



CONCO SYSTEMS

IN THE TUBE

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Midwest Power Plant Uses Eddy Current Testing To Prevent Costly Tube Failure

Recently, engineering personnel of a 700 MW plant in the Midwest became very concerned about the appearance of several small weeping leaks in one of their condensers. The condenser dated to the mid-1970's and contained 27,716 tubes made of Copper-Beryllium Alloy 194. The tubes had never been replaced, and it was last leak tested in the early 1980's. Over the years, 2,192 of the tubes had been plugged as leaks developed. There were no capital expenditure plans in the immediate future calling for the replacement of the tubes in the condenser. They knew that steps needed to be taken to address the weeping leakage situation and avoid a more serious tube failure problem.



Tube plugging was performed in conjunction with eddy current testing.



Technician using MIZ28 Data Acquisition Equipment.

The first of these steps was to perform eddy current testing to determine the exact condition of the condenser tubes. For this service, the plant contacted Conco Systems. They had used Conco for condenser tube cleaning in the past and knew from peers in their industry that Conco had an excellent reputation for eddy current testing as well.

The plant began a scheduled shutdown and used the opportunity to eddy current test the condenser. Conco's crew started with just 10% of the tubes to determine the severity of the problem. Conco provided frequent reports on what technicians were finding in the way of tube condition. Using onsite analysis, they expanded the area tested to 20% when they saw the extent of the problem. It wasn't looking very good, so even before they completed

the 20%, senior plant management gave the okay to eddy current test all 27,716 tubes to provide a comprehensive picture of overall tube condition.

Conco Eddy Current Testing Services utilizes the latest generation multi-frequency testing equipment, including the Zetec MIZ-28 digital acquisition testing unit that expands testing ranges into both the ultra-high and ultra-low frequency ranges. Conco also provides a multi-color tubesheet map for graphic illustration of tube wall condition, showing each tube's condition in a trend-specific color. It took about four weeks to eddy current test the entire condenser, and the results gave the plant the thru-wall damage percentage of every tube in the condenser.

The tubes were a lot worse than had been originally thought, many on the verge of failure. Using an 88% or more thru-wall condition as a guide, the plant proceeded to plug 348 tubes. This brought the total number of plugged tubes in the condenser to 2,540, which at 9.16%, was below the plant's 10% flow restriction guideline for the condenser. A die test was then performed, and the results showed that there were no more tube leaks in the condenser. Conco's color-coded tubesheet map also gave them a good guideline for what they have to do at the time of the next scheduled outage in 2010, as to whether they will have to plug or replace the aging tubes.

It has been over a year since the eddy current testing and subsequent tube plugging and there have been no leaks or unscheduled outages attributed to tube failure. The eddy current testing proved to be a valuable tool in the prevention of condenser tube failures at the plant.

From the Mailbag

DTE Energy



Dear Conco:
The eddy current testing on Unit 6 earlier this year ended up showing that the condenser was shot. We will finish up the retube next week. Thanks for the excellent response, quick testing, and speedy analysis. Your guys were great.

The data was the key to getting the project approved, and it ended up saving us a lot of money in wasted time and labor costs. Another job very well done!

Meg Guillaumin
Detroit Edison
Chemical Engineer,
St Clair Power Plant



Dear Conco:
I wanted to drop you a quick note to say thank you for your total support this outage. Your people did an awesome job and everyone on your team carried their load and took responsibility to get the job done safely and productively. The crew knocked the condenser water boxes out one after another, working both day and night shifts to meet our scheduling.

I look forward to working with you in the fall and next year's outage. Let the crew know we came in with Unit 2 online in 22 days, 4 hours and 53 seconds!

