

# K-12 KITCHEN EXHAUST AND MAKEUP AIR SYSTEM PROJECT USING INTEGRATED PROJECT DELIVERY

This month's Facility File is based on an existing K-12 school building that is receiving a new, energy-efficient kitchen hood exhaust system along with a new gas-fired makeup air unit. The Facility File is based on the B2B April test.

At the recommendation of the design team leader, the H&V consulting engineer, the building owner has chosen the project delivery method to be IPD (integrated project delivery). The method of project delivery is based on *ASHRAE 2015 — HVAC Applications Handbook* chapter 58 (Integrated Building Design). An IPD team meeting was coordinated with the city's building facility manager, school department representative, 3rd-party owner representative, 3rd-party commissioning and testing, adjusting, and balancing (CxTAB) consulting engineers, H&V consultant engineer, electrical and plumbing consulting engineers, a local utility company representative, H&V contractor's IPD project manager as the lead/prime contractor, and fire protection consulting engineer.

The team will review *2015 ASHRAE Handbook — HVAC Applications*, chapter 33 (Kitchen Ventilation), chapters 36 through 43 (Building Operation and Management), and chapter 59 (HVAC Security). This information combined with the owner's own knowledge of operating K-12 schools, and more specifically the cafeteria and kitchen within educational facilities, will assist the IPD team in understanding the intricacies of owning, operating, and managing this building.

With all these design guidelines from ASHRAE, the IPD team discussed specific building standards that need to be applied to this project, as well as project scheduling/timeline. For the facility operation, with in-house staff and not an outsourced group, the staff will want to assure there are adequate contract specification requirements included pertaining to O&M, training, preventive maintenance work order system, and energy operating budget.

In the Phase 3 Concept Development of the IPD project, the facility manager and a few of her O&M technicians will want to contribute information to the design team member's writing of the contract specification, and more specifically, to the following activities: service contracts, parts inventory, and as-built drawings requirements.

For this April B2B, the IPD team working together with the owner-designer-builder, based on a building program construction budget, the IPD estimator, along with the prime subcontractors, will be involved in the design phase and be able to contribute to the contract documents. In the construction phase, the O&M technicians will want to revisit the issues noted earlier that were in the design phase. Next comes the startup and commissioning phases, and the O&M staff (as well as the local utility company energy engineer) will want to be proactive in following along with

the IPD team's mechanical-electrical in-house coordinator and the subcontractor's startup personnel and receive equipment and system training using the O&M manuals and contract drawings (that will eventually become the as-built drawings). **ES**

Once the startup has been completed, the ATC subcontractor, owner representative, and CxTAB consultant will complete the air balancing of the new makeup air and exhaust air systems. The H&V subcontractor shall go through an automatic control system initial dry-run demonstration prior to his subcontractors demonstrating the system to the CxTAB consultant, utility engineer, and the O&M staff. The ATC subcontractor will also begin collecting system performance by trending pertinent H&V system and equipment data including the following:

- Outdoor air dry bulb and wet bulb temperature
- Space dry bulb and wet bulb temperature
- Space pressure
- Outdoor air quantity
- Exhaust air quantity
- Pressure differential from cafeteria to kitchen
- Alarms
- Offsite internet computer control interface

Taking the same approach as the design engineering, the facility manager's personnel will use a series of computer generated touchscreen project checklists that allows her staff to confirm that the following facility files have been collect. This process should start at the beginning of construction and not at project closeout, so that the facility files can be inputted into a CMMS system. Touchscreen O&M checklists should include:

- Equipment shop drawings
- Maintenance work orders
- O&M manuals, parts list, and lubricants
- Troubleshooting tips
- Remote monitoring instructions

The O&M staff should review the contractor-produced sheet metal field fabrication/field coordination drawings prior to fabrication. Touchscreen service checklists should include:

- Location of automatic dampers and volume dampers
- Filters
- Equipment and control devices
- Access for servicing equipment
- Access for cleaning exhaust ductwork

The training process should include specific H&V system ventilation and IC training, along with emergency plan training due to unexpected alarm (e.g., outdoor air quality alarm). An air balancing report will be completed and as-built conditions updated after the final TAB report. This will require the TAB subcontractor to provide the air balancing reports along with the associated system flow diagrams, noting quantities and pressures for rebalancing if necessary as part of the project closeout documents. Touchscreen training checklists should include:

- Equipment
- System startup and shutdown
- Fire suppression system
- Emergency plan
- Automatic controls
- Energy management



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