

Architects design to please and welcome passengers in high-volume airports. Sometimes implementing their ideas without breaking the bank is an engineering challenge.

As senior vice president for mechanical engineering at Syska Hennessey Group, the international consulting engineering firm, Lalit Mehta is often responsible for bringing architects' visions to life. "People think airports are cookie-cutter designs," Mehta said. "In reality, every airport is different; every terminal is unique."

Mehta heads Syska's airport group, with more than 25 full-time engineers. Their priority was always excellent design within local climate factors. Now, "Everyone wants both high performance and sustainability—sometimes even LEED certification," Mehta said. "We're seeking different approaches for greening airports." LEED certification is a program administered by the U.S. Green Building Council to encourage energy-efficient and sustainable building design.

Glass walls are a frequent architectural and esthetic choice at airports. "Passengers like to see the view on both the land and the air sides, and get a feeling of aircraft taking off and landing," Mehta said. However, glass has lower thermal transmittance value than solid insulated wall partitions, which are used less often. That's why glass transfers more energy and heat and solar load from the outside into the airport space. "The more glass you use, the more energy is required to cool and heat the space."

Syska sometimes selects materials that are unusual for airports. Its engineers were early users, for example, of "fritted" glass, which decreases solar energy entering the terminal through ceramic enamel embedded into the glass. "Controlling solar load is vital, with cooling one of the biggest energy use factors," Mehta noted. "Clients have to find our solutions practical and cost-effective now. Telling them about a long-term payback, on an investment like solar panels, doesn't sell well."

At Indianapolis International Airport, the Midfield Terminal has a 200-foot-diameter skylight heating the 60-foot-high space. Mehta's team realized that radiant floor cooling could lower the cooling load by one-third. "The difficulty is cooling the air throughout the entire, high-volume space while keeping a constant dew point temperature, to avoid moisture condensation above the floor. People could slip, so employees would have to mop the floors all day," Mehta said.

Could Mehta's team find an energy-saving way to cool the air and maintain the dew point? The team designed an unusual combination: a variable air volume system, light sensors, and a radiant floor system. Constant-volume

systems, pumping a steady air supply, waste energy: a space designed for 200 people always feels cooler when only 12 are there, or on overcast days when sunlight isn't entering.

According to Mehta, "Our highly sensitive, energy-saving variable air volume system automatically modulates the air supply, by responding to many factors. For example, it ramps up as the sun returns or occupancy rises or lighting levels brighten."

Light sensors help conserve energy by lowering the lighting while sun shines into a space. "Turning off a 60-watt lamp when it's not needed reduces energy use," Mehta said. In radiant floor cooling, "Sensible heat gain (or surface temperature) is controlled by using a hydraulic system and lowering the dew point. This

kind of air system takes away moisture-generating latent load." Removing moisture from the air and reducing the humidity level avoids condensation. Cooling the air controls both latent load and sensible heat gain.

This element was one phase of Syska's Midfield Terminal project, which earned LEED certification, as well as two awards from the American Council of Engineering Companies.

Current major projects involve LaGuardia Airport (Syska's first aviation client, in 1939) and Los Angeles Airport, already a California Construction Board Best of 2010 award winner.



Midfield Terminal, as pictured in an Airport Authority financial report: Radiant floor cooling saves energy in a 60-foot-high space.

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