

# WHITE PAPER

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## Specifying Low-Cost Salt Spreaders Doesn't Always Pay off in the Long Run

Fleet managers now need to consider the total cost of ownership

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A white paper prepared by the Aebi Schmidt Group

## Accounting for multiple factors when acquiring new equipment will yield more efficient and effective winter maintenance operations

Well executed winter maintenance plans have always helped to reduce crash rates and fatalities. And new technologically advanced winter maintenance equipment can help managers deliver even safer, more commuter-friendly mobility at a greatly reduced cost to tax payers. Although this “smart” equipment delivers significant improvements in performance and long-term cost savings, the cost to obtain and understand it, give pause to those responsible for acquiring it.

That’s why it’s more important than ever to look beyond the lowest acquisition costs when it comes to acquiring new

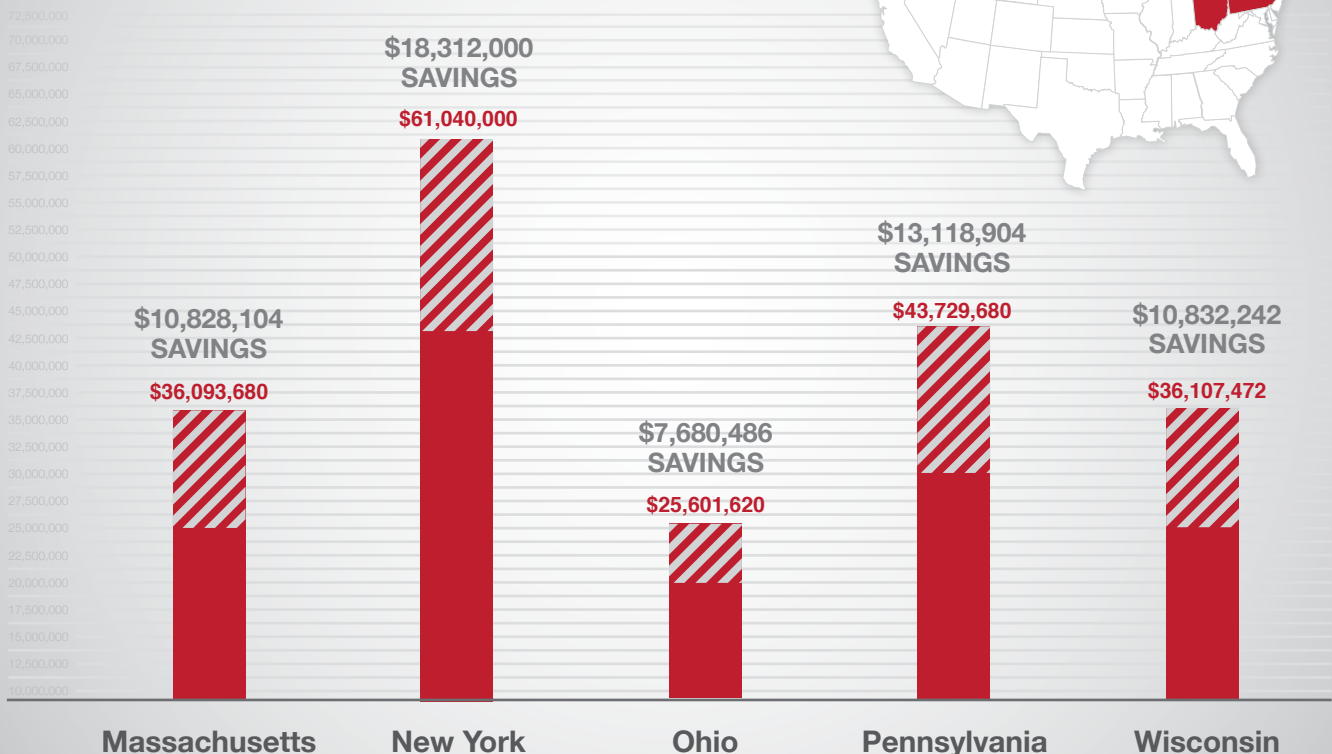
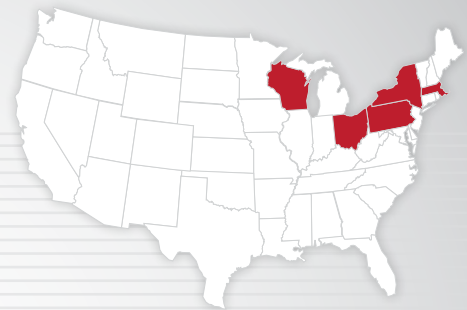
equipment. Acquiring a basic spreader will, most likely, cost less up front than a more advanced spreader, but what will the total lifecycle costs of that spreader be and what will all direct and indirect costs be? With winter maintenance being a major part of the budget in many states and municipalities, more government agencies across the country are recognizing that Total Cost of Ownership (TCO) should be a factor when issuing specifications for new equipment.


