




By Allan Heydorn

## Contractors Turn to Rejuvenators to Help Customers Extend Pavement Life



*Parking lot three hours after Reclamite Preservative Seal application. Note stripes still easily visible.*

**I**ncreased emphasis on the life-cycle costs of a pavement has led commercial customers and public works departments to seek alternative maintenance options that can get the job done.

Just as infrared repair has carved out a niche that not too many years ago was dominated by traditional remove-and-replace approaches or even overlays, asphalt pavement rejuvenators have made headway throughout North America as a pavement maintenance alternative.

So when Southern Illinois University in Edwardsville, and Elkford, British Columbia, Canada, began considering their pavement maintenance options, they each ended up making the same decision: pavement rejuvenators — Reclamite Preservative Seal and CRF Restorative Seal — products of Golden Bear Oil/Tricor, Bakersfield, CA.

These products are designed to reinvigorate the asphalt in the pavement, thereby extending pavement

life, reducing its life-cycle costs.

“In flexible pavements such as asphalt, durability can be defined as the relationship between strength and flexibility. Both properties contribute to the longevity of a roadway,” says Monty Kallio, partner/operations manager, Interior Emulsions Ltd. (IEL), a contractor and rejuvenator supplier in Kamloops, B.C.

“Although type and size of aggregate are very important to the design of a particular pavement, this material doesn’t change over its life span. Only the binder, the asphalt cement, is altered.”

“Asphalt rejuvenation is the process of restoring durability to asphalt pavement,” Kallio says.

Harrell Lankford, superintendent of CAM LLC, South Roxana, IL, says CAM has been successfully manufacturing and marketing rejuvenators in Southern Illinois, Missouri, and Arkansas for years, focusing on both the long-term cost savings rejuvenators can offer and the benefits to the

end user when the pavement is closed and then reopened within 24 hours.

“But the job has to be right for a rejuvenator. You can’t just put a rejuvenator down on every job — just like you can’t put an overlay down on every job,” Lankford says. “You have to match the technology to the application.”

That’s what both CAM and Interior Emulsions Ltd. have been doing for years under ongoing maintenance contracts with their customers. And while the jobs are different — SIU’s project involves as many as nine parking lots a year while Elkford’s work is on city streets — the pavement characteristics that help decide which maintenance technique to use are very similar.

Kallio says Elkford streets exhibited minor to moderate aging and the standard deterioration that accompanies aging. The town’s public works staff knew that without proactive measures, the decline in condition would continue — eventually requir-

ing some form of major and costly rehabilitation.

The same is true of SIU's parking lots. Lankford says the university, knowing it has so much pavement to maintain, wanted a pre-emptive maintenance approach that could be applied to pavement while it is still structurally sound, before it needs reconstruction or significant repair.

### Why rejuvenators?

Jim Brownridge, manager of national product marketing for Golden Bear Oil/Tricor, says asphalt cement is made up of a variety of components which can be divided into two basic types of materials: asphaltenes and maltenes. The correct ratio of asphaltenes (the hard, bodying agents that provide strength) to maltene fractions (which collectively contribute resilience), must be retained to maximize the asphalt's durability.

Kallio says maltenes are susceptible to oxidation. When oxidation occurs, the asphaltene/maltene ratio on the pavement's surface is changed. With higher rates of asphaltenes present, the asphalt becomes harder and more brittle. As the oxidation reaction continues, the surface of the pavement is

*Lankford says another advantage of the rejuvenator is that "the striping comes right back. You don't have to restripe it because the material goes right through the stripes, depending of course on how thick the paint is, so you save money because you don't have to restripe."*



After sweeping the street, Interior Emulsions Ltd. spray applies CRF Restorative Seal. In less than an hour fine aggregate is applied, then drag-broomed to fill cracks and voids.

robbed of the components that provide flexibility.

"Penetration values, which measure softness, plummet," Kallio says. "The pavement becomes less able to withstand temperature-induced shrinkage and expansion, resulting in cracking. In addition, the pavement becomes less able to 'bounce back' from traffic loading — and again, cracking occurs."

Cracking, of course, allows moisture and oxygen into the pavement, weakening the pavement structure. Further, the effects of time and exposure to the elements decrease the volume of asphalt binder at the surface, lessening the asphalt's ability to bond and retain aggregate, and opening up the pavement even more.

"Asphalt rejuvenators work by replacing and replenishing the maltene fractions lost through oxidation," Kallio says. "The application of rejuvenators increases the quantity of maltenes in the asphalt cement, rebalancing the asphaltene/maltene ratio, restoring flexibility, and increasing resilience. This balanced ratio restores durability to the pavement."

