Cirus CONTROLS

CHALLENGE Reduce salt use on streets and roads in Lowell, Mass., while maintaining or improving safety

SOLUTION Use "smart" spreader controls to reduce salt use by 60 percent while improving material management and performance reporting

CITY OF LOWELL USES "SMART" SALT-SPREADING SYSTEM TO CUT MATERIAL COSTS AND IMPROVE REPORTING

Controlling its use of salt on city streets and compiling performance data on its fleet of snowfighting trucks have combined to help the Lowell Department of Public Works save money and improve effectiveness.

Located northwest of Boston near the New Hampshire border, Lowell, Mass., gets more than its fair share of snow and ice during the winter. Severe cold can cause black ice to form on the city's streets and the infamous Nor'easters can bring freezing rain followed by periods of blowing snow. Mitigating the effects of winter's wrath and making driving safer is the job of the Lowell Department of Public Works and its fleet of snowfighting equipment. For the past two seasons, snow removal trucks in the city have been using new salt-spreading and GPS tracking systems from Cirus Controls to improve the performance of snow and ice removal equipment while substantially cutting salt use to save money. These systems have not only reduced operating costs, but they provide truck location and performance data that improve department reporting to the city government.

Before installing Cirus SpreadSmart Rx™ control systems on its fleet of snowfighting equipment, Lowell was applying upwards of 1,000 tons of salt on city streets during a typical storm, according to Brandon Kelly, Lowell Street Division general foreman. "Our operators would typically set their existing manual spreaders to maximum and go, putting down about 1,000 pounds of salt per lane mile. As a result, our streets were often covered in salt after a storm," said Kelly. Not only was that practice wasting money, it left a lot of salt dust on the roads and raised both aesthetic and environmental concerns.

UPDATE!

City cuts salt use by 30 percent in first two snow seasons.

ciruscontrols.com/news

"Operators who used to fill up with salt 10-12 times during a storm, are now refilling about three times. This helps keep trucks out on the road instead of driving back and forth to get more salt."

Brandon Kelly, Lowell Street Division general foreman, Lowell Department of Public Works

LOWELL GETS SMART

To get control over the amount of salt the city was applying to its streets, the DPW appealed to the city council to purchase nine new snow removal trucks equipped with spreader controls from Cirus Controls. The purchase of the SpreadSmart-equipped units was justified on the basis of potential material savings — and the results did not disappoint, according to Kelly. "We used to put down about 1,000 tons of salt per storm as a general rule. Now, with better spreading controls, we're down to about 400 tons per storm — a reduction of 60 percent. Before it was 'turn the auger and the spinner all the way up and let it fly.' Now we apply just the right amount for the conditions."

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 sets the deicing application prescription and records the amount of salt being applied per mile, while its built-in GPS captures geographic location, direction and speed. A sensor also captures road surface temperature, a critical element in determining how much salt to apply."

Using a Cirus Drive-by Download™ system, all of this data is downloaded to Lowell's computer network automatically when the trucks come within range of a Wi-Fi communication hub at the central facility. In addition, all SpreadSmart Rx™ units are equipped for AVL (automatic vehicle location). This means that if in the future Lowell is interested in collecting data in real time, performance and location information can be transmitted to headquarters on a continuous basis.

SpreadSmart Rx systems offer numerous mounting options including a color display dashboard mount.

DATA HELPS FINANCIAL CONTROL AND MORE

The SpreadSmart Rx™ system controls salt applications and collects data on materials applied per mile, as well as vehicle location, speed and direction, time of day and other factors that can not only help control costs, but also provide meaningful information for governing bodies. "Obviously, a big thing nowadays is reporting," said Kelly. "Our city council wants to know how much we are spending and what we're spending it on, so that's where the data collection advantage comes in. Thanks to the savings we generated with the first nine trucks equipped with spreader controls, we were able to justify purchasing the equipment for the rest of our trucks. This year we're getting three more trucks that are all spec'd out with the Cirus spreader controls," said Kelly. "We are also using the Cirus reporting function that is built in to the software. That allows me to call up any of the data I want in the report. I understand that new software is coming out that will be web-based and has reports already designed," said Kelly.

Not only are the city's trucks spreading salt more effectively, they are also getting the job done more efficiently. "One thing we've found is that now a truckload of salt lasts longer, so our trucks can actually be on the road three times as long before they have to come in and refill," said Kelly. "Operators who used to fill up with salt 10-12 times during a storm, are now refilling about three times. This helps keep trucks out on the road instead of driving back and forth to get more salt."

