform elected officials, the airport manager, maintenance staff, and airport users about pavement preservation, why it is needed, and why preventive maintenance should be a priority.

Getting started

Knowing what type of maintenance is required for a given type of distress is necessary for selecting the appropriate maintenance technique. The Mn/DOT Office of Aeronautics surveys all non-towered and non-MAC (Metropolitan Airports Commission) public airport pavements every three years. From that survey, it develops an inspection report that it provides to the airport owner. The attached example of a pavement inspection report used by the Mn/DOT Office of Aeronautics shows a variety of important values, including:

Survey location: Location of the condition survey

Surface type: Either AC for asphalt pavement or PCC for concrete pavement

Last construction: Date of the pavement construction (and therefore, pavement age)

PCI: Pavement Condition Index, a numerical index between 0 and 100. A pavement with a score of 100 has no distress of any kind. Pavements in worse condition have ratings lower than 100.

Distress description: Type of distress present

Distress severity: Low (l), medium (m), or high (h) based on the amount and condition of the distress

Distress quantity: Area (in square feet) of each type of distress

One final factor is the **percent of deduct values based on distress mechanism**, which is the percentage of the related distress due to the two main distress mechanisms—load and climate. Load-related distresses indicate that the pavement is not strong enough to support the loading or traffic conditions. In that case, the pavement must be made stronger, and total reconstruction or thick overlays are required. Distresses caused by climate indicate that the pavement has dried out or has been damaged by environmental factors. Repairs for these problems are usually less expensive; techniques include thin overlays, sand seals, or crack repair.

Obtaining and using the Mn/DOT inspection reports will help airport owners select and program the appropriate maintenance treatment for a given area. The Airport Technical Assistance Program (AirTAP) can provide several manuals that identify low-, medium-, and high-severity levels of each pavement distress. Distresses are also categorized by their cause: environmental, traffic, or construction factors.

AirTAP can also provide manuals that outline best practices for the treatment of specific asphalt and concrete pavement distresses. This is an especially important element of a preventive maintenance program, since knowing the type of distresses present, their causes, and the most appropriate treatment is critical in efficiently preserving a pavement condition.

Larry Galehouse, P.E., director of the National Center for Pavement Preservation, was recently interviewed about the importance of pavement preservation in the April 2005 issue of *Better Roads* magazine. Although many people use a one-size-fits-all approach, it's not necessarily cost-effective, he said. Rather, you should consider what treatment will perform best to correct the problem for the least amount of money.

Galehouse reinforced that one of the worst practices is waiting too long to maintain a pavement, taking action only once actual damage appears. Pavement preservation techniques, he said, will not only improve pavement performance, but will also extend its life.

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Inspection Report

Pavement Database:MNARPT02

Report Date: 5/6/2005
Site Name:
Selection Criteria: Where ("&NetworkID) ='MOX'
Sort Criteria: None

Location and Surface Type

Network: MOX
Branch: APA
Section- 002
Name: MORRIS
Name: APRON A
Surface: AC
Use: APRON
Family DEFAULT
To: 105
Last Const- 9/30/1974
From: I 00
Category-. 5 **Zone:** WEST
Rank: B Street Type:
Length 283.00
Width 38.00
Area 20,354.00
Shoulder: **Grade:**
Lanes: 0

Constructed

Inspections

Last Insp Date	Total Samples	PCI	Samples Surveyed
06/23/1998	2.	16	2

Pavement Condition Index

Sample Number 104 Type R Size Units 4.000. *SF*

Distress	Description	Sev	Quantity	Units
43	BLOCK CR	L	3,999.97	SF
48	L & T CR	L	1,500.38	LF
52	WEATH/RAVEL	m	2,499.98	SF

Distress Type and Amount

Sample Number 1 0 5 Type R Size Units 4,000. *SF*

Distress	Description	Sev	Quantity	Units
41	ALLIGATOR CR	m	899.99	*SF*
43	BLOCK CR	L	3,999.97	*SF*
48	L & T CR	L	2,500.64	LF
48	L & T CR	m	143.04	LF
52	WEATH/RAVEL	m	2,499.98	SF

Extrapolated Distress Quantities

Distress	Description	Sev	Quantity	Units	Density %	Deduct
41	ALLIGATOR CR	M	2,287.42	SF	11.24	57.77
43	BLOCK CR	L	20,332.61	SF	99.89	35.58
48	L & T CR	L	10,168.99	LF	49.97	43.9 4
48	L & T CR	M	363.54	LF	1.79	14.83
52	WEATH/RAVEL	M	12,707.88	*SF*	62.4 3	46.4 3

*** Percent of Deduct Values Based on Distress Mechanism ***

Load	Related Distress =	29.0 Percent Deduct Value
Climate/Durability	Related Distress =	71.0 Percent Deduct Value
Other	Related Distress =	0.0 Percent Deduct Value

Deduct