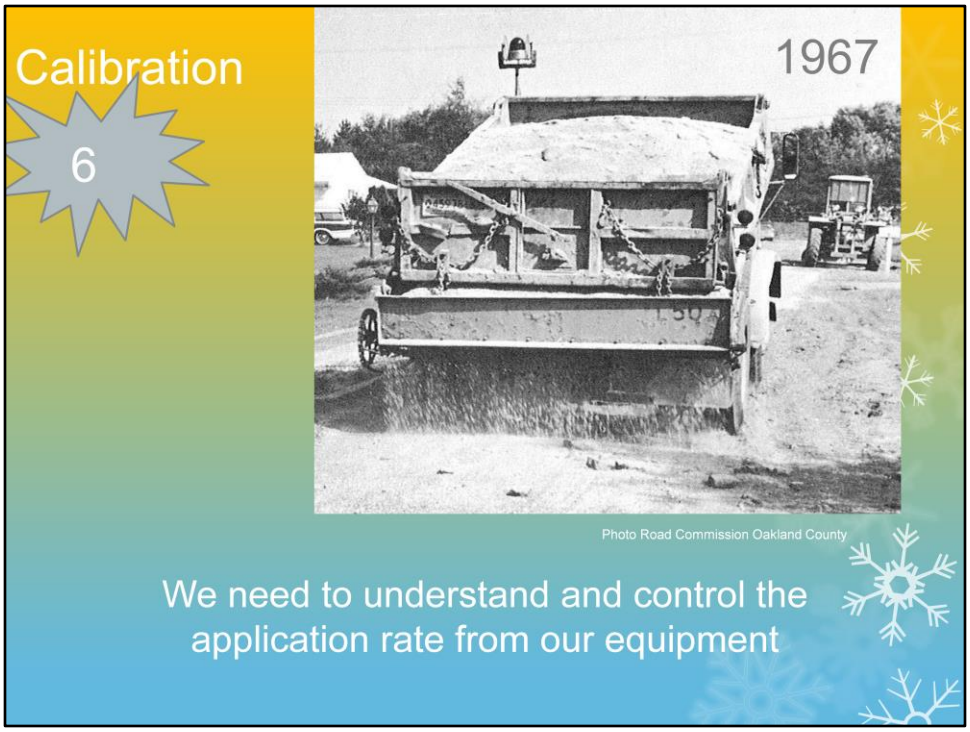

One of the first steps to increased accuracy of winter maintenance operations is to test and document how much material is discharged at each setting. (or commonly used settings)

If you want to be on the “A” team of winter maintenance calibration is key. If you look at the leaders in the industry this is built into their maintenance programs. If you want to move from the “B” team to the “A” team this is an easy way to do it.

Ask for help, those already calibrating are often willing to have visitors to their shop to observe and learn.

Calibration should be part of your winter maintenance plan

Maintenance Advisory

MA 2009-02
January 7, 2009

From Jon W. Reincke, Engineer of Operations

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jw:db:tc

Calibration of Salt Trucks

It is MDOT's policy to require yearly calibration of each salting unit (MDOT and contract agencies). The reason for this policy is to help achieve the department's goal of using only the appropriate amount of salt. The exception to this policy is trucks equipped with closed-loop ground speed control systems which can go up to five years without being calibrated.

MDOT's calibration policy reads as follows:

- Before the beginning of each snow fighting season, salt trucks must be calibrated to ensure salt distribution falls within department guidelines. The calibration should be rechecked if there are any mechanical adjustments or changes throughout the remainder of the snow fighting season.
- Closed-loop ground speed control units need to be calibrated only every five years unless a major change has been made to the system. Examples of a major change to the system might include, using a different hopper box or a major component failure (examples of closed-loop systems are Dickey John ICS 2000 and Dickey John Control Point).
- Open-loop ground speed control units must be calibrated each year and rechecked if there are any mechanical adjustments or changes throughout the remainder of the snow fighting season (an example of an open-loop system is the Muncie Power Master).

Please check with the manufacturer to ensure which type of system you are using. If no determination can be made, the system must be calibrated each year. A video and workbook are available to walk personnel through the calibration procedure.

