



## ODOT Research Executive Summary Report

State Job Number: 134817

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### Investigate Plow Blade Optimization

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For copies of this final report go to <http://www.dot.state.oh.us/research>.

### Project Background

Snow and ice management is the single largest expenditure in the maintenance budget for the Ohio Department of Transportation (ODOT), with an annual cost including labor, equipment, and materials reaching approximately \$86 million. Given the current financial climate, it is essential to minimize costs while simultaneously maximizing efficiency, especially for winter maintenance operations. The main technique employed by ODOT for removing accumulated snow from roadways is by using snow plows and snow plow blades, or cutting edges. The plow blade, which is bolted to the snow plow, is the component of the plowing system that makes contact with the roadway surface. Multiple blades are currently on the market that may last longer than flame-hardened steel blades, which are the standard blades that ODOT is currently using. ODOT was encouraged to pursue further research to compare the cost-effectiveness of using the specialty blades in place of the standard blades and to identify safe and efficient procedures for replacing the standard blades that are currently in use. As with any new equipment, a thorough assessment of the various specialty blades is needed in order to determine which, if any, of the specialty blades are prudent to implement in ODOT's winter maintenance fleet.

### Study Objectives

There are three objectives of this study:

- **Objective One** – Determine a usage strategy based on safe, efficient, and cost-effective methods for changing and purchasing plow blades,



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- Objective Two – Recommend specialized blade changing equipment to assist and protect personnel, and
- Objective Three – Recommend plow blades based on condition types.

Meeting these objectives will ensure that ODOT has detailed information regarding the different blades available and any cost savings associated with the utilization of each blade.

### Description of Work

A survey was developed to gather information about current blade usage at ODOT garages. The research team also collected information from county garages regarding the typical plow application, additional plow equipment, plow blade configuration, plow blade changing techniques, safety concerns and road information. Through the survey and discussions with the technical liaison committee, the research team identified six garages to include in an evaluation of plow blades of various types over two winter seasons. The blades evaluated during this study included standard flame-hardened steel blades in various configurations, carbide-tipped blades, JOMA blades, PolarFlex blades, and BlockBuster XL Classic blades. During winter maintenance activities in the selected counties, data was collected throughout the entire winter season, at any time of day and for any length of time that maintenance activities occurred. Data was collected using a digital video recorder equipped with a global positioning system and an infrared vision camera for each plow truck included the study, and measurements of each blade were collected periodically during the two winter seasons to determine the rate of wear.

### Research Findings & Conclusions

When analyzing the data from the first winter season, the results indicated that implementing the carbide-tipped blade and the XL Classic blade will result in a cost savings. The remaining blades would cost more to utilize than the equivalent number of standard blades. The PolarFlex has an \$83 additional cost as compared to a standard blade, while the JOMA has a \$707 additional cost as compared to a standard blade. The results of the analysis from Year Two indicate that the PolarFlex and XL Classic have a cost savings of \$778 and \$302, respectively, when implemented in place of a standard blade.

### Recommendations for Implementation of Research Findings

Implementation of specialty blades in ODOT's fleet is a decision that the managers of each garage must make. There are cost savings and risks to implementing each of the specialty blades. Cost savings are observed for two specialty blades, the carbide and XL Classic blade in the first year, while cost savings are observed for the double stacked carbide tipped, double stacked standard, standard with additional middle guard, PolarFlex, and the XL Classic blades during the second year of the study. The single stacked carbide tipped and the standard blade on a truck with no counterbalance were found to have an additional cost when implemented in place of a standard blade or a truck with a counterbalance, in the second year of the evaluation. The single stacked carbide, PolarFlex, and XL Classic are tested in both seasons of the evaluation; when reviewing the data for both years, a cost savings is associated with implementing the PolarFlex and XL Classic. More details regarding the costs associated with each blade tested are presented in Section 5.2 and Section 6.2 of this report. Table 5.3 in Chapter 5 of this report provides details regarding the damage to the test blades that is observed over the first winter season of this project and the breaking of one carbide blade during the second year of data collection. If a blade is damaged and is no longer useable, a specialty blade would cost more money to replace than a standard blade. Reviewing the routes and considering the operator's experience may help to reduce the likelihood of a blade breaking; however, there is no way to completely eliminate the risk of breaking a blade, regardless of the blade type.