## Looking at Total Cost of Ownership

The State of Maine has been combatting harsh winter weather using controlled spreading for nearly two decades, as well as using pavement temperature sensors on its plow trucks. The goal has been to strike the right balance between commuter safety, material cost savings and being environmentally responsible.

# POTENTIAL SALT SAVINGS

IN DOLLARS



 30% Savings in salt costs when switching to a smart spreader

July 2016-July 2017 Data Provided by ClearRoads.org



**We spent more upfront, but knew we would easily recoup the costs with better control of the amount of material we used**

**- Brian Burne**  
Highway Maintenance Engineer  
Maine Department of Transportation



equipment, reliability is critical to keeping TCO down, as is the ability to minimize salt usage.

Down the road from Maine, the Town of Lexington, Massachusetts, has turned to smart spreader technology and an aggressive anti-icing program to keep residents safe and protect the environment, investing heavily in training and equipment to boost liquid operations. That means the town looks well beyond acquisition cost, assessing equipment by analyzing its history of repair and reliability, effectiveness, ease of use and ergonomics. The town uses computer software to help track and quantify the repair and reliability of its equipment, which includes 34 municipal vehicles for winter maintenance on roadways using spreaders from Schmidt, Henderson and Hi-Way. Based on the manufacturer's calculations and reference checks for each product, Lexington developed a matrix to determine when systems would be paid off.

Maine DOT is responsible for 8,300 total lane miles on Maine's highways. Of the 400 plow trucks used for winter maintenance, all 400 are equipped with smart spreader technology [see "What Makes a Spreader Smart" in the figure below]. Maine DOT constantly monitors maintenance costs of its equipment and other factors to know what every class of equipment costs over time. When issuing specs for new

## What Makes A Spreader Smart?



Automatic vehicle locating (AVL) software enables better fleet management



Ground speed controlled spreading syncs dosage rate with vehicle speed



Pre-wetted salt works faster and bounces less



Easy-to-use controllers allow accurate lane placement



Dashboard reports optimize salt usage & provide documentation



Computer-assisted route planning improves fleet efficiency



Air and ground temperature sensors provide dosage guidance



Self-diagnostics let operators monitor equipment performance



**“Lower cost of ownership is more critical to us since we keep the equipment for 10 to 15 years based on its use. A higher cost of ownership really strains our operations budgets,”** said Marc Valenti, manager of operations for the Lexington Department of Public Works.

To achieve its goals of reducing salt usage while maintaining its level of service and improving the consistency of material placement, Lexington has installed ground speed systems on several of its trucks and has a 5-year capital equipment program to replace all open-loop control units to ground speed systems.

The town has reduced salt usage by almost 50 percent on some routes with the slurry spreaders and up to 30 percent with enhanced liquids with conventional saddle tanks and V Box spreaders with a regimented calibration program. While usage varies by season, overall Lexington has realized reductions of 25 percent and is still trending down. Last year, the town used approximately 5,800 tons, which is well below its historical peak of more than 8,000 tons in the past eight years.

Valenti said limiting the amount of salt being used has yielded a number of benefits. **“We have multiple watersheds in our community and it’s imperative that we keep the environment well balanced. We also keep more salt in our shed, which means we can manage salt shortages from suppliers when they occur. We have had a run of tough winters lately and have done a great job managing supplies, part of that is due to our winter liquids operation as well as the slurry spreader system,”** he added.

