Thermal Comfort & Energy Savings Achieved at Phoenix Distribution Center

Phoenix Distribution Center

Building Type:	Warehouse
Space Type:	Modular Office Space
Location:	Phoenix, AZ
Climate:	Zone 2B, Hot-Dry

Key Results

Comfort
Reduced hours above the 78°F setpoint by 25% to lower peak temperatures by 1.6°F

HVAC
Reduced daytime HVAC use by 17% and shifted cooling to overnight to decrease daily consumption

Performance
Delivered optimal performance without the need for costly AC equipment upgrades

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Project Overview

The Phoenix Distribution Center houses a modular office space located within a large, unconditioned warehouse. In the intense heat of Arizona, maintaining comfortable temperatures inside this enclosed office proved difficult for facility managers. Temperature moderation and thermal stability are critical in such environments to ensure occupant comfort, maintain productivity, and prevent excessive wear on mechanical cooling systems.

Challenge

The primary challenge was maintaining comfortable conditions through the hottest hours of the day within the constraints of the HVAC system's capacity. During peak summer days, the warehouse environment became exceptionally hot. The uninsulated office ceiling acted as a major conduit for heat gain, causing indoor office temperatures to frequently exceed 85°F and creating significant occupant comfort issues. The existing rooftop air conditioning unit ran at maximum capacity throughout the day but consistently failed to maintain the desired 78°F setpoint.

Front of Templok® Tile

Back of Templok® Tile

Solution

Facility operators resolved this issue by installing Ultima® Templok® ceiling tiles paired with R-19 fiberglass batt insulation. Templok ceilings incorporate Phase Change Material (PCM), which actively absorbs excess thermal energy as room temperatures rise and releases that energy as the environment cools. Facility managers established an overnight pre-cooling schedule to freeze the material during off-peak hours when the air conditioning system had surplus capacity. During the afternoon, the charged ceiling tiles absorbed the incoming heat from the warehouse. This process passively cooled the office space, addressed the dominant source of heat gain, and significantly reduced the daytime burden on the mechanical systems.

Templok ceilings reduced peak room temperatures and achieved effective load shifting, resulting in energy savings and greater temperature stability in comparison to standard acoustical celings ***(Figs. 1 & 2)***.

