HEAT PIPE TECHNOLOGY

CASE STUDY

Colleges & Universities

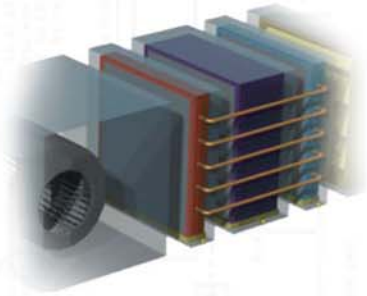
Utilizing Controllable Wrap-Around Heat Pipes to Enhance Chilled Beam Systems

THE PROBLEM

When a University in New England decided to build a new facility – intended to integrate three programs from three separate colleges within a single building - they opted for chilled beam systems in all their classrooms to reduce overall energy consumption. A Dedicated Outside Air System (DOAS) is utilized to deliver fresh air to all the chilled beams in these rooms. Chilled beams systems require drier air than more common "all-air" systems to avoid condensation on the beams. So the DOAS must cool enough to provide low dew point air while reheating that air to be supplied at a more comfortable temperature. But how could they achieve this while further reducing energy consumption?

THE SOLUTION

Dehumidification Heat Pipe Systems



HPT's Dehumidification Heat Pipes (DHP's) utilize the phase change of the working fluid to both precool the air before entering the cooling coil and reheat the air after the cooling coil using the recovered upstream heat that's "wrapped around" the cooling coil. This reduces the load on the coil, allowing more latent cooling to be done to achieve a more depressed dew point, while nearly eliminating the need for additional reheat. Adding control valves not only allows reheat temperature to be accurately controlled by staging circuits off and on as needed, but the DHP can be more appropriately sized to provide the desired amount of reheat over a broader range of entering air temperatures.

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THE RESULTS

The project was designed with a DOAS to provide 8,000 CFM of fresh air at 59°F dry bulb / 50°F dew point to all the chilled beams serving the 2nd floor classrooms. The DHP not only reduced cooling energy while helping the cooling coil drive down to that 50°F dew point, it redistributed that recovered heat to provide the desired 9°F of reheat, reducing the facility's reheating energy as well. That reheating energy reduction was enhanced by utilizing solenoid valves to essentially "oversize" the heat pipe to recover as much free reheat as possible more often. And because heat pipes require no power and minimal maintenance, the cost of operation is minimal as well.