Melt Track™ Explained

. This Application Note explains the operation of and benefits afforded by the new patents pending Melt Track technique for aerial snow sensors and controllers. Melt Track's importance is that it substantially narrows the gap between the best possible energy efficiency and truly unsupervised automatic control. It is particularly useful for applications where the sensor is remote from the surface being deiced as is the case with aerial sensors.

An aerial snow sensor consists of a moisture detector and a device for measuring ambient temperature. When the ambient temperature falls below 38° F (3.3° C) and moisture, in any form, is present, the sensor calls for deicing heater operation. Prior to Melt Track, moisture detector itself required enough heat to melt the snow into liquid water.

For small installations, the aerial snow sensor is a subsystem component in a controller that directly operates the deicing heaters. In larger installations, the sensor issues a call for heat to an external control panel.

The deicing heaters must continue to operate for a period of time after snow stops. This time interval is called the heater hold-on time or simply the hold-on time. Without the hold-on time, there is a risk of incomplete melting. The controllers provide a fixed time for this purpose while control panels make this time adjustable for improved energy efficiency.

A snow event is defined as the interval between the beginning and end of the snow produced by a weather system. Its strength is the water equivalent of the snow that fell during the event. The energy needed to melt the snow and evaporate undrained melt water is measured in kilowatt-hours or BTU's. If thermal losses are neglected, the rate at which melting occurs is determined by the pavement heat flux expressed in watts per square foot or in BTU's per hour-square foot. Snow often falls at rates exceeding the deicing system's ability to melt the snow and convert it into water vapor as it falls. Thus, snow often accumulates.

The LCD–7 Snow Switch, The first aerial controller from Environmental Technology, Inc., to feature Melt Track™ Technology.

Without Melt Track, deicing heaters must operate for the hold-on time after snow ends to ensure complete melting and drying. For controllers of small installations, a fixed hold-on of five hours ensures good performance under most conditions. Control systems for larger installations provide adjustable hold-on times of up to ten hours. The hold-on time feature often uses energy in excess of the minimum required to ensure complete snow melting. Incomplete melting is generally worse than doing nothing at all! Black ice and similar slippery areas resulting from freezing residual melt water constitute real safety hazards.

Before Melt Track, snow had to be melted into liquid water before it could be detected. At low temperatures this required moisture detector power fluxes up to 300 watts per square foot for reliability. Since this greatly exceeds the pavement deicing power flux of 30 to 50 watts per square foot, the deicing heaters would turn off when snow stopped without the hold-on time.

Melt Track reduces the hold-on time to just one hour. It accomplishes this by using the same power flux for the moisture detector as most snow melting systems use for the pavement heaters — 45 watts per square foot. Since snow melts and clears on the moisture detector at the same rate as on the pavement, both dry at about the same time. The one hour hold-on time accommodates site variations including differences in power flux between the pavement and moisture detector heaters.

In summary, Melt Track increases energy efficiency by reducing the hold-on time. This feature also simplifies the user interface by eliminating the need to adjust the hold-on time.

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