

**Swenson & Schmidt
Chloride Reduction Conference
Automated Systems**

- Who is Swenson Products
 - History
 - Today's Swenson Products
- Developments in Spreading
- Considerations for “Today's” Fleet
- Automated Operations
- Automated Results
- Conclusion



Who is Swenson Products?



Who Is Swenson Products



- Celebrating 80 Years in the Industry (79 Years in Lindenwood)
- Manufacture over 4000 Spreaders, Spray Systems and Bodies Annually.
- Specialize in Customized Manufacturing Across our Product Offerings.





- **Over 130 FTE+ and occupy 130,000 sq ft**
 - **One Piece Flow**
 - **3 Focused Factories**

As of October 1 2015, we have become the North American division of a privately held, European-based parent company known as the...

ASH GROUP

Meyer

SWENSON



Developments in Snow & Ice Control

Developments in spreading

50s *Man with shovel*



60s *Salt spreaders*



70s *Speed-related*

80s *Pre-wet*



90s *Focus on environment*



00s *Spreading management*

10s > *Spraying*
Automatic Spreading



- How Should Protection of Lives and Commerce Balance with Protection of the Environment?
- What Risks and Sacrifices are we Willing to Take and Make when the Safety and Economic Livelihood of so many are at Stake?
- Increased Population, and Decrease of Budgets, Make it Difficult to Maintain a Clear Safe Road.
- If not Properly used or stored, salt can get into wells or groundwater.
- Environmental Restrictions Continue to Increase with Regards to Storage, Clean-up, and Tracking.

- Traditional Spreading Equipment
 - Manual Controls, or Limited Automation with Today's Systems
 - Tailgate Spreaders Still Predominantly used in Midwest Markets
 - Electric or Hydraulic Prewet Pumps with Limited Capabilities
 - Hazardous Conditions for Operators and Motorists



The Age of Automation

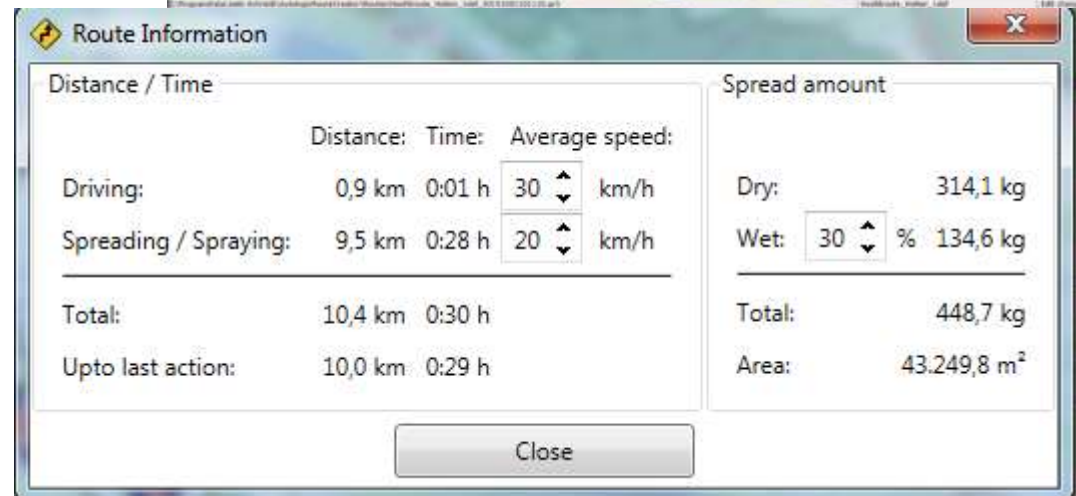
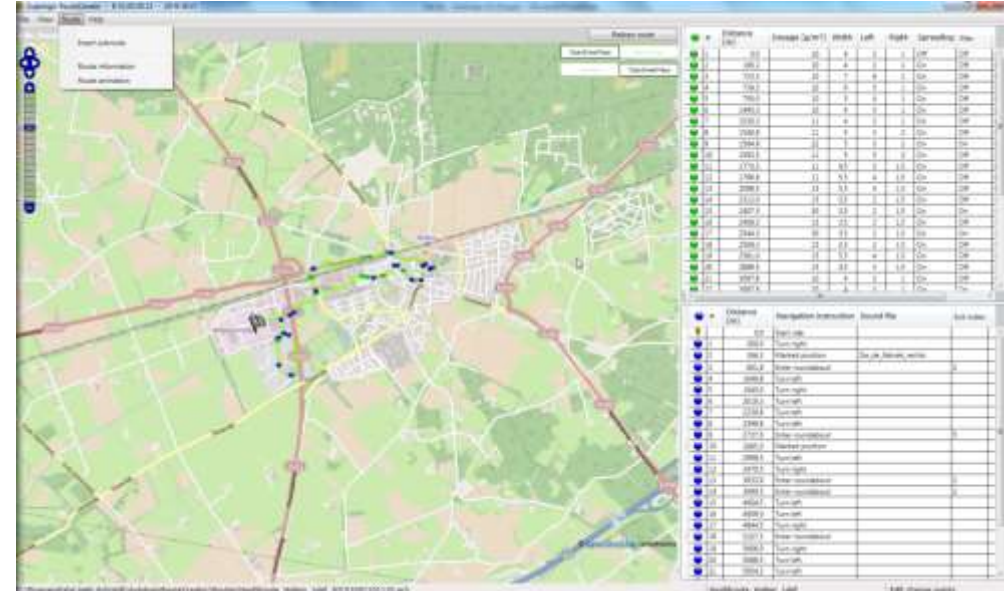
- **2 Levels of Automation Currently Offered**
 - Dictated by Predetermined Routes
 - Dictated by Live Weather/Road Conditions
- **Safety as the Driving Force**
 - Eliminates the Operators Need to Interact with Control System
 - Immediately Reacts to Road & Weather Conditions Before Driving Conditions Become Unsafe.
- **Financial as the Secondary Concern**
 - Places Material only in Areas Required
 - Salt Consumption Reduced by a Minimum of 30%

