# Expensive Leaky Valve Maintenance Eliminated by Replacing Radiant Panels with Therma-Fuser™ VAV

*ATLANTA, Georgia*—Leaking radiant panel valves had become an expensive maintenance problem for the Five Points Plaza building. Replacing the radiant ceiling system with a VAV system could solve that problem but the only available ductwork was the existing conditioned ventilation air system. The ductwork could not be enlarged due to structural constraints and as a result the VAV terminals had to be low pressure. Therma-Fuser™ VAV diffusers by Acutherm filled that need and in addition gave the building individual temperature control and a system with low maintenance.

*Five Points Plaza Building*

When the 17 story, 129,000 square foot Five Points Plaza building was built in 1962, it was a prestigious office building in the heart of downtown Atlanta, and was equipped with what was then considered a state of the art HVAC system. Floors one through seventeen were served by two centrifugal chillers, two hot water boilers, dual pumps for chilled, hot and condensed water, a central station air handling unit and a central return air fan—all located in a penthouse equipment room. A three-pipe hot and chilled water piping system fed heating and cooling radiant ceiling panels zoned with fourteen three-way control valves on each floor. The air handling unit supplied a constant volume of treated air through a vertical supply air duct with take-offs at each floor where it was distributed through light troffers to the occupied space. Return air was through the vertical shaft containing the supply air duct.

*The cost was within the budget and the operating and maintenance costs are meeting all expectations. The building is now 100% occupied and the tenants are happy.*

By 1996, the competition of the new and renovated construction in downtown Atlanta, together with low tenant occupancy, inefficient lighting, and the high maintenance cost of a deteriorating radiant panel heating and cooling system mandated a complete upgrade of the mechanical and electrical systems. Morris E. Harrison & Associates Inc., (MEH&A) Consulting Engineers, Norcross, GA were retained to determine how it could be done.

MEH&A found that all of the central station equipment was still service-able, but that the radiant ceiling panel system would have to be replaced. There could be enough static pressure in the last branch for a low pressure VAV terminal using the existing air ducts if the air handling unit and return air fans could be upgraded to provide an additional 15% capacity. The trunk ducts on each floor passed through sleeved openings in structural concrete beams extending to within six inches of the ceiling and could not be enlarged. A duct analysis showed

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that by increasing the static pressure in the main supply air riser, providing a pressure independence station (Acutherm static pressure controller and damper) at the duct take-off to each floor, and enlarging some of the diffuser branch ducts, the duct system would be able to provide design air in the last branch but only at a low pressure. At the same time, existing fan performance curves showed that fan capacities could be increased 15% by installing a larger premium efficiency motor. Fan static pressure control could be by the addition of variable frequency drives.

Low pressure Therma-Fuser thermally powered modular VAV diffusers by Acutherm offered the final solution. They also provided individual temperature control, adaptability for future tenant layouts and low maintenance—all prime design objectives. Therma-Fuser modules maintain temperature to within one and a half degrees of set point, because a built-in thermostat responds automatically to warmer or cooler room air, opening and closing damper blades as required. In addition, the units require no pneumatics or wiring, reducing considerably both the time and cost of installation. The unit is simply installed in the ceiling and connected to a run-out from the main duct.

*Morris E. Harrison of Morris E. Harrison & Associates*

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Existing radiant panels, valves, piping and light troffers were all removed. Fan motors were replaced and variable speed drives added. 320 model TB-C (cooling only) Therma-Fuser modules were installed in interior spaces and 352 model TF-HC (VAV heating/VAV cooling) Therma-Fuser modules with minimum flow stops were used in all perimeter spaces. Runouts to TF-HC units were provided with an electric duct heater controlled by a wall thermostat set approximately 4°F below the TF-HC cooling set point.

The system has now been in operation for almost three years. According to Mr. Daniel Brawley, Vice President in Charge of Operations for RB Management Services, Inc., there have been no service calls directed specifically to the performance of the Therma-Fuser diffusers since commissioning of the system.

Five Points Plaza is equipped with the first modular VAV system designed by MEH&A, installed in a Richard Bowers, Inc. building, managed by RB Management Services, Inc. All three report they are pleased with the results—especially because the cost was within the budget and the operating and maintenance costs are meeting all expectations. The building is now 100% occupied and the tenants are happy.

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