

Case Study

HMX helps AI Waha tower reduce chiller load

AI Waha Towers, a premium residential complex owned by the AI Batha Group in the UAE reduced the load on its chiller by using HMX pre-cooling units to cool the make-up fresh air, resulting in reduced capex and opex.

Background

The AI Batha Group is one of the largest private business groups in the UAE. The Group consists of more than 20 autonomous companies that operate in the diversified sectors of automobiles, pharmaceuticals, contracting, manufacturing, electronics, FMCG, real estate, education, and more.

The real estate arm of the AI Batha Group was established in 1986 and is directed towards meeting the multifaceted property needs of the UAE – from building warehouses and showrooms to managing commercial, residential, and retail space. Over the years, AI Batha's real estate business has enjoyed considerable success as the UAE real estate industry flourishes.

Challenges

AI Waha Towers is one of the AI Batha Group's premium residential properties. Located in the severely hot and humid climate of Sharjah, UAE, The AI Waha Towers are centrally air-conditioned. The central air-conditioning system covers all common areas, such as lobbies, corridors, and lift areas of the 44 floor building while the residential areas have packaged air-conditioners of their own.

The AI Batha Group found it difficult to maintain a constant comfortable temperature in the common areas of the building; temperatures in these areas were always 2-3°C higher than the required temperature. To overcome this challenge, the Group looked at several solutions:

1. **Addition of a chiller:** Adding a chiller to the existing system would make it possible to maintain the required temperatures inside the common areas. However, this would also mean significant capex and a higher opex.
2. **Recovery of air through ERW:** Energy recovery wheels (ERWs) would take in the air from the conditioned space and circulate it back to the same space by recovering the heat energy. This would require additional ducting from the ground floor to the top floor where the ERW would be installed. Moreover, installing an ERW would also require significant capex and high opex.
3. **Closing/reducing the make-up fresh air:** Every building requires some amount of fresh air to be inducted occasionally to maintain good indoor air quality (IAQ) while the remaining air (which work has been done to cool it) is re-circulated. This is generally done through FAHUs (Fresh Air handling Units) also known as TFAs (Treated Fresh Air units). Even though the quantity of fresh air inducted is only 15% of the entire air quantity, the load on the air conditioning system to cool this air can go upto 30%, especially during summers. Closing the fresh air dampers would mean that more tonnage can be allotted to the chiller and less to the FAHUs but this would come at the cost of reduced IAQ and increased health hazards.

AI Waha tower had two FAHUs installed (capacity: 30,000 CFM each) to treat their 15% make-up fresh air. The FAHU cooled and dehumidified the make-up fresh air from the ambient 50°C to 15°C. The FAHU tonnage consumption for this was 510 TR/Hr. In spite of the fresh air quantity being only 15%, the tonnage consumed was almost 30% of the entire chiller load. This meant less available tonnage for cooling the recirculated air and therefore, inadequate cooling for the fresh air being supplied.



Installation of HMX-PCU at AI Waha towers.

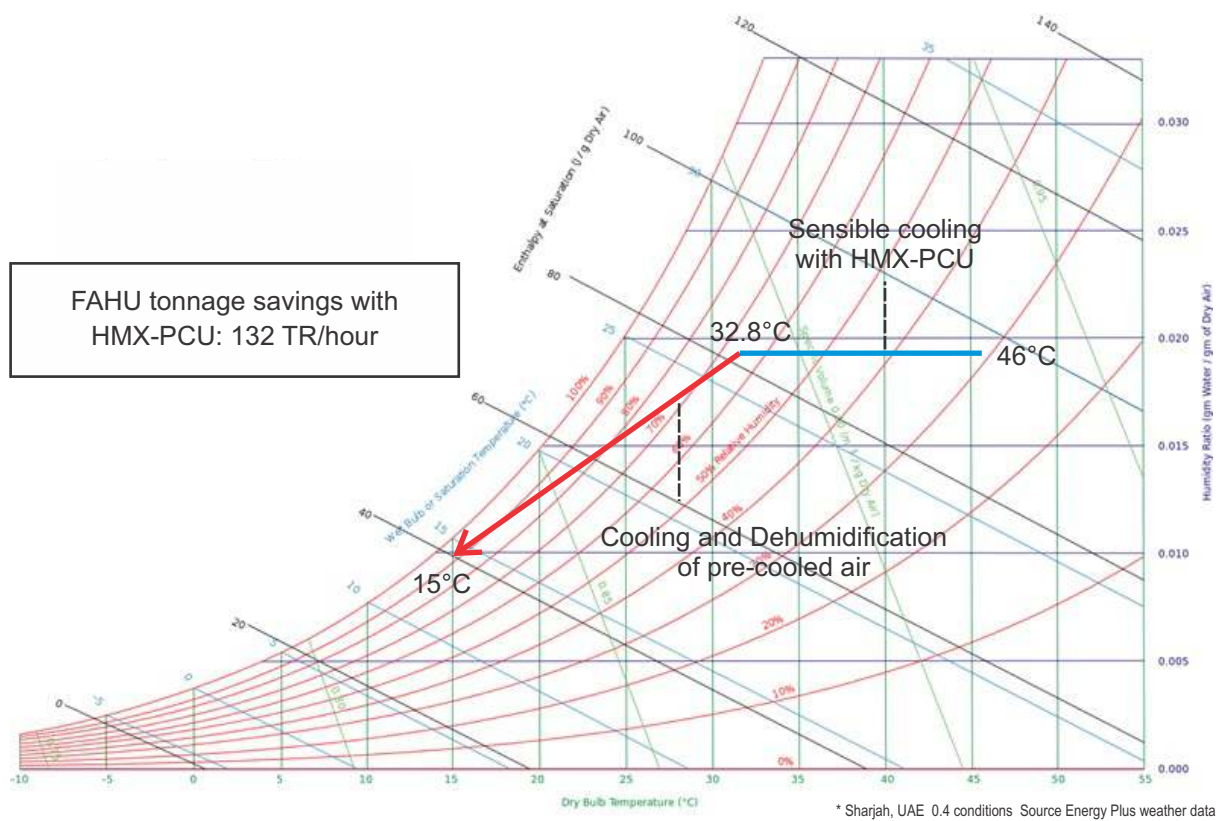
Solution

The Al Batha Group searched for a solution that would help maintain their desired requirements in terms of temperature and an appropriate fresh air quantity without significant capex or opex and with minimal alteration to their existing systems. This was when they approached HMX for a solution.

HMX retrofitted the two FAHUs with two HMX-PCUs of 30,000 CFM capacity each. The HMX-PCU is essentially an IEC-based (Indirect Evaporative Cooling) pre-cooling unit that cools the ambient air without the addition of any moisture. This is done with the help of water as the cooling media and without any dependency on the chiller system or on return air ducts.

The HMX-PCU has a clear advantage over other technologies; it provides a host of benefits such as:

- Low capital investment
- Smaller footprint
- Reduced energy consumption
- Elimination of return air ducting
- Zero cross contamination
- Minimal maintenance and
- Better life cycle



Psychrometric representation of cooling with HMX-PCU

Result

The HMX-PCU helped reduce the enormous load on the chillers that was used to treat the make-up fresh air. With considerable tonnage now freed up, the air conditioning system at Al Waha towers is efficiently cooling the common areas as desired.