System Neurology of a Kitchen Ventilation System

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Engineering Corner: Commercial Kitchens

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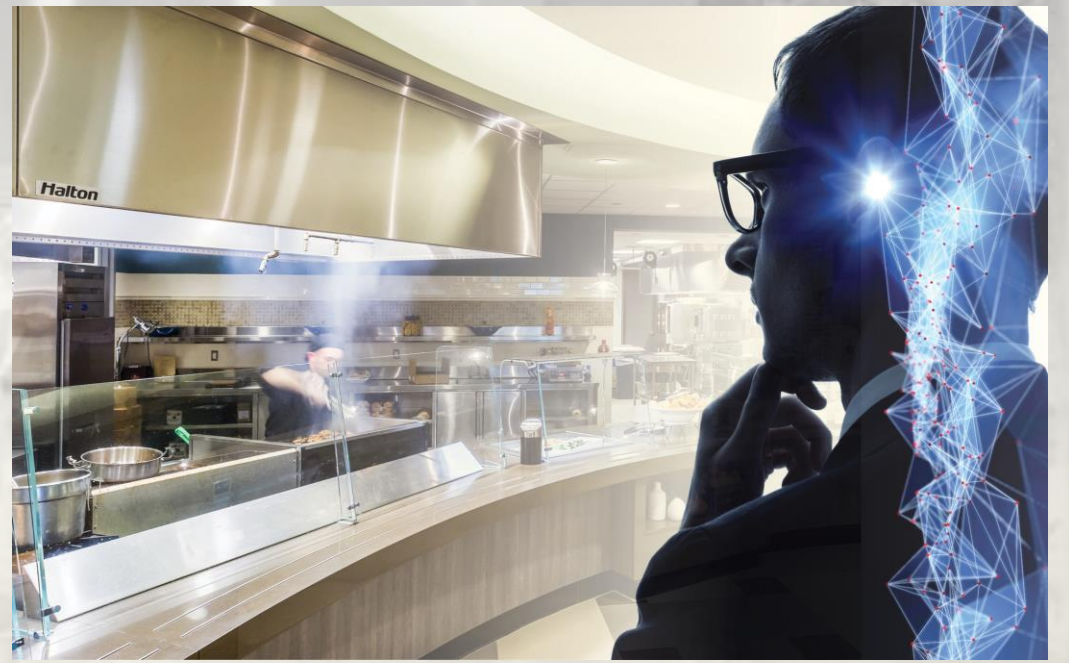
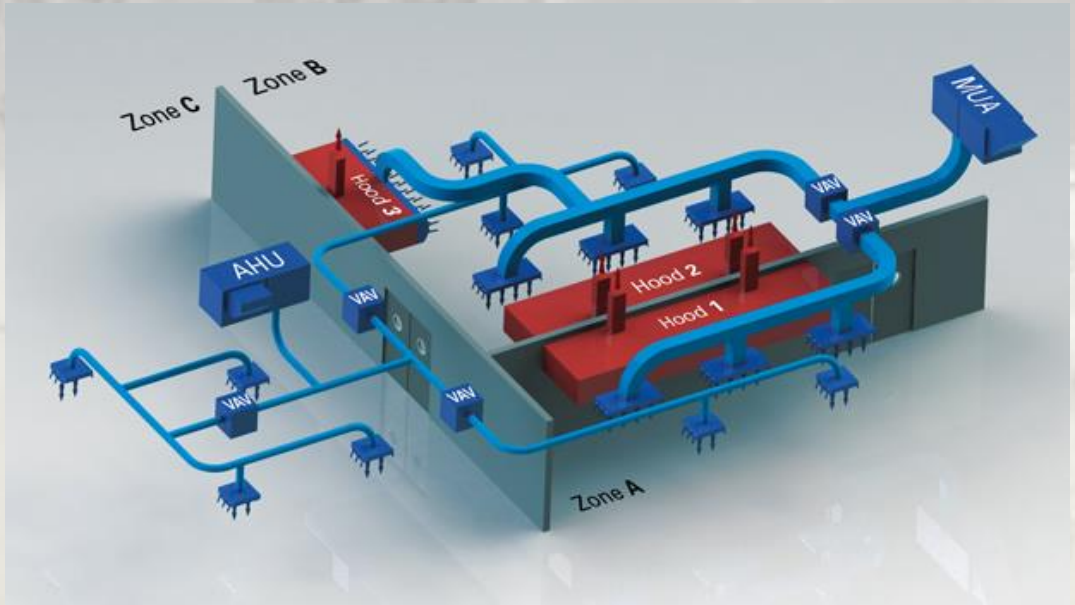
Setting the Stage

