Case Study

ENGINEERING
TOMORROW

The Central Bank of Egypt rolls out cost and energy efficient HVAC system for new cash printing house

The Central Bank of Egypt's (CBE) new cash printing house has worked closely with Danfoss and building technologies expert PETROKIMA, a local Danfoss partner, to install a heating, ventilation and air conditioning (HVAC) system. The implementation of this solution not only delivers the cooling requirements needed to keep the printing facility's employees comfortable, it is also energy efficient.

Based in the New Administrative Capital of Egypt near Cairo, the CBE's new printing house features state-of-the-art printing and IT equipment, with four production lines for producing and printing money. The New Administrative Capital is a mega-project developed by the Administrative Capital for Urban Development (ACUD), which is owned by the Egyptian military and the Ministry of Housing, with the strategic vision of an integrated smart city with an infrastructure to provide many services to citizens.

The new CBE printing machines are able print all denominations of both paper and plastic currency. The plastic banknotes are made of polymer, an anti-spoilage, water-resistant material that is highly resistant to the transmission of microbes or viruses as well as being more difficult to counterfeit than paper notes.

The challenge: enhanced energy efficiencies coupled with excellent control

As a country, Egypt has placed a strong focus on environmental impact and addressing climate change, stepping up efforts to preserve its environment while also looking to boost prosperity and economic welfare for its population. As such, sustainable development and a focus on scaling down energy consumption have progressively come to the fore on the national agenda.

Ventilation systems and air handling units are under growing demand, thanks to an increasing population and the rising expectations of comfort. However, the use of newer heating and cooling solutions can play a critical role in helping organisations to decrease their CO2 footprint, as well as driving down energy consumption and thus energy bills.

In line with these efforts, CBE required a cost-effective HVAC solution that would enhance the new cash printing facility's energy efficiency, providing an effective means to reduce energy consumption while also allowing for optimal control of the desired air flow under all conditions. In addition, the organisation wanted a solution that would allow for the safe shutdown of the HVAC system in the case of power outages.

Solution:

As part of its energy-saving building management system (BMS), CBE opted to include 900 Danfoss Pressure Independent Balancing and Control Valves (PIBCVs) with spring-return AME actuators.

"Danfoss fully supports the development of the Egypt's new Cairo capital city, and as such, has partnered with ACUD to assist in this process, from the design phase through to fulfilment, in more than 30 local projects," comments Emad Anwar, Country Sales Manager of Danfoss Climate Solutions (DCS).

"Higher climate and energy ambitions have been on the Danfoss agenda for many years. Our 'energy efficiency first' approach has been further ramped up recently, with the introduction of our 'Green Restart' initiative in early 2021. The thought behind this concept is to help restart global economies that have been negatively affected by the COVID-19 pandemic, encouraging growth while also fostering climate action by investing in a low-carbon world.

"We believe that energy efficiency opportunities in new and existing buildings must focus on efficient heating and cooling, as this accounts for up to 80 percent of energy consumption. One of the most cost-effective measures to reduce energy demand is optimizing HVAC and technical building systems, which on average leads to energy savings of 30 percent – and with a short payback time of less than four years."
As part of its range of components aimed at improving the efficiency of air handling units, Danfoss' PIBCV offering represents the latest development in balancing and control solutions. It has become a standard in many heating and cooling systems, offering the lowest possible total cost of ownership (TCO).

"Danfoss is well-known for its cost-efficient, reliable PIBCV offering," explains Anwar. "PIBCVs are mainly used to control and balance larger-sized systems in both residential and commercial buildings Combining the control function, pressure independency and flow limitation all in one valve, as with our AB-QM solution, saves in purchasing individual valves and reduces valuable installation time.

The Danfoss AB-QM delivers the lowest total cost of ownership due to:

- **Precise flow limitation ensures always the right flow at the right time, ensuring minimised pumping energy.**
- **Full range from DN15 to DN250 for flows up to 407 m3/h.**
- **Available with internal and external thread for universal applicability.**
- **Easy troubleshooting because of the always visible setting and the ability to measure flow through test plugs.**
- **Minimum hysteresis for stable and precise temperature control.**
- **Future-ready with a range of smart actuators, ready for data driven and optimised HVAC 4.0.**

"Equipping the AB-QM with a smart AME actuator, controlled by a room thermostat or BMS solution, brings out the best in the valve's combined balancing and control features, and thus the best possible indoor climate control. The AB-QM valve is able to assist forward-looking businesses wanting to adopt the next level of data-driven, optimised HVAC 4.0."

Results

The combination of Danfoss AB-QM balancing and control valves with compatible actuators used at the CBE's cash printing building provides excellent indoor comfort for workers, as well as energy savings for the organisation.

The precise flow control performance of the AB QM with a Danfoss actuator provides increased comfort and allows for savings on:

- Efficient energy transfer and minimal pumping costs, since there are no overflows at partial loads because of the exact pressure independent flow limitation.
- Smaller pump investments and lower energy consumption as the pump head needed is lower than in the traditional setup. With the built-in test plugs, it is easy to troubleshoot and find the optimal set point for the pump.
- Reduced movements of the actuator since the built-in differential pressure controller ensures pressure fluctuations do not influence the room temperature.
- Achieving a stable temperature in a room, leading to a lower average temperature at the same comfort level.
- Minimal flow complaints, as the valve performs as designed.
- Minimal blockage complaints, as the membrane design makes the AB-QM less susceptible to blockage than a cartridge-type construction.
- Trouble-free segmentation of the building project. When sections of a project are finished, they cannot normally be handed over to the customer with a fully functional HVAC installation. However, the combination of the AB-QM with a Danfoss actuator will automatically control the flow, even when other parts of the installation are still unfinished.
- Commissioning costs: the costs are close to zero because of a convenient setting procedure without the need for flow charts, calculations or measuring equipment. The AB QM valves can be set to a precise design value even when the system is up and running.
- Halved mounting costs as the AB-QM valve covers two functions, Balancing & Control.

"Danfoss' PICVs provide a cost-efficient solution for the challenges faced by forward-looking designers of HVAC systems," states Ahmed Aman, PETROKIMA Board Member. "The design of the AB-QM is fully geared towards ensuring that your project runs on time and on budget, while delivering the most efficient HVAC system. The simple design of these valves ensured the reduced commissioning time of our installation at the CBE's printing facility and will deliver safe operation and lower maintenance costs into the future."

About PETROKIMA
Building technologies expert, PETROKIMA was founded in 1977 by Eng. Sami S Aman. With a strong focus on the implementation of integrated building management systems, including control system solutions, fire safety and security solutions, PETROKIMA has an excellent reputation in third-party integration. The company has enjoyed a lengthy partnership with Danfoss of more than 12 years.