Closing the Gap 8

New Products relating to Commercial Kitchen Ventilation

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This month we are going to examine three products. They are Melink Corp's Intelli-hood[tm] Operator, Avtec Industries InVent[tm] hood, and finally Safe-T-Net[tm].

Commercial kitchen ventilation (CKV) remains one of the most expensive components of any food service operation. Ineffective systems are not only wasteful, but also dangerous. For these reasons two new products herald a new age of CKV, where systems are designed to match both the application, and the operators variable loading and menu.

Intelli-hood[tm]

Steve Melink, President and founder of Melink Corporation is a professional engineer and began his business by providing CKV balancing services to multi-unit operators. Today, Melink Corp. is the industry leader of new technology based controls for CKV systems. In past articles, we exposed the lack of correlation between UMC, BOCA and SBCCI exhaust volume formulas and the thermal processes that they are intended to accommodate. By having codes based upon arbitrary standards, inspectors who are not themselves engineers or even very familiar with this specialty field often say NO to permit requests which do not exactly conform to their interpretation of what is written in the code. Steve Melink and his company have designed, developed, tested and brought to market a package of controls that make optimizing CKV automatic.

Their Intelli-hood Operator is the brain or processor for commercial kitchen ventilation systems. Two types of data are acquired and analyzed by the system which will then vary the exhaust and make up air (MUA) rates automatically, to optimize the system. Temperature data is acquired by a sensor in the duct collar, and smoke is "observed" by an optical emitter and receiver installed on both ends of the hood. A unique air purging system is provided to assure that the optics do not themselves get coated with grease. When a piece of cooking equipment is fired up or energized, thermals rise off of the equipment. The *Operator* responds to the increase in heat by ramping up the exhaust fan, which is outfitted by a GE Fugi Electric AF 300 variable frequency drive. Whatever happens to the exhaust rate also happens to the make-up-air (MUA) rate, thereby keeping the space in balance. The fans will continue to operate at a rate adequate to capture the thermal as it grows in volume and velocity. When smoke is generated from the different cooking processes, it is sensed by the optics installed on the ends of the hood and the fan ramps up to full speed. Once at full design speed, then duct transport velocities will run between 1500-2500FPM, complying with UMC 2002. The *Intelli-Hood Operator* can communicate directly to an existing EMS system at whatever voltage is required, which enables engineers to take advantage of variable air volume controllers (VAV's) and other HVAC methods. A single Intelli-hood controller can accommodate up to (4) hoods. Included with the Melink sales materials is a paper titled: **Estimating the Energy-Saving Benefit of Reduced-Flow and/or Multi-Speed Commercial Kitchen Ventilation Systems**. This engineering white paper is authored by Donald Fisher, PE and president of Fisher-Nickel, Inc., (consulting PE's, ASHRAE SP 154 Tech committee), Ferdinand Schmidt an engineer at Architectural Energy Corp., and Anthony Spata, PE, building systems engineer for McDonalds Corporation. The savings that they document for the use of such systems is enormous, and varies based upon your design climate, cooking equipment, menu and loads. The paper also introduces a fantastic new public domain engineering tool that they call the Outdoor Air Load Calculator, or OALC. With this tool, an engineer can quantify energy savings associated with using a CKV solution with rates that vary with need.

There are some other big savings with this system as well. Among them is reduced noise in the kitchen. Fixed speed fans that are moving UMC based air volumes create a steady background noise in the kitchen.

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Furthermore, these wasteful volumes create unwanted turbulence in the space which complicates maintaining safe food holding temperatures. UMC and other model codes also speak to duct velocity requirements. Melink has documentation from the various code writing bodies that discuss the fact that so far as the code is concerned, these velocities only need to be met when food is actually being cooked and grease ladened vapors are being produced. During idle times, or heat up, there are no minimum requirements for duct transport velocities, thus ventilating just enough to capture the thermal plume and make up only so much as is being exhausted leads to some dramatic efficiencies. The Intelli-hood system optimizes kitchen comfort, fire safety, occupant health and energy efficiency. If the kitchen is warm but the outside air is cool, the system will use the outside air to cool the kitchen instead of air conditioned air. In addition, this is the first CKV system that can anticipate a fire. Since there is a sensor in the duct measuring exhaust temperatures, temperature spikes that are "out of range" can be enunciated with an alarm, and also shut off gas and electricity to the cooking equipment before the fire even begins. Melink also offers a (optional) CO2 sensor that can be integrated into the Operator to increase ventilation rates if CO2 levels build due to occupancy. This product will be of particular interest to engineers and operators when faced with high temperature cooking operations that are installed in the colder design climates. The hotter the cooking temps and the colder the design climates, the quicker the payback and the greater the savings. Fishers report also documents substantial savings for installations in Florida, where the cooking temperatures, menu and loading led to substantial reductions in cooling loads.

