Evaluation of Multiple Blade Snowplow Designs

Sheri Anderson
Office of Maintenance
Iowa Department of Transportation
800 Lincoln Way
Ames, IA 50010
sheri.r.anderson@dot.iowa.gov

Dennis Burkheimer
Office of Maintenance
Iowa Department of Transportation
800 Lincoln Way
Ames, IA 50010
dennis.burkheimer@dot.iowa.gov

Jim Dowd
Office of Maintenance
Iowa Department of Transportation
800 Lincoln Way
Ames, IA 50010
jim.dowd@dot.iowa.gov

Tina Greenfield
Office of Maintenance
Iowa Department of Transportation
800 Lincoln Way
Ames, IA 50010
tina.greenfield@dot.iowa.gov

ABSTRACT

The design of plows used to remove snow and ice from roadways has changed very little in the last 50 years. A typical snowplow is comprised of a very heavy metal frame that usually relies on gravity to keep the plow in constant contact with the roadway surface. Attached to the plow are steel or carbide blades that help cut or peel the snow or ice from the road. These rigid blades do not conform to the contours of the road, which results in snow and ice being missed by the carbide blades and left in the traveled portion of the roadway. Subsequently, any deicing materials spread at the rear of the snowplow truck will have to melt the remaining snow or ice missed by the plow plus any additional snow or ice falling from the sky. The remaining snow or ice can continue to affect traffic and can contribute to the dilution of deicing chemicals.

The Iowa Department of Transportation has developed, built, and tested three new plow designs that incorporate multiple cutting edges that can adjust to the contours of the roadway and that are designed to more effectively clear the road of snow and ice in one pass. In each multiple-blade test plow design, a traditional carbide blade is positioned on the front portion of the plow so it can first remove the bulk of the snow and ice from the roadway. Immediately behind the traditional carbide blade, a scarifying blade is used to scrape and loosen hard-packed snow or ice left by the traditional blade. Behind the scarifying blade, a rubber blade is used to squeegee the roadway surface of any remaining loose snow, slush, and liquid. The rubber blade can follow the shape of the road surface and can effectively clear areas missed by traditional rigid blades. Although the three test plow designs had different outward appearances and operation controls, each combination blade approach allowed deicing materials spread from the truck to be placed on a roadway with a smaller amount of snow and ice, which resulted in less material usage and a quicker return to normal driving conditions.

Key words: equipment—plow design—snow removal—winter maintenance