

Slower gas emissions give more precise readings

How can we take temperature readings that are reasonably precise in high velocity gas streams? One solution is to create a stagnant zone around the sensor to avoid the dynamic effects. Pentronic uses this method to measure exhaust flows.

Exhaust temperatures are a speciality of Pentronic, which manufactures temperature



The design of Siemen's gasturbine sensor is more sophisticated than it appears to be. Every opening, angle and weld has been carefully calculated so that the sensor will take reliable readings for a long time.

sensors for engine R&D and OEM sensors for mass-produced engines for power generation.

"We develop the temperature sensors together with our customers," explains Boije Fridell, who is in charge of customer contacts for several emissions projects.

The most advanced emissions temperature sensor is found in Siemens' gas turbines. It is a dual sensor with two protective tubes of different lengths. This design makes it possible to measure the temperature at two different levels within the exhaust flow.

FRICTION DISRUPTS THE READINGS

Gas emissions must be one of the most inhospitable environments for a temperature sensor. The emissions flow past at close to the speed of sound, thereby creating high heat due to friction and stagnation. The result is that the sensor's own temperature becomes hotter than the gas it is intended to measure. In turn, the result is incorrect control parameters.

The solution is to equip the sensor with

an outer protective tube which has a large opening facing the gas stream and a small bleeder hole at the rear through which the gas slowly seeps out. This means that the gas stream passing the sensor is slow enough that it does not affect the sensor.

CAREFUL CALCULATIONS

This technology has been known for a long time but the difficulty lies in customising the sensor for each specific measuring junction. Diameters, angles, openings and many other factors must be optimised so that the sensor can take accurate measurements without disrupting the process it is supposed to monitor.

"In this case Siemens has calculated the geometry," says Leif Jansson, director of mechanical construction design at Pentronic. "Our job is to create a temperature sensor that meets the customer's specifications and contribute our expertise in measurement technology."

He holds up the latest version of the Siemens gas emissions temperature sensor. Its design is more sophisticated than it appears to be. Every opening, angle and weld has been carefully calculated so that the sensor will take reliable readings for a long time. 