

Remote measurement and control system

Improvement in comfort, commercial impact

Return on investment

Air curtains

50 % energy saving in a shop

As a result of new energy requirements, the need to reduce consumption in shopping environments has become a major issue. A study carried out at an Yves Rocher store on the Champs Elysées demonstrated the importance of combining different types of expertise in the control of consumption.

In 2009, 102 Champs Elysées Paris, which offers natural products became a real "plant workshop", marking a key stage in the remodelling of its visual identity.

The 172 m² shop on two levels is oriented towards the environment, and the priority of reducing our environmental footprint.

With an energy consumption of 972 kW per m² per year, the shop needed to improve its performance.

Some installations that were wrongly sized, or poorly maintained, were consuming more energy than was necessary and manual control did not enable any control over energy consumption. Temperatures were sometimes set as high as 30°C.

Given the interaction between the different air treatment installations, it was clear that a link had to be made between the different systems.

A diagnosis

The study of aeraulic flows around the main entrance of the Yves Rocher store showed the conjunction of two phenomena: free convection and pressure difference.

Due to the difference in density, hot air flows towards the outside via the upper part of the opening in the winter.

Cold air entering at the bottom of the opening represented a loss of 38 kW



The Champs Elysées store has reduced its consumption by half

for an opening of this size (ext. 5°C – int. 23°C): this is the convection. The pressure difference was created mainly by the use of a continuous mechanical ventilation system, and the (occasional) use of a delivery door. Altogether, 43 kW was required for the entrance.

The traditional air curtain that had been installed was not fulfilling its role: the divergent jet was not reaching the ground and its air flow was pushed towards the outside by the convection, resulting in the possible loss of a further 18 kW.

Remote measurement and control system

In order to control the systems and automate them, a remote measurement and control mechanism was installed.

It operates via a controller connected to four energy meters (general, air curtain, lighting, and air-conditioning), an interface for dialogue with the VRV (operating parameters and technical faults), relays allowing control of the main items, and the routing of technical alarms, particularly for the air

curtain: production fault and clogging of the filter.

Dialogue with the platform is via a GSM modem, using a secure protocol. The data is stored and processed to produce tables of electricity consumption associated with the outside temperature and curves of indoor temperatures (see opposite).

The Vigiebox[®] also sends 24/24 notifications of technical faults in real time so that they are treated as part of the maintenance contract.

A new air curtain system

The second corrective measure consisted in replacing the traditional air curtains with a more advanced system. The new air curtains automatically eliminate turbulence created by fans using downstream guide vanes.

The jet is convergent and rectilinear. Contrary to popular belief, varying the discharge speed of the air has drawbacks, and these models vary the thickness of the jet rather than its speed.

The automatic control algorithm separates the range of the jet and its power. In most traditional air curtains, a power level corresponds to a specific air flow, but in fact, these two parameters should be managed separately.

To effectively cover the entire area of the opening and deal with changes in weather conditions (the Champs Elysées is often windy), the new air curtain constantly calculates the strength of the convection effect (with the delta t°), and adjusts the thickness and air flow. The jet reaches the ground without using excessive power.

