

SOY-BASED ASPHALT PAVING PRODUCTS

Paving trials demonstrate soy-based sealer's value in pavement protection, extended pavement life and ease and cost of application.

PAVING INDUSTRY OVERVIEW

U.S. asphalt production in 2010 was about 24 million tons with 85 percent used for road paving and 15 percent used for roofing (shingles). Asphalt is a viscous liquid bitumen residue of the petroleum oil refining process. Asphalt has been readily available and cheap, but it is rapidly becoming less available and more costly as oil refiners upgrade distillation product mixes. The price of primary asphalt has risen from \$100/ton to \$430/ton since 2003. Major asphalt producers are large crude oil refiners such as BP, ConocoPhillips, ExxonMobil and Shell. Some large plants have been shut down, and two former manufacturers exited by selling their asphalt businesses. Asphalt demand and production has declined from 35 million tons in 2007 due to recession in the economy, which has prevented prices from escalating further.

ASPHALT CEMENT

Petroleum-based asphalt cement is the black, bitumen binder that holds together aggregate in paving asphalts and crushed granite in shingles. It constitutes about 6 percent of a paving asphalt and 28 percent of a shingle composition.

PAVING PRODUCTS

Asphalt cement is used in four types of paving products.

1. *Cutback Asphalt* – 30 percent of market. Asphalt cement is diluted with petroleum solvents (kerosene, gasoline, naphtha) to control viscosity and reduce cost. Use is declining due to growing environmental regulation and escalating solvent costs. Petroleum solvent use in cutback asphalt in 2005 was 256 million pounds.
2. *Foamed Asphalt* – 10 percent of market. Hot asphalt cement with cold water forms a thin film coating for soil stabilization.
3. *Emulsion Asphalt* – 35 percent of market. Asphalt cement with water and emulsifier to lower viscosity for cold paving. This use is growing due to positive economics and environmental impact.

4. *Superpave* – 25 percent of market. Polymer-modified asphalt cement (PMAC) is growing because of superior product performance in controlling pavement rutting and cracking and asphalt oxidation. However, Superpave product cost has escalated from \$175/ton in 2003 to \$650/ton. Conventional PMAC is the primary competition for polymer-modified, soy-based asphalt cement.

Despite severe cost escalation, industry demand for asphalt cement in paving will continue to grow modestly as the nation's road system grows and maintenance paving and replacement needs continue.

It is estimated that the relative cost of paving one linear mile of highway is \$15 million for concrete and \$13 million for asphalt. The need for improved paving product performance technology is great, including the ability to cost-effectively recycle asphalt pavement. Most states have stockpiled millions of tons of Reclaimed Asphalt Pavement (RAP) that is reconstituted for repaving.

SOY-BASED ASPHALT CEMENT (SBAC)

BioSpan Technologies, Inc., Washington, Mo., has developed soy-based asphalt cement. It is a proprietary blend of biobased solvents in which many volumes of waste plastics can be dissolved. A typical formulation contains about 25 percent soy and 11 percent waste styrene-butadiene polymers from foam flotation billets and ground tire rubber – materials that are unwanted in landfills.





SOY-BASED ASPHALT PAVING PRODUCTS

SBAC PAVING PRODUCTS

BioSpan has developed a line of road paving, restoration and patching products based on this technology that contain the new soy solvents and other biosolvents.

RePLAY™ – Pavement restorer and protective coating. It is a low-heat spray coating that dries quickly, reverses oxidation, extends pavement life and costs less than petroleum oil seal products.

ACTIVATE™ – Asphalt millings (RAP-reclaimed asphalt pavement) restorer. It can be sprayed on and mixed with millings then repaved cold.

C-Patch™ – Asphalt cement product with fiberglass and aggregate for concrete patching.

SBAC COST-PERFORMANCE

The cost-effectiveness of BioSpan's new soy-based asphalt cement is creating a growing market demand. Over 80,000 miles of paving trials in many states and Canada have demonstrated superior performance compared with conventional asphalt in pavement protection, extended pavement life and ease and cost of application. *RePLAY™* pavement restorer costs about one-seventh of the price of conventional asphalt to apply. Paving with SBAC requires much less heating – 250° F versus 350° F for conventional asphalt. *RePLAY™* also dries quickly in about 20 minutes without the tracking caused by conventional asphalt.

SBAC paving products cost less to produce. BioSpan estimates that manufacturing costs for SBAC are about one-third that of conventional asphalt due to lower raw material costs and lower production-process heating. The environmental impact of SBAC paving products is very positive beyond the energy savings in manufacturing and application. An independent Life Cycle Assessment in December 2008 determined that the use of *RePLAY™* pavement restorer significantly reduced greenhouse gas, air pollutant and VOC emissions when compared with *Reclamite™*, the conventional petroleum-based asphalt cement product. For more information on BioSpan, visit www.biospantech.com.

ROOFING MATERIALS INDUSTRY OVERVIEW

Approximately 15 percent of primary asphalt cement production goes into the manufacture of shingles and roll roofing. Shingles contain 28 percent asphalt cement that binds together ground granite and fiberglass reinforcing. Recent annual U.S. production of shingles was 150 million squares (bundles), which required 4.2 billion pounds of asphalt cement, the value of which, at \$20 per square, was about \$3 billion. The roofing market is currently in a housing slump with severe price escalation of petroleum feedstocks used in asphalt cement. The shingle recycling industry is growing. Reclaimed asphalt cement use is allowed up to 15 percent in road paving. Polymer-modified asphalt cement is used primarily in shingles. Improved product performance technology is also needed in the roofing industry if it is cost-effective. A significant opportunity is available to recycle used shingles and replace asphalt cement in new improved-performance, soy-containing shingles.

SBAC ROOFING PRODUCTS

New soy solvents developed by BioSpan can be used to recycle roofing shingles and manufacture new shingles by utilizing the asphalt cement described above. About 15 percent of petroleum asphalt cement production goes into roofing shingles. BioSpan's asphalt cement contains about 25 percent soy. Conventional shingles produced currently have reduced asphalt content, which lowers costs but results in a shorter lifespan. There is, consequently, an excellent market opportunity to provide a longer-lasting shingle using BioSpan's asphalt cement binder that does not oxidize nor degrade as quickly.

ABOUT USB

The 69 farmer-directors of USB oversee the investments of the soy checkoff to maximize profit opportunities for all U.S. soybean farmers. These volunteers invest and leverage checkoff funds to increase the value of U.S. soy meal and oil, to ensure U.S. soybean farmers and their customers have the freedom and infrastructure to operate, and to meet the needs of U.S. soy's customers. As stipulated in the federal Soybean Promotion, Research and Consumer Information Act, the USDA Agricultural Marketing Service has oversight responsibilities for USB and the soy checkoff.

FOR MORE INFORMATION, VISIT: SOYNEWUSES.ORG