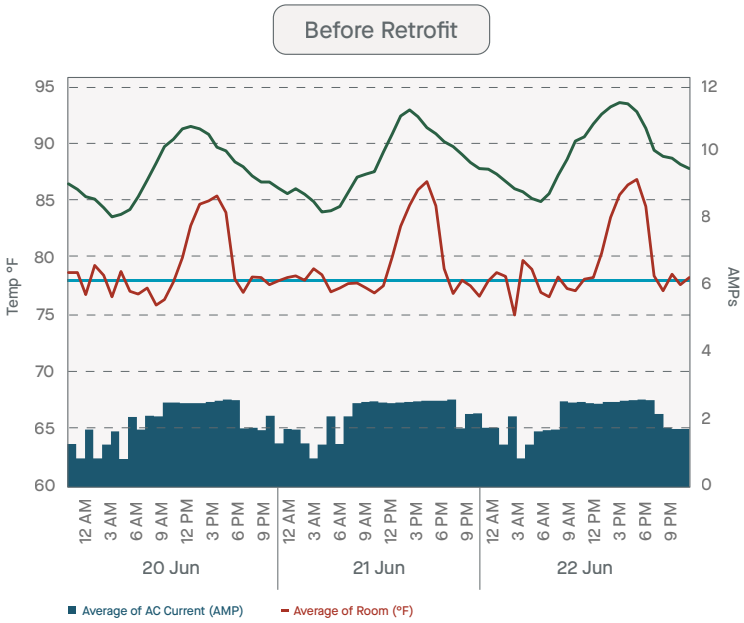

Fig. 1 Comparison of Temperatures and AC Use Trends Before Retrofit

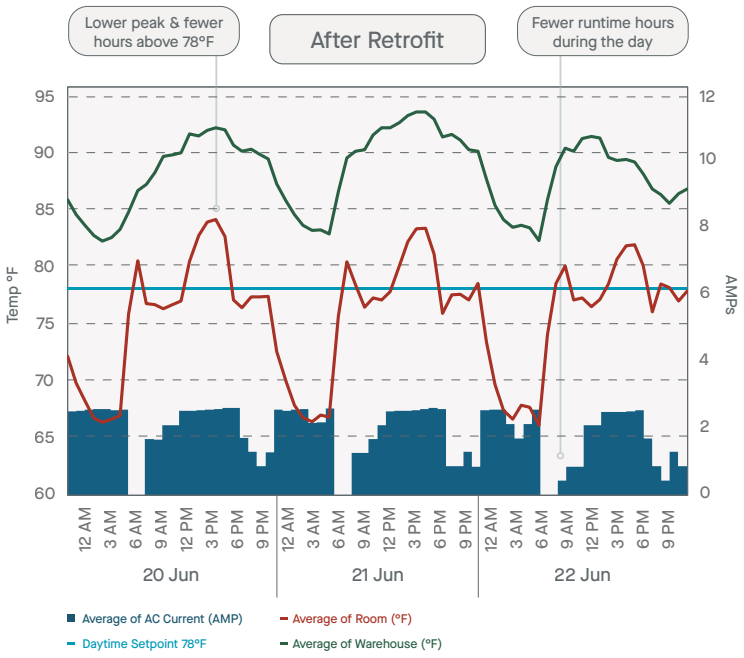

Fig. 2 Comparison of Temperatures and AC Use Trends After Retrofit

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A consistent reduction in hours above the 78°F setpoint across all temperature bins after the retrofit demonstrates improved thermal comfort ***(Fig. 3)***.

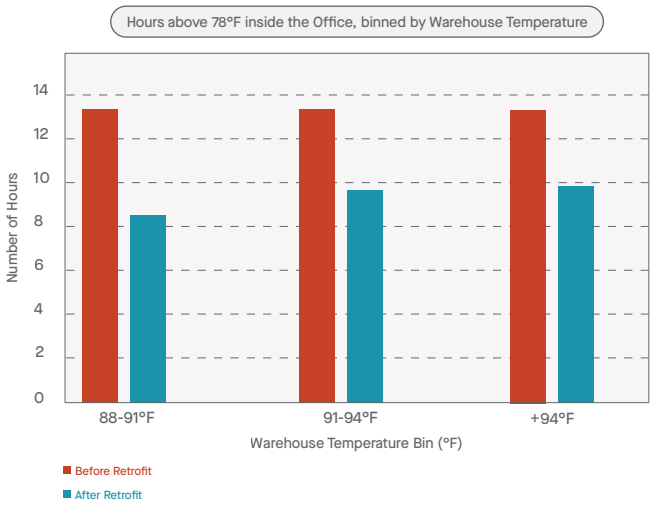

Fig. 3

At night, the PCM in Templok® panels freezes as temperature reaches the low 70s°F ***(Fig. 4)***.

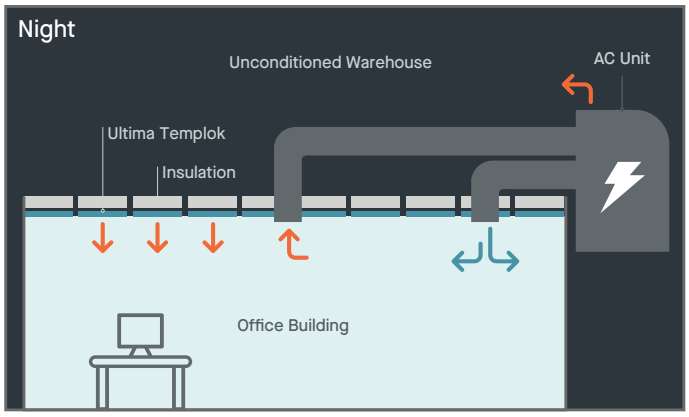

Fig. 4

During the day, the PCM absorbs heat as temperatures rise, blocking heat from flowing through the ceiling and passively cooling the space ***(Fig. 5)***.

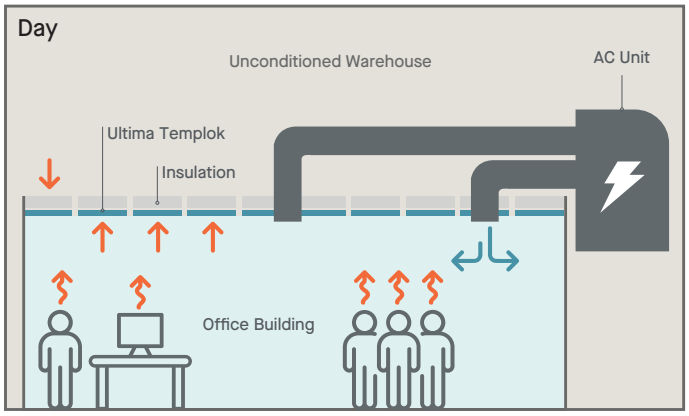

Fig. 5

For more information about Templok® Energy Saving Ceilings, visit **armstrong.com/templok**

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