

GENESIS HEALTH SYSTEM

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COMPANY BACKGROUND



DAVENPORT

Genesis Health System comprises four hospitals and numerous office buildings. Two main campuses are in Davenport, Iowa. Each location houses approximately 250 beds and employs 800 first shift employees and physicians. Both locations offer complete general hospital services. A specialized cancer center at Genesis West offers some of the most advanced methods of treatment in the area. The Heart Institute at Genesis East offers state-of-the-art diagnosis techniques dedicated to improving heart health.

PROJECT BACKGROUND

This project focused on the conditions of the boiler systems at both east and west campuses. The facilities serve the hospitals with a constant supply of steam for sterilization, humidification, dietary, and heating purposes. A survey was done in order to establish boiler efficiency at these locations and to analyze the steam distribution system throughout both facilities. The analysis included a steam trap inspection and research into possible boiler upgrades that could raise the system's efficiency.

INCENTIVES TO CHANGE

Genesis Medical Center (GMC) Davenport uses natural gas boilers for steam production. The life expectancy of these types of boilers is typically 30 years. The boilers at Genesis East are currently 35 years old. Although considerable preventative maintenance has kept these boilers in very good condition, there are concerns that they will need to be replaced in order to minimize maintenance costs and maximize efficiency. There is also concern that rising energy costs could drastically affect utility costs if preventative measures are not taken.



RESULTS

Steam Trap Audit: An audit of almost 250 steam traps was conducted throughout both campuses. Steam traps are used in order to remove condensate from the distribution system without allowing steam to leave the system. More than 20 percent of the audited steam traps were found to be malfunctioning, allowing steam to pass into the return condensate line.

To address this problem, an annual steam trap audit should be conducted by maintenance on site, using an ultrasonic probe. This should lower the number of faulty traps each year to less than 10 percent facility wide. In order to aid with the audit, a steam trap database and floor maps with locations of each trap were created. This will allow for proper recordkeeping and thorough steam trap inspections.

Boiler Insulation: Researching past performance of GMC Davenport's boilers showed typical combustion efficiencies, close to the maximum allowable of 85 percent. However, the boilers were often producing steam at much lower levels, from 65 percent to 70 percent. This shows a loss of energy within the boilers themselves. In order to

help address this problem, insulation was recommended on the bare surface at the ends of each boiler. The insulation would raise the efficiency by approximately 1 percent and would require little up-front capital.

Waste Heat Economizers: The intern analyzed the feasibility of installing economizers on the boilers. Economizers take heat leaving the system in the exhaust (flue gas) from the boiler and use the heat to preheat incoming boiler makeup water. Current flue gas temperatures at the facilities range from 300°F to 360°F. Prior to use in a boiler, makeup water must be heated to 212°F. Economizers were not feasible for this project because most of the water (86 percent) is kept in the system in the form of condensate at a much higher temperature than domestic cold water. This made the capital investment considerably high for the potential return.

Boiler Replacement: Replacing GMC Davenport's boilers could raise the efficiency of the system by as much as 20 percent. However, due to the current condition of the boilers, the low volume of steam production at these facilities and the relatively high capital investment that would be required, boiler replacement is not feasible at this time. The high capital investment would be needed, in part, due to the nature of the boiler locations and the large installation costs that would be incurred.



CONVENTIONAL AIR POLLUTANTS AND GREEN HOUSE GASES DIVERTED IN STANDARD TONS

Total for all sectors					
CO ₂	SO ₂	CH ₄	N ₂ O	CFC	PM-10
26.29	0.07	43.41	0.11	0.33	0.01

PROJECT	ANNUAL COST SAVINGS	ENVIRONMENTAL RESULTS	STATUS
STEAM TRAP AUDIT	\$23,000	33,000 THERM	IMPLEMENTING
BOILER INSULATION	\$5,600	8,000 THERM	RECOMMENDED
WASTE HEAT ECONOMIZERS	\$29,000	41,000 THERM	NOT FEASIBLE UNDER CURRENT CONDITIONS
BOILER REPLACEMENT	\$131,000	187,500 THERM	NOT FEASIBLE UNDER CURRENT CONDITIONS