### Maintaining SIU's parking lots

Lankford says CAM LLC has been treating roads with Reclamite throughout the central Midwest for years, including 200,000 sq. yds. a year in Little Rock, AR; 100,000 sq.

yds. annually in Madison County, IL; and 60,000 sq. yds. in Farmington, MO. Because the pavement in the SIU parking lots is in good shape, with the maintenance work done in the early stages of pavement deterioration, CAM used Reclamite.

"Reclamite is a maltene-based rejuvenator that adds back the light fractions of the asphalt that have oxidized out of the pavement," Brownridge says. "When the pavement 'grays' out it's the light fractions, the maltenes, that dissipate. Reclamite adds them back."

Brownridge says Golden Bear's Reclamite is a high-solvency product that "fluxes" after it's been applied to the pavement.

"After penetration it combines with and expands the asphalt," Brownridge says.

Lankford says CAM spray applies the rejuvenator at a rate that varies from one-fifth to one-tenth of a gallon per square yard. He says it does take some time to get used to the process, particularly to learn how much to put down.

"If you put too much down the pavement not only gets too slick but the material just runs right off," Lankford says. "And each batch of asphalt is different, too. The plant operators don't make the same batch twice, so you have to keep an eye on the pavement as you're applying the

material to see how much is soaking down and how much isn't so you can adjust it as you're going if you need to."

### Extending life of Elkford's streets

Kallio says that at first glance, Elkford's system of streets seemed to be in good condition.

"For streets over 30 years old, in an area of significant yearly temperature fluctuations and heavy winter snowfalls requiring frequent plowing, the overall condition remained surprisingly good," Kallio says.

Closer inspection, however, revealed hairline cracking and loss of surface fines throughout the street network, and some areas exhibited the early signs of more serious distress such as raveling of the larger aggregate and spalling of pavement edges where they met the concrete curbs.

"Elkford's pavements were entering a critical stage of their life cycle," he says. "Action was required to slow or

reverse this process, without which the deterioration would accelerate."

So IEL tested both Reclamite and CRF Restorative Seal, opting for CRF because of its asphaltenes content, in conjunction with a light application of sand, to improve the surface texture of the streets and provide long-term protection from water intrusion and further oxidation.

"CRF is a rejuvenator with flexible binder in the product," Brownridge says. "It's designed for use on roads that have more distresses, such as raveling or cracking. It takes a road that's beyond a fog seal and brings it back by adding some strength."

Elkford tested CRF on more than 33,000 sq. meters of residential and arterial streets in its 1999 maintenance program.

Elkford monitored the performance of the treated roadways, and since that initial test IEL and Elkford applied a rejuvenator to almost 50,000 square meters of pavement in 2001 and another 60,000 square meters of the town's remaining streets last year.

## Some Specs

**Description:** Reclamite Preservative Seal and CRF Restorative Seal are asphalt pavement rejuvenators designed for use on parking lots and roads. Reclamite is intended for near-new pavements that show only early signs of aging, such as minor cracking, moderate raveling or pitting. CRF Restorative Seal is for structurally sound pavements that exhibit more significant deterioration, such as a major loss of fine aggregate and alligator cracking.

**Application:** Spray-applied from a distributor truck. CRF application is followed by a sand application and then a drag broom to force sand into cracks and voids.

"CRF provided a penetrating 'seal in depth', becoming an integral part of the road surface — not just a cover up," Kallio says.

IEL sweeps the streets, then each street is closed to one lane, alternating traffic. IEL then applies the rejuvenator to the closed lane using an asphalt distributor truck. The emulsion sits and penetrates for 30 to 45 minutes, providing sufficient time for water within the emulsion to evaporate, leaving a tacky residue. Next the public works winter sanding units place fine aggregate at rates of between 2 and 3 kilograms per square meter. Streets are then drag-broomed to even out the sand and force it into any voids or cracks.

"CRF will rejuvenate to a degree but it's a flexible emulsion," Brownridge says. "When it cures it will knead and work into the pavement with traffic to seal it and fill open voids."

Kallio says that normally 40% to 50% of the sand permanently adheres to the road surface.

"Proactive pavement maintenance before serious deterioration was apparent has postponed the need for major reconstruction," Kallio says.

"With restoration and rejuvenation of its entire street inventory completed, Elkford will have purchased years of extra life for its pavements at a fraction of the cost of repaving." ■

**CAM LLC's Robert Brown and a laborer applying Reclamite to pavement areas not reached by the spray truck.**

