Multi-point temperature sensors have long been used for profiling the temperature across a medium. They have been installed in petrochemical storage tanks to determine tank level and to profile the vertical temperature gradient as to accurately determine the specific gravity and in turn, total liquid volume.

A government meteorological reporting station wanted to determine the frost level in the ground to track climate trends and report the information for building codes. A multi-point temperature sensor was the obvious choice.

The frost line is to be tracked from the surface of the ground to a depth of 10 feet. A minimum of 8 temperature points were needed to get the required level resolution. For long term stability and accuracy, a construction of 8 Platinum Resistance Thermometers (PRTs) were selected instead of thermocouples. The challenge became trying package 8 sensing elements while maintaining good thermal contact with the environment.

The sensing elements needed to have a good thermal conducting path to the outside environment. The leadwires connecting all the elements restricted this conduction path and created thermal isolation barriers. Special conduction zones were placed at each element location and were secured with thermal conducting epoxy to ensure accurate temperature measurement at each point along the length of the sheath.