PAVEMENT MAINTENANCE THROUGH REJUVENATION

Proper Pavement Maintenance is essential if maximum pavement life is to be expected.

The concept of Rejuvenation is to introduce into a healthy asphalt pavement a property that is not already present to enhance and prolong the life of the asphalt binder therefore extending the life of the asphalt pavement.

Rejuvenators are designed to penetrate deep into the top surface of asphalt pavement introducing into the asphalt the binder the required maltenes and polar compounds necessary to keep the fines and the small aggregate on the surface of the pavement bonded together so as to prevent raveling of the top of the asphalt pavement. Rejuvenation keeps the asphalt binder healthy and results in longer pavement life by keeping the fines in place and not allowing the course aggregate to become exposed.

With today's high yield refining processes such as the hydrotreater and the catalytic cracker, the quality of available asphalt's are not what they use to be. The problem is that these efficient refining processes are taking too many of the light ends or maltenes out of the asphalt, which are necessary for proper binder performance. It is getting increasingly more difficult to acquire good quality asphalt base stocks to produce quality asphalt pavements.

Asphalt is basically the black sheep of the petroleum industry. It is a low yield byproduct from the manufacture of high end products such as styrene, polymer's, gasoline, fuels and lube stocks, which are high end, high profit products. Therefore it is natural to assume that a refiner would develop more efficient process's to produce more of the high profit products per barrel of crude oil. One would figure this is "good business". However, this "good business" practice has resulted in lowering the quality of today's asphalt base stocks. This is why proper pavement maintenance through rejuvenation is essential in today's asphalt paving industry.

Pavement Rejuvenation is not a new concept. It has been around for about forty years. There has been several products introduced into the industry over the years and several have gone the way of the Dodo.

Asphalt pavement is like the human body. It is easier to keep it in good shape, rather then let it go to heck and then try to rebuild it.

The proper way to begin pavement maintenance through rejuvenation is to start with a healthy asphalt pavement and keep it that way. It is generally recommended to apply a rejuvenator sometime between 3 and 6 months after the new asphalt pavement has been laid. This introduces into the new asphalt mat the additional binders necessary to keep the fines in place thus protecting the base aggregate in the mat and helps keep the mat flexible. Then after about three to four years apply another application of the rejuvenator to reintroduce the compounds necessary to help maintain the life of the pavement. Continue to reapply a rejuvenator about every four years through the life of the pavement.

Utilizing this method, it has been proven that with proper pavement maintenance through rejuvenation in conjunction with a properly designed crack-sealing program it is possible to extend the life of primary and secondary roads up to three to five years.

In parking lot and driveway applications pavement life has been extended up to ten years or more in some cases.

SEALCOATINGS

Now some people will tell you that rejuvenation is snake oil and is a waste of money and that a good Seal Coating is the way to go. Now lets take a serious look at some of the Seal Coating systems available for pavement maintenance.

Seal Coating Systems are designed to seal off the surface of the asphalt mat filling in the voids of the pavement so as to provide a tough wearing surface that will prevent any water from penetrating the mat. By keeping the surface sealed, a seal coating is keeping the damaging Ultra Violet of the sun and the elements of weather off the pavement, while also keeping sealed into the asphalt mat the necessary oils that are required to keep the asphalt mat flexible and healthy. The drawback to a seal coating system is that once it begins to wear off the surface it no longer provides any protection from the elements in the areas where it has worn off the surface of the asphalt pavement.

Most seal coating systems are mineral filled and rarely have more than 20 % bitumen content which is normally only enough bitumen to bind the mineral to the pavement and cover the pavement surface. This low bitumen content in conjunction with the absence of any light oils or maltines prevents a seal coating from providing any rejuvenation to the asphalt pavement.

One of the most popular seal coating systems across the country is Coal Tar Pitch Emulsified Seal Coating. Coal tar pitch is generally emulsified with water and mixed with a mineral aggregate and/or sand to give the product body and wear-ability. The major benefits of coal tar is that the product is fuel resistant and generally will provide superior abrasion resistance therefore it will wear and look cosmetically appealing for a longer period of time. However, Coal Tar seal coating does normally begin to wear within a year of application and once it begins to wear off the surface it provides no protection to the asphalt mat in the areas where it has worn off.

Coal Tar Pitch is a by-product of the coking process of coal used in steel mills. Like petroleum crude it is refined through a distillation process to produce products like xylene, benzene, creosote and several other types of products. But like asphalt it is the black sheep of the coal tar pitch industry. But, unlike asphalt, coal tar pitch is in no way, chemically or otherwise, compatible with any type of petroleum product including asphalt. Due to this reason coal tar pitch cannot provide any rejuvenation at all to an asphalt pavement. In order to get coal tar to properly adhere to asphalt pavement generally a polymer additive needs to added by the applicator prior to application to prevent the sealer from delaminating from the pavement surface. So, the question is. Why put a product that is not compatible with a petroleum product on a petroleum product such as an asphalt mat. The answer is a coal tar is generally more is cost effective.