The GPS-derived information on location, speed and direction has turned out to be more valuable than first thought, according to Kelly. The city has been able to use location information several times when individuals have accused city trucks of hitting their cars during plowing. "Now we can look back at the GPS data to determine if, in fact, that truck was at a specific location at a specific time," said Kelly. "Sometimes we find out the complaint is false. We even instruct operators to keep the Cirus systems on even while they are not spreading salt — for the simple purpose of being able to identify where the truck has been."

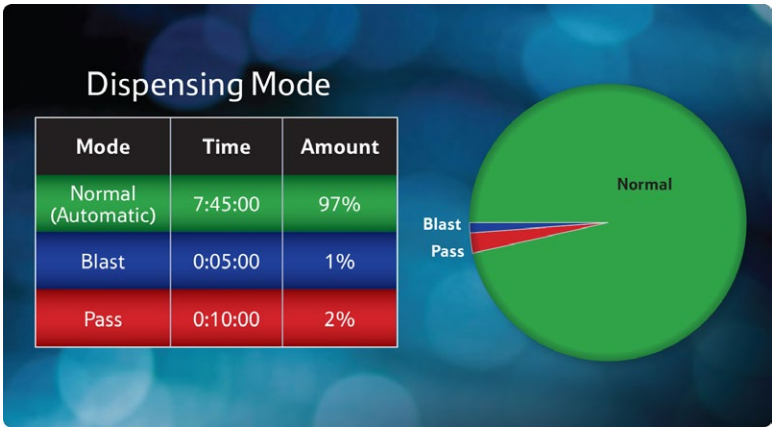
New snowfighting trucks for Lowell, Mass., are equipped with SpreadSmart Rx systems from Cirus Controls.

NEW LIQUID SYSTEMS COMING

The next step in improving Lowell's snow removal fleet is to equip a number of the trucks with tanks for liquid brine applications, which can also be controlled with the SpreadSmart Rx™ system. Adding liquid brine to the granular material as it's applied activates the dry material making it melt ice faster and lowering the effective ice melting temperature range below that of dry salt alone. "By adding brine capability to our fleet, it gives us the flexibility to handle a wider range of temperature conditions," said Kelly.

Getting control of salt applications for winter road maintenance has yielded many advantages for the city of Lowell. City supervisors are getting more accurate and detailed data, less salt is being applied to city streets and the savings in materials is being used to continually upgrade the city's fleet of snow removal trucks. Best of all, the entire fleet operation is more efficient and effective, making Lowell's streets safer no matter what the Nor'easters blow in.

Types of detailed information available in Cirus Controls' companion spreading performance reports include materials dispensed. The Lowell, Mass., Department of Public Works is using these performance reports to provide more accurate and detailed data to city supervisors.



The Lowell, Mass., Department of Public Works uses Cirus Controls' accompanying spreading performance reports to provide more accurate and detailed data to city supervisors. Types of detailed information available in these reports include dispensing mode.

ABOUT CIRUS CONTROLS

Cirus Controls designs, engineers and manufactures central hydraulic systems, electronic spreader controls, advanced plow controls and innovative data management systems for road maintenance vehicles. The company's products for the snow removal industry offer solutions that make providing winter maintenance services easier and more cost-effective for municipalities and commercial operations.

7165 Boone Ave. N., Suite 190 | Minneapolis, MN 55428 | p 763.493.9380 | f 763.493.9340 | **www.ciruscontrols.com**

Cirus CONTROLS

CHALLENGE Automate snowplow operator record keeping and empirically measure the effectiveness of winter road maintenance operations

SOLUTION Integrate SpreadSmart controllers, GPS-based spreading data and an automated reporting system that overlays spreading data on RWIS data for fully integrated winter reporting

CIRUS SPREADER CONTROLS INTEGRAL TO IDAHO'S DATA-DRIVEN WINTER ROAD MAINTENANCE SYSTEMS

Benefits of ongoing partnership include future automated recordkeeping of materials spread by snowplow operators and empirical proof of road-clearing effectiveness as well as winter road maintenance cost savings and accident reduction.

"The integration of SpreadSmart controllers and GPS-based spreading data from Cirus Controls along with RWIS data gives ITD a window into our operations that didn't exist before."

