



TxDOT

# Newsletter

## Summer 2010 / Issue 19

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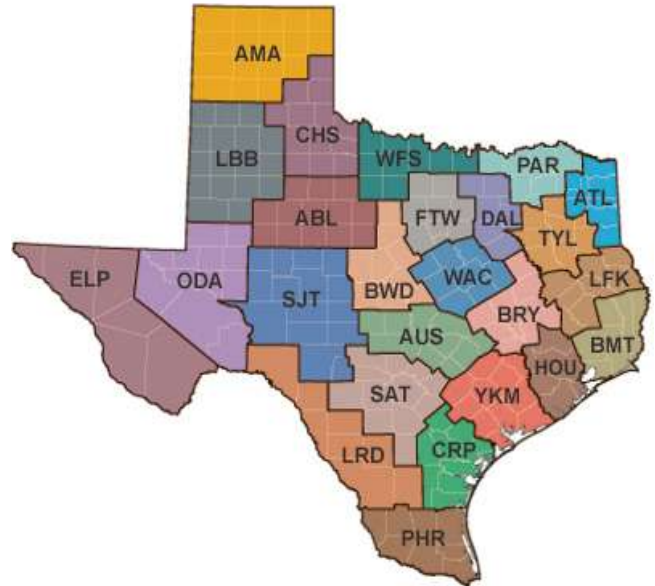
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### Our Mission

The mission of the TPPC, in joint collaboration with the Center for Transportation Research (CTR) of the University of Texas at Austin and the Texas Transportation Institute (TTI) of Texas A&M University, is to promote the use of pavement preservation strategies to provide the highest level of service to the traveling public at the lowest cost. The executive sponsor for the TPPC is the Texas Department of Transportation (TxDOT).

### Contact Us

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## Past and Upcoming Events

### TPPC Microsurfacing Courses

Microsurfacing training courses will be offered by the TPPC. The course is designed for engineers and inspectors and is entitled “Guidelines on the use of Microsurfacing.” The course recapitulates the pavement preservation concepts, specifically with reference to microsurfacing. It focuses on proper mix design selection and application of microsurfacing. TxDOT’s experience with microsurfacing is also discussed. This course also includes discussion on the use and applications of cape seals.

### Pavement Preservation Strategies with A-R

The Pavement Preservation Strategies with A-R Workshop was held on May 24<sup>th</sup> at the Center for Transportation Research at the University of Texas, Austin. The workshop included presentations by Dr. Yetkin Yildirim on pavement preservation strategies, Gerald Peterson on TxDOT materials and specification, Douglas Carlson on the advantages of using recycled tire rubber in asphalt, and Maghsoud Tahmoressi on case studies of AR seal coats and thin overlays.

### TPPC Seal Coat Training Courses

Seal Coat training courses will continue to be offered by the TPPC. The course designed for inspectors, entitled “Seal Coat Inspection and Applications,” focuses on proper inspection methods and the equipment used during chip seal construction. The other course, “Seal Coat Planning and Design,” instructs engineers on planning, designing, and constructing chip seals.

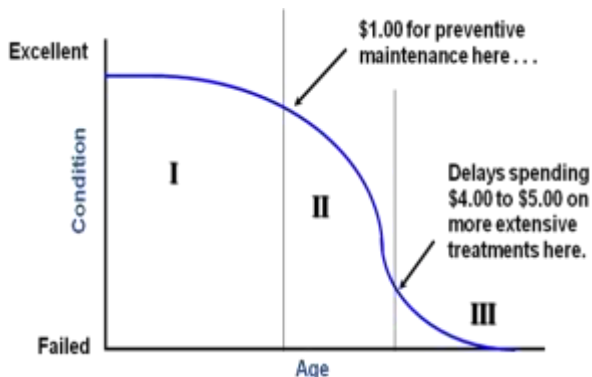
For more information on the Seal Coat courses, please contact Dr. Yetkin Yildirim, P.E. at yetkin@mail.utexas.edu

## Evaluation of Training Requirements in Pavement Preservation Methods in the State of Texas

### Introduction

Pavement preservation strategies have long been known to provide cost effective means to extend the life and performance of pavements. Most transportation agencies today are facing budget cuts and it is increasingly becoming a challenge to maintain high road service quality. Pavement preservation methods are thus gaining grounds and have been successfully accepted by the highway community as a means to maintain performance levels within available budget.

Pavement preservation methods include all those techniques which extend the life of the pavement by improving its surface condition without affecting its structural capacity. Therefore, it is useful only for those pavements that are structurally sound with good drainage and acceptable thickness. Selection of the right pavement is essential for achieving positive results. It is a proactive approach as opposed to the reactive maintenance approach and includes maintenance techniques like crack filling and sealing, fog seals, slurry seals, scrub seals, microsurfacing, chip seals and thin HMA overlays. Research suggests that every \$1 spent on preventive maintenance techniques saves \$5 on major rehabilitation. The critical factor for a successful pavement preservation program is the application of the right treatment at the right time.