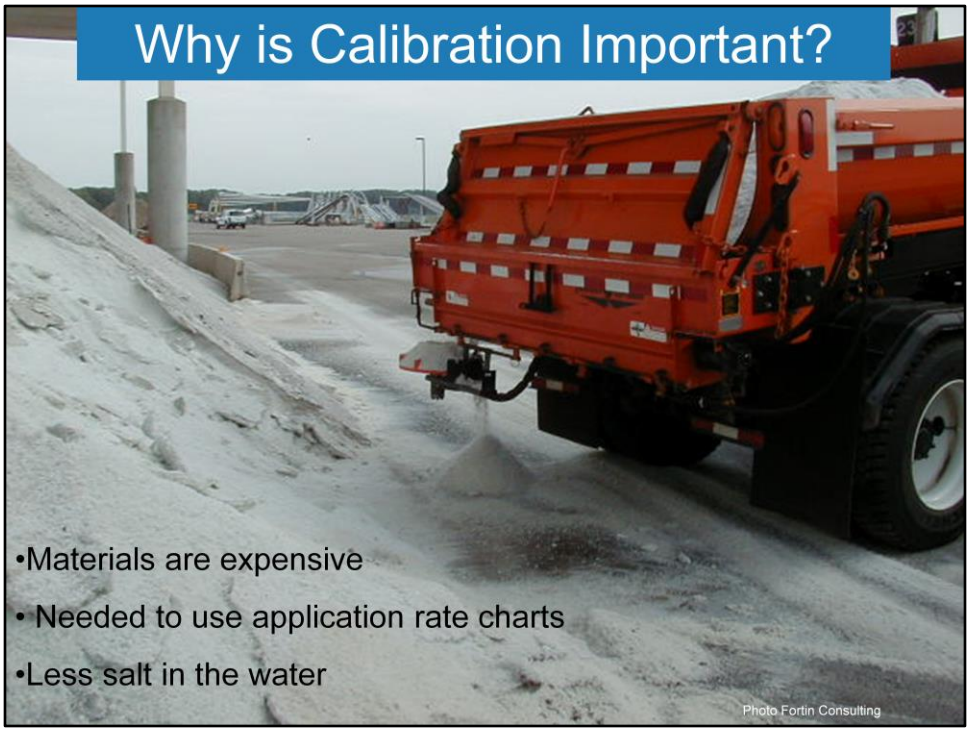
- If the truck requires a calibration chart it should be located in the truck so that it is convenient to the driver.

The tailgate of the vehicle must be marked, or the gate locked or bolted down, so that it can be returned to or kept at the calibration location during salt distribution.

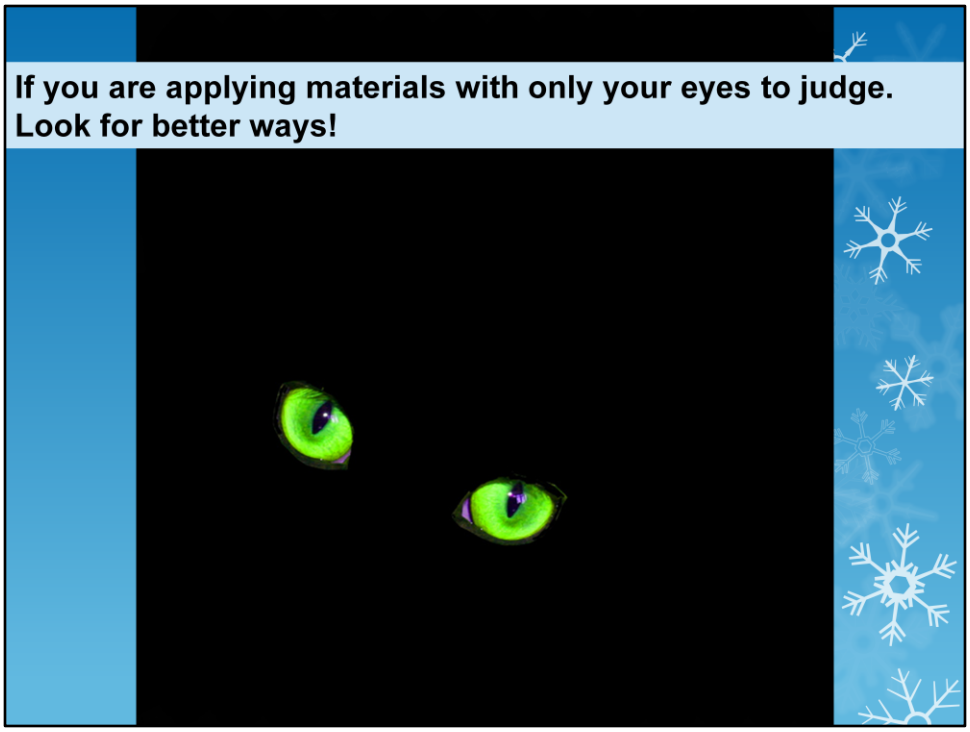
This change was endorsed by the Engineering Operations Committee at its March 12, 2002 meeting.

