The Standard
Wednesday, December 18, 2019

COLD FACTS ON SAVING THE AIR

The mercury dipped early this month to the low teens and the humidity to below 60 percent.

In industrial and municipal buildings, there remains a need to control humidity in enclosed spaces, even during the deep winter.

For industrial purposes, low humidity is often required for production and storage purposes, such as for pharmaceuticals and lithium batteries.

In the case of hospitals, a high occupancy rate and human perspiration can quickly lead to increased humidity in wards, adding to the risks of bacterial or fungal growth and significantly affecting those patients with weak immune systems and other serious illnesses.

Obviously, reducing humidity through refrigeration is undesirable for the winter months.

The combined effects of cooling and drying make spaces too cold.

As Hong Kong has short winters, the practice of indoor heating, mainly done by duct heaters, is not common.

Even when installed and turned on for a few weeks in winter, heaters often emit odors as dirt and dust deposited on the heating elements throughout the year get burned by the heating coils.

An alternative way of controlling humidity without cooling by refrigeration is by desiccation.

In simple terms, a desiccant wheel is used for moisture transfer in an energy-efficient manner.

Most of us understand how a heat exchanger works, but in a moisture exchanger, silica gel is used to absorb excessive moisture, which is removed by electric or gas heating.

Towngas has developed an efficient desiccation system using gas heating.

Its efficiency compared to refrigeration makes it a good alternative, as reheating to attain a comfortable temperature is not required.

This system is now widely applied in hospitals, exhibition halls (which are left empty and idle some of the time), industrial buildings, food production plants, ice rinks and clinics. The direct drying process by gas flames has proven to be far more efficient, especially as refrigeration usually requires reheating to achieve an acceptable room temperature for occupants.

Speaking of efficient methods of heating, I would like to remind readers of the advantages of reverse-cycle air-conditioning. Conventional air-conditioning equipment feeds cooled air into rooms while extracting heat.

Machine efficiency dictates that machine losses, invariably converted to heat, are lost to the atmosphere.

The ingenuity of mechanical engineers helped devise a "reverse-cycle" air-conditioner plant, which feeds warm air indoors and extracts cooled air.

By feeding the heat generated due to machine loss back into the room, it converts the unavoidable inefficiency element of machine loss into effective use by heating up the room.

Air-con systems operating in a "reverse cycle" can actually achieve "more than 100 percent efficiency."

Engineers measure this gain via a "coefficient of performance," and it can magically achieve superior results, defeating the apparent natural phenomenon of physics.

For those who are technically-minded, the Second Law of Thermodynamics states that there is an inevitable loss of energy whenever machines are used.

This inefficiency turns into heat energy that is normally discharged outside, aggravating the undesirable effect of warming the atmosphere.

It is almost like pouring beer from a pint bottle and ending up overfilling the pint glass. Life has never been so good and rewarding!

Now who can say engineers do not help to save the environment?

Veteran engineer Edmund Leung Kwong-ho casts an expert eye over Hong Kong's iconic infrastructure