

Technical Q&A: Staying Cool, Comfortable at the Gate

Q: How do you properly size preconditioned air (PCA) systems for aircraft gates?

A: PCA systems cool and heat aircraft parked at the gate and pre-cool/pre-heat the passenger boarding bridges for passenger comfort during loading and off-loading operations. A life cycle cost analysis study can identify the most economical option for each airport based on the number of gates, gate usage schedule, local utility rates, initial capital cost and terminal space availability.

For PCA equipment to be effective, it must be sized so that it can accommodate varying sizes of aircraft serviced at each gate during peak outdoor design temperatures.

To determine a system's size, designers:

- Consult gated flight schedules to see what types of planes each gate serves and when such planes arrive and depart.

- Obtain the maximum ambient design temperature for the airport's location, then calculate planes' conductive and solar load conditions.
- Identify the largest type of plane to be serviced at the gate when the ambient temperature is at its peak.
- Factor in heat gained when planes are full, have most of their electrical equipment operating and are absorbing heat (or cold) from the outside.

PCA systems cool outside air to a range of 30 to 35 degrees, to be pumped into each connected plane and passenger bridge. Such air comes in at relatively high pressure so that it can make its way through the plane's small supply air ductwork.

The maximum volume of supply air is the pounds per minute of outside air cooled to 30 degrees (leaving coil temperature) required to meet the aircraft cabin cooling load.

For more information, contact Janelle Burd, 816-822-3558.



Janelle Burd is a senior mechanical engineer in the Fueling Group at Burns & McDonnell.