Dennis Jensen, ITD mobility services-winter maintenance coordinator

The task of keeping winter roads safe for travelers throughout Idaho — while collecting accurate data on materials applied to road surfaces for reporting and performance measurement — presents a unique set of challenges for the Idaho Transportation Department (ITD) and its fleet of 450 snowplow trucks. For instance, the state's 12,000 lane-miles of largely remote highways cover diverse terrain, from rugged mountain passes to rolling hills and deep valleys. Plus Idaho's vast size and multiple micro climates trigger heavy snow in the north and extreme winds and blinding ground blizzards in the east. Over and above these difficulties, work orders completed by Idaho snowplow operators after long shifts may not accurately report the amount and type of materials applied to prevent or remove ice from roads.

To tackle the challenge of automating snowplow operator recordkeeping on ice removal and prevention materials applied to roads, ITD is relying on the spreading controller and data from Cirus Controls' SpreadSmart spreader control system. The Cirus system not only controls material spreading but also provides accurate and reliable information on the amount and type

of materials applied to road surfaces, enhanced with GPS location data and nearly real-time reporting. To empirically measure the effectiveness of its ice removal and prevention operations, ITD is depending on the SpreadSmart spreader control system from Cirus as well as weather and road surface information provided by their RWIS (road weather information system) monitoring sites.

ITD's approach has resulted in a sophisticated, integrated and calibrated spreading and road clearing performance measurement system covering the whole state of Idaho.

COMMITMENT TO CALIBRATED PERFORMANCE MEASUREMENT

"Calibrated performance measurement is an integral part of our winter operations and is made possible by the RWIS monitoring sites supplied by Vaisala and spreader control systems from Cirus Controls," said Dennis Jensen, mobility services-winter maintenance coordinator for ITD. "The RWIS technology has allowed us to compare events across the state and pinpoint storm event similarities," added Jensen. "And the integration of SpreadSmart controllers and GPS-based spreading data from Cirus Controls along with RWIS data gives ITD a window into our operations that didn't exist before."

In addition, ITD can now see exactly what their snowplow trucks executed at RWIS locations and match that specific material application data and timing to the RWIS road surface data, before and after treatment, to evaluate the effectiveness of its winter road maintenance operations. "Bottom line," said Jensen, "we can see how well we're doing at preventing and removing ice from roadways."

FUTURE AUTOMATION OF OPERATOR RECORDKEEPING

After a demanding and up to 12-hour shift clearing snow and ice from highways, the last thing a snowplow operator wants to do is spend another hour documenting his or her daily activities in a work order. To automate this process in the future — and ensure the accurate documentation of the amount, type and location of materials applied to road surfaces during a particular shift — ITD will upload the raw data supplied by SpreadSmart spreader control systems to a server. The Winter Automated Reporting System will create the work day summary, which will be fed to ITD's TAMS Maintenance Management System — TAMS will then generate automated operator work orders and daily work summaries. "When the system is fully automated, the only human element will be the summary review and modifications of data that are not provided by Cirus," explained Jensen.

Each winter, the Idaho Transportation Department is charged with snow and ice removal on 12,000 lane-miles of highway covering mountain passes to rolling hills and valley floors.

In addition to keeping winter roads safe for travelers throughout Idaho, the Idaho Transportation Department collects accurate data on materials applied to road surfaces for reporting and performance measurement. The material spreading data is supplied by SpreadSmart spreader control systems from Cirus Controls.

AUTOMATING ANALYSIS OF RESULTS

From the get-go, ITD realized that hundreds of person-hours would be required to manually process and evaluate data gathered from RWIS sites and a fleet of snowplow trucks equipped with spreader controls — and the need to fully automate data input and analysis. To achieve this key component, Cirus Controls and Vaisala are developing an automated reporting system that overlays Cirus spreading data on Vaisala's RWIS data. When the system is complete, it will automatically provide reports informing ITD how much material was applied at a specific location and what the results were within 15 minutes of treating the road surface.

"These combined results will help us fine tune our spreading rates on a given stretch of roadway," said Miranda Forcier, ITD winter performance analyst. "When the complete automated system is up and running, operations managers, road foreman and operators will be able to see the RWIS and Cirus spreading data in almost real time on Vaisala's Navigator web-based software. They'll also know quickly if the spreading application was appropriate and successful for the given road and weather conditions."

FLEET-WIDE EXPANSION WITH FAST PAYBACK

"Our pilot programs demonstrated that we could save $600,000 a year by using the SpreadSmart spreader control system from Cirus Controls, if implemented statewide," said Jensen. "Based on our projected ROI (return on investment), the new system will pay for itself in two to three years, which resulted in a special appropriation to equip all ITD snowplows with the Cirus SpreadSmart controller."

