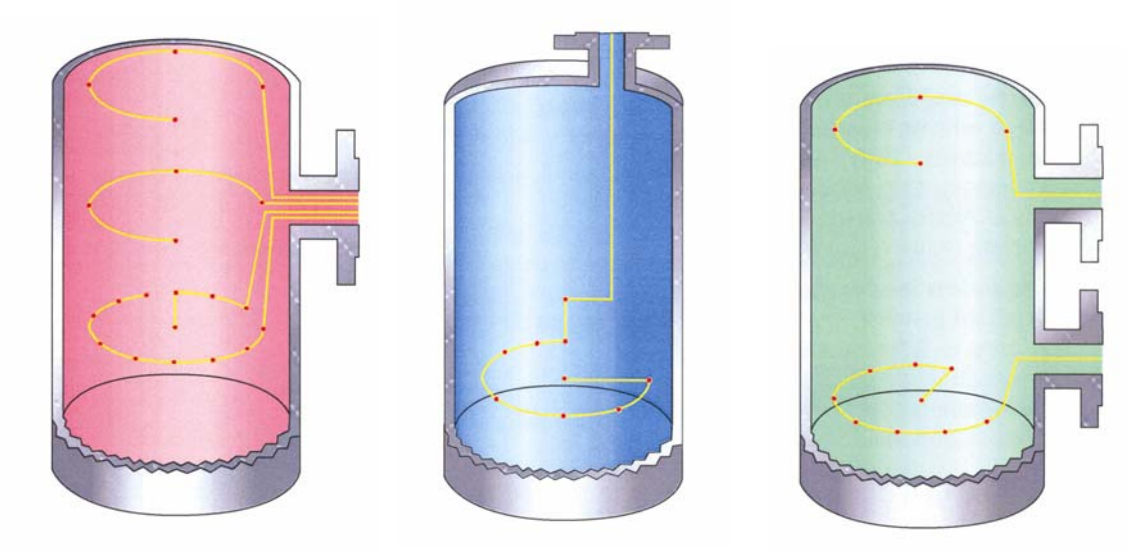
Tight Delta T Control
for Real Process Control



Why is Delta T important?

Delta T is referred to as the difference in temperature between points in a rector. Reactor performance is not determined by simply measuring the temperature, but by measuring the difference in temperature readings between points. Process Engineers are typically using the information from Radial Temperature Profiling to detect the following:

Maldistribution: One side of the reactor flowing more quickly than the other.

Channeling: The flow through a “crack”, or less dense area of the catalyst bed that is quicker than the rest of the process.

HotSpots: Where the exothermic reaction is running hotter than the reaction in the surrounding areas. This extra heat can cause this particular area to run even hotter until the process escalates beyond control.

Determining Catalyst Wear: Which parts of the catalyst are reacting and which are is no longer reacting. For Hydrotreaters and Hydrocrackers in the refining industry, this is done by WABT number calculations.

Quench Performance: Quench manufacturers typically give a guarantee of the temperature spread as the product exits the quench through a distributor tray.

In all of the above, the variable that is relied upon is the difference in temperature between points. We call this “Delta T”. Thermocouples are used in reactor temperature measurement because of their robust nature, but thermocouples can vary greatly in their reading of one temperature.

The more precision a Process Engineer has in the measurement of the Delta T, the more accurate the information he has in the decision-making process. The ability to have the information to run a reactor for one extra month or to know the causes of poor performance will save a processor a great deal of downtime, which leads directly to the bottom line. Only the CatTracker® system is capable of giving true, precise “Delta T” control.

Thermocouple Accuracy vs. Delta T

A typical thermocouple has an accuracy statement of plus or minus ¾%, but can be as low as plus or minus 3/8% if “Special Limits or Error” is specified. Using a standard thermocouple at 800°F, one point could measure 794°F while the one next to it could measure 806°F. This is a 12°F variance. The Process Engineer is using Delta T to make major decisions while not truly knowing if the variance read is from the Thermocouple inaccuracy or from Process malfunctions.

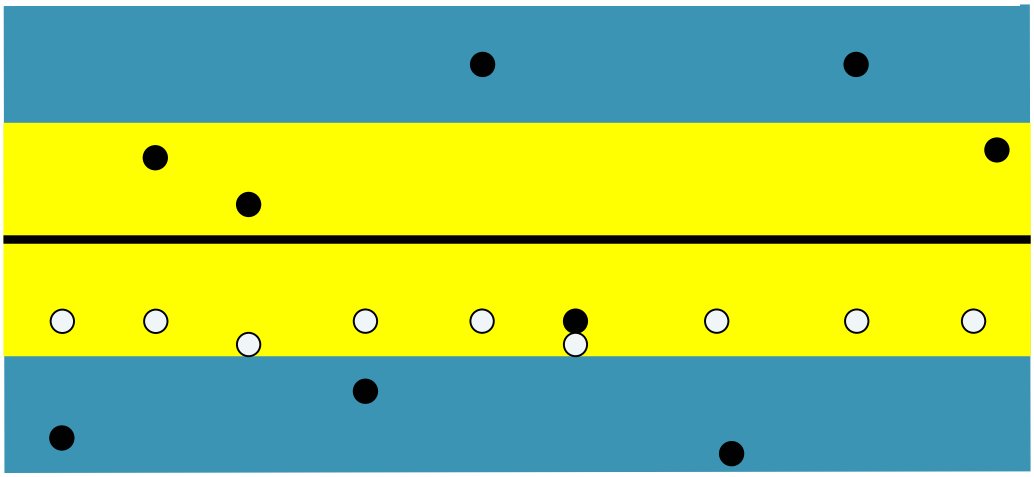
The CatTracker® system meets “Special Limits of Error” accuracy, and, more importantly, it is tested to ensure that all points exposed to the same temperature in a reactor measure within 1°C Delta T.

Data that you can use

With the above in mind, Daily Thermetrics has developed documentation that a Processor should require. We take each CatTracker® probe, remove a sample and make a “mini” CatTracker® with all of the sensing points at the end. The mini CatTracker® is then calibrated at 800°F against a traceable standard. All readings, including the standard, are recorded, and the information is submitted as part of the vendor data manual. Further, Daily Thermetrics maintains the “mini” CatTrackers® in case of any discrepancy in the future.

Only the Daily Thermetrics CatTracker® system gives the Process Engineer information in a format that he can rely on to make proper decisions with.

The table below shows how a typical thermocouple can read at one temperature while the CatTracker® will measure within 3/8% accuracy, with readings less than 1°C apart.



- Standard thermocouple accuracy: +/- 3/4%
- “Special Limits of Error” thermocouple accuracy: +/- 3/8%
- Standard thermocouple readings at baseline temperature
- CatTracker® readings at baseline temperature