Across the country in the state of Washington, TCO factors into all equipment purchases, everything from anticipated maintenance to keep equipment on the road to the ability to more precisely apply material to reduce waste.

**“At the end of the day, we want the lowest lifecycle cost. We’re pinched further and further as new lane miles are added without adding more resources to our operations, so avoiding downtime and being as efficient as possible are very important,”** said James Morin, Washington State Department of Transportation maintenance operations manager.

The department has a dedicated number of trucks with smart spreaders that can treat up to three lanes at a time. Morin said smart spreaders are **“a tool in the toolbox”** to have when conditions get tough. The department uses an Automatic Vehicle Location (AVL) system to set constant

application rates and to collect data. Of the department’s 500 trucks, 480 are AVL equipped.

## Smart Spreaders Gaining Traction

While many state and local maintenance departments have adopted smart spreader technology, Europe is still ahead of the United States with its use of smart spreader technology. But more states and cities in the United States are catching up.

Columbus, Ohio, is one of those cities. The Columbus Department of Public Service is responsible for keeping 6,387 lane miles of roadway clear of snow and ice. Street Maintenance Assistant Manager Leo Ross is a big proponent of using smart spreaders to help treat such a large area because of their ability to cover up to three lanes with a choice of multiple spread patterns.

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**We can precisely cover three lanes when we put smart spreaders on a route, which allows us to free up two trucks. The best we can do with our older spreaders is two lanes at a time, and they’re not as precise**

**- Leo Ross**  
Street Maintenance Assistant Manager  
Columbus Department of Public Service

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When issuing specs for new equipment, the department analyzes multiple factors, including reliability and efficiency. **“We don’t do low bid anymore because we might get what we paid for. We can’t have equipment sitting in the shop come wintertime,”** he added. **“We spend a little more, but we can justify it.”**

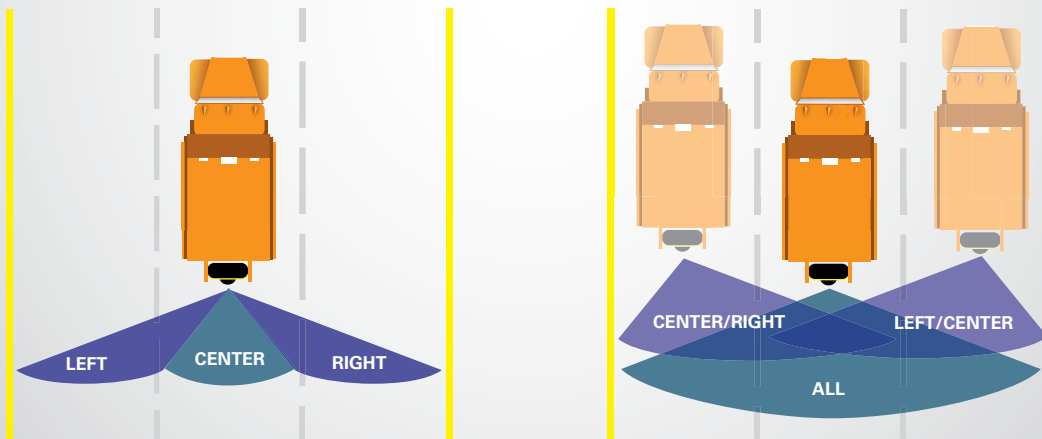
As Ross and others in the department have sung the praises of smart spreaders, the city continues to add them to its fleet. **“I’d like to see at least half of our fleet converted to smart spreaders. The more we get, the more efficient we’ll be,”** he said.

Ross said trucks equipped with smart spreaders are reducing the amount of time spent on routes—as much as 33 percent less time compared to trucks with double spinners and as much as 50 percent less time compared to trucks with single spinners. In turn, they’re also reducing fuel consumption.

## Swenson and Schmidt Smart Spreaders

Swenson and Schmidt spreaders both deliver precise material placement, enhanced ice melting ability, and cost reductions of 35% or more. Plus, improved safety for drivers and the community are achieved through:

- › Advanced in-cab controller allows driver to choose from one to three lanes of coverage with six different spread pattern options.
- › 26-gallon-per-minute liquid pump supports a 70:30 ratio of granular salt to liquid pre-wet ratio, which is 65 gallons per cubic yard of salt.