- Several components make up a commercial kitchen ventilation CKV system:
  - Hoods
  - Exhaust fan/Pollution Control Unit (PCU)
  - Make-up air fan
  - Fire suppression system
  - Demand control system
- Make-up air can have limitations on turndown (the amount of make up air that can be reduced)
  - Makes things interesting when looking at how to connect it all and make it work properly
- **Primary concern is “what controls everything?”**



When a Demand Control System is Present



- Demand control systems determine:
  - When cooking occurs
  - When there is not cooking
  - When exhaust cfm can be reduced because there isn't cooking, but there is heat.
- These systems often turn the fans on and off automatically
  - Dependent upon the status of cooking equipment
- These systems need to be "in control" of the operation
  - Ensures the IMC 507.1.1 interlocks with cooking appliances and properly directs the exhaust and make-up air volumes to maintain space balance
- Once you have a demand control system involved, expect that system to orchestrate the operations

When There is no Demand Control System Present

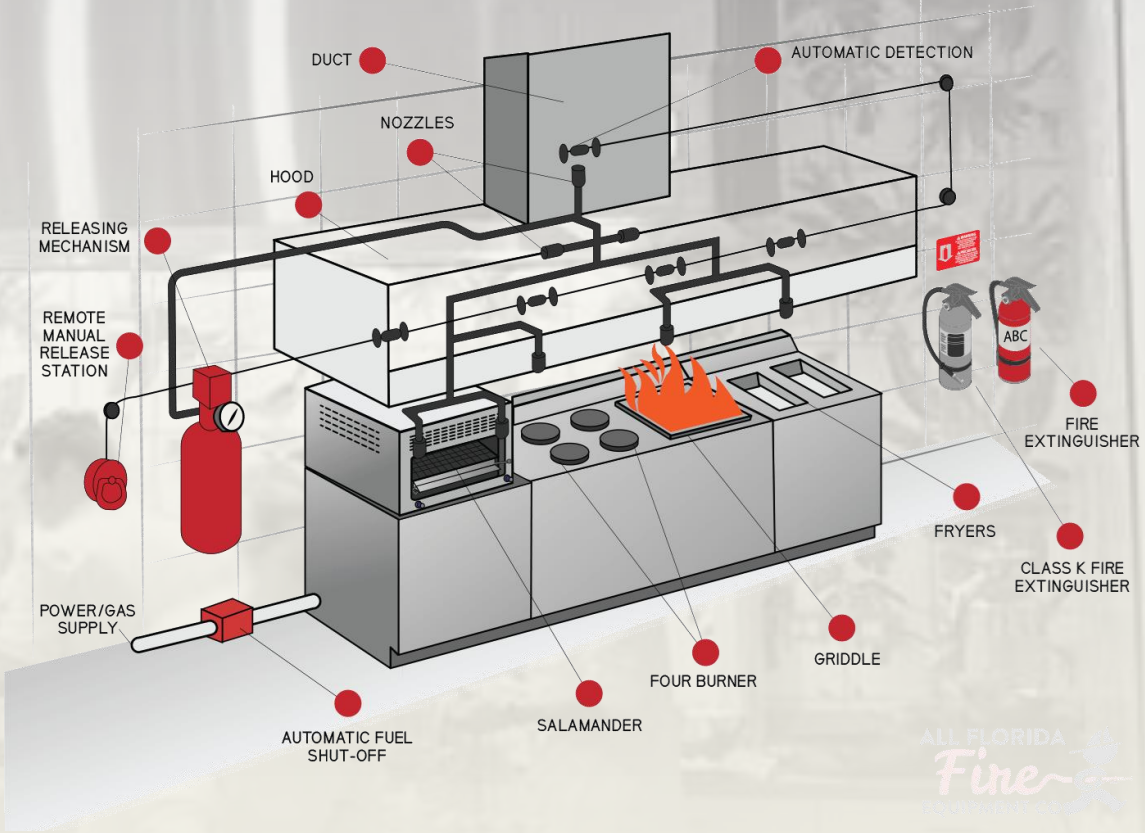
- Arrangement is more straightforward
- Hood system needs to be wired together for on-off operation
  - Hoods can have switches on them to activate a contactor/overload or VFD for exhaust fan, while simultaneously engaging the make up air
- To ensure make up air is “off” upon fire conditions, make up air can be wired through the fire suppression system to shut off make up air during a fire condition
  - Turning off make up air when the fire suppression discharges is a code requirement
- Hood can still contain sensors for an interlock with the appliances
  - Turns on exhaust fan automatically using two-position thermostatic switches
    - Seen by fan like another “fan switch” to turn system on upon encountering enough heat

