New Purge System Removes Excess Oil From Refrigerant, Restores Efficiency

Owner expects to save more than $20,000 annually

At its plant in Charleston, S.C., the Bosch Group, global supplier of automotive, industrial, and building technology, was having trouble maintaining sufficiently low temperatures in each of seven 1,000- and 1,250-ton chillers. One chiller in particular was underperforming.

"We ran this chilled-water system set at approximately 38°F," Chris Landon, then a service technician for Fluor, Bosch's on-site service provider, said. "But the chiller was only able to maintain 42°F discharge temperature."

The problem was excess oil on the refrigerant side of the chiller. The conventional solution was to pull the refrigerant charge, put in a fresh one, and send the contaminated refrigerant for reclaiming, but that would have meant shutting down the production line. Another possibility was online decontamination, but the engineers at Bosch and Fluor knew oil contamination is an ongoing problem and that system efficiency would begin to degrade as soon as decontamination was completed. They wanted a permanent solution.

Having read an article discussing its new purge system in the trade press, Landon called Redi Controls.

"Our system uses a combination of heat and pressure in cycles to separate the oil and other contaminants from the refrigerant," Mark Key, vice president of marketing for Redi Controls, said. "The contaminants are removed completely, the reclaimed oil returns to the oil sump, and the purified refrigerant channels back to the top of the evaporator. ... The purger ... operates even when the chiller is idle. It's a 24/7/365 solution."

Landon and Bosch's facility engi-

neer decided to purchase one OAM Purger and try it on the problem chiller.

OAM Purgers are installed close to refrigerant charging valves and come with clear instructions. Bosch's facility engineer and his crew decided to install the unit themselves. They were done in a few hours.

"It started removing oil and returning it to the oil sump as soon as we turned it on," Landon said. "Within two weeks, we were able to supply 40°F chilled discharge water at lower amperage than before."

Bosch since has bought and installed five more OAM Purgers.

"Based on our figures, it looks like these purgers will save us more than $20,000 annually in improved efficiency and decreased power demand," the facility engineer said.

Information courtesy of Redi Controls.
Circle 105

PERFORMANCE IMPACTS OF EXCESS OIL

In American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Research Project 601, "Chemical Analysis and Recycling of Used Refrigerant From Field Systems," refrigerant from 10 randomly selected operating chillers was analyzed. Each sample was found to contain excess oil—from 3 percent to more than 20 percent.

How much does excess oil in an evaporator degrade performance? The chart below gives typical levels of performance loss for various amounts of minor contamination.

Part 1 of ASHRAE study "Effects of Oil on Boiling of Replacement Refrigerants Flowing Normal to a Tube Bundle" concludes: "Flow-of-boiling results ... obtained for the low-pressure-refrigerant enhanced boiling tube in the presence of R-123 ... (show) a marked decrease in heat transfer with the addition of even a small amount of oil throughout various heat loadings. Even at 1 percent to 2 percent (by weight) oil, the heat-transfer coefficient is reduced by one-third from its no-oil baseline. At substantial oil content (5 percent to 15 percent), a 40-percent to 50-percent reduction (in heat transfer) is noted." Part 2 of the study reached the same conclusion: "Flow-boiling results ... obtained for a newer enhanced boiling tube with R-134a ... (show) a decrease in heat transfer with the addition of even a small amount of oil throughout various heat loadings. Even at 1 percent (by weight) oil, the heat-transfer coefficient is reduced by 25 percent from its no-oil baseline. At higher oil content, a 30-percent reduction has been typically measured."