

RESULTS SUMMARY

Testing the material properties of snowplow blades in the lab and the performance of plow blades in the field will enable winter managers to evaluate and compare the cost and life span of blades.

PROJECT DETAILS

Project Title: High Performance Blade Evaluation

Project Number: CR18-02

Project Cost: \$195,747

Report Date: January 2023

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MAY 2023

EVALUATION METHODS GUIDE SNOWPLOW BLADE CHOICES

Need for Research

While chemical deicers can keep winter roads clear, significant accumulations of snow and ice require mechanical removal. Snowplow blades bear the brunt of this work, clearing winter roads effectively and efficiently.

Many variables impact a blade's performance and life span, including road surfaces, other snowplow equipment and operator techniques. New blade materials may be stronger and improve a plow's capacity, but they can be costly. Clear Roads members needed more information about the cost and performance of different blades to determine if a promised longer life span with more miles plowed is worth the increased cost. They also needed a process to assess and compare high-performing blades going forward.

Objectives and Methodology

The goal of this project was to investigate different snowplow blades and develop a test protocol for evaluating and selecting blades that winter maintenance managers could use in the field.

The project began with a review of past studies that assessed snowplow blades. The results of two surveys—one of equipment vendors and another of state transportation agencies—supplemented the information gained from this review. The first survey gathered vendor information about blade brands, materials and costs while the second survey reported on state transportation agencies' assessment of plow blade performance, experience with other plow equipment and winter road conditions.

A large-scale field exercise conducted in conjunction with the Idaho Transportation Department identified data collection methods to use in evaluating plow blades. Additionally, two Idaho county transportation garages shared how they assess blade performance. Lastly, laboratory testing identified the chemical and structural differences and similarities of the blades.



Plow blades are a mainstay of winter maintenance, and new technologies require careful evaluation. (Photo courtesy of Wisconsin DOT)

Results

A review of the state of the practice regarding snowplow blade assessments in the country revealed the range of variables that may impact a blade's performance and life span. The results of the review were integrated with findings from field and lab testing to develop a [guide](#) that will assist agencies in evaluating blade choices.

The guide's recommended standard testing protocol includes:

- **Large-scale testing.** On a national or statewide scale, snowplow operational data—location, speed and miles of road treated—can be collected through the trucks' GPS and automated vehicle location (AVL) technologies. Roadway surface characteristics are provided by geographic information system roads layers, and weather data is gathered from Road Weather Information Systems stations and National Oceanic and Atmospheric Administration resources. Local transportation agency garages provide specific blade information, installation reviews and plow operator assessments.
- **Laboratory testing.** Controlled test protocols can evaluate the chemical and mechanical attributes of a plow blade. A dozen tests were used in this study to determine the base resin and relative hardness; thermal stability; and tensile, tear and compressive strength of the blade material. Researchers suggested a prioritization of the possible tests and provided general costs for eight batteries of tests.

- **Integrated testing.** By combining field and lab test results, agencies can determine if blades with different material qualities perform differently in the field. The order of testing may vary by purpose. Understanding material qualities of a new blade compared to an old blade of the same type can inform its performance over time. Large-scale testing is ideal; visual inspection and assessment by maintenance staff and operators can serve as informal field testing.
- **Cost-benefit analysis.** Researchers identified expected blade wear by mileage for carbide insert, carbide articulating and steel blades. Using this data, agencies can compare how costs change relative to wear to determine a blade's cost-effectiveness.
- **Data warehousing.** A comprehensive, searchable database could educate and assist all agencies in optimal blade selection. A centrally located data warehouse could be developed that accommodates a range of blade specifications, road conditions, pavement types and other variables, and uses consistent testing practices to compare and assess blade performance. All agencies could then choose cost-effective snowplow blades to accomplish their winter goals.

Benefits and Further Research

The [Quick Reference Guide](#) developed in this project summarizes the features and specifications of each blade along with key field test results. The New Hampshire Department of Transportation is already planning lab testing for five different blades and will use the guide to determine the parameters to explore. Additional lab testing of snowplow blades could lead to developing material specifications that agencies can use in identifying the optimal blade for their specific conditions.

"The *Quick Reference Guide* will help DOTs understand what to test and compare costs of different plow blades."

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