The "Guardian Angel" of the System: Fire Suppression

- View the fire suppression system as the guardian angel of the commercial kitchen system
- Doesn't do anything most of the time until it's activated by a manual pull station or a fusible link in the hood melts (due to an appliance or duct fire)
- Once the fire system is activated, it takes over control of the ventilation system
- Typically, this means it wants the exhaust fan "on" the make-up air fan "off" and stays this way until things have stabilized and someone can come in to reset it

Fire Suppression in a Demand Control System

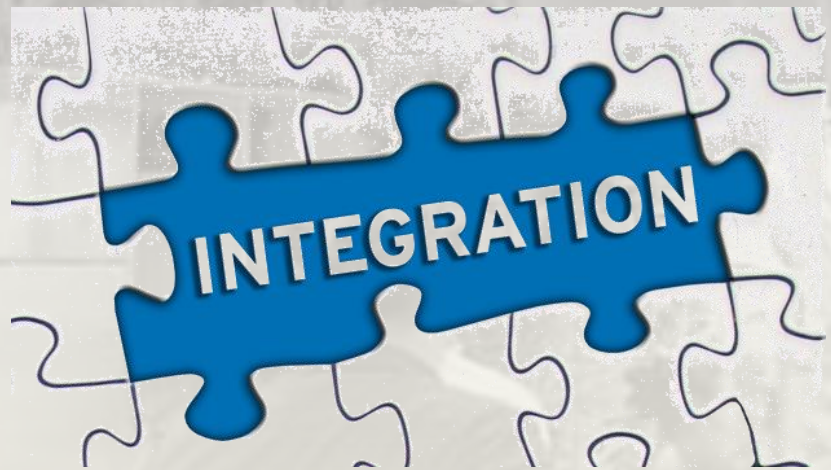
- The main controller for demand control system would need to tie to the fire suppression
  - Knows when to command the fans if there is a fire
- If there is a pollution control unit or hoods that require wash-down
  - It has to be coordinated so that the fan doesn't run during a fire
- Variables needed to be plugged into the demand control system:
  - PCU's, often have a "dry out" period, which the system needs to command the fan "on" for
  - Possible that make up air unit cannot turn down below a certain speed, due to the limitations of its heating section or cooling section



Demand Control Systems: Much More than Kitchen Exhausts

- Demand control systems can do much more than kitchen airflow adjustments
- These systems are advanced enough to handle other tasks/help with other ventilation goals within a space
- Example: A large dining space that can be used for a meeting space when food isn't being served
  - If more ventilation air is brought into the space, there may be a general exhaust fan to maintain pressure in the space
  - That general exhaust fan can be removed, and the hoods, with their fans, can be commanded "on" by the BMS to do that work
- Example: CO2 monitoring required
  - These systems can be connected to handle that
- Even more far-fetched items, like monitoring the temperature of a walk-in cooler – or even whether the door to the cooler is open or closed – can be handled by the more advanced systems

Closing Remarks



- Demand control system needs to be the component in control of the commercial kitchen system
- Integrate smoothly with all the other components, as long as it's designed from the outset
- Recommended that the demand control system is in the mechanical package, where those integrations happen commonly
  - The coordination will save a lot of headaches during installation
- Recommended to utilize components from the same manufacturer with all parts of the system for seamless integration
  - As an example, PCU's and demand control systems from different manufacturers provide for challenging wiring solutions to allow each of them to know what the other is trying to do
- Finally, some simple wiring and components can provide a system that works adequately for an on-off operation when there isn't a demand control system

Contact the Experts

- Learn more about Halton Group's M.A.R.V.E.L. Demand Control Ventilation Solution along with their complete commercial kitchen line by going to http://www.technicalair.com/halton
- Contact the Technical Air Systems' Sales Engineering Team at 973-285-0333 or by email at solutions@technicalair.com
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