

# Sintering Furnace

Dangjin Province, Korea

**A leading Korean steel maker selected an AP Sensing Distributed Temperature Sensing (DTS) Linear Pro Series solution to detect and monitor hot spots in the activated carbon absorption plant of the sintering furnace.**

## The Challenge

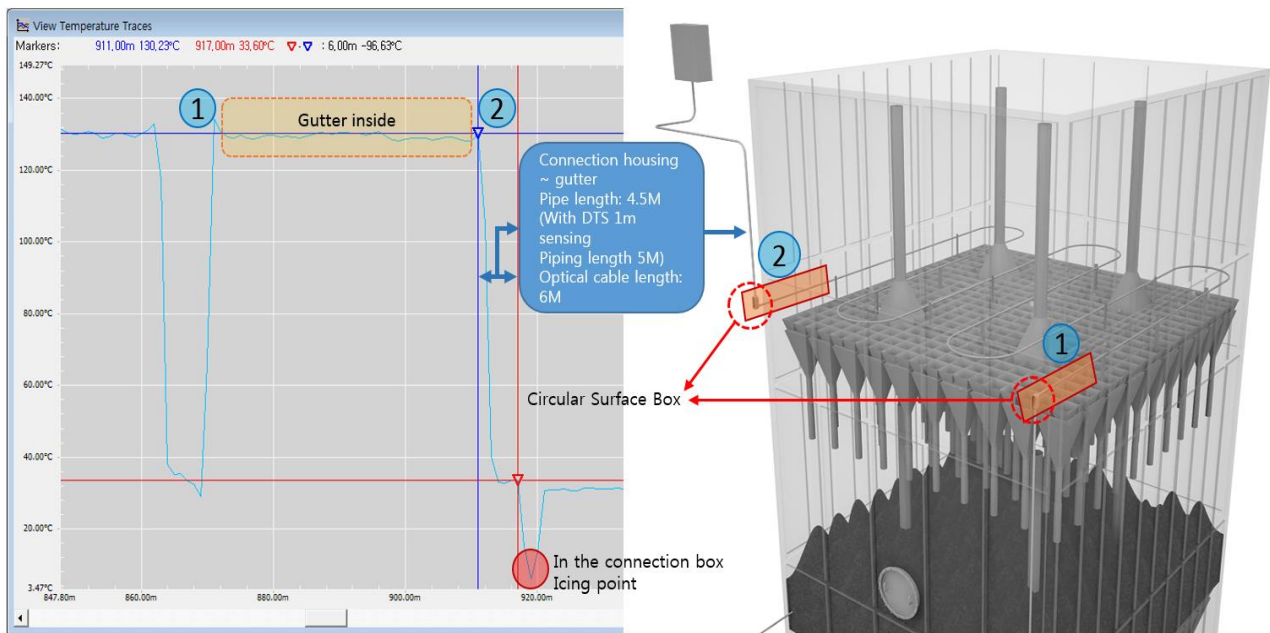
Sintering is a process of forming metal without melting it to a liquid state. A leading Korean steel maker utilizes a sintering furnace and wanted to analyze the internal temperature profile of the activated carbon absorption plant in order to establish an early warning system for hot spots. When the absorption plant is operating properly, it ensures that the emission of pollutants is kept to a minimum; a fire can result in significant fines and downtime. The company selected an AP Sensing solution for accuracy and reliability. The operator chose a 4km, 12-channel model of AP Sensing's Linear Pro Series, keeping some channels in reserve.

The device improves operational safety and is used to quickly detect hot spots. In the areas where protection is needed up to 300 °C, polyimide-coated fiber is used, in other areas copper-coated fiber is used for protection up to 600 °C.

Significant monthly cost savings are realized due to reduced usage of activated carbon. Following installation and commissioning, the operator found this solution exceeded their expectations. In particular, the combination of spatial and temperature accuracy, mapped along the route of installation, provided a new level of insight into the overall furnace status.



*Sintering furnace*



**#1 and #2: Sensor cable route inside the gutters**

## The Installation

The optical cable is 4680m long, and also monitors the 64 sintering gutters for hotspots. The piping length is 5m to the connection enclosure and gutters inlet section, and approximately 45m to the gutter temperature reduction area. The temperatures on the pipes were independently confirmed to be within  $\pm 1$  °C of the DTS measurements around the gutter areas.

