

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 2007 was about 35 million tons with 85 percent used for road paving and 15 percent for roofing (shingles). Asphalt is a viscous liquid bitumen residue of the petroleum oil refining process. Asphalt has been readily available and cheap but is rapidly becoming less available and more costly as the oil refiners upgrade distillation product mixes. The price of primary asphalt has gone from \$100/ton to \$400/ton since 2003. Major asphalt producers are large crude oil refiners that include BP, ConocoPhillips, Exxon-Mobil and Shell. Some large plants have been shut down, and two former manufacturers exited by selling their asphalt businesses.

ASPHALT CEMENT

Petroleum-based asphalt cement is the black, bitumen binder that binds 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 is growing because of superior product performance in controlling pavement rutting, cracking and asphalt oxidation. However, Superpave product cost has escalated to about \$680/ton.

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 despite severe cost escalation. It is estimated that the relative cost of paving one linear mile of highway is \$17 million for concrete and \$10 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 Recycled 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. These materials are not wanted in landfills.



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.





SOY-BASED ASPHALT PAVING PRODUCTS

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-recycled asphalt pavement) restorer. 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 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 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 conventional asphalt causes.

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 bind 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 for the manufacture of new shingles 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 to lower costs and have shorter use life as a result. There is, consequently, an excellent market opportunity to provide a longer-lasting shingle using BioSpan's asphalt cement binder that doesn't oxidize and degrade as quickly.

ABOUT USB

USB is made up of 68 U.S. farmer-directors who oversee the investments of the soybean checkoff, a U.S. soybean research and promotion program, on behalf of all U.S. soybean farmers. Checkoff funds are invested in the areas of animal utilization, human utilization, industrial utilization, industry relations, market access and supply. As stipulated in the Soybean Promotion, Research and Consumer Information Act, USDA's Agricultural Marketing Service has oversight responsibilities for USB and the soybean checkoff.

For more information, visit: soynewuses.org



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