Most organizations that calibrate in the fall. Some of the leading edge organizations recalibrate in the winter to increase their accuracy.

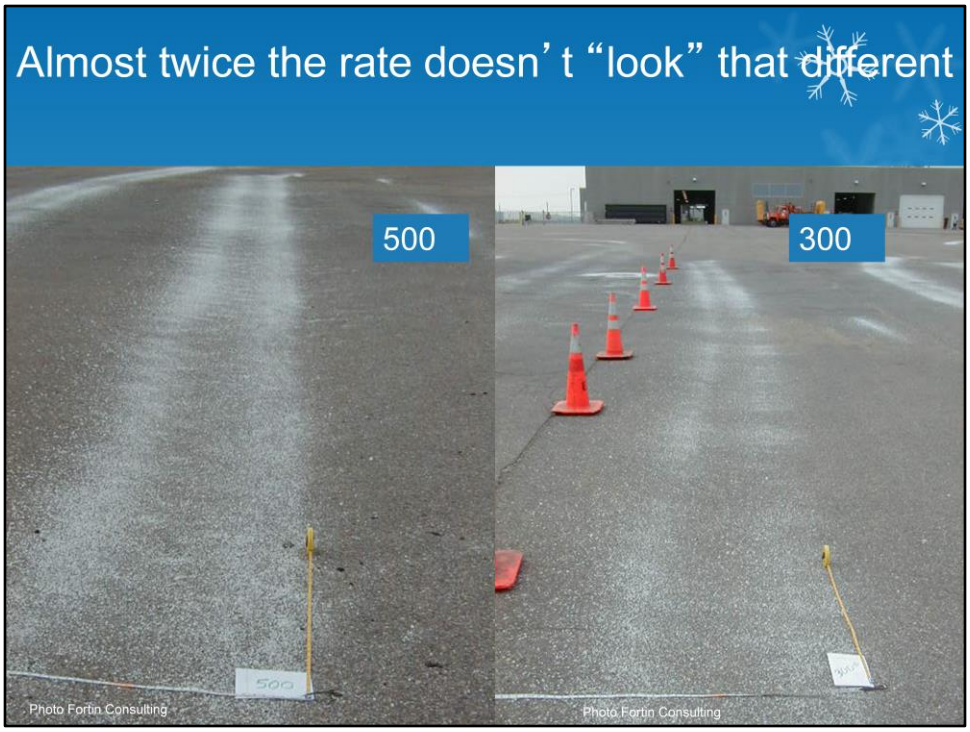
Calibration sends a message to the crew that application rates are important.



Michigan rate was about $55 per ton for salt in 2013. For every 1,000 tons saved that is $55,000. A full time salary! Possibly another employee for your operation or a new piece of equipment that is needed.



Often experienced plow drivers will talk about “seeing” the right application rate. However with our improved equipment and chemicals the rates do not have to be very high. These rates are extremely difficult to judge by eyesight as shown on the next slide.



Almost double the rate but very difficult to “see” the difference. Imagine how difficult it would be to see this at night, on a snowy surface, or through the side mirror of the truck?

There is much written about the benefits of calibration. Many industries calibrate, winter maintenance industry is behind most other industries as far as calibration. For example farmers have been calibrating for years for seeding, fertilizing, irrigation and weed control. If they can figure it out so can we!

This type of systems lets you type in the desired application rate and the truck adjusts itself to meet that rate regardless of your speed of travel. Calibration is still important to test the typed in rate = discharge rate.

