Thermal Anemometry Probe Contamination

Frequently Asked Question #9

Question:

Do you have a technique to diagnose probe contamination? I realize that it is a shift in the calibration, but are there clear and obvious signs that my technician can recognize in the data? How can we distinguish it from effects due to bubble formation or change in temperature of the water in our flow system?

Answer:

Probe contamination can be an issue when a hotwire or hot film probe is used in an environment where it is exposed to a flow with many particulates in it, and specifically particulates larger than about 5-10 microns. The probe can be affected in several ways. The first is contamination buildup on the sensor itself. As particles build up on the sensor, the rate of heat transfer changes. This can be seen as a “drift” in the velocity (voltage) measurements over time.

The other effect of particulates in the flow is the potential to actually damage the sensor itself. This is more common in higher speed flows. A particle can impact the sensor and deform it slightly. The sensor is not broken, so it will continue to work. Over time, these small deformations can cause the heat transfer properties of the sensor to change, again causing a “drift” in the velocity over time.

Follow-Up:

Thanks for the advice. I did some tests with a 2 micron filter on the inlet to the tank and I no longer get the large voltage drift. In fact, I get such a small shift in the voltage for a 0.4 degree temp change that computing the film temperature is now a little difficult since there needs to be a measurable and significant difference in voltage to use the methodology. I am in the process of running some tests with a larger temperature difference to see if it works.

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