

RESEARCH PROGRESS REPORT FOR THE QUARTER ENDING: 2nd

Wisconsin Department of Transportation
DT1241 2009

| Research, Development and Technology Transfer | |
|--|---|
| Program: (Choose One) | |
| <input type="checkbox"/> Policy Research | <input checked="" type="checkbox"/> Pooled Fund TPF # 5(092) Clear Roads |
| <input type="checkbox"/> Wisconsin Highway Research Program | <input type="checkbox"/> Other |
| Project Title: Development of Standardized Test Procedures for Carbide Insert Snowplow Blade Wear | |
| Administrative Contact/Phone #: Colleen Bos/ (608) 577-4805 | WisDOT Project ID(s): 0092-08-31 |
| WisDOT Technical Contact/Phone #: Michael Sproul/ (608) 266-8680 | Other Project ID: Clear Roads 07-01 |
| Project Investigator/Phone # (agency & contact): Cam Kruse Braun Intertec (612) 369-5747 | Approved Starting Date: 10/22/2007 |
| WisDOT Comments: | Original End Date: 7/1/2009 |
| | Current End Date: 8/31/2010 |
| Sponsor: Wisconsin Department of Transportation | Number of Extensions: 1 |

Schedule Status:

- On schedule Ahead of schedule
 On revised schedule Behind schedule (Please explain below)

| Total Project Budget | Expenditures Current Quarter | Total Expenditures | % Funds Expended | % Work Completed |
|----------------------|------------------------------|--------------------|------------------|------------------|
| \$74,965.00 | \$8,592.50 | \$59,588.21 | 79% | 80% |

Project Description:

Carbide inserts of snowplow blades fail through wear (abrasion) and through durability (fracture). This research project will (Task 1) identify test procedures that have potential to predict the wear and durability performance of the carbide inserts. The most promising test procedures will be developed in the laboratory (Tasks 2 and 3) and compared to the performance of identical sample carbide inserts measured in field tests of actual snowplowing (Task 4). The results of the laboratory and field tests will be analyzed to determine the effectiveness of the tests at predicting performance of the carbide inserts (Task 5). The final deliverables are a report and implementation plan that document the testing and provide recommendations for use of the test procedures and for additional studies, if needed.

Progress This Quarter: (Includes project committee meetings, work plan status, contract status, significant progress, etc.)

Phase 2 Laboratory testing was completed this quarter. Various types of tests were evaluated for their likely relevance to wear and fracture qualities. Initial testing was completed at a selected commercial laboratory expert in the selected tests.

The test methods tentatively recommended for final testing include:

- Visual Inspection for Cracks and Chips (new test method)
- Hardness Test for Cemented Carbides (ASTM B294)
- Density of Cemented Carbides (ASTM B311)
- Apparent Porosity (ASTM B276)
- Apparent Grain Size (ASTM B390)

The visual inspection of an internal face of an insert that was under development in our laboratory has not been recommended because it appears that the Apparent Porosity and Apparent Grain Size tests will provide similar, better defined test results. However, we have added a visual inspection of the open faces of the inserts in the blades for cracks and chips. This was added because of the amount of cracking and chipping observed in two of the three sets of blades tested in the field, the sets that had the most wear.

We completed evaluation of the results of the field testing of the three types of blades. The amount of wear has been measured. We also measured the amount of cracking and chipping of the surfaces of each type of blade. The

difference in shape of the inserts in one set of blades (with an exposed wearing surface that is flat instead of beveled as the other two sets are) makes direct comparison of this set of blades impossible. We are proceeding with a comparison that is based on judgment of the influence of the shape on the wear results.

Basically, it appears that there is a difference in the performance of the two set of blades with inserts that are trapezoidal in shape and there may be some difference in the performance of the set of blades with the rectangular inserts. The chemical composition of the three sets does not appear to be significantly different. However, the manufacturing processes of the carbide inserts are likely sources of differences among the three sets. These differences show up in the visual examination of cracks and chips and in the porosity evaluations as "large" voids or clusters of voids in the inserts. A statistical evaluation to better define these conclusions is in process.

Anticipated Work Next Quarter:

We will complete the analysis of the laboratory testing of Task 3. We expect to complete the Draft Final Report and Implementation Plan by July 26 for distribution to the TAC. We will attend the Clear Roads Summer Meeting in Grand Rapids, MI to present the findings and recommendations and get comments and complete the Final Report by August 31.

Circumstances Affecting Progress and/or Budget:

None.

Gantt Chart:

See following page.