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Iowa DOT snow-removal crews cutting salt use by 10% using SpreadSmart Rx system

By precisely metering the amount of salt applied per lane-mile and capturing GPS data on speed and location, the SpreadSmart Rx system better manages material usage and optimize cost effective operations.

Minneapolis, Minn., September 26, 2013 – When the snow flies in Iowa, the state Department of Transportation (IDOT) fleet of snow removal trucks gets busy. In fact, with over 900 trucks, 24,000 lane-miles of highway and 35 snow events per season, IDOT has one of the biggest and busiest snow-removal fleets in the country. The snow removal trucks are equipped with snow plows, but they also disperse deicing and traction-control materials such as salt, salt brine, sand and calcium chloride depending on temperature and road conditions.

In the course of an average winter, IDOT will spread more than 203,000 tons of rock salt and more than 15 million gallons of salt brine in order to control ice and snow on road surfaces. Beginning in 2005, IDOT began using SpreadSmart Rx systems from Cirus Controls (Minneapolis, Minnesota) on its trucks to monitor and control the application of salt. Recently, IDOT upgraded the rest of its fleet with SpreadSmart Rx systems and set a goal of reducing salt use by 10 percent and cutting material expenditures by $2 million per year.

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Technological challenges

Annette Dunn is the winter operations administrator for IDOT and the person responsible for keeping the state's highways clear of ice and snow. One of her biggest challenges in her nearly four-year tenure has been implementing technological improvements that reduce costs while maintaining or improving winter safety on the state's highways.

"To improve materials management, we installed SpreadSmart systems in about half of our snow removal trucks starting in 2005," said Dunn. "However, we had multiple spreaders and multiple firmware systems that were sending back different algorithms via the GPS system. This made it difficult to analyze the data we were getting on application rates and locations. To simplify, we decided to standardize all of our equipment so every operator had the same equipment on every truck. In addition to supplying the SpreadSmart equipment, Cirus Controls created standardized firmware for our systems, which allows us to gather higher quality data for better decision making. As a result, we think we can reduce our usage of materials a minimum of 10 percent by exercising tighter control over the application rates and through the use of more accurate real-time GPS information."

Control units are GPS/AVL-ready

According to Paul Mortell, president of Cirus Controls, each SpreadSmart Rx system consists of a controller (CPU), an operator keypad and a display unit. "The controller's job is to precisely drive the hydraulic spreader unit and track how much material is being applied to the road surface per mile," said Mortell. "The controller not only sets the deicing application prescription and records the amount of salt being applied per mile, but captures geographic location, road surface temperature and truck speed data. All of this data is uploaded in real time via cell phone transponder to IDOT through its AVL (automatic vehicle location) system. The SpreadSmart system also measures and controls the flow of other granular and liquid materials," he continued. "All of the systems are AVL-ready, so they can easily interface with IDOT's chosen AVL system for data transfer."

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The recent IDOT fleet upgrade involved the installation of 350 SpreadSmart systems in a very short timeframe. “We made the decision to upgrade the fleet in the spring with the need to have the whole system tested and ready to hit the road by October 1st,” said Dunn. “Our winters can start as early as October 15th, so Cirus Control’s ability to deliver the systems in that short timeframe was critical. They really came through for us.”

Reducing the guesswork

In general, road salt application rates are based on formulas developed by federal and state Departments of Transportation that factor in weather pattern, temperature, precipitation and road conditions. Upward adjustments are sometimes made to the formulas when road surfaces are colder than the air temperature, a condition that causes adhesion of ice and snow to the surface. One of the ways the SpreadSmart system will help save materials is by reducing the amount of subjective judgment a truck operator needs to exercise. Prior to the spreader control systems being installed and calibrated, drivers visually determined the spreading rate on each stretch of roadway. More often than not, this would result in too much salt being applied for the conditions, as it was impossible to visually judge how much salt had been applied to a snowy, white surface by looking in the rearview mirror.

“Now that all our trucks will have the SpreadSmart system,” said Dunn, “operators can apply a variable amount of material up to 300 pounds per lane-mile and use occasional blasts of 500 pounds per lane-mile on bridges. In some instances, operators can lay down even more materials. Now, each of the state’s six maintenance districts will have the tools they need to better manage their annual allocation of salt. We think much of the department’s savings in materials will come from each district doing a better job of managing their application rates,” she said.

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Savings through better material management

The SpreadSmart system continually records information on spread rate, truck speed, location, temperature and other factors and then uploads the information to IDOT through the GPS/AVL system once every 15 seconds. The AVL system used by IDOT is supplied by Location Technologies, a technology partner of Cirus Controls. This gives IDOT a stream of data in real time that can be used to make decisions on plowing effectiveness.

"What we'll be able to do with the data is improve our effectiveness and efficiency on the road by reviewing performance measures such as the speed on a particular roadway in a particular kind of weather," said Dunn. "Then, we will look at the type of treatments we're doing and relate that information to highway accident data. This analysis will enable us to determine which treatments work best in certain types of conditions. And savings will come through much better management of our materials using the spreader controls."

Dunn said that the 75 older trucks in the fleet without spreader controls will be replaced with new trucks by 2014 and also equipped with SpreadSmart systems. That will make IDOT the most "connected" snow removal fleet in the country—and perhaps one of the most effective as well. When the temperatures plunge and the snow flies in the Hawkeye State, motorists can be assured that IDOT's snow removal fleet is using the latest technology to keep the roads clear, safe and well-managed.

About Cirus Controls

Cirus Controls manufactures central hydraulic systems, including electronic spreader controls, advanced plow controls and innovative data management systems for winter and summer road maintenance. The company's hydraulics, controls, telematics and related accessories for the snow removal industry offer solutions that make providing winter maintenance services easier and more cost-effective for municipalities and commercial operations. Typical applications include snow and ice patrol trucks, plow trucks, airport and multi-function trucks, sanitation and leaf collection trucks, road-surface and vegetation spraying vehicles. For more information, contact Cirus Controls at 763.493.9380 or info@ciruscontrols.com.

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Photos:

An Iowa Department of Transportation truck plows a highway lane while using a SpreadSmart system from Cirus Controls to precisely meter salt onto the roadway and upload speed and location data for real time or later analysis.

The SpreadSmart Rx control system allows operators effortless control of salt applications while logging data on application rates, location and speed.

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