Winter maintenance agencies use a wide variety of material spreaders to place deicers onto the pavement. Educating practitioners about the range of spreader systems available—and the products and modifications that other agencies have found effective—would help them select the systems that best fit their needs and budgets.

**Need for Research**

With an efficient spreader, an operator can be precise in placing salt on the roadway—just the right amount and just where it’s needed, without excessive bounce or scatter. This means an agency can achieve its target level of service using the smallest amount of deicing material possible, which saves money and minimizes material waste in the surrounding environment.

Spreader systems range from relatively inexpensive—such as in-house modifications to a dump truck’s tailgate—to sophisticated vehicles that are designed specifically for spreading deicing materials. Spreaders may be outfitted with prewetting systems or salt slurry generators, and additions like ground-speed controllers to control the spreading rate or zero-velocity units to reduce bounce and scatter. With such a wide range of approaches, it can be difficult for an agency to identify which options will deliver the best performance cost-effectively.

**Objectives and Methodology**

The goals of this project were to identify as many solid material distribution systems as possible, catalog them, and develop recommendations for future field-testing.

First, researchers conducted a literature search to identify effective commercial spreading systems, modified systems, and shop-made systems and components. Next, they surveyed 112 winter maintenance professionals about their experiences with different spreader systems. Respondents included practitioners at state DOTs, county and city governments, and international agencies.

**Results**

From the literature search and survey of practitioners, researchers compiled a Catalog of Spreader Types that shows a range of commercial and shop-made...
spreading systems and components. The catalog shows photos of 85 products in eight categories:

- Tailgate spreaders
- Hopper spreaders (slide-in)
- Single-purpose spreaders
- Prewetting systems
- Salt slurry generators
- Spinners, chutes and boots
- Zero-velocity spreaders
- Controllers

The catalog arranges spreading systems from simplest to most complex. Tailgate spreaders are the simplest and least expensive; the tailgate of a dump truck is replaced or modified and the lifting of the truck’s box moves the material to the exit point. Hopper spreaders, in which the spreader unit slides into a regular truck, represent the next level of cost and sophistication. Finally, single-purpose spreader trucks—in which the truck is used only for spreading deicers—offer the potential for the most features but also have the highest purchase price.

From the practitioner survey, researchers found that the two most common modifications to commercially manufactured spreaders were adding prewetting systems and modifying (usually lowering) the spinner or chute to minimize bounce and scatter. The catalog shows various configurations of these systems, such as a spinner with a skirt attached, drop chutes, and boot systems that lower the material drop height.

Other survey results included:

- **Overall performance**: Across all types of spreader systems, most respondents had confidence in the effectiveness of their spreaders. They noted that effectiveness depends on many factors, including the experience level of the operator, the speed of the truck, and whether the salt is prewetted. Many also suggested the use of pre-storm anti-icing treatments to improve effectiveness.

- **Costs**: Respondents noted that there is a trade-off between up-front costs and maintenance costs. Systems with a higher purchase price tend to offer greater material savings, lower maintenance costs, greater flexibility, and easier upgrading.

- **Bounce and scatter**: There were many approaches to tackling bounce and scatter, including commercial products like zero-velocity spreader units and in-house approaches like adding flaps and cages and lowering the material release height.

- **GPS data**: Many respondents wanted to find ways to make better use of usage data generated by global positioning systems or other on-board sensors to lower costs and improve level of service.

Based on the results of the survey and literature search, researchers developed recommendations on how spreader systems could be evaluated and compared in a follow-up project that would focus on field-testing. These recommendations include descriptions of testing methodology, strategy and budgetary considerations.

### Benefits and Further Research

The spreader catalog and final report will serve as resources for winter maintenance professionals looking to purchase new spreader systems and those looking to modify their systems in-house to improve their bounce and scatter performance, improve their prewetting systems, or add features. The catalog includes agency contact information for each item pictured to facilitate follow-up connections.

The field-testing recommendations lay the groundwork for a follow-up project that would aim to identify the most effective spreader systems and develop a standard specification for a material distribution system.

"The catalog provides a good variety of material spreaders in use today. It’s a great tool for operators and supervisors who are looking for ways to improve their spreader performance."

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