## The Sintering Process (refer to the diagrams on page 3)

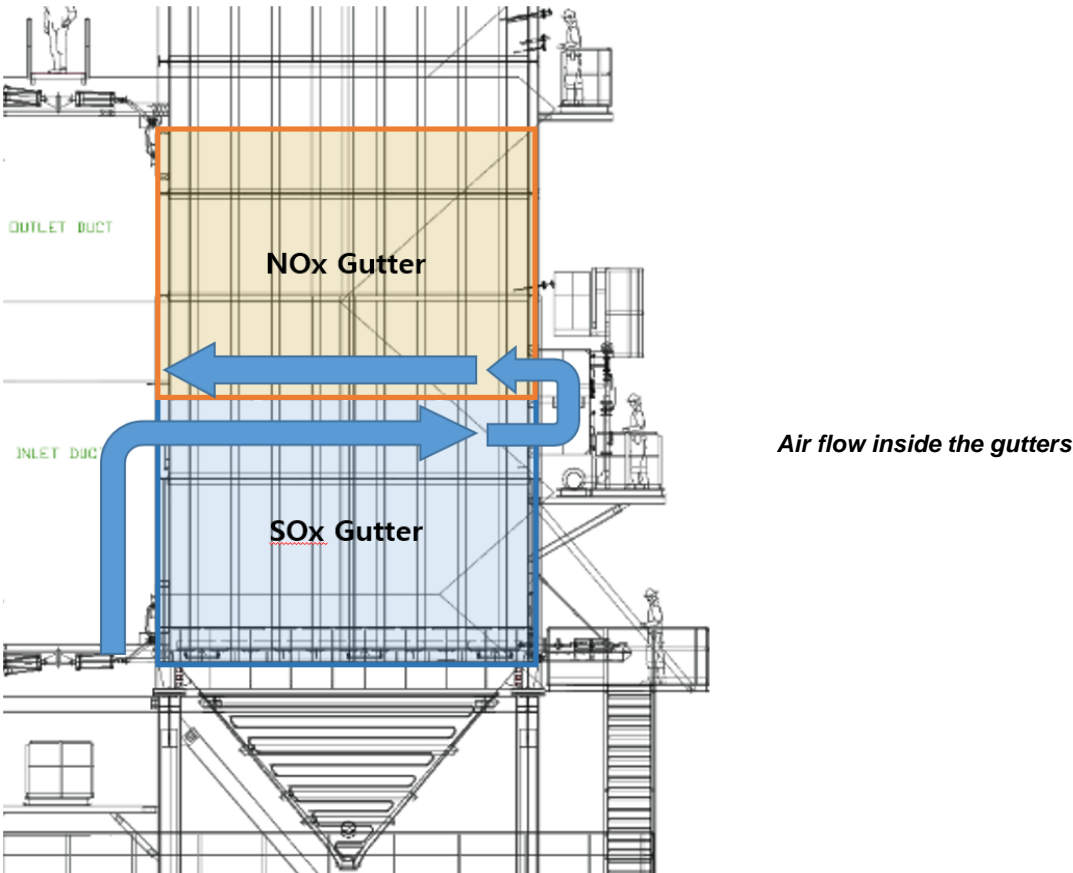
**1. Gas injection:** The temperature of the SO<sub>x</sub> layer is higher than that of NO<sub>x</sub> on average by more than 30 °C, and the temperature of the center of the gutter is high until the temperature stabilizes after gas injection.

**2. After gas injection:** The NO<sub>x</sub> layer takes about 5 hours more temperature equalization time than the SO<sub>x</sub> layer by the gas injection method.

