Ice gets cold shoulder

A new technology for keeping bridges frost-free has been installed at an accident blackspot in the USA, reports *Bob Persichetti*

Left: Installation of the overlay

Below: A special aggregate stores deicing chemicals and releases them as required

The twin ports of Superior in Wisconsin and Duluth in Minnesota are nestled on the western edge of Lake Superior, the largest freshwater lake in the world. The sheer enormity of the lake is breathtaking - its northern tip borders Canada and its south-eastern shore serves as a gateway to rest of the Great Lakes.

Together, the ports welcome more than a thousand freighters annually with inter-lake (and often international) cargos of iron, grain, coal and stone. Travelling between the two cities by land, however, is another matter. They are separated by St. Louis Bay, a smaller body of water that feeds into Lake Superior. Two bridges carry as many as 36,000 vehicles from city to city every day, including a large portion of semi-trailer trucks that supply the area's mining and marine-related industries.

Keeping bridges and ramps free of snow and ice can be a challenge during the region's long winters - the area receives on average, 2.5m or more of snow per year. Frequent high winds coming off the lake also cause drifting snow, as well as frost and ice formation – including treacherous black ice.

One area in particular has suffered 20 accidents in four years. The on-ramp to the John A Blatnik Bridge on the Wisconsin side of the bay has two lanes that merge on an incline with a sharp curve. Under icy conditions, trucks and other vehicles have taken the curve too fast and tipped over, resulting in property damage, injuries and even fatalities. Wisconsin Department of Transportation officials were on the lookout for ways to make it safer for traffic during winter driving conditions.

Over the years the DOT had tried various methods to keep the state's bridges and ramps free of snow and ice. But even with sophisticated weather forecasting services, pavement temperature forecasting systems and real-time weather reporting and monitoring, safety continued to be a big issue.

In addition to ploughing and salting, their strategies included spraying anti-icing liquid chemicals on road surfaces prior to snow or ice formation. The DOT had even established 'frost patrols' - road crews that would be sent out in the early morning hours to search for and treat road surfaces that were icing over.

"The problem is you can't get there fast enough," says WisDOT's Tom Martinelli. Normally, frost occurs very early in the morning, and we'd have to send crews out at, say, 3am - on overtime pay - to drive out to a site and treat it."

A new strategy came to light after DOT officials saw the results of a new anti-icing technology called the Safelane Ice Protection Overlay. It had been applied to a bridge in Crandon, Wisconsin, as a test installation in 2003, and in the following two years, accidents had been reduced from three to four per winter season to zero.

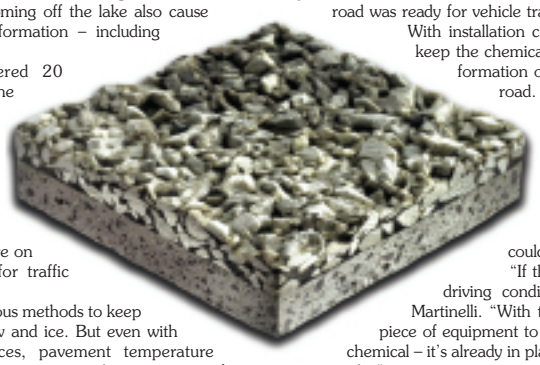
These results spurred Martinelli to recommend a second test installation - he identified the Blatnik Bridge on-ramp as an ideal location. A cost-benefit analysis was compiled, and an application was submitted to the Federal Hazard Elimination Safety Program to help fund the project. It met the necessary requirements and installation of the overlay was scheduled for the summer of 2005.

The Safelane overlay was developed at Michigan Tech University and is licensed and marketed by specialist Cargill Deicing Technology. The system combines the pavement-sealing characteristics of epoxy overlays with a special aggregate that stores and automatically releases deicing chemicals as they are needed.

It can be applied proactively to prevent frost and ice from ever forming. A single application can treat multiple frost events.

Studies conducted by Cargill Deicing Technology and Michigan Tech have shown that the system requires up to 75% less deicer to keep road surfaces clear. Because chemical treatments are no longer needed during every frost event, expensive call-outs and overtime are required less often, and equipment usage is reduced. And, because of the pavement's ability to store anti-icing chemicals, crews can treat surfaces on their schedule - not the weather's.

The first step of installation was to prepare the surface and clean off oils and contaminants, followed by shot-blasting to roughen up the surface and ensure a good chemical and physical bond. The two-part epoxy was mixed then spread on the surface before the special aggregate was applied by a spreader. After it was allowed to cure, loose rock was vacuumed up and the road was ready for vehicle traffic again.



With installation complete, the rock acts as a reservoir to keep the chemical in place, and the chemical will prevent formation of ice from bonding to the surface of the road. WisDOT officials are anxious to monitor the results of the test installation. They intend to track maintenance costs and conduct periodic road friction tests to determine how well the traction holds up over time. Most importantly, they will monitor vehicle crash statistics. If results prove positive, more installations could be considered for the future.

"If there's anything we can do to make safer driving conditions, we want to be proactive," said Martinelli. "With this system, we don't have to wait for a piece of equipment to drive to a site and treat it with anti-icing chemical – it's already in place, ready to activate, any time of the day or night." ■

Bob Persichetti is general manager of Cargill's Safelane Anti-icing Overlay business.