APPLICATION REPORT

Solutions for Your TOUGHEST MIXING Applications in

CHEMICALS

Production of Polymer Modified Asphalt for Road Surfacing

SILVERSON®
HIGH SHEAR MIXERS/EMULSIFIERS

Production of Polymer Modified Asphalt for Road Surfacing

Polymer modified asphalt is increasingly used in road surfacing. Unmodified asphalt is sensitive to extremes in temperature, it becomes brittle and cracks in cold conditions and softens at higher temperatures, causing rutting and surface deformation.

Modification of asphalt by addition of polymer results in a more elastic and durable product with greater temperature stability.

One of the most common polymer modifiers is Styrene-butadiene-styrene (SBS).

The Process

Polymer, typically in either crumb, pellet or powder form is added to hot asphalt which penetrates the SBS particles and causes them to swell and flow. A number of factors govern the efficiency of the dispersion process:

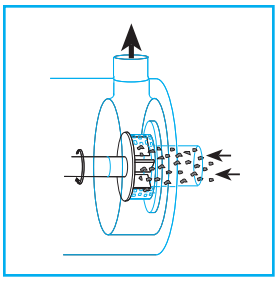
- The polymer particle size. Smaller particles present a larger surface area to the asphalt allowing faster penetration.
- The temperature of the process. Asphalt will penetrate the polymer more rapidly at higher temperatures.
- The polymer incorporation system. It must be capable of rapidly wetting out the polymer and uniformly dispersing it throughout the contents of the vessel.
- The dispersion system. Typically a high shear mixer which is required to disperse and dissolve the polymer.
- The type and make of polymer.

The Problem

- SBS is more difficult to dissolve than other polymers used to modify asphalt such as PVC (polyvinyl chloride) and APP (atactic polypropylene)
- It has a hard yet elastic molecular structure which requires a high shear mixer to disperse and dissolve it.

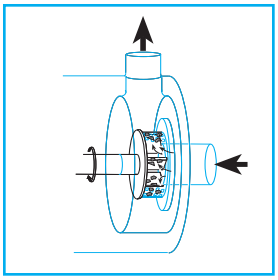
The Solution

Silverson have developed a range of Jacketed In-Line mixers for this application. They operate as illustrated in stages 1 to 3.



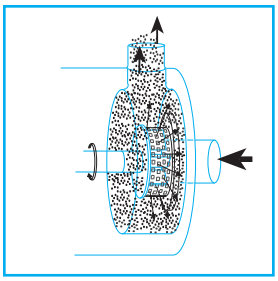
STAGE 1

Asphalt and polymer are drawn into the workhead of the In-Line mixer. High speed rotation exerts hydraulic shear on the materials.



STAGE 2

The high shear action of the rotor/stator workhead progressively reduces the size of the polymer particles, exposing an increasing surface area of polymer to the surrounding asphalt.

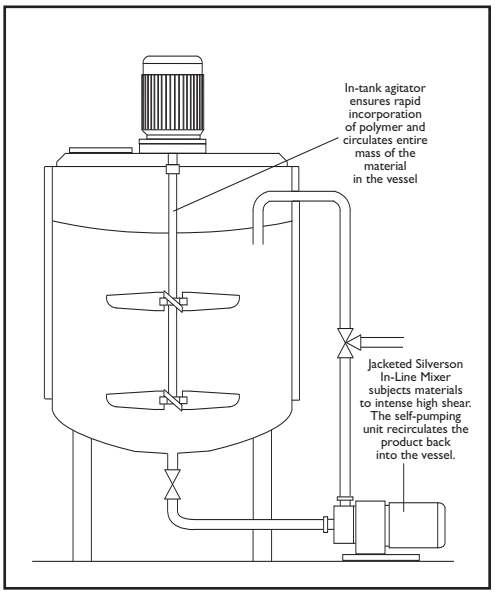


STAGE 3

The asphalt and polymer mixture is forced out through the stator and recirculated back into the vessel by the self-pumping action of the In-Line mixer. The combination of finely reduced particle size and vigorous mixing rapidly solubilizes the polymer.

CHEMICALS

A typical configuration for this process would be as illustrated:



The Advantages

- The rotor/stator workhead rapidly disintegrates the polymer pieces, exposing an increasing surface area of polymer to the asphalt.
- The In-Line mixer concentrates its effort on a relatively small volume within the workhead rather than the entire batch, a more energy efficient process.
- Bypassing the intense high shear action of the rotor/stator assembly is impossible.
- High rotor tip speed reduces process time.
- No additional pumping is required to circulate the asphalt/polymer mix back into the tank.
- The cylindrical body walls of the mixer are jacketed for oil heating. This allows thorough heat penetration to all moving parts before start-up and prevents solidification of asphalt inside the workhead.
- The unit is fitted with graphite/carbon fibre gland packing specifically designed for use on asphalt.

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Issue No. 1CA3