The facility personnel implemented these recommendations and are now saving 12.7% of their baseline energy usage every year

Pearson Engineering, LLC

14 Ellis Potter Ct.
Madison, WI 53711-2478

608.274.3339
Fax: 608.274.0373
www.pearsonengineering.com

Aurora Heil Center – Site Visit Notes
March 4, 2009
Brian Basken

1. Walked through the facility with Tom Hanson.
2. The main facility houses the main Aurora data center, main Laundry, and office spaces. The new wing contains a daycare on the lower level, offices on the second level, and conference center on the third floor.
3. 4000 amp service including lights in parking garage.
4. Approximately 1400 employees total at all three facilities:
    1. Forest Home = 650-700
    2. Corporate = 60-80
    3. Heil = 600
5. Second floor north and south are IS offices. They are occupied from 5:30 am through 6:00 pm. This area is served by VAV boxes.
6. Terminal device control in this building is pneumatic. VAV box reheat coils have 3-way control valves. Approx 50-75 pneumatic VAV boxes.
7. 200 ton air cooled Trane chiller provides cooling to the main facility, except the laundry and loading dock. JCI monitors, but can't control CHW setpoint. Chiller is turned on at 55°F outside air. The chiller enabled point was missing from the graphic. Chilled water setpoint is a fixed 43°F. Use both chilled water pumps when hot out, system has all 3-way control valves. System does not have enough capacity on very hot days. Approximately 50°F CHWR on mild days, 53°F CHWR on hot days.
8. AHU cooling coils have 3-way valves.
9. Three 1-million BTU HW boilers, with a 3-way mixing valve and pump, provide hot water to perimeter heat and reheat coils. Third boiler only on below 0°F outside air temperature.
10. According to original documents, HW reset is 210°F @ -10°F, and 160°F @ 65°F. Current values at 40°F OA is 163°F.
11. AHU-1 serves 1st floor north Helpdesk. AHU-2 serves 1st floor south Creative Services. AHU-5 serves the mail room and shop. AHU-6 serves the kitchen and dining. AHU-7 serves the print shop. AHU-9 serves second floor north. AHU-10 serve the second floor south.
12. AHUs discharge temperatures are not controlled per their original sequences.

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13. Datacenter
    1. Current load is 440 kW
    2. Approx. 10,000 sq ft total, with 7,000 sq ft of computers
    3. Twelve 20 ton Liebert traditional underfloor CRAC units in data center, 1 in surrounding offices, and 2 in the UPS room.
    4. Two glycol loops for CRAC units.
14. Only humidification is in the data center and in the printing area.
15. Printing area operates from 6:00am until 5:00 pm, Monday through Friday. This area has a separate AHU with humidifier and reheat.
16. First floor south is Creative Services. The TV studio has its own VAV box and this area is pre-cooled when not in use to account for it heating up quickly when occupied. First floor north is the helpdesk.
17. The laundry is approximately 49,000-50,000 square feet. Six make-up gas fired units. The laundry is generally under a severe negative pressure. OA dampers are sheet metal screwed open. Units have 3 stages of direct fired heat. Four large exhaust fans. Systems operate 24/7.
18. Cafeteria has separate AHU. Operates from 5:00 am until 7:30 pm.
19. Operate the unit heaters in the trash compactor at 50°F.
20. Loading dock lights could have a photocell. Alley lights could be on a separate switch. The back warehouse could have separate light switches for the upper and lower mezzanine that aren't used very often.
21. Ceiling fans in the loading dock would help to push the heat down to the floor during the winter and save energy.
22. The conference center was added on in 1994, and has 3 floors.
23. Two small hot water boilers provide heat to reheat coils and the perimeter radiant heating panels. Original documents show 210°F @ 0°F, 150°F @ 65°F. Current HW temperature is 173°F at 40°F OA.
24. Two big Trane RTUs, one for the 3rd floor and one for the 2nd floor. The first floor has two small AHUS, one serves the north area and one serves the south area. The supply ducts for these two RTUs are connected with a cross connect duct. Nobody is sure how and when this operates. These two systems don't appear to work in unison. At the time of my visit, one unit was at minimum outside air and full relief, and the other units was economizing and zero relief.

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25. VAV boxes on the second and third floor are DDC controlled. First floor is pneumatic or stand-alone electric.

26. The conference rooms are occupied from 7:00am until 8:00pm. Not sure about occupancy on the weekends.

27. Daycare – 5:30 am until Midnight, Monday through Sunday. 140-170 kids, 32 staff. 8-10 electric duct heaters in the baby sleeping areas.

28. VAV box sequence opens the perimeter radiant heat valves to 100% first, and then the reheat coil valve is allowed to open. This causes cold supply air to blow on people and causes discomfort. This sequence is causing discomfort and wasting energy. It can be improved. The perimeter radiant heat takes a long time to heat up a space. Ideally, the perimeter heat would be on a separate HW so the control valve could be eliminated and the water temperature controlled directly to the heat loss at the wall.

29. Short Term Recommendation Conference Center: An improvement to this VAV sequence is to operate the two valves in parallel during the winter, and only operate the reheat valve during the summer. This will reduce the amount of wasted heat in the summer when it is being added at the perimeter where it is not needed. This will also improve comfort.

30. Short Term Recommendation Conference Center: Because this building has a lot of feedback form the spaces, intelligent resets can be done. The system can easily see all of the damper and valve positions. The supply air temperature setpoint and static pressure setpoint can be reset by the VAV boxes that they serve. The hot water temperature setpoint should be directly reset from the valve positions of the reheat and perimeter heat.

31. Short Term Recommendation: Modify time of day schedules to match the actual operating hours of the space. Pay attention to unoccupied heating and cooling setpoints so these spaces don't get too far out of control.

32. Short Term Recommendation Main Building: Create a better reset schedule for discharge air temperature. This is a little difficult because there isn't any feedback from the VAV boxes. A combination of an outside air reset and time of day reset will save reheat and chilled water energy.

33. Short Term Recommendation Main Building: Lower the discharge static pressure setpoint. This will be a trial and error because the system does not have good feedback from the terminal devices.

34. Short Term Recommendation Main Building: See if it is possible to have the BAS control the chiller CHW setpoint. Right now, the staff needs to go on the roof to adjust the setpoint. There are many hours per year where the 43°F chilled water is too cold and is wasting energy.

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35. Medium Term Recommendation Main Building: The chilled water system efficiency can be improved by reducing the amount of bypass at each 3-way control valve. These 3-way valves are installed to protect the chiller by keeping the minimum flow above a point at which the evaporator would be damaged. If there are valves in the bypass ports of these 3-way valves, they should be throttle down a little bit to eliminate this bypass when the valve isn't fully open. This will increase the system delta T and may allow the second chilled water pump to be turned off when it gets really hot. We'd like trends setup on these valve positions to learn more about a "design cooling condition". It may be cost effective to get valves installed on the bypass ports on those AHUs that aren't at full cooling at design conditions.

36. Long Term Recommendation Main Building: Add a heat pump system to the data center glycol loops and use that heat to provide heat for the rest of the building. A payback calculation will need to be done to determine how much of this heat is able to be used economically. At the minimum, the amount of heat recovered would be equal to the summer reheat load and the boilers would be turned off during the summer.