Application Note

A071011

High Temperature Surface Mount Sensor for Heat Exchanger Temperature Measurements

APPLICATION

A heat exchanger manufacturer needed to measure the tubing fluid temperature in a heat recovery heat exchanger used in conjunction with a gas turbine engine.

By monitoring the fluid temperature and comparing it to the air temperature, they could prevent thermal shock events that could catastrophically damage the unit.

Model 21257, Tube Surface Mount RTD

CHALLENGE

A direct immersion style sensor seemed to be the obvious choice. However, they were restricted from penetrating the tubing wall as this may be a potential leak point. This also eliminated the option to use the Sanitary Non-Intrusive (SNI). A surface style sensor seemed the next best alternative.

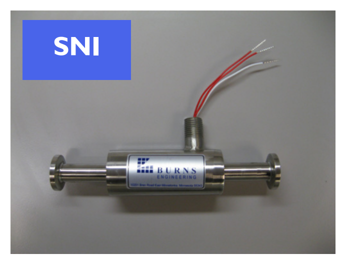
The challenge was the high temperature air flow across the tubing and between the fins created a large convective thermal gradient. They needed a sensor on the surface of the tube that could measure the temperature inside without being influenced by the air flow outside.

They required three temperature measuring elements and wanted minimal impact on the heat exchanger. This meant a sensor that was small enough for minimal installation impact yet large enough to package three sensors and provide adequate isolation from the ambient air.

In addition, the whole assembly needed to withstand 450 F and be mounted in a manner such that no components could come loose and fall off over time. Any mounting nuts or bolts would need to be welded in place to ensure integrity of the mounting.

SOLUTION

The solution evolved from a modified version of our SNI temperature sensor. The SNI has the sensing elements mounted on the exterior of the tube with a protective shell providing mechanical protection and thermal isolation.



We modified the SNI design to mount on the surface of the existing tubing by creating a half-shell design. This half-shell left tabs on the sides that could be used to hose clamp the unit in place. Hose clamps created an easy way to install the sensor on the tubing while providing the component integrity required. No welding was needed for installation.

Moreover, all of the sensor hardware is on half of the tube so very little modification of the heat exchanger fins needed to be done at the time of installation.

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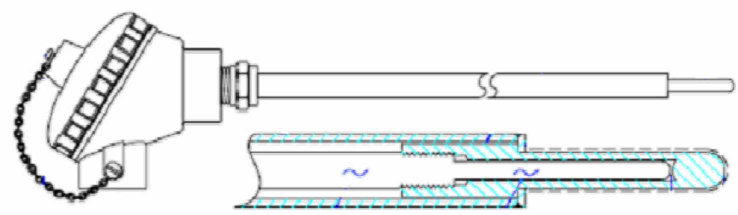
Cocoa Bean Roaster RTD



Description

APPLICATION

Abrasive nature of cocoa beans is destroying temperature probes.

A chocolate manufacturer needs to monitor the temperature of a cocoa bean roaster. The beans are poured into the rotating roaster and are continuously agitated. In this process the cocoa beans come into direct contact with the RTD probe. The beans shells are very abrasive and wear through the probes sheath on a regular basis.

CHALLENGE

The sensing element of the probe is located at the tip of a 5' long probe.

Previously the sensing element was an integral part of the 5' probe. When the small tip
would wear out, this necessitated replacement of the entire probe. This is both costly and time consuming. It would be advantageous to the user to be able to replace only the worn out tip and retain the rest of the probe.

SOLUTION

Design a modular probe that would replace the existing 5' probe, but had a removable sensing element and tip.

Since the roaster is designed for use with the 5' long probe, it did not make sense to try to redesign the entire system. Instead Burns' engineers designed a probe with a removable tip that threads into the end of the 5' probe. This saves the customer time and money when the tip requires replacement at regular intervals. The customer now has an economical and hassle free solution for sensor tip replacement.

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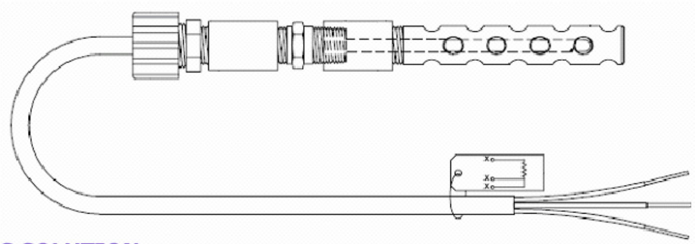
Application Note

A080301

Underwater Temperature Measurement

Model 10313



Description

APPLICATION

As part of a requirement by a state Department of Natural Resources, a power generating facility was required to monitor the temperature of their cooling tower water discharge into a nearby river. Two locations were required, one at the settling basin and the other a short distance downstream of the discharge point where they wanted to obtain 5 points across the width of the river. Concern was that water which is too warm can damage fish and other aquatic life.

CHALLENGE

Sensor 1 was to be located on the bottom of the settling basin about 50 feet from shore. Sensors 2 through 6 locations were chosen downstream of the discharge and located on bridge supports. Protection from debris in the water and ice during the winter posed some serious installation challenges in addition to the sensor being located 6 feet beneath the surface.

SOLUTION

The Burns 10313 Underwater Sensor was chosen for the settling basin application. It was supplied with a 60 foot cable and installation was as simple as tossing it in the water and connecting the wires to a shore panel which housed a Burns Model TL21 transmitter. From there the 4 to 20 mA signal traveled back to the control room.

In the interest of standardizing on one style sensor, the 10313 was also used for the river water temperature measurement. Five locations were chosen on the downstream side of the bridge supports where an open ended pipe was installed to further protect the sensor. The sensor was lowered into the pipe and the cable secured with a cord grip fitting at the desired depth. From there the cables led back to a centrally located panel on the bridge which housed 5 Model TL21 transmitters. From there the signal traveled back to the control room.

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