### Pre-Wetting... It Really Works

Whether states and cities are using smart spreader technology and to what extent, the majority have incorporated pre-wet capabilities. Pre-wetting is the process of spraying deicing salt with a solution of liquid chemical before spreading the salt on the roadway. Pre-wetting the salt helps it work more effectively as a deicing agent because wet salt clings to the road instead of bouncing off or being swept off by traffic. And, to be effective as a deicing agent, salt requires moisture. Moisture dissolves the salt, releasing heat to melt the ice and snow, as well as breaking the ice-road bond.

In Maine, all 400 trucks are equipped with pre-wetting systems. When Maine DOT issues specs for new spreaders, the ability to deliver higher liquid percentages has become another important factor.

The Idaho Transportation Department (ITD) has been purchasing Swenson spreaders since 2010 with pre-wetting systems. Steve Spoor, maintenance service manager at ITD, said the results were encouraging. ***“We have learned pre-***

***wetting does reduce overall salt use and deliver better results. We are working to update the technology on our newer spreaders and really pushing for pre-wetting.”***

The higher the ratio of liquid pre-wet to granular salt, the better for melting snow and ice faster to keep roads safe and reduce salt loss. ITD is still working to find the ideal mix of salt to liquid, but typically uses eight to 12 gallons of liquid per ton of salt and is working to push that amount up to 20 gallons per ton. ***“We’re definitely seeing better results the more liquid we use,”*** added Spoor.

Valenti at the Lexington Department of Public Works agreed. ***“Saturation of the salt is key. Our slurry spreaders are dispensing over 90 gallons per ton of winter liquid onto granular salt, which equates to 25 - 30 percent less salt on the roadway.”***

The Columbus Department of Public Service uses liquid systems for both pre-wetting of salt and for anti-icing. Anti-icing is the spraying of salt brine before a snowstorm to prevent frozen precipitation from bonding to a road’s surface.

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**We don't need to reconfigure trucks because our smart spreaders can do both. With pre-wetting and our drivers having better control from the cab, there's much less scatter and we've reduced the pounds needed per lane mile...**

**- Leo Ross**  
Street Maintenance Assistant Manager  
Columbus Department of Public Service

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Ross said the smart spreaders have made it easier to do anti-icing and pre-wetting.

***“We put down what we need to reduce the environmental impact. We're not just going out and turning up the volume and throwing salt everywhere.”***

## **A Data Advantage**

Smart spreaders use technology to more accurately control the amount of material being used and its spread pattern, while also collecting valuable spreading performance data that in turn helps further refine the winter maintenance process.

By tracking salt use, Maine DOT uses data to get an accurate picture of material used by event and how that event affected salt use per lane mile, track performance measures, track truck usage, track which shed salt comes from, make comparisons to other states, respond to press queries and more.

***“By the next morning after an event, we have the data to answer everything we need to know and to support***

***data-driven decision making to continuously improve our processes and effectiveness,”*** said Burne.

ITD has been using ground speed controlled spreading since 1992, but more recently implemented AVL to collect more data to be able to better analyze its winter maintenance operations. ***“Collecting and analyzing data is key to understanding where we can make improvements and then validate or not validate those changes we make all in an effort to minimize the materials we use,”*** said Spoor. ITD soon discovered some drivers were applying too much salt, which has the potential to reduce material usage by as much as 40 percent in some areas.

The Washington State Department of Transportation collects a variety of data that is used for a variety of purposes, including to know where training needs to occur and to help protect the state from legal liabilities if lawsuits occur.

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***Washington is a liberal tort liability state. We have greatly reduced tort liability payout because we have data***

**- James Morin**  
Maintenance Operations Manager  
Washington State Department of Transportation

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There are many factors that contribute to enhancing winter road safety, reducing material costs and labor, and reducing environmental impact. The upfront cost might be more, but the long-term impact can be significant by making an investment in improved equipment, technology and management—and smart spreader technology can be an important component of that investment.

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