Coal Tar also has other drawbacks. Coal Tar contains Benzene along with several other listed cancer causing compounds. In addition, the main issue with coal tar is the fact that the vapor of the product is carcinogenic and can cause serious health problems with continued use. Some of the early warning signs are burning of the skin similar to what happens when one lets gasoline dry on the skin. It has been documented by the National Institute For Occupational Safety And Health (NIOSH) in report No. NIOSH-78-107 that states: “vapors can cause serious lung problems resulting in cancer”. This hazard will remain present as long as the product gives off a vapor that one can smell.

Due to obvious health and environmental concerns the use of Coal Tar Pitch has been restricted in some states such as the State of New Jersey, State of New York and has been banned in the State of California and the City of Austin, Texas just to name a few.

An alternative to coal tar pitch is Asphalt Based Emulsified Sealcoat. Asphalt based seal coatings are similar to coal tar in the fact that most are mineral filled and are applied and perform in the same fashion, however asphalt is used as the binder. Asphalt based emulsified seal coatings do not have the health hazards associated with coal tar. However, asphalt based seal coatings tend not to ware quite as well as coal tar and if fuel resistance is desired a vinyl latex must be added to the product, which results in a increased cost per gallon.

REJUVENATORS

One of the first rejuvenators available, and which is still used today is Reclamite®. Reclamite® is a lube oil base derivative that provides the asphalt the necessary maltenes to help keep the binder healthy. The major draw back to Reclamite® is that in most cases it is necessary to sand the product heavily to prevent tracking.

Another of the first products to come available was Gilsonite. Gilsonite was a blend of Gilsonite ore and select asphalt's blended together with a fast drying petroleum cutter stock. Gilsonite has proven to provide the binder with the maltenes necessary to enhance their binding ability and as an added bonus Gilsonite contains a high carbon content that provides excellent UV protection from the sun. Gilsonite dries dry and requires no sanding.

Another product that was developed approximately 20 years ago is the DISSCO RS-90
DISSCO RS-90 is a product made to meet today's demands for a penetrating sealer/binder for existing asphalt pavements. RS-90 was engineered to penetrate the pavement surface and rejuvenate the surface by replacing the oils and binders (maltines and polar compounds) that the sun and weather bake out of the pavement through time. These maltines and polar compounds are necessary to keep your asphalt pavement in good repair by binding the surface together. RS-90 keeps the pavement flexible thus preventing the surface from deteriorating and becoming brittle. Keeping the pavement flexible helps prevent the pavement from cracking thereby keeping water from entering and softening the base course, which can result in pavement breakup and costly repairs.

RS-90 can be used on old asphalt, new asphalt, shoulders, curbs, chuckhole patches, and also as a tack coat. It may also be used to black out pavement markings, any asphalt markings, and in any asphalt maintenance program requiring superior sealing and binding characteristics at a low cost.

RS-90 is a liquefied bitumen consisting of select grade asphalt binders and plasticizers blended with a fast drying petroleum cutter stock. RS-90 contains antioxidants, adhesives and chemicals not present in highly refined crude oil base asphalts. Properly applied, RS-90 seals out water to protect the base and eliminates water stripping. Seals in resins and oils necessary for pavement flexibility and adds antioxidants, binders, and a tough, durable surface to modern, highly refined asphalts. RS-90 formulations are designed to replace and preserve the chemicals beneficial to pavement life. As an integral part of the pavement mat, RS-90 adds many years of serviceable life to asphaltic concretes.

DISSCO RS-90 along with other rejuvenators are generally very cost effective and easy to apply. Application can be achieved using almost any positive pressure spray applicator utilizing a hand wand or using any standard asphalt distributor truck with computer controlled rate controls. Recommended rates of application are generally at .08 to .12 gallons per square yard. With an applicator several thousand gallons can be applied in a single day.

Most rejuvenators as well as DISSCO RS-90 can be purchased in place for as little as .90 cents per square yard with a total cost per lane mile of less than $6,400.00. Reviewing the numbers of a maintaince program that requires an application of a rejuvenator once every four years including the initial application after the first ninety days, and with a asphalt pavement life expectancy of 12 years and also taking into account a 12% increase every four years for inflation. Total rejuvenation results in a cost of less than $19,200.00 over the life of the pavement.

Compare this to an asphalt pavement with no rejuvenation program in place with an average life expectancy of nine years. Taking into consideration the cost of an average 2" overlay every nine years with a $22.00 per square yard cost in place of $155,000.00 per lane mile. By extending the life of the asphalt pavement through rejuvenation to an average life expectancy of twelve years results in a savings of $19,000.00 over the life of the asphalt pavement.

With these numbers in mind one can only wonder why Asphalt Pavement Maintenance through Rejuvenation is not practiced nationwide. The savings could result in billions per year.