Presentation 4.5

AMOUNT OF SALT VERSUS FREEZING POINT

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Freezing temperature is not as useful as it appears to be at first glance for road maintenance decision making. One major challenge is that concentration of the de-icing chemical may vary very rapidly, as only a very small absolute change in the water amount of water, easily occurring by evaporation or precipitation in minutes, causes a drastic change in the freezing temperature, which is directly and strongly dependent on the concentration.

Due to this at given time viewing only freezing point, concentration or salt % maintenance people are not able to know how the road will tolerate expected change of water.

To overcome this problem the measurement of actual total amount of chemical (g/m^3) should be used instead. The total amount of the de-icing chemical present on the road per unit area do not change when absolute change of water does. Amount of the chemical clearly indicates how much residual salt is on the road and how much road surface will tolerate expected change of water.

Maintenance people also spread the salt in g/m^3 and residual salt should be measured in the same understandable unit.

Even the bigger challenge using freezing point is the measurement accuracy in real road environment. Particularly active type of freezing temperature sensor can measure freezing temperatures with high accuracy in lab conditions where measurements are not disrupted by traffic or any weather related phenomena's. In practice, it can be demonstrated that freezing point temperatures may change quite randomly even there is no obvious reason for it due to chemical treatment or concentration related changes. Principle of freezing the actual small sample of the solution is highly vulnerable for large measurement errors in true road environment.

It is almost impossible to define if reading at given time is correct or if measurement freezing cycle is disturbed by traffic or other sources of measurement error.

Total amount of chemical measurement is less sensitive for such errors as are based on continues measurement instead of freezing the sample volumes of the solution.