The Texas Pavement Preservation Center (TPPC) has been providing exemplary assistance and training to promote pavement preservation strategies in the state of Texas ([www.utexas.edu/research/tppc](http://www.utexas.edu/research/tppc)). Pavement preservation methods ensure that the traveling public gets the highest level of service at minimum cost. TPPC's mission is to make the practicing engineers and district officials aware of the available pavement preservation techniques. This would in turn result in better safety, quality and performance of state highways and also save large amount of taxpayer's money. The center identifies new research in the areas that could cater suitably to the state's requirements and needs. Thus, TPPC serves as an information center that provides the engineers, managers

and district officials with the most relevant and the latest up to date information in the area. TPPC conducts training courses, workshops, conferences and also online courses through The University of Texas at Austin. The target audience for each of the above is TxDOT officials, industry personnel and agencies within the highway community.

### Purpose & Objective

To be successful in fulfilling its mission, it is essential for TPPC to be aware of the requirements and training needs in the highway community – especially at TxDOT. Also, it is essential to assess if the pavement preservation practices currently being used in the state are performing adequately and serving the needs of the state effectively. For this purpose a survey was conducted for the TxDOT personnel.

The objectives of the survey were

1. To identify the pavement preservation strategies adopted by various districts in the state
2. To evaluate the benefits of these strategies adopted
3. To assess the requirement for training to improve the strategies
4. To evaluate the need for training in the pavement preservation techniques not used by the district till date

### Study Methodology

For evaluating these requirements, an online survey was circulated among TxDOT employees. The survey can be found here: <http://www.surveymonkey.com/s/tppc>. The responses were collected over a two month period from February-March 2010.

The survey consisted of thirteen questions, three of which related to respondent's details and ten assessed the status and potential needs of the pavement preservation program in the district. The survey was sent out to approximately one-hundred TxDOT employees who serve in responsible positions and are related to pavement preservation programs in their respective districts. Fifty-six people responded to the survey in all.

Of the various pavement preservation techniques, the following were mainly focused on in the survey:

#### 1. Crack Sealing

As the name suggests, crack sealing includes timely identification and sealing of top down cracks to prevent water from infiltrating into the pavement and causing severe distresses. Additional benefits include improvement in ride quality. Asphalt or specialized crack sealant materials are used for the purpose.



**Figure 1: Crack Sealing**

## 2. Seal Coating

Seal coat, also known as chip seal is application of single or multiple layers of aggregates covered in asphalt binder on existing paved surface. This technique is used to correct distresses like severe cracking, raveling, bleeding or to improve skid resistance.



**Figure 2: Seal coat application in progress**

## 3. Micro-surfacing

Micro-surfacing is the application of resurfacing material that is derived from polymer modified asphalt and aggregate mixture. It is quick setting and allows traffic to open within an hour of application. It requires specialized paving equipment for its application. It is a rehabilitative technique that restores surface texture, fills cracks, voids and ruts thus improving appearance, performance and life of the pavement.



**Figure 3: Micro-surfacing in progress**

## 4. Slurry Seals

Slurry seal is similar to micro-surfacing, the difference being that resurfacing material has lesser polymers and additives and thus longer setting time.

## 5. Thin Asphalt Overlays

A less than 1.5 inch thick HMA overlay that does not influence the pavement strength but is mainly applied to improve pavement appearance, ride quality and functional problems. Existing pavement surface is milled before application of new layer.



**Figure 4: Hot-in-place Recycling**

## 6. Hot-in-place Recycling

In the Hot-in-place Recycling technique, the top one to two inches of the existing pavement surface is heated, milled, mixed with recycling agents and replaced on pavement. The pavement temperature is maintained at 200°F during the entire process. It is a very useful and cost effective rehabilitative method that addresses several pavement distresses and lasts longer than other methods.

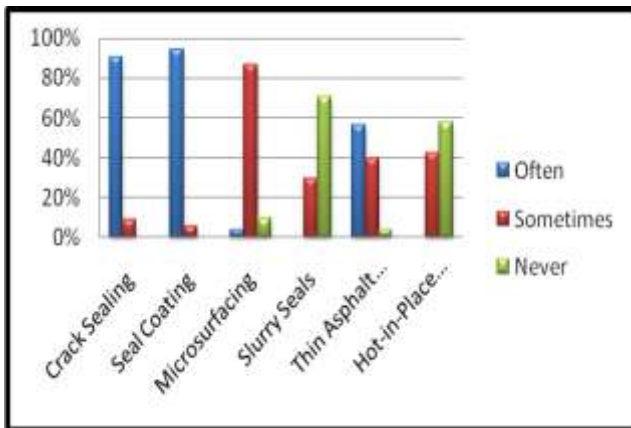


**Figure 5: Thin asphalt overlay**

### Data Analysis and Results

Of the 56 responses received, two responses had to be eliminated because they were not employees of TxDOT. The remaining 54 responses included individuals from 21 of the 25 districts in Texas. The objective here is to identify the weaknesses in the existing pavement preservation strategies being adopted in the different districts in the state and to understand the specific training needs that might help overcome these weaknesses.