Jeff Wood
Program Analyst
Calvert Cliffs
Nuclear Power Plant

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This is Conco

■ Established in 1923

■ Recognized worldwide for "Absolutely the Best"

- Condenser Tube Cleaners
- Tube Cleaning Services
- Air Cooled Condenser Cleaning
- Tracer Gas Leak Detection
- Eddy Current Testing
- Support Services

■ Manufacturer of a wide variety of state-of-the-art equipment that includes tube cleaners, tube cleaning systems, hydrodrills, air-cooled condenser cleaning services and testing instruments engineered to keep you productive and efficient

■ Headquartered in the United States, with offices and representatives throughout the world:

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Conco employees assembling care packages.

"Supporting the Troops"

"The men and women of Conco have come together to support our troops." These were the words of Conco Systems President Greg Saxon as his team put the final touches on dozens of care packages being sent to the 3rd Special Forces Group of the United States Army at locations throughout Afghanistan. "We challenged our employees to meet certain objectives, with the reward being these care packages for our men and women in uniform" says Saxon. "This is the first time we've tied performance goals with the supporting our troops campaign, and our employees really came through."

Service personnel receiving Conco care packages will be treated to a variety of items we take for granted such as snacks, moist wipes, playing cards, chewing gum, toothbrushes and magazines. The care packages assembled by Conco employees were all loaded onto a pallet and shipped to Afghanistan for direct delivery to the troops.

The Smooth Tube Benefit

Cleanliness of your condenser tubes is vital in achieving optimal unit performance and efficiencies. There are several methods of tube cleaning. It is important to choose the most practical and cost effective way to clean condenser and heat exchanger tubes.

It is basically understood that the insulating effects of tube fouling can drastically reduce a unit's efficiency. By cleaning the tubes the insulating deposits are removed, vastly improving the unit's efficiency.

A second phenomenon that will result in improved efficiencies is the smoothing of the tube's internal diameter or surface.

What are the benefits of a smooth surface?

Rough tube surfaces cause problems associated with increasing friction coefficients. Rough surfaces accumulate deposits faster and tend to pit more than smooth surfaces. Smooth tube surfaces can improve condenser and heat exchanger performance in at least five ways.

- Combination of reduced heat loss and improved heat transfer of the tube wall reduces operating temperatures, increases circulating velocity and improves heat rates. More volume at a greater velocity will result in a lower temperature differential across the unit.



Tube in as-received condition



Tube cleaned with high pressure water



Tube cleaned with Conco C4S Cleaner

- By eliminating heat loss through cleaning, siphon recovery of the circulating water reduces the pumping power needed by increasing circulatory efficiency

- Smoother tube surfaces increase the length of time between tube cleaning. A smooth surface greatly reduces the rate of re-deposition of fouling particles on the tube surface

- Irregularities in the tube surface are attributed to excessive pitting caused by turbulence and bubble implosion. A smooth surface can reduce this pitting. Pitting peaks are removed by the edge of the Conco tube cleaner, and pits are flushed out with water. This retards pitting and increases tube life. Tenacious

deposits and obstructions are removed as the surface is smoothed.

- Smooth tube surfaces enhance eddy current inspection operations by increasing probe life and providing more reliable signals. More reliable inspection results improve plant availability.

Conco cleaners are custom designed for each tube. More than 50 custom-fitted Conco cleaners match the tube's exact inside diameter. Our products assure smooth inside diameters, unlike high pressure water or chemical cleaning.

Independent testing by customers prove conclusively that Conco cleans and smooths tubes more cost effectively than any other method. Tube cleanliness factors of 93 percent, back pressure improvements of over 1" HG abs, 2 percent increased power generation, extended periods (6 to 8 months) between tube cleaning and longer tube life are actual results reported by customers using the Conco system of tube cleaning.

In addition, our cleaners are the only cleaners in the industry capable of removing deposits, clearing obstructions and retarding pitting while polishing the tube inside diameter surface. The smooth tube benefit is of significant value to Conco customers. Conco removes more deposits and leaves the smoothest surface in the industry!

Look to CONCO for Your Stimulus Package!