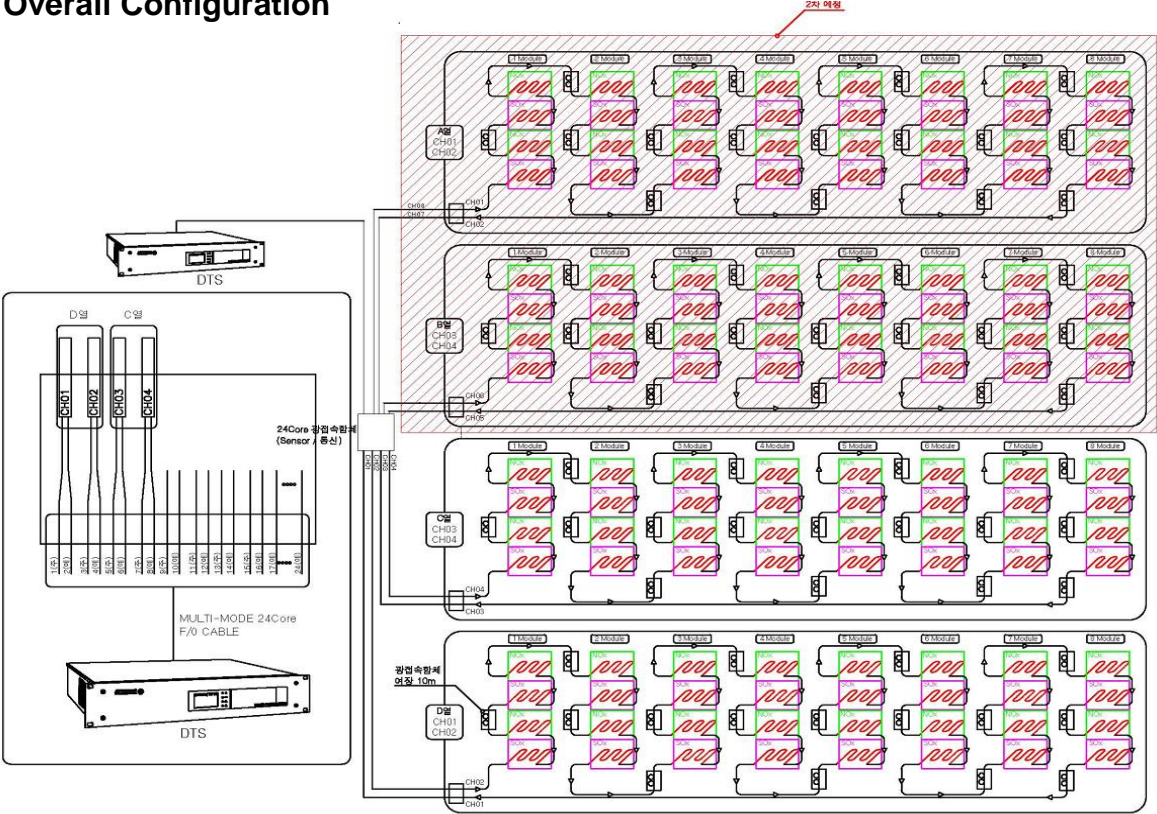
**3. After temperature stabilization:** The temperature inside the gutter is repeatedly rising and falling for a period of 2-3 hours. The average temperature change per hour is about 5 °C for the SO<sub>x</sub> layer and about 2 °C for the NO<sub>x</sub> layer. The change amount of the SO<sub>x</sub> layer and the NO<sub>x</sub> layer is the same, about 5 °C. This is influenced by the ambient low temperature of about 3 °C around the side module.

**Results:** Analysis of temperature data for two months showed that the temperature change from September 1 to October 24 was about 5 °C, and the same measurement results were obtained when measured by different equipment. Temperature reliability and stability indicate no unexpected temperatures throughout the sintering process.

