Casino saves $1,883,210 in annual energy costs while providing unsurpassed comfort

Overview

This casino (CAS)* is one of the largest in the United States with over 300,000 square feet of gaming space, an arena, a cabaret theatre, meeting and function rooms, retail shopping, and over 1,000 guest rooms.

** Due to confidentiality agreements, we are not able to provide the client name. We will refer to the organization as CAS throughout this case study.*

The Challenge

CAS had a vision from its inception to respect Mother Earth and to act responsibly for future generations. As a result, CAS wanted to incorporate sustainability into its vision.

CAS's sustainability program includes an aggressive recycling program, a large lighting retrofit project, and the installation of low flow water fixtures. In addition, CAS wanted to incorporate energy, operation and maintenance reducing technologies to provide a major impact.

Cimetrics' Solution

Cimetrics was selected to provide its Analytika Pro solution for over 2 million square feet of multi-purpose space. Cimetrics collaborated with Johnson Controls, CAS's building automation system provider, to connect to and collect sensor and actuator data from almost 13,000 physical points. Data was collected every 15 minutes, 24 hours a day, and 365 days a year, totaling more than 1.2 million data samples per day.

The following systems were monitored: 102 hot water and chilled water distribution pumps, 10 condenser water pumps, 6 boilers, 255 air handling units, and 606 terminal units.

Over 1,000 Analytika software algorithms then analyzed the data to identify opportunities to reduce energy consumption, improve comfort, and reduce operations and maintenance costs. Analytika also uncovered potential equipment problems, and provided opportunities for profitable retrofit projects.

Experienced Cimetrics engineers leveraged Analytika software to identify opportunities, determine root cause, and calculate annual savings impact. Actionable recommendations were documented and provided to the client both through online and offline channels. Cimetrics' role did not end with providing recommendations; Cimetrics engineers engaged with the client team on a regular basis to help answer questions, coordinate implementation, and provide regular feedback on progress.

Results Achieved

- Financial summary
  - Total energy savings: $1,883,210 (annual)
  - Simple payback: 0.1 years
  - Net present value: $10,044,189
  - A 10 year ongoing relationship
- Operational benefits
  - Sustainability and environmental stewardship: Achieved 7,000 metric tons in annual CO_2 emissions reduction, which is the equivalent of taking almost 1,500 cars off the road.
  - Vendor management: Verified that optimum sequence of operations were programmed into the building automation system (BAS) by outsourced facilities management vendors.

- Predictive maintenance: Initiated inspection and reprogramming of valve and damper controls to avoid premature actuator failure.

- Comfort improvement: With over 1,000 guest rooms, an arena, and 300,000 square feet of gaming space, guest comfort is imperative. Cimetrics monitored CO_2, outside air, temperature control, relative humidity, and air changes per hour to provide unsurpassed comfort for all guests at any time of the day or night.

- Commissioning: Optimized newly constructed area HVAC operations. Identified flaws in temperature sensor calibration in an air handling unit and worked to remedy under warranty. This also reduced energy consumption.

Example of fault detection and diagnostics: VAVs with leaking reheat valves

With over 600 variable air volume terminal devices (VAVs), identifying the units that were operating incorrectly, using excess energy, or providing less than desirable temperature conditions was a daunting task. Analytika uncovered that more than 40 of the VAVs had leaking reheat valves. Analytika provided the root cause of the problems, recommended action items and prioritized by wasted energy.

This issue was not detected on-site because the devices serve smaller areas, and the zone temperature error in some areas was less than 5 degrees F; however, when it was multiplied by 40 zones, the magnitude of the leaking reheat fault was significant.

VAV Unit	Air Temperature Degrees F		Total Hrs	Leaking Reheat
	Avg AHU SA DAT	Avg DAT		
Z-BOH_2_61	55.1	105.3	720	✖
Z-KIDS_68	55.1	100.3	720	✖
Z-BOH_2_49	55.1	89.6	720	✖
Z-FOOD_BUFFET	55.1	88.7	720	✖
Z-63	53.4	86.7	720	✖
Z-BOH_1_25	57.8	82.5	720	✖
Z-COAT_CHECK	54.8	80.8	720	✖
Z-TV_BACKROOM	57.8	80.5	720	✖
Z-MENS_RR	57.8	80.3	720	✖
Z-BOH_1_23	57.8	80.2	720	✖

Figure 1: Top 10 VAV leaking reheat table

Solution

Cimetrics worked with CAS staff and their controls vendor to fix the leaking valves and correct sensors that were out of calibration.

Annual energy savings achieved: $26,454

Annual carbon emissions reduction: 165 metric tons

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