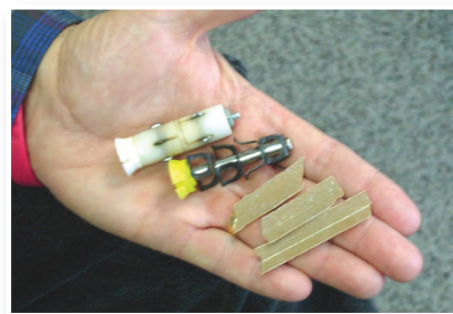
With the recent news from Washington regarding bailouts and stimulus packages, we thought we'd like to mention that Conco has been providing stimulus packages to our customers since 1923 in the form of increased megawatt output, reduced emissions and dramatic fuel savings. Using our exclusive tube cleaning technology, Conco crews are able to quickly and effectively clean your condenser for optimal performance. Take for example the following three power plants that all received a real stimulus as a result of their Conco service;



C3S Tube Cleaners

A Southern California Plant experienced degradation in condenser performance of as much as 0.40 in. Hg in one year's time, attributed largely to impeded tube flow in the condenser tubes. Using sample tubes removed from the condenser, the plant evaluated various cleaning methods; including high pressure water lancing, chemical, rubber pigs, brushes and Conco spring-loaded metal cleaners. Of all the methods evaluated, only the Conco cleaner was completely effective in removing all deposits. The Conco cleaners cleaned the tube surface to bare metal and polished the tube surface for minimum flow restrictions. Conco C35 tube cleaners were then used to clean all the plant's condenser tubes. The result indicated an improvement in turbine backpressure of 1.24 in. Hg at full load and a 2.10% heat rate improvement. The plant estimated that the condenser performance improvement yielded almost \$2 million in fuel savings as well.

Stimulus Savings: 2% Heat Rate Improvement and \$2 Million Dollars Annual Fuel Savings



Calcium carbonate scale removed by Conco specially engineered Tube Cleaners

A Nebraska Coal-Fired Plant noticed a significant rise in cooling water temperatures leaving their condensers. Tests showed that a severe insulating blanket of calcium carbonate averaging .02" in each of the more than 50,000 tubes in the plant's condensers. A Conco crew used patented Calbuster tube cleaners that feature carbide wheels in a two-stage design to fracture the scale and break its bond with the tube surface. Once the calcium scale was fractured, the final operation was shooting a Conco C35 heavy-duty cleaner through each tube, removing the accumulated scale deposit. Tubes were cleaned to their base metal and polished by the C35 cleaners during the cleaning process. In all, 18,000 pounds of calcium carbonate scale deposits were removed from the condenser tubes. Plant engineers estimated that overall savings exceeded \$1.5 Million dollars per year.

Stimulus Savings: 18,000 lbs of Calcium Carbonate Removed and \$1.5 Million Dollars Annual Savings



C4S Tube Cleaners

A 449 MW coal-fired power plant in Zolling, Germany, sought assistance in improving unit performance that was negatively impacted by fouled condenser tubes. The plant contacted the European office of Conco Systems, and a crew was quickly dispatched to the plant. Shooting Conco spring-loaded metal cleaners, the Conco crew removed fouling from the condenser's 40,000 brass tubes. After returning the unit to service, plant personnel noticed an immediate improvement in plant heat rate to the tune of 1.5%, and estimated that coal consumption would be reduced to the tune of €1,000,000 Euros annually, or the equivalent of \$1.3 million dollars!

Stimulus Savings: 1.5% Heat Rate Improvement and \$1.3 Million Dollars Annual Fuel Savings

These are only a handful of the hundreds of plants receiving Conco Tube Cleaning, Leak Detection and Eddy Current Testing "stimulus package" results daily. Call 1-800-345-3476 today and let Conco Systems stimulate your plant's productivity!

Showtime for Conco

■ **Electric Power 2009**
Chicago, IL
May 12-14

■ **Electric Utility Chemistry Conference**
Champaign, IL
June 2-4

■ **Southwest Chemistry Workshop**
Farmington, NM
June 22-26