# The Sintering Process: Temperature Characteristics



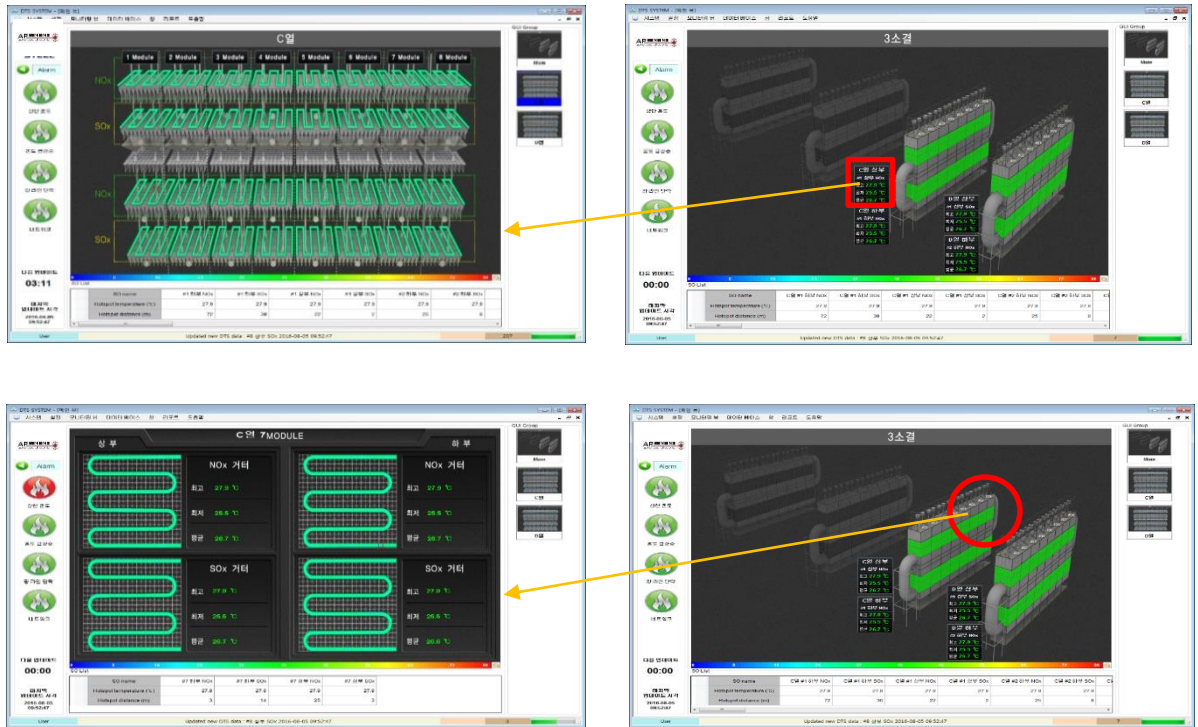
# Overall Configuration





## Intelligent Software

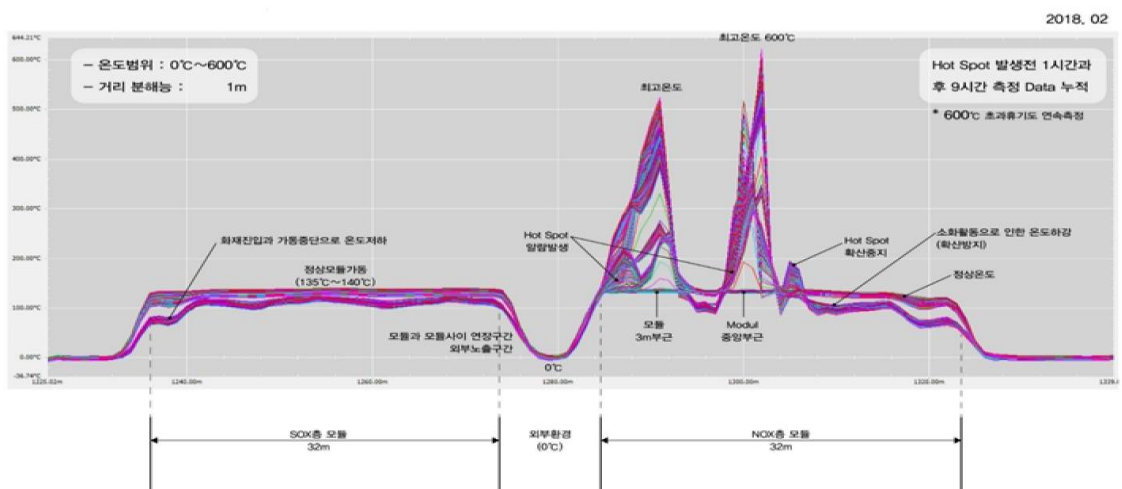
The data analysis and asset visualization software uses an intuitive GUI (Graphical User Interface). The customer can view and store analyses, statistics and colored 2D temperature mapping, while accessing history trace generation and much more. It is easily integrated into the operator's existing client network.



Graphical User Interface

## Conclusion

This site uses the DTS real-time temperature system to minimize accidents and property damage, and to optimize fire suppression. The operator found that the AP Sensing solution exceeded expectations.



Prevention of fire with DTS solution and the ability to make operational decisions using DTS temperature data