

Vaisala Maintenance Decision Support System (MDSS) Guidance for 21st Century Roadway Operations



Essential Vaisala MDSS Elements

- **Data Ingest**
 - Site specific weather forecasts based on National Center for Atmospheric Research (NCAR) technology
 - Pavement temperature and condition modeling
- **Data Processing and Analysis**
 - Storm characterization
 - Alerts of important road weather parameters
- **Decision Model**
 - Provides treatment recommendations
 - Supports multiple chemical types
 - Tuned to operations
 - Supports “what if” treatment scenarios
- **Java-based Display**
 - Retrieve forecasts and observations
 - Retrieve and interact with treatment recommendations
 - Real-time and archive capability
- **Consultation Services**
 - 24/7 access to trained meteorologist to discuss MDSS output and adverse weather events
 - Human generated updates and alerts concerning MDSS forecasts of road weather conditions

The Challenge

A common thread that exists throughout the winter maintenance community is the need to guarantee a level of service that will maximize roadway safety and efficiency during adverse winter weather events. Likewise, the ability to achieve the desired level of service while minimizing the associated maintenance-related costs is also important. Although the winter maintenance community has access to sophisticated maintenance equipment, a diverse set of materials and application strategies, and the latest in road weather observations and forecasts, the decision-making process continues to be fraught with challenges.

The decision makers responsible for the execution of maintenance activities must have the capacity to effectively and efficiently

reach conclusions about the most appropriate treatment strategies to use to control roadway snow and ice during and after winter weather events.

Vaisala MDSS

In 2009, Vaisala began leveraging the U.S. Federal Highway Administration (FHWA) Maintenance Decision Support System (MDSS) to provide operational guidance to winter maintenance practitioners (airports and roads), with a focus on road weather assessment and forecasting. The MDSS automates several of the steps that a decision maker must follow in order to select a course of action. Moreover, it presents data, information, and products in an easily understood format so that end users, regardless of their background, can use the system and its output.

One of the primary benefits of Vaisala's MDSS is its ability to serve as a single repository of data and information, with critical items being available to the end user at the click of a button.

The MDSS relies on both external sources and internal processes for the static and dynamic data used to drive the application. The MDSS can provide a number of products that benefit winter weather operations. Many of the forecast products

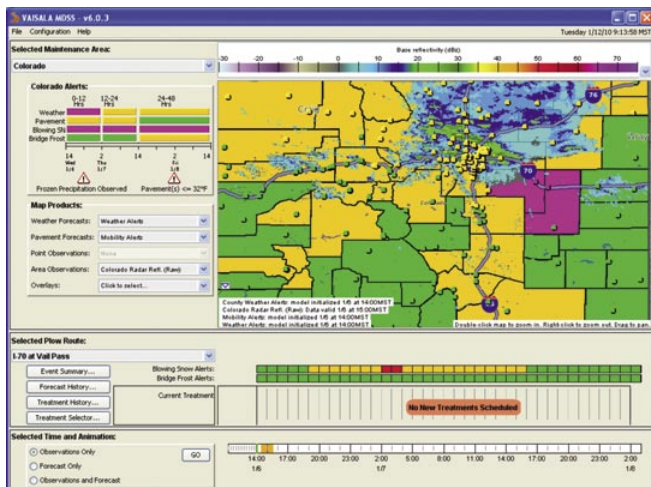
provided by the Vaisala MDSS are provided out to 48 hours and at 1 hour resolution (i.e. presented with discrete values at each hour over a 48 hour period). The MDSS forecasts are updated on a 3 hour cycle.

Moving Forward

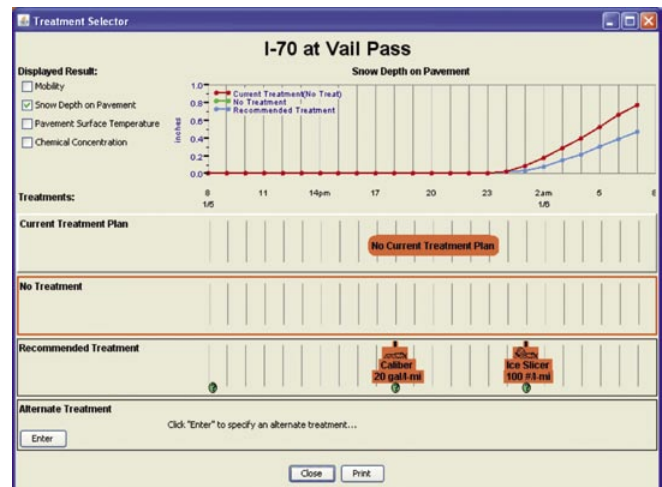
In parallel with MDSS development and operations, Vaisala is investing in the next innovation of Maintenance Decision Support Systems.

Key Vaisala MDSS Products

- **Weather Forecasts**
 - Temperature
 - Wind (Speed, Direction)
 - Relative Humidity
 - Precipitation (Type, Rate, Accumulation)
 - Blowing Snow Potential
- **Pavement Forecasts**
 - Pavement Temperature
 - Pavement Condition (Liquid, Ice, Snow)
 - Bridge Frost Potential
- **Treatment Recommendations**
 - Type
 - Timing
 - Location
 - Amount
 - "What if" Treatment Scenarios



Vaisala MDSS State Overview Display (Colorado)



Vaisala MDSS Treatment Selector

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