InVent[tm]

Developed by AVTEC Industries (a division of Randell Manufacturing, a Dover Industries Company), the InVent[tm] is among the first of a new generation of UL 710 hoods. What is new is that the hood was designed for a specific piece of equipment that is intended for a specific menu. The hood does not look like a hood, but rather it appears to be part of the double deck conveyor pizza oven. Various Stainless Steel panels are assembled like a jig-saw puzzle. This system introduced the industry to two new patented design features. The first is the detachable duct connection and the second is a static port at the duct collar. Since the conveyor oven is on casters, it was necessary to develop a means by which one could separate the duct from the hood for cleaning of both and major servicing of the ovens. The pressure port is necessary in order to properly balance the system.

Since the InVent was tested with untempered Make Up Air (MUA), it is necessary to very accurately balance both MUA and exhaust while the unit is in operation. The MUA is flushed along all of the hot oven surfaces which picks up heat that would have otherwise been lost to the space. The ovens fan motors also heat the air surrounding them, which is also swept along to the rear of the oven where it mixes with some ambient room air and then is mixed with burner gases and grease ladened air from the cooking chamber which first is pulled through a series of UL listed, removeable grease filters (on either end). The total volume of air is then exhausted from the kitchen. Pizza

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operations that have installed this new generation of hood laud the dramatic improvement in comfort in the kitchen, the decrease in turbulence, and also the silent operation of the system.
I had personal experience with this system this past winter as I was hired to assist with acquiring permits for installation of this product with a number of local municipalities. The Invent was clad to a Blodgett[tm] model AB2B double deck, high volume natural gas fired pizza oven . At first glance, some might consider this a "short-circuit" hood. But since the MUA is never mixed directly with exhaust air, it is not. Furthermore, we were able to document a 110º F rise between the MUA temperature and the exhaust air temperature, regardless of the MUA temp. We took both volume and temperature readings when the outside air temperature was 0º F and again when it was 20º F. The exhaust air temp was 110º F and 130º F respectively. If we were to temper the MUA prior to getting to the unit, all of that added heat would be wasted and go right up the stack. Furthermore, fire suppression in the duct is not required. Uniform Fire Code sec. 10.513 lists those equipment items specifically requiring such fire suppression, and UMC sec. 2003(g)4 specifically excludes Pizza ovens. Finally, a fundamental scientific research study, titled the *Identification and Characterization of Effluents from Various Cooking Processes* (AHSRAE 745-RP phase II) has PROVEN that gas fired pizza ovens produce less VOC's and grease ladened vapors than almost all other types of commercial cooking processes (short of steam jacketed kettles).

Expect to see more ventilation solutions like this in the future, where the solution is specific to the equipment and the process, and the energy savings enable compliance with the (yet to be enacted) national energy code.

Safe-T-Net[tm] .

The industry has been looking for a system like this one since the FDA created their first draft of the FDA food code (1993). Many companies can provide temperature alarms that are hardwired to sensors in refrigerators, walk-ins and hot food tables. But how many of those systems continuously log each of those data points with a computer GUI interface (your browser) and real-time local and remote signaling? Of those systems, how many include a third party data validation with monthly exception reporting and other verification services? Only one that we are aware of, and it is **Safe-T-Net[tm]** , from Johnson Diversified Products, Inc.

The overall system consists of four primary components, each of which can be unbundled, and provided separately The critical component of **Safe-T-Net[tm]** is the third party data validation service listed below. The components are:

1. An energy management controller (existing EMS controllers can often be used)
2. The right sensors (appropriate to the application, eg, thermocouples, iR, sensors)
3. Third party data warehouse with data validation and verification services
4. Installation

This system represents the first of the due diligence technology based automations for permit holders for food operations. Once you have an EMS module in the kitchen or the building, the sky is the limit. Building energy management systems have been the rage for controlling HVAC and other systems in commercial buildings for a number of years. As technology has advanced, EMS controllers have become "smarter". This technology is the neural backbone of the Safe-T-Net system. The focus of Safe-T-Net is simple...to support food service Permit Holders by providing rock solid temperature data from NIST traceable sensors. Data is taken directly form the EMS module, before it lands on the operators software which will enable the third party defend the integrity of stored data following rules of evidence.

Installation of sensors in existing equipment must be done with care, given the ANSI NSF Std 2 listing of the equipment, which relates to its cleanability. For example a sensor installed in a reach-in refrigerator would be installed in that area of the box most likely to have temperature abuse (by the door, up high). The leads

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from the sensor would have to be routed up to the top of the box (top mounted compressor) and then provided with a cap (plug) and matching receptacle so that it could be disconnected when the piece is moved. Ultimately, manufacturers will make provisions for this. In fact, some are already providing LCD displays and alarms on their units. Some manufacturers are already playing around with open design sensors that will enable stripping real time temp data off of the unit. Hot food tables provided another challenge, as it is the surface of the food that is most likely to suffer temperature abuse. Thus iR sensors are located above each individual food pan. Before long Safe-t-Net will be able to provide LCD and LED panels that will advertise the temperature that they log to re-assure consumer's of food temperatures before they purchase.

As usual, if you need any additional information on any of the technologies or systems described, please respond to tomj@jdpinc.com, or, (800)676-8488, ext 101