The appendix of the manual contains several links to instructions on how to calibrate a manual controller.

For auger based systems, sander plate must be in place

The sand shield is often removed for sanding operations but without this plate in place the material has a free fall from the truck, it isn't augered out. No calibration in the world will help if this shield is not in place.

Basic Calibration

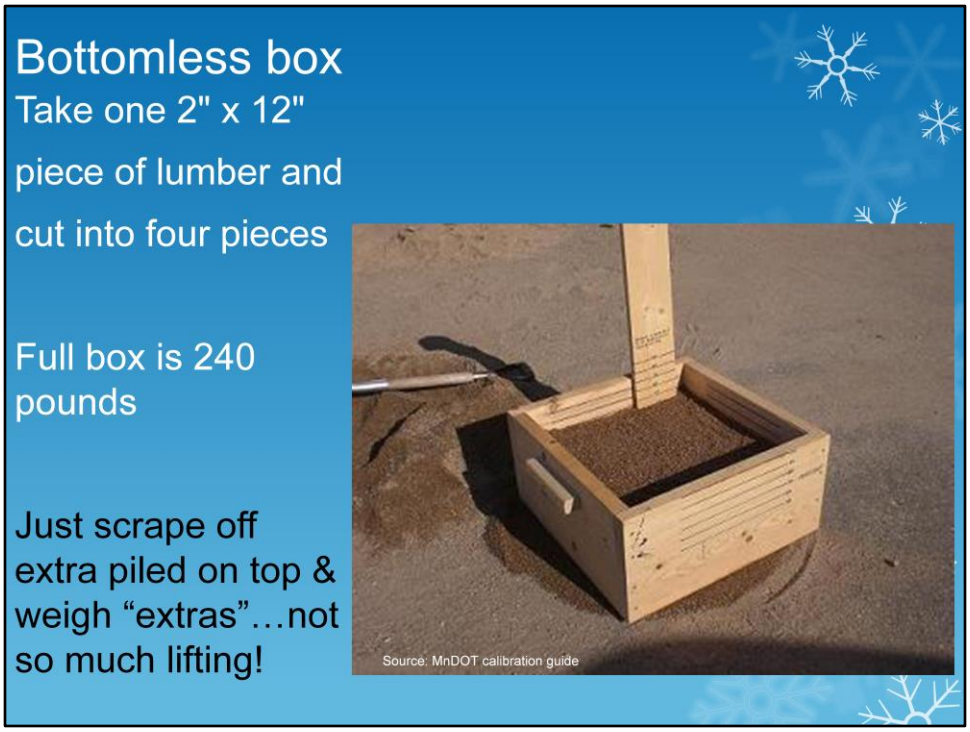
Determine pounds per minute discharged

The basic principle is how much material is discharged from each setting. Often it is a 1 minute timed sample. A larger sample is more accurate. Or take 3 measurements and average them for increased accuracy.

You can collect the salt that has been discharged in many ways.

Sweep it off the ground
Catch it on a tarp
Catch in in a bin or bucket

Once you collect the salt you must weigh it. It doesn't matter how you weigh it. If you weigh it like this remember to subtract out the weight of the bucket before you record the number.



