

## Achieving a Smooth Ride by Automated Machine Guidance

### PROJECT TITLE

Achieving a Smooth Ride by Automated Machine Guidance

### STUDY TIMELINE

7/2022 – 12/2022

### INVESTIGATORS

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### KEYWORDS

SmoothRide  
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More information about the VTrans Research Program, including additional Fact Sheets, can be found at:  
<http://vtrans.vermont.gov/planning/research>

### Introduction

With stricter construction specifications and narrowing the scope of work for roadway resurfacing projects, both VTrans and Industry seek new technology with Topcon's SmoothRide Solution to pave smooth roadways and extend pavement service life. The SmoothRide Solution determines where contract materials and contractor resources are needed the most by pre and post surface scanning, resurfacing design software, 3D machine control milling and paving and intelligent compaction.

VTrans elected to perform a 1-mile demonstration of the SmoothRide Solution on a 6-mile resurfacing project on VT 78 in Swanton. This demonstration will compare, preliminary construction surveying, milling and paving construction practices, quality of construction, surface International Roughness Index (IRI), and service life, between the SmoothRide Solution and conventional milling and paving methods.



### Action Taken

VTrans, working alongside Topcon and Pike Industries, Inc. will demonstrate the SmoothRide Solution on the Swanton NH FPAV (58) resurfacing project. Preliminary construction meetings with all parties confirmed the necessary resources, support, and contract requirements were all met and understood prior to the demonstration. All parties worked together to select the demonstration limits and perform the preliminary 3D scan of the roadway to determine existing roadway cross slopes and design cut and fills. Topcon will provide support for integrating the software to Pike's milling and paving equipment and onsite assistance during construction. Pike will mill the roadway to the contract requirements, following the preliminary 3D scan cut limits to reestablish a

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consistent grade of the roadway. A post scan of the milled surface will determine the efficacy of the milling and determine design fill limits for paving. Intelligent compaction software integrated into the pavement rollers will display the rolling pattern, number of passes, speed, and surface temperature to the roller operator to verify the designed rolling pattern is achieved.

## **Next Steps**

VTrans performed initial surface testing to determine a baseline IRI and will perform final surface testing once the project is complete. VTrans will then evaluate both surface tests to determine percent increase in IRI and compare the surface roughness of the SmoothRide demonstration limits to the conventional milling and paving limits. Other aspects that will be compared are daily production limits, overrun/underrun of project quantities, additional manpower or resources necessary, quality of construction, and service life of the pavement.

After completion of the demonstration, closeout meetings will be held with the contractor and vendor for constructability feedback of ease of use, construction requirements, and final recommendations of future use. VTrans will evaluate the demonstration, Automated Machine Guidance (AMG) System specifications and determine what roadway classifications and scopes of work align with the benefits of AMG and possible project candidates.

## **Potential Impacts and VTrans Benefits**

The scale of impact to VTrans procedures will depend greatly on the success of the demonstration and how well the technology is received. A direct benefit from using the SmoothRide Solution is minimizing time and effort of VTrans initial survey by using the roadway scanner before and after milling. The scanner attaches to any vehicle and surveys the existing roadway using Light Detection and Ranging (LIDAR) at highway speeds. The MAGNET Design software included in the SmoothRide Solution converts the roadway scan into a 3D model of record and produces design cut/fills, geometry design, and quantity determinations. Project quantities will less likely overrun given the mill and pavers are operating off a 3D model of the existing and milled roadway surface. The 3D survey data and final design model are exported directly to software integrated to the construction equipment, relaying precise cut and fill data as the equipment progresses through the project. Pavement rollers integrated with intelligent compaction allow for consistent compaction effort following an established rolling pattern to achieve the desired density of the pavement.

Using AMG systems will provide accurate construction applications which increases the service life of the wearing course, keeping the project on budget and providing a better-quality product.

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