Equipment & Materials
Effective snow and ice control is a critical aspect of highway winter maintenance. Snow removal equipment, especially, is a key element that is affected by harsh conditions. This session is relevant for fleet management and maintenance and operations personnel who have winter maintenance responsibility.
Equipment and Materials

- Accuracy of data collected from equipment/vehicles (scales and plow sensors)
- New equipment (plow lighting, plug and play communication protocol) and cost benefits (plow blades, tow plow)
- Mitigating corrosion
Equipment and Materials

- Effective use of winter maintenance materials
- Optimizing computer-based plow routes to minimize completion time, balance work load, reduce wasteful deadheading
- Snow Plow Operators
INNOVATIONS

• Staff Swap with Forestry
• Underbody Slush or Pack Cutting Blades
• Hot Water Sander- Cold Surfaces
• Load Cell On-board Weighing
• Spreader Calibration during the Season to Account for Salt Density Changes
• Laser Light Guide for Wing and Tow Plows
Gaps

- Cost Benefit of Corrosion Inhibitors/Quantifying Corrosion Costs/On-board Corrosion Sensing
- Recycling Truck Wash Water- Turn into Brine vs. Disposal Cost Effectiveness
- Update Warning Light Guidance- Consideration of New Technology
- Need for a National Standard or Guidance for Reflective Sheeting
- What do Winter Liquids do to Electric Vehicles?
- Winter Maintenance of Pedestrian Areas, Bicycle Routes and ADA Compliance
- Addressing Freezing Rain
Breakout Session Notes

Equipment and Materials

- Non-Chloride Materials
  - Corrosion prevention
  - Salt x 10
  - Oregon Salt Ban.

- Sodium Propionate
  - Lower corrosion
  - $10,000 per tonne.

- Tow Plows
  - Hills: chains, combo spreading
  - How to avoid plowing salts?
  - Snow plowing, trailer with underbody skid plate?

- INNOVATIONS
  - Stuffing swap with forestry
  - Underbody Slash Blade
  - Hot Water Sander

- Variable Salt Rates
  - Many factors:
    - Snow load cell on board
    - Variable

- GAPS
  - $ of innovation: inhibitors
  - Magnitude of improvements
  - Maintenance vehicles
  - Best Practices:4

- Recycling track maintenance
  - Visibility: Lighting, Funding - FEMA
  - Need for national standard
  - Freeway: LED, walkway

- MDSS
  - Road state forecast
  - 24-hour forecast

- Sweeping up wind?
  - Patrolling frequency
  - How? What?

- What do similar liquids do to electric vehicles?
  - Standard Test Procedures

- Accurately applying asphalt
  - Maintenance of production
  - Bicycle riders

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TRANSPORTATION RESEARCH BOARD
Na Propionate • Chloride free materials
Load Cells
Emerg. Mgt + Winter Operation
Innovative Practices + Technologies
Corrosion - measure to manage
Tow Plow performance - hills
Equipment needs
Patrol routes + frequency
Materials

Non-Chloride Materials
CMA → -10°C corrosion pretreat with grit
$ salt x 10 50 t 800 km
Oregon Salt Ban, MgCl₂ 20-30 g/l lmi
+ pretreat sand
S Steel truck bodies?
Breakout Session Notes

Sodium Propionate
lower corrosion
$10,000 per tonne

Tow Plows
hills - chains
combo spreading
how to avoid plowing salts?
Astral wing plows
trailer with underbody slush plow
implementation?
Jony flexible blade
Akron U. cost-benefit
Breakout Session Notes

MDSS
- road state forecast
- recommended rate + material
  Hybrid Staff Positions

Automatic Plow Control

Sweeping up Sand?

Patrolling Frequency
24/7 8?16?12? flexible?
Full patrol? RWIS eyes?
Plow or Pick-up?

Operations Center calls controller
track RWIS forecast
snowplow rock/pick
trackers/public crowdsource
E-car
INNOVATIONS
- Staffing swap with Forestry
  - Underbody Slush Blade
- Hot Water Sander
  - Cold surface! 8 KAAD
- Cinders: volcanic brooms - attachment
- Load cell on board

Accuracy of salt spreading
- Spreader cal ± 20-30%
- Salt density Δ thru season - compensated
- Accurate placement across pavement

Variable Salt Rates
- Many factors move salt on the pavement
Breakout Session Notes

GAPS

- $ benefit of corrosion inhibitors
- magnitude of corrosion rate on maintenance vehicles → simple Sensor
- Best Practices corrosion mitigation → Clear Roads report
- Recycling truck wash water
- Visibility
  - Lighting, sheeting → FEMA
  - Need for national standard snow packs on airfoils LED
  - Residual Salt - Aurora

GAPS

LED too bright at night → refine the technology

Early implementation
- Laser guide for wing plow
- DOT visual guidance system

Operator visibility clothing - reflective → optimum color?
Breakout Session Notes

What do winter liquids do to electric vehicles?

Standard Test Protocols
- plow blades
- anti-icing application rate
- maintenance of pedestrian + bicycle routes
- freezing rain