ACCIDENTS REDUCED

The combination of RWIS sites and Cirus SpreadSmart spreader control systems not only translate into more information, but more importantly, more drivable roads and fewer accidents. "One of our performance measures is mobility, which is determined by how much ice is reduced on our roadways when the pavement is below freezing," said Steve Spoor, maintenance services manager for ITD. "With data from the RWIS monitoring sites, we can analyze how we did to prevent or remove ice from the roads. Based on our first small samples of data, we've seen our mobility index going up and the number of road accidents going down. The evidence is from a small sample size right now, but the trend is definitely in the right direction," added Spoor.

RESPONDING TO ITD NEEDS

When ITD needed to determine the total road-clearing efforts for geographically selected sections of the state, they asked Cirus Controls for help. After listening to ITD and understanding their specific needs, Cirus developed and added new geo-fencing and geo-filtering functions to its GPS DataSmart reporting system. The geo-filtering allows ITD to generate reports based on selected geographical regions and quickly analyze data that summarizes all the road-clearing efforts in a specific geographical area. ITD then feeds the geo-filtering data to its TAMS Maintenance Management System, which accounts for ITD's cost of specific road clearing efforts.

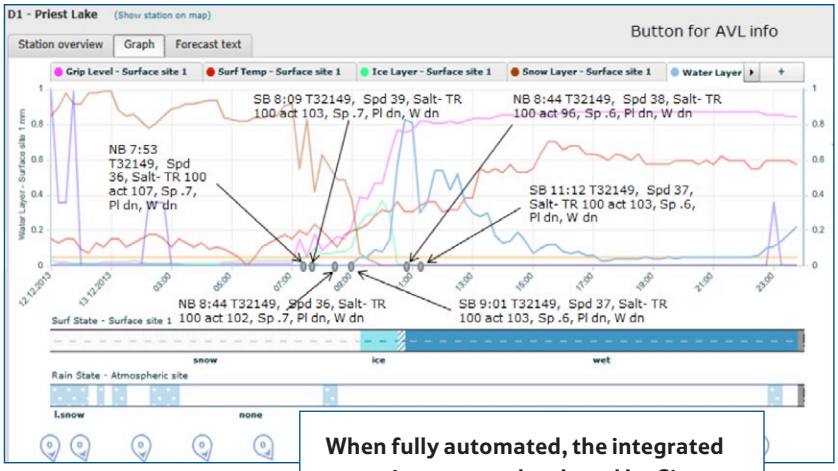
"The total cost reporting for road clearing feature of our GPS DataSmart system helped Cirus Controls win the NTEA Work Truck Show Innovation Award in March 2014," said Paul Mortell, president of Cirus Controls. "To our knowledge, no other product on the market provides this type of integration for winter road maintenance reporting."

Cirus Controls and Vaisala are developing an automated reporting system for the Idaho Transportation Department that overlays Cirus spreading data on Vaisala's RWIS (road weather information system) data. When the system is complete, ITD will know exactly what their winter operations accomplished on every single application lap from anti-icing to de-icing efforts.

Cirus CONTROLS

EMPIRICAL PROOF OF ROAD-CLEARING EFFECTIVENESS

During the coming snow seasons, ITD will continue to rely on the Vaisala RWIS network and SpreadSmart spreader control systems from Cirus Controls to better understand what's going on with their snow and ice removal operations and keep winter travelers safe on over 12,000 miles of highway. "We'll also make stronger correlations between efforts and results and empirically determine the effectiveness of road clearing activities. And that's been the endgame all along," concluded Spoor.



When fully automated, the integrated reporting system developed by Cirus Controls and Vaisala will overlay Cirus spreading data on RWIS (road weather information system) data enabling operations managers to empirically measure in almost real time the effectiveness of their ice removal and prevention operations.

Idaho snowplow truck retrofitted with Cirus control systems: SpreadSmart spreader control with 7" color display, Uni-Grip 620 plow control joystick in Armadillo armrest attached to driver's seat, and Moray Jr. adjustable plow weight control for reducing blade and road wear.

ABOUT CIRUS CONTROLS

Cirus Controls designs, engineers and manufactures central hydraulic systems, electronic spreader controls, advanced plow controls and innovative telematics-based data management systems for winter road maintenance vehicles. The company's award-winning winter road maintenance system provides fleet and operations managers and commercial operators with additional tools for making winter road maintenance services more cost-effective and environmentally friendly. For more information, contact Cirus Controls at 763.493.9380 or info@ciruscontrols.com. Learn more at www.ciruscontrols.com.