Switch Heating & Blue Point Discussion

SAN Electro Heat, a NIBE Railway Element company, has developed a powerful combination for rail switch heating – we think we have a great match for switch point heating from the **Monel 400 switch heater** to the **fully automated Blue Point extreme heating control system**.

SAN and OMNI have just completed an **extreme switch heating and switch heating control pilot** for **AMTRAK** outside of Boston.

This pilot was configured to drive **7 turnouts/crossovers** on high speed track of 125 mph. The configuration deployed **dual element heat** which was controlled by the Blue Point controller in a **fully autonomous operation** with no human intervention. This was accomplished by using the advanced **Blue Point SCADA** system in coordination with rail sensors and a weather station attached to the Blue Point enclosure.

No additional trenching was needed for the second pair of switch point heaters as we developed a smart junction box that utilizes the existing heater power lines.

The pilot operated in a **"man out of the loop"** mode for the entire season and successfully modulated power to address a range from moderate snow conditions to severe snow & wind conditions including **two Nor'easters and one Blizzard** keeping the points and rods free and clear of snow & ice.

Some of the highlights of these technologies are:

1) The Switch Point Elements are flat switch point heaters made with **a helix internal heating element and a Monel 400 sheathing**.

   The **helix element** allows for **expansion and contraction** of the element with minimal effect to the element versus a straight wire element (most common). This extends the life of the heater.

   The **Monel 400** is an alloy used in **undersea applications and is near impervious to salt and most chemicals.** This also extends the life of the heater.

   The combination of these two design points allows us to provide a 10 year warranty on our heaters based on a **Mean Time Before Failure (MTBF) of over 30 years.**

   We have also developed a **stainless steel pan heater** that uses the same heating elements described here. These elements are encased in a thin stainless steel enclosure that is well protected and easily slides in under the switch machine rods.

2) The Blue Point Control System allows for the automated operation of the heating system **– "Man Out of the Loop"**.

The system uses an array of sensors, an advanced weather station and an intelligent RTU to automatically control the heating profile of switch heating according to the weather conditions at hand.

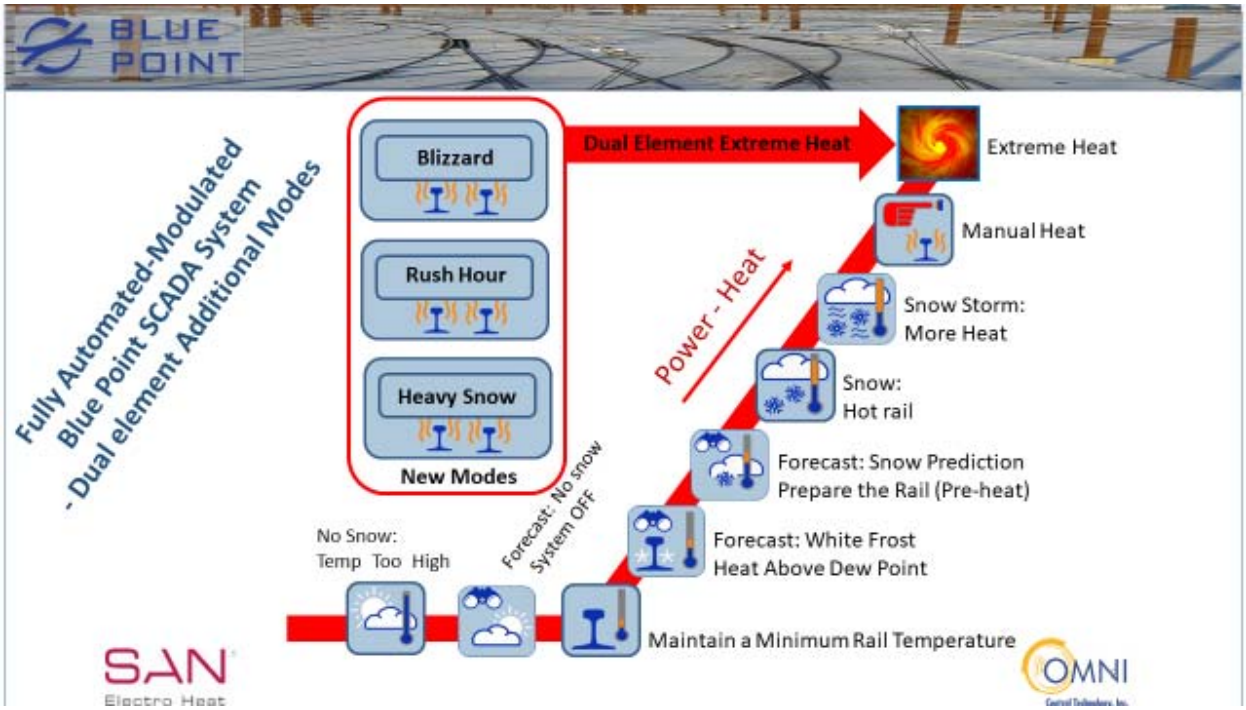
It can be accessed through an internal web server or through a VPN cloud to view the SCADA system and, if desired, override it – this can be done locally at the enclosure as well.

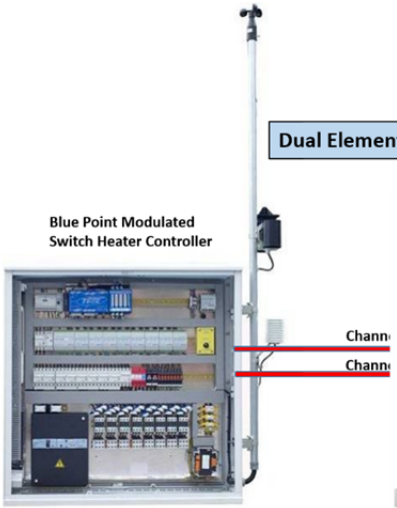
Dual element heaters or single element heaters can be employed. The dual element heaters can be modulated to provide extreme heat, **as high as 500 w/ft**, while keeping nominal wattage to a much lower profile according to weather conditions.

In addition we can show you live SCADA applications of the heaters in the U.S., Europe and Japan.

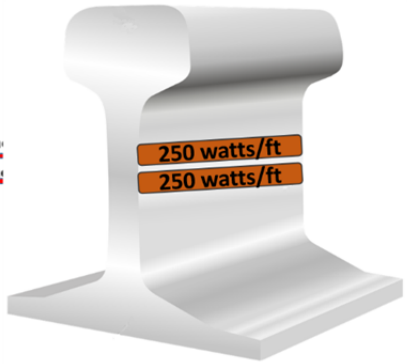
We have provided 2 slide pictures, below, that speak to extreme heat and the SCADA application for your review. We can also apply a single heating element should that be the desire.

We would be happy to meet with you and provide a more detailed discussion of the technology and provide you references to the **Amtrak pilot** and over **500 deployed Blue Point systems and over 20,000 switch heating elements deployed**.





Dual Element – Power Modulation with Redundancy



- Two flat elements operate alone or together
- Having two heating elements provides a redundant path in both element and channel
- Modulation is controlled by need according to weather conditions - warm to extreme – fully automated (Pulse Width Modulation PWM)
- No additional trenching needed – use existing heating cables and separate dual heaters at a provided Junction Box that is fused to protect each element from each other
- SAN-OMNI has "knock on" stainless steel clips that will support dual elements
- Extreme Heat, Energy Savings, Redundancy
  - New expanded Blue Point Functionality
  - Modulation and double heaters
- Weather Station, Rail Sensors & Weather Forecast Provide Optimal Automated System – "Man Out of the Loop" capability

Extreme Heat When Needed, Energy Efficient and Redundant