The first question in the survey identified the pavement preservation methods being used in the state currently and the frequency of their application. Crack sealing and seal coating are the two most common strategies used in all the districts. This can be attributed to their lower costs and easy application. Micro-surfacing and thin asphalt overlays are also used frequently in many districts while slurry seals and hot-in-place recycling are not preferred or hardly used.



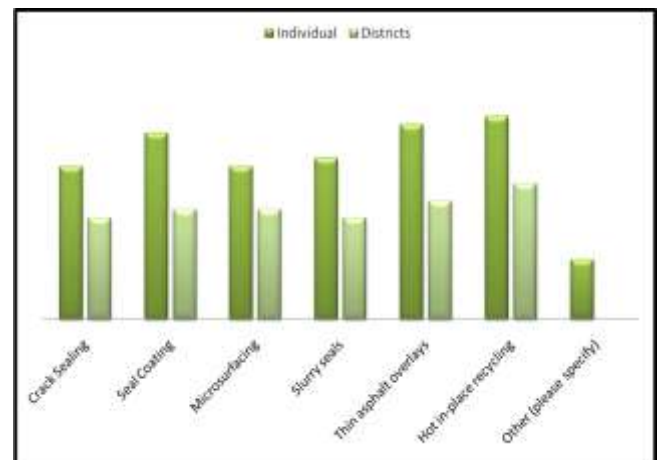
**Figure 6: Frequency of use of Pavement Preservation Treatments**

The reasons for not using particular pavement preservation strategies were then evaluated in the next question. The

reason cited by most people was that the strategy did not address the needs of the district. Need of specialized equipments and lack of appropriate information about the treatment also emerged as significant reasons for the avoidance of certain strategies. Among other reasons mentioned, Hot-in-place recycling was considered to be cost ineffective as compared to using virgin overlay.

Most respondents expressed a desire for learning more on pavement preservation techniques, especially for asphalt pavement. The majority of pavements in Texas are flexible as opposed to rigid pavements. Thus districts have to deal with their maintenance more frequently.

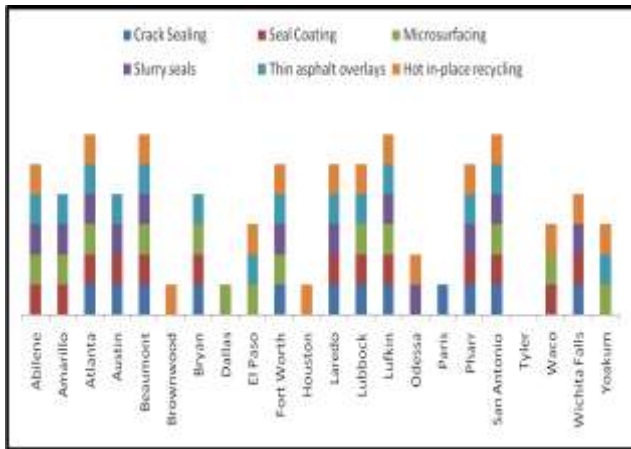
The next question revealed that there is a general need for training for all pavement preservation strategies throughout the state. Though much has been written and spoken about pavement preservation, it is still yet to become a common practice and training district personnel is the key to ensure an effective and robust pavement preservation program for each district. As can be seen in Figure 11, the survey identified hot-in-place recycling, thin asphalt overlays and seal coats to be the ones that most districts would be interested to learn more about.



**Figure 7: Treatments about which districts are interested in learning more about**

Besides the specified pavement preservation strategies, certain personnel specified that their district, namely Houston and Wichita Falls, uses a lot of concrete pavement preservation techniques. The Dallas district indicated having used relatively newer techniques, Ultra Thin Bonded Wearing Course (UTBWC) and Bonded Permeable Friction Course (PFC), for preventive maintenance in addition to the mentioned strategies. UTBWC is an open-graded mix placed on polymer modified heavy asphalt emulsion layer using a specialty paver. It is especially useful in places where there are restrictions on overlay thickness due to clearance requirement. It improves ride quality and restores skid resistance of the pavement. PFC is known to improve safety and ride quality on high speed roadways.

Figure 12 illustrates which districts expressed a need training for which particular strategy. Atlanta, Beaumont, Lufkin and San Antonio indicated that training is required for all strategies in the district.



