Gas
Liquid & Slurry
Solid & Powder
Steam & Water

Case Study

Sentry MT Series magnetic trap alleviates combined cycle power plant's iron issue

situation

A combined cycle power plant uses both a gas and a steam turbine together to produce up to 50 percent more electricity from the same fuel than a traditional simple-cycle plant. The waste heat from the gas turbine is routed to the nearby steam turbine, which generates extra power.

Combined cycle power plants are the new workhorse of the power industry. Frequently asked to start up quickly, the equipment in their gas-fired units endures rapid thermal stresses and pressure changes. One effect of these operational demands is increased iron transport.

A 2x1 combined cycle power plant in the southeastern U.S. has experienced success with the Sentry MT Series magnetic trap. The installation – with magnetic traps for the HP drum and IP drum – is shown above.

challenge

Water within a power plant must be sampled to meet government regulations and protect the safety of operators, the public and the environment. Most particulates must remain within the system so they can provide a representative sample. Yet, within a power plant's water sample conditioning and analysis systems, entrained oxide particulates pose a huge challenge. The most prevalent is magnetite, which causes jamming and plugging of conditioning components involved in obtaining representative samples of water and steam in the boiler cycle.

During a plant start-up, copious amounts of iron particulate are transported through the sample lines into the steam and water sampling equipment. Samples such as high pressure (HP) or intermediate pressure (IP) drums in a combined cycle plant (or boiler drum/blowdown samples in a coal-fired plant) tend to exhibit high "iron throw", or magnetite. The magnetite shows as a black sandy material found in the sample panel sinks.

solution

The Sentry® MT Series magnetic trap addresses the problem of magnetite. The magnetic trap captures the magnetite before it can reach and adversely affect components. Placed immediately after the primary sample cooler, the magnetic trap protects the Sentry VREL® control valve, flowmeters and analyzers from iron fouling. A 2x1 combined cycle power plant in the southeastern U.S. has experienced success with the Sentry MT Series magnetic trap. The installation has magnetic traps for the HP drum and IP drum.

"The MT magnetic trap uses high strength neodymium magnets in its core to attract and capture magnetite while allowing remaining particulates to pass – protecting the sampling and conditioning equipment while maintaining sample integrity," says Rich Wartgow, Director of Engineering. "While conventional filters trap ALL particulates and choke off sample flow as the filtering media becomes plugged with contaminants, the Sentry magnetic trap captures only the magnetic particles that cause issues."

Flushing the traps is easy, simply requiring one person to remove the magnet from the trap body and pull the flush handle. Ten to 15 seconds of flush time is sufficient to clean the trap and return it to service by replacing the magnet and switching the handle back to "sample". Since sample lines are not opened, oxygen is not introduced to the lines.

Plus, to better serve customers, the magnetic trap is cleaned, or purged of its particle collection, in place, requiring no tools or disassembly. It also incorporates a unique cyclonic cleaning action to scrub its internal surfaces clean.

SENTRY

966 Blue Ribbon Circle North, Oconomowoc, WI 53066 | 262-567-7256 | sales@sentry-equip.com | www.sentry-equip.com

solution, continued

All wetted components of the magnetic trap are 316 stainless steel, and it is available as a stand-alone trap or as a complete assembly. It is designed for installation on a sample stream after primary cooling.

The combined cycle power plant using the Sentry MT Series magnetic traps appreciates the simplicity of their operation as well as their effectiveness. Flushing them about once per week has proven to be sufficient to handle the magnetite generated from multiple unit starts.

By removing iron oxide particulates, the Sentry MT Series magnetic trap protects sample conditioning systems and analytical instrumentation from critical downtime and costly repairs.

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European Authorized Rep:
OBELIS
Bd. General Wahis 53-1030
Brussels, Belgium

966 Blue Ribbon Circle North
Oconomowoc, WI 53066 U.S.
+1-262-567-7256
sales@sentry-equip.com
www.sentry-equip.com