National TAB

SUMMARY

The purpose of this visit was to balance two new exhaust hoods and gain an understanding of the Restaurants HVAC system to inspect known & unknown issues that can be evaluated by the team for possible improvement. NTAB adjusted or made modifications to any asset during the visit that created immediate improvements toward a properly balanced restaurant. Please note the issues described below, as well as listed throughout the report.

This is an older Culvers location and has had some changes made to its HVAC system over the years. On arrival, the store building pressure was significantly negative (measured at -0.0287" W.C.). Tolerance for building pressure is +/- 0.02" W.C.. We evaluated each asset of the HVAC system to identify any means to correct this unbalanced condition.

Exhaust Hoods

Two new low profile exhaust hoods and their respective fans were installed at this store. Both hoods are designed for 1500 cubic feet/min (cfm) and were found to be exhausting significantly higher airflow than design (HD-1: 1836 cfm / HD-2: 1951 cfm). This high airflow was contributing to the stores' negative pressure. Both fans were slowed to within the design airflow (10% of design). Hood smoke capture was found to be 100% with the MAU off but was significantly impacted when the MAU was operating due to the MAU supply diffuser's location directly above cooking equipment. As described below, MAU diffusers were adjusted to improve hood capture.

MAU

The store has a make-up-air unit (MAU) that is conditioned (provides both heating and cooling) and serves 4 diffusers located along the cookline. These diffusers are positioned directly above the cooking equipment. Typically, the cookline diffusers are installed further back from the hoods to condition the air but not disrupt hood capture. This is also why perforated grilles and 2' straight necks are usually used on these diffusers (so air blows straight down and not at the hood). These diffusers are perforated but do not have the straight necks installed. As installed, the MAU diffusers were significantly impacting hood capture, specifically on the griddle. Because the MAU provides a significant portion of the kitchen supply airflow, we did not want to turn it off or slow it down. The diffusers directly above the cooking equipment were dampened down, with the diffuser above the griddle closed significantly. This slightly lowered the total MAU supply airflow, but greatly improved hood capture.

RTUs

This store has three Lennox rooftop units and all three have humidity control. The sensor wiring was verified. Typically, RTU supply airflow should fall between 350-400 cfm per ton for unit performance and efficiency.

RTU-1: RTU-1 is a 5-ton direct drive unit that serves the Kitchen and BOH. Supply airflow was initially measured at 1547 cfm. Two kitchen diffusers were found dampened shut, these were opened. The fan speed was increased, and total airflow was measured at 1927 cfm. The outside air damper was initially found set to 10% but was opened to 14% (308 cfm) in order to set a 15% ratio of OA to Supply airflow and bring building pressure positive.

RTU-2: RTU-2 is a 10-ton belt driven unit that serves six diffusers located in the serving counter area / drive-thru, and one diffuser on the cookline. Its airflow was measured at 3395 cfm and the motor is operating just below full load amperage (FLA), fan speed cannot be increased. This airflow is slightly below design. Its OA damper was initially found shut but was opened and set to a 20% OA to supply ratio to relieve negative building pressure. The

supply drop for this unit is in the middle of the kitchen but the unit serves diffusers at the customer serving counter, creating long duct runs. The return static pressure for the unit was slightly high and the unit is served by two 16" round returns. The dampers on these returns were verified open. Adding an additional return may relieve return pressure and increase supply airflow. Recommend consulting National Tab if any changes to the ductwork are made to improve supply airflow.

RTU-3: RTU-3 serves the Dining area and was initially measured at 4635 cfm. The motor was found overamping and was slowed to bring the motor below FLA. This put the total supply airflow at 4239 cfm. The OA damper was initially found shut and was opened to provide a 20% ratio of OA to supply airflow. The OA damper needed to be set to 47% in the prodigy board to open 1," suggesting it is not calibrated properly. The damper was recalibrated and responded correctly, but still does not seem to be opening to the proper position based on percentage. Regardless, the proper position was marked on the actuator with permanent marker and the damper is opening to the correct position.

Exhaust Fans

EF-1: EF-1 is a small ceiling fan located in the front mop closet. The fan was found to be operational.

PRV-1: PRV-1 serves the customer restrooms and was not operating on arrival. The belt was found damaged and the electrical disconnect turned off. A new belt was installed, and the fan runs but is spinning in the incorrect direction. Recommend rotation is corrected and the fan powered on. The building was balanced positive enough that once the fan is operational, it should not have a significant impact on the net pressure.

PRV-2 and PRV-3: These fans serve HD-1 and HD-2 respectively. They are installed properly, and airflow is at design. There is some significant grease staining surrounding PRV-2 but we assume this was caused by the previous fan as the new fan appears clean and the grease drain/trap is properly installed.

PRV-4: This fan serves the employee restroom and mechanical closet. It is a small direct drive fan and is exhausting a total of 82 cfm.

PRV-5: This fan serves the back mechanical room where the walk-in cooler is located. It operates based on a thermostat and activates when the room reaches a certain temperature. When the fan is activated, a louvre in the room opens to bring fresh air into the space and reduce the temperature. Once the thermostat is satisfied, the fan turns off and the louvre closes. When PRV-5 is operational, most often on warmer days, it pulls from the store space and causes the store to go negative. We recommend that the door to this room is kept shut so that when PRV-5 is activated, it only pulls from the louvre and not the store. This will prevent already treated air from being exhausted and prevent the store from becoming negatively pressurized and pulling untreated air into the store space.

Conclusion

The building's net pressure has drastically improved as a result of the balance. Reducing the hood exhaust airflow to design and bringing in the proper amount of outside air through the RTUs has brought the building from a severely negative state to a positive pressure of 0.007" W.C.. Changes to RTU airflow on RTU-1 and RTU-3 should also improve their performance and efficiency. We recommend the issues described and listed above are addressed to further improve the store's HVAC system.