**Figure 8: Training Needs in Districts**

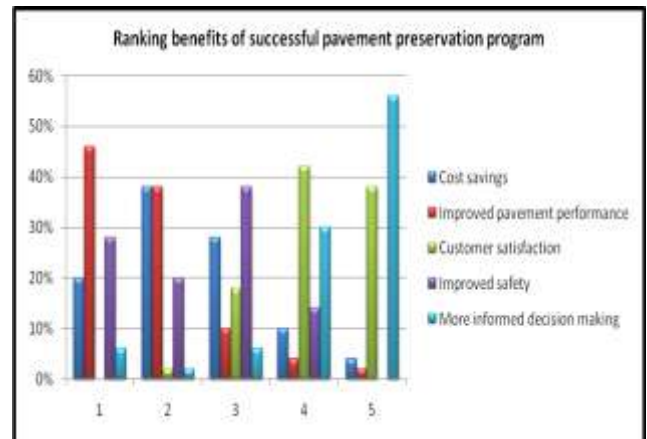
Furthermore, the responses indicated that more comprehensive and improved training techniques and methods would encourage more districts to use pavement preservation methods, especially hot-in-place recycling, slurry seals and micro-surfacing.

There is an urgent need to improve the training procedures and increase training programs frequency for pavement preservation techniques across all districts in the state. As mentioned by one of the respondents, most districts are familiar with most of the pavement preservation strategies discussed, but what is needed is better training in the use and application of each of these techniques to enable effective and viable preventive maintenance programs.

The decision for the need of maintenance on a particular pavement may be guided by several criteria. The decision has to be made keeping in mind the available maintenance budget and resources and the severity of pavement distress. Each district has its own criteria for making the judgment and based on the survey responses, engineering judgment is the most reliable factor followed by cost/benefit analysis and available in-house guidelines. This means that a lot depends on the engineering expertise, experience, knowledge and judgment. Thus it is essential that engineers be well acquainted with the pavement preservations methods to make the right maintenance treatment selection at the right time for the right pavement.

Most personnel considered their district to be well acquainted with pavement preservation efforts being practiced in other districts. Only 22% of the respondents felt that their knowledge was inadequate while 13% considered they were totally abreast with all developments in the field of pavement preservation in other districts.

The respondents were asked to rank the perceived benefits of a successful pavement preservation program. The benefits considered included cost savings, improved pavement performance, customer satisfaction, improved safety and more informed decision making.



**Figure 9: Ranking benefits of successful pavement preservation program**

Most people picked improved pavement performance to be the obvious benefit of a successful pavement preservation program while more informed decision making was identified as the least useful benefit. This can be attributed to the fact that research in the area of preventive maintenance is yet to come up with a standardized guideline that would help in making the right decisions. Several methods/algorithms are available that help in making the decision, but none have proved to be a satisfactory standard. Much still depends on engineers' observation and judgment. There is no doubt in the fact that pavement performance is bound to improve with a successful pavement preservation program, as shown by the survey responses. Cost savings is considered to be the second most important benefit, which is obvious as pavement preservation methods are considered as a means to tackle maintenance issues in the face of shrinking budgets. This is followed by improved safety, then customer satisfaction. The ranking of benefits appear to be as expected based on the utility and performance of pavement preservation program.

The last question of the survey asked the respondents if any formal or informal quality assurance procedure for preventive maintenance application was in place in their district. No clear indication could be obtained as to the trend in the state since the responses were almost equally divided between formal procedures and informal ones. Some districts rely on PMIS scores as a quality assurance tools while others base their assurance on pavement management engineer's judgment. Standard specifications, material testing and equipment calibration before application are other means to ensure quality.

## Conclusion

Pavement preservation methods have been acknowledged as cost effective techniques for improving pavement performance and extending their service life. Most districts in Texas use several pavement preservation methods but a significant need for improving the pavement preservation program in various districts of the state has been identified in this study. The survey responses covered most of the districts in Texas, thus the results can be considered as fairly representative for the whole state.

Of the common pavement preservation methods specifically examined in this study, crack sealing and seal coats emerged as the most frequently used techniques while most districts expressed their interest in learning more about Hot-in-place recycling, thin asphalt overlays and slurry seals so as to be able to use them more often and effectively. Almost all district personnel were unanimous in their observation on the need for better training for pavement preservation methods. Improved pavement performance and cost savings were identified as the primary benefits of a successful pavement preservation program. Most decisions for pavement maintenance rely on sound engineering judgment which makes it all the more critical for district personnel to be trained and experienced in effective and timely use of pavement preservation strategies.

Thus the survey clearly illustrates that the current pavement preservation program in most districts will remain inadequate if the district personnel are not trained to ensure its success. Also, the current training programs need to be modified to better serve the needs of the district. It is possible to achieve a high level of service for the traveling public within the existing budget constraints if the right pavement preservation methods are applied at the right time on the right pavement.