

Case Study

Johnson Controls Optimizes Building Performance in Pushpawati Singhania Research Institute

New retrofit solution achieves higher efficiency and 50 percent savings in electricity costs



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*Debashis Kole
Chief Engineer
Pushpawati Singhania Research Institute*

Summary

India's Pushpawati Singhania Research Institute was in need of a retrofit solution as its current centralized air conditioning system was inefficient and incurring unnecessary costs. Johnson Controls led the project which cut electrical costs by more than 50 percent (equivalent to USD 70,000) and freed up space for future expansion.

The Story

Pushpawati Singhania Research Institute (PSRI) is South East Asia's first and India's foremost institute providing advanced and comprehensive medical and surgical treatment for digestion-related diseases, with core specialization in the treatment of ailments related to liver, kidney, gall bladder, pancreas and gastro-intestinal tract systems. Located in South Delhi, PSRI has become a leading knowledge center with state-of-the-art medical facilities.

As the hospital sees many patients each day, it is paramount for it to maintain optimal humidity and temperature levels to create a comfortable indoor environment. However, its old air conditioning system was unable to meet rising load conditions and was consuming 60 percent to 70 percent of the hospital's electricity.

Johnson Controls Maps Retrofit Plans

PSRI's initial system ran on six water-cooled reciprocating chillers with the capacity of 50 tons of refrigeration (TR) each, which provided an efficiency rate of 1.1kW/TR that was below expectations. Johnson Controls swiftly performed an audit and presented a complete centralized air conditioning retrofit solution that would raise the efficiency of the system.

The team first consolidated real annual data to gauge for accurate energy consumption demands. They then compared the efficacy of the initial and proposed new systems based on current demands. The total energy consumption of the old system was 1,049,272 units of electricity while the estimated consumption of the proposed system was only 504,572 units of electricity - a reduction of more than 50 percent.

Creating an Optimized System for Enhanced Chiller Performance

The existing energy guzzler and reciprocating chillers were replaced with two units of highly efficient YORK® water cooled screw chillers (model YRTDTCT0555C) with capacities of 200TR each. Three 300TR cooling towers, primary and secondary chiller pumps, condenser water pump and main electrical panel were also installed.

Case Summary

Customer Challenges:

- High energy consumption due to low efficiency of centralized air conditioning system
- Maintain optimal level of comfort in hospital premises
- Optimize layout space within plant room for future expansion

Our Solution:

- Energy audit to identify appropriate system capacity
- Complete retrofit solution for centralized air conditioning system, including:
 - Two highly efficient YORK® water cooled screw chillers (model YRTDTCT0555C)
 - Three cooling towers
 - Primary and secondary chiller pumps
 - Condenser water pump

Customer Benefits:

- Reduction of energy consumption levels by more than 50 percent, resulting in energy savings of USD 70,000 per year
- Comfortable indoor environment for the hospital's patients
- Freed up 450 sq ft of space for future expansion

The previous chillers had a power factor of 0.75 which fell short of the 0.99 power factor needed in the hospital. More capacitor banks would need to be installed due to a low power factor. With the new system, the optimal power factor could be maintained with the help of one capacitor bank with a capacity of 100KVAR.

To keep the cooling towers running at optimal conditions, the team recommended the use of hydrochloric acid to maintain the pH level of the water. Other measures to address scaling and corrosion control were also implemented.

Reaping the Benefits of Quality Services

PSRI recorded electrical savings of more than five lakh units within a year, equivalent to USD 70,000 (based on the tariff rate of USD 0.134). With such robust savings, the projected payback period was only 25 months. They could also enjoy a comfortable environment within the hospital for the benefit of both patients and doctors.

During the retrofit project, the Johnson Controls team was sensitive to the needs of the customer and managed the installation works without disrupting the operations of the hospital.

"The installation work was successfully completed within 45 days - 15 days ahead of schedule," commented Debashis Kole, Chief Engineer, Pushpawati Singhania Research Institute. "Johnson Controls accommodated their working time to minimize disruptions to our hospital's operations. Where shutdown periods were required, the team scheduled for the tasks to be completed at night. We really appreciate the thoughtfulness shown."

Moreover, the hospital also recovered an estimated 450 square feet area previously occupied by the six old chillers. This freed-up area can be used to house new chillers powering up the new extension in the hospital, providing a single plant room serving two different buildings for ease of operations and maintenance. It can also potentially increase the parking space available within the hospital.

"It was a great experience working with Johnson Controls. We are satisfied with their commitment, workmanship and technical knowledge. I will definitely recommend Johnson Controls for professional services, and I look forward to continue working with them in future," Kole concluded.