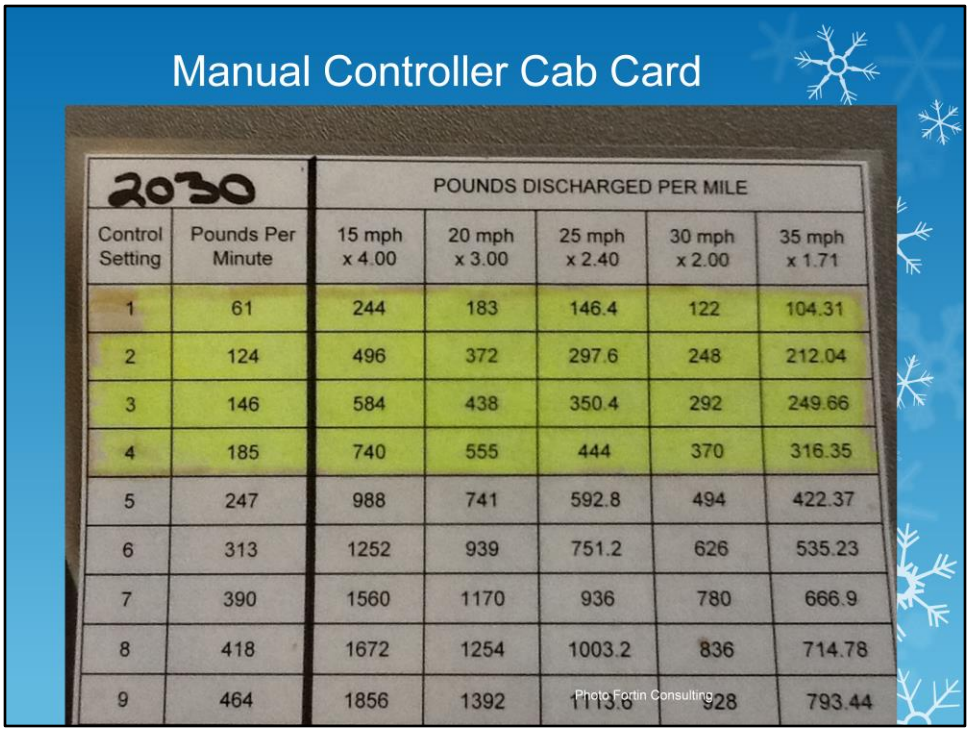
http://www.dot.state.mn.us/maintenance/research/files/MnDOT%20Salt%20and%20Sander%20Calibration%20Guide.pdf

Bottomless Box -
Take one 2" x 12“ piece of lumber and cut into four pieces to make a square. If inside length of sides is 20-1/4", then weight of full box will be equal to four 5 gallon pails. (i.e. if full pail is 60 pounds, then we know full box is 240 pounds)

The box holds a specific amount of salt.(you can build it to your own size as well). You know the weight of the full box, after that, just scrape off and weigh the extra, less lifting. For the next setting move the truck ahead a few feet, pick up the box, the salt stays put and you are ready for the next sample. At the end you should sweep up the small salt piles you have left behind.

This box has a scale on it so you can reset the scale after each test without emptying the box. Here is one company that sells this sort of product. There may be many other products available.
http://www.scale-tec.com/scales_calibrator.php

Manual Controller Cab Card



2030

Control Setting	Pounds Per Minute	POUNDS DISCHARGED PER MILE				
		15 mph x 4.00	20 mph x 3.00	25 mph x 2.40	30 mph x 2.00	35 mph x 1.71
1	61	244	183	146.4	122	104.31
2	124	496	372	297.6	248	212.04
3	146	584	438	350.4	292	249.66
4	185	740	555	444	370	316.35
5	247	988	741	592.8	494	422.37
6	313	1252	939	751.2	626	535.23
7	390	1560	1170	936	780	666.9
8	418	1672	1254	1003.2	836	714.78
9	464	1856	1392	1113.6	928	793.44

Photo Fortin Consulting

Example of a cab card for trucks with manual controllers. Notice the example that each setting does not give you a predictable jump in salt rate. That is why it is important to calibrate.

Once you create a cab card, laminate it and put it in the truck, also put one in the office.

As our salt rates get lower and lower it is important that our equipment is able to deliver a consistent spread pattern at a low rate. Make sure any new equipment you buy can deliver steady pattern at low application rates or do not buy it…even if it is on sale!

This is an example of an equipment upgrade to help deliver salt at a low rate with a consistent spread pattern. The auger on top is designed to deliver a lot of sand/salt mix. As we move to straight salt we don't want to apply that volume of material. The below auger is able to turn at the same speed but delivers salt at a much lower rate.

Calibration of liquids is also important

Test:

10 gallons/minute

At 30 mph

= 20 gallons/lane mile

Calibrating liquid systems is very important. The techniques are different but the concept the same. How much liquid is dispensed in one minutes time is a typical way of measuring.
When using hygroscopic liquids the calibration is even more essential because over application of these materials can produce problems.

The power of winter maintenance professionals to change the industry is immense! Understanding why the change is needed is a big step forward towards making that change. Make sure your crew understands why accurate application rates are important. Once they understand that they will understand why calibration is important.