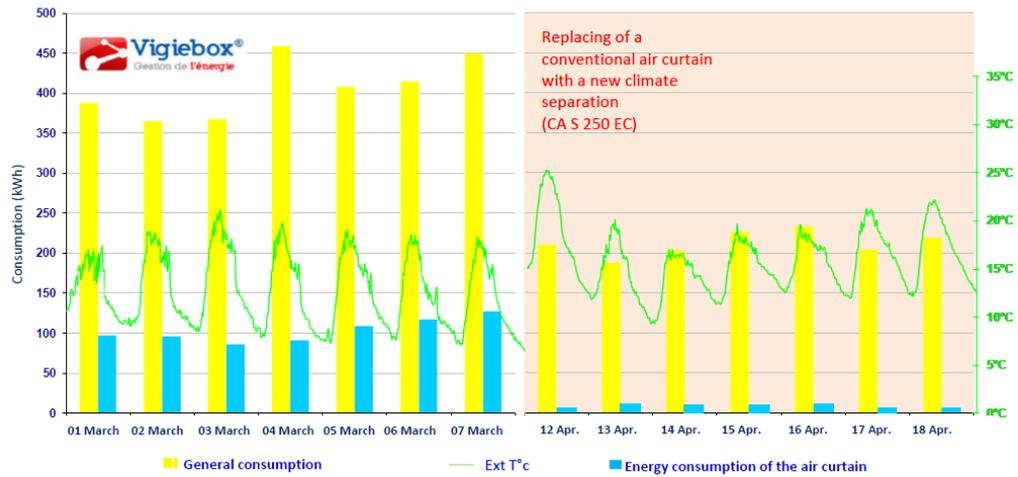
Energy performance

The impact of the automatic control is very significant in ensuring a maximum energy yield, on a permanent basis. Manual adjustment is among the most common causes of over consumption, and in the case of air curtains is practically impossible: one cannot keep assessing the ideal range to eliminate convection flows and changes in ventilation. The second factor is the calculation of the heating power that should be adapted precisely to requirements: for the Yves Rocher store in the Champs Elysées, consumption was reduced by 60,000 kWh, corresponding to 45% of the store's total consumption. Consumption without a curtain (or with an inefficient curtain) to maintain comfort was calculated to be 77,000 kWh per year, while current consumption (for the same level of comfort) is 17,000 kWh/year.

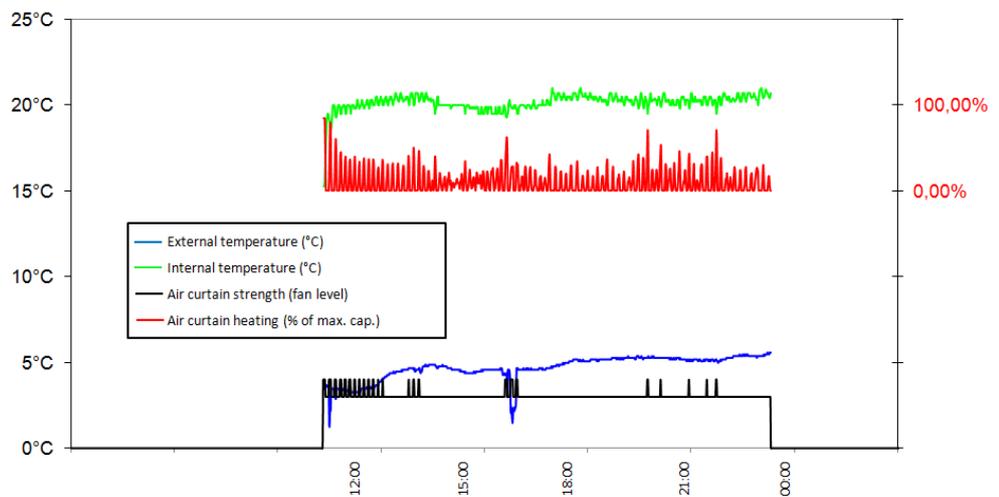
Regarding the installed CAS-250-EC air curtain, proportional control enabled consumption to be reduced by 75% compared to manual control. Not a single watt is supplied unnecessarily.

Improvement in comfort, commercial impact

The previous air curtain installation was only 50% operational. The doors were therefore partially closed and the desired indoor



Impact of the air curtain on energy consumption, measured by the Vigiebox



The air curtain automatically adapts the strength and temperature of the air stream to the changing conditions surrounding the doorway.

temperature was harder to reach.

These inconveniences had a direct impact on the numbers of shoppers, and resulted in a lowering of the temperature that was compensated for by the air-conditioning units.

After the corrective measures carried out on the store, the desired temperature was always reached and noise levels were reduced.

Return on investment

Remote measurement and control offer the advantages of being able to adjust the demand charge, reduce maintenance costs and reduce consumption by load shedding. The installation of a high performance air curtain enables elimination of losses to the outside

to be compared to the cost of investment (equipment + installation). For the air curtain (which also achieves the objective of maintaining a comfortable temperature), the cost of the investment will be recovered in 19 months.

The electricity bill will then be reduced by nearly 3,600 euro per year for the remaining 13 years of operation of the air curtain.

In this example the active supervision and installation of a controlled air curtain has enabled the energy consumption of this Yves Rocher store to be reduced by half. The brand is thus ahead of legislation and has reinforced its positioning in the organic and sustainable cosmetics market.