Intelligent Store Solution for Pharmacy Cold Room

The reconstruction project for the cold room in the logistics centre of Yunnan Pharmaceutical Co., Ltd.

The Project Background

Yunnan Pharmaceutical Company is wholly owned by Yunnan Baiyao Group. It is the largest state-owned pharmaceutical logistics enterprise with the strongest comprehensive strength in Yunnan Province. It is also responsible for disease prevention and curing, emergency reaction and stabilization, as well as medicine and healthcare for inhabitants of the Yunnan Province.

In October 2011, the company relocated and invested RMB 250,000,000 to build a large modern pharmaceutical logistics center. The center covers an area of 200 acres, including the 36,000 square meters of building area. It has the ability to store 300,000 cases of drugs, with a daily delivery of cargo from storage peaking at 40,000 cases.

The company started to reconstruct the original cold room in July 2013. After the reconstruction, there is now one mid-temperature (refrigeration) cold room of 2-8°C that stores liquid medicine and one low temperature (freezing) cold room of -18°C which stores frozen medicine.

Challenge

After a few years of operation, the original equipment began to age and some compressors were broken. Moreover, the power consumption of the original system was quite high which made it no longer suitable for the rapid development of the company.

The new refrigeration system of the reconstruction project had to be designed according to the GSP standard. Thus, the requirements for the reliability of the equipment and the system as well as the temperature and humidity control were extremely high. In addition, the data of the medicine's temperature and humidity throughout the refrigeration process should be recorded and the database should be connected to the client's ERP system, so documents can prove the safety and standards of the operation throughout the medicine refrigeration process. This information can be compared to the requirements of the GSP standard to ensure medicine quality.

Result

- Copeland Scroll™ outdoor condensing unit from Emerson can save more than 15% energy compared with ordinary condensing units.
- The automatic switching to backup units and alarm function are achieved through configuration optimization to ensure the safety of the pharmacy cold room.
- The Dixell™ products provide the overall solution of intelligent control and monitoring. They help to ensure the normal operation of the equipment in the cold room. Meanwhile, it can centralize the management of the cold room including temperature and humidity, to achieve remote control anywhere and at anytime.
- The medication's temperature and humidity during the refrigeration process can be recorded and this information can be connected to the client's ERP system. This function represents how the medicine quality monitoring process has stepped into a new era of automation and digital control.
- The application of the automated temperature control technology has the ability to control the humidity level in the cold room without using dehumidification equipment.
- All the systems above were installed and tested by - Beijing Bingchuan Hongye Refrigeration Technology Co., Ltd. and operated stably after the project finished at the end of 2013. (Data collected until July, 2014)

Solution

The reconstruction project chose the integrated solution from Emerson in consideration of their reliability, safety and efficiency.

This solution uses the Copeland Scroll™ outdoor condensing unit from Emerson. The Copeland™ compressor has patent scroll compliances, which can ensure a steady and reliable operation of the unit. Meanwhile, the back-up system design for the cold room ensures the consistent operation of the cold room with one condensing unit and one cooling unit that are paired together as an independent refrigeration system.

The Dixell™ electronic control and remote monitoring system from Emerson can provide an integrated solution to manage the refrigeration, heating, defrosting, fan, humidifying, dehumidifying and the electronic expansion valve drive. It has the ability to manage the status of the cold room including temperature and humidity and to do so with remote control access.

Beijing Bingchuan Hongye Refrigeration Technology Co., Ltd. has developed a program that works with Yunnan Baiyao's Information Department, and allows the data to be recorded and connected to the client's ERP system so the information management is convenient and effective for the client.

The success of this project marks a new era of automation and digitalized medicine quality monitoring. It also marks that the cold room hardware and software technology of China's pharmaceutical industry has entered a new stage of development.

Cold room	Required cooling capacity (kw)	Length * width * height(m)	Cold room temperature	Temperature of the goods before entering the cold room	Daily amount of goods entering the cold room(kg/batch)	Condensing unit	The total cooling capacity (kw)	Cooling unit	Number of units
Mid-temperature cold room for refrigeration (Capacity: 250 tons)	32	23.3*13*3	2°C -8°C	8°C -10°C	>20	ZX075E	69	FEME0795	3(plus 3 backup)
Low temperature cold room for freezing (Capacity: 52 tons)	12	8.3*7.5*3	-18°C	Below 0°C	<10	ZXL075E	24	FEM1020PD6	1.5 (plus 1.5 backup)

The Refrigeration and Centralized Monitoring Solution

Automatic control of the refrigeration system: 1/4 of the independent refrigeration system is controlled by an electronic expansion valve and computer system. It can accomplish cooling and dehumidification simultaneously by setting the standard temperature of the cold room as well as the temperature limitation. When the humidity sensor detects that the humidity is higher than the set value, the dehumidification cycle will start automatically. When the humidity is lower than the set value then the system will revert back to normal refrigeration operation.

Over-limit temperature alarm and backup equipment start-up: When the cold room temperature is too high or too low, the monitoring system can ring an alarm through the monitoring system by buzzer, SMS, telephone, fax and other methods of communication. There are three kinds of alarms: high temperature alarm, low temperature alarm and unit protection alarm. In addition, the alarm system that is part of the temperature controller is connected to the control circuit of the backup system. When the alarm is triggered, the emergency backup system is activated.

Local and remote monitoring: The monitoring module XWeb server can be connected to the local monitoring computer by using a simple internet cable. After being connected, it can monitor the temperature of each cold room and the operation status of the equipment and also has the ability to regulate all operations, including the start-stop and defrosting of equipment. The monitoring screen can be shared with other big LED screens so several people can read the information at the same time and can remotely control the operation. Dixell monitoring system includes centralized monitoring server XWEB500, single temperature controller XLR170, dual temperature controller XLR470, and temperature data collector XJP60D and other equipment.

Quote from the contactor:

The cold room design fully use the integrated cold room solution from Emerson including Copeland Scroll outdoor condensing units, flow control valves, Dixell electronic controllers and remote monitoring systems. It can also be connected to the Yunnan Baiyao's ERP system. The Integrated pharmacy cold room solution from Emerson can bring consistent reliability and convenience for the customers. The project was installed and tested by Beijing Bingchuan Hongye Refrigeration Technology Co., Ltd. and won the Best Refrigeration Scroll Product Application Award of Retail and Refrigeration Product Group of the 2013 Emerson Cup.

- ZHANG Hong, General Manager of Beijing Bingchuan Hongye Refrigeration Technology Co., Ltd.

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