- Automated Operation

- Route is Pre-Programmed Into Spreader Controller During Non-Winter Months
 - Multiple Routes Can be Programmed and Saved to Controller
- When & Where Material Should be Spread is Also Pre-Programmed into the Spreader Controller
 - Material Placement Only Where Specified

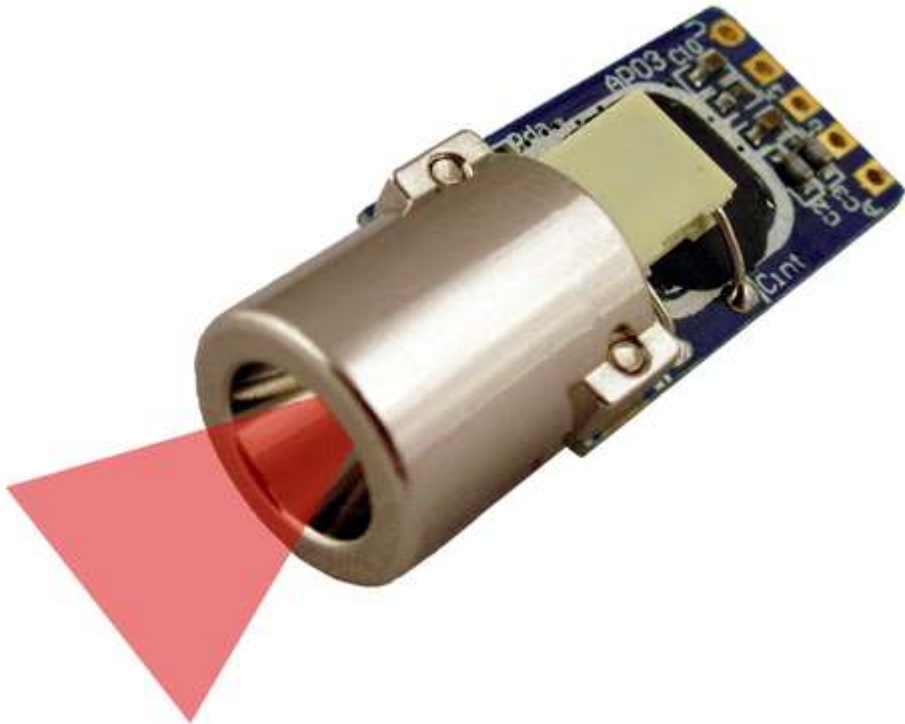


- **Routes Stored Via USB Drive**
- **Data Protected With Authorization Password**
- **Easily Toggles from Automated to Manual Depending on Required Performance, and GPS Location**
- **Route information Accumulated Includes:**
 - Driving Distance
 - Spreading, Time, Area
 - Salt and Brine Consumption.



- Automated Results

- Material & Liquid Application Dictated by Road Conditions & Temperatures
- Percentage of Material & Liquid Volume Adjusts Instantaneously Based on Feedback from Spreader Sensors



- Factors that Determine the Dosage of Material and Liquid Include
 - **Road temperature**
 - **Type and quantity of the icing factors:**
 - Rain
 - Ice
 - Snow
 - **Residual salt**
 - **Weather forecast**

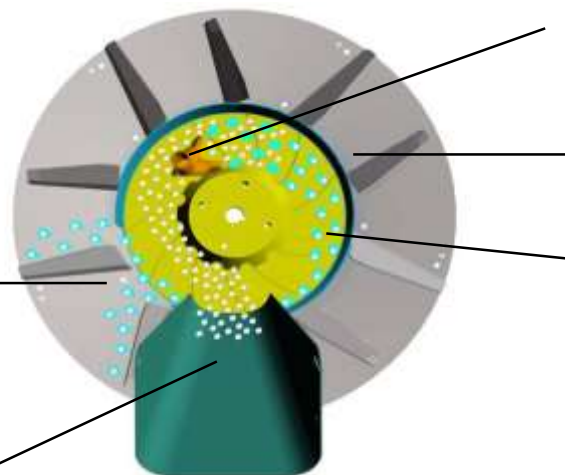


- Automation Based On Monitoring 3 Parameters:
 - The driver chooses the kind of humidity:
 - Dew
 - Moist
 - Wet
 - Snow
 - The spreader measures continuously the road temperature with an infrared sensor
 - If preventive spreading, the expected temperature drop is set by the driver (offset temperature)



• Smart Spreading Enhances Automated Results

- Ability to Spread Different Volumes of Material and Liquid, Based on Pre-Determined Variables Automatically.
- Change from 100% Liquid to 100% Solid Automatically, based on weather conditions.
- Produce 50/50 Blend for High Traffic, Low Temperature Areas such as Bridges and Overpasses.



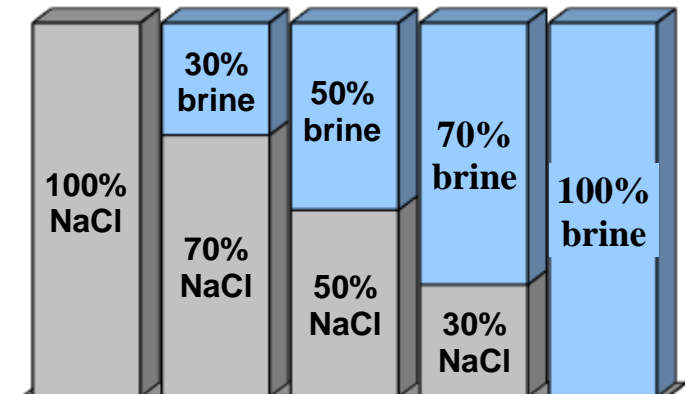
2. Supply of liquid

3. Mixing chamber wall: rotary movement

4. Mixing disc: liquid is mixed with salt

5. Optimum mixture leaves the spreading disc

1. Supply of salt



Results Of Automation

- Safer Streets
- Increased Financial Savings due to Decreased Salt Consumption
- Enhanced Performance and Reaction to Changing Weather Conditions in Real Time



- ***Before Automated Operations.....***



- ***After Automated Operations.....***



- Safer Environment for Operators
- Healthier Environment for Operators



Thank you!