PARAGON HVAC

CAPTIVEAIRE'S SUPERIOR HVAC SOLUTION

CASE STUDY APPLICATION

FRESH AIR RESTAURANT SYSTEM

PRODUCT SPOTLIGHT

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CaptiveAire's Fresh Air Restaurant System (FARS) is the concept of a holistic Kitchen Ventilation System (KVS) for perfect Indoor Air Quality (IAQ) and comfort. This is achieved through integrated control of all airflow in the space. Exhaust rates are safely lowered to an absolute minimum with precise control of building balance (pressure), supply air velocities, and supply air temperature. Less exhaust means less outside air (OA) needs to be introduced and conditioned to replace it. Positive building pressure ensures that all OA enters the building through a Paragon RTU for proper filtration and conditioning. FARS also simplifies building design by avoiding the use of dedicated make-up air units, saving construction costs. The result is a simple, efficient design that delivers perfect IAQ and comfort.

This case study compares equipment operation data from Aug. through Oct. 2020 for twin fast casual dining franchisees. One utilizes FARS, the other traditional KVS. The conclusions reveal the Fresh Air Restaurant System as the new KVS design standard.

Perfect Indoor Air Quality (IAQ)

FARS delivered perfect IAQ throughout the analysis period. The IAQ comparison on page 2 shows vastly superior control of space conditions, exceeding traditional KVS. The improvement stemmed from Paragon HVAC's modulating components (i.e., compressor and hot gas reheat).

Minimized Exhaust (And Supply) Rates

FARS lowered exhaust rates, meaning less outside air introduction was needed to maintain building balance and health. Return (recirculated) air was also minimized since Paragon HVAC can efficiently handle up to 100% fresh OA. Therefore, the design reduced the total supply air (mix of outside and return air) by 36%, which resulted in less energy needed to move and condition the air and lower ductwork costs at construction.

Reduced Equipment Cycling Through Paragon HVAC

Because of Paragon HVAC's modulation capabilities, precise performance can be maintained. In contrast, traditional equipment runs at fixed performance levels and cycles (turns on and off) the compressor in order to satisfy conditioning needs. Cycling adds wear-and-tear, shortening the compressor's life. Equipment also supplies unconditioned air (without heating, cooling, or dehumidification) to the space at times when the compressor cycles "off". FARS lowered compressor cycling by 80% and unconditioned supply runtime by 66%.

User-Friendly, Integrated Control and Monitoring of Equipment Through Caslink

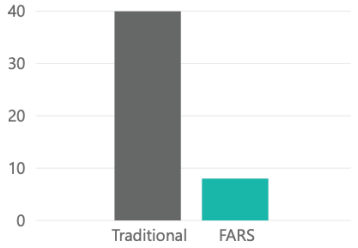
Traditional KVS without integrated scheduling and controls often results in disjointed system components. CASLink, CaptiveAire's proprietary Building Management System, integrated all FARS equipment. As a result, FARS eliminated all negative building pressure periods (40 minutes per day) from independent exhaust runtime and reduced costly independent HVAC runtime by 67%.

Conclusion

The comparison demonstrated that the Fresh Air Restaurant System delivers perfect IAQ for clean, comfortable spaces in an efficient, user-friendly way. Learn more at CaptiveAire.com/FARS.

Unconditioned Supply Runtime
(hours per day, per unit)

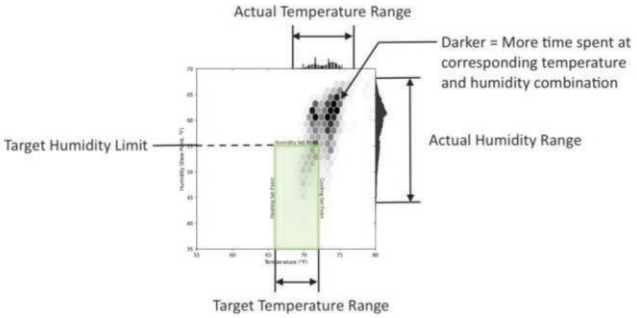
Compressor Activations
(hours per day, per unit)



Independent HVAC Runtime
(hours per day, per unit)

IAQ Comparison (August – October 2020)

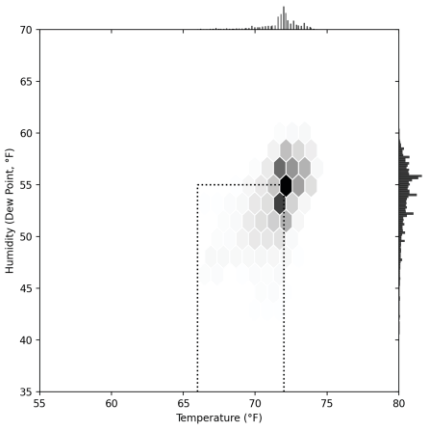
The plots below summarize space conditions of distinct areas of the restaurants from Aug. through Oct. 2020. Space comfort is determined by the temperature (horizontal) and humidity (vertical) combination at any given time. The plot indicates the time spent at different comfort levels by grayscale color (i.e., darker = more time spent at comfort level). Narrow ranges demonstrate precision. Proximity to the target set point box indicates comfort.



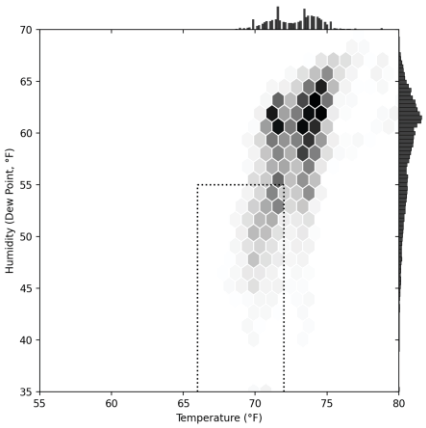
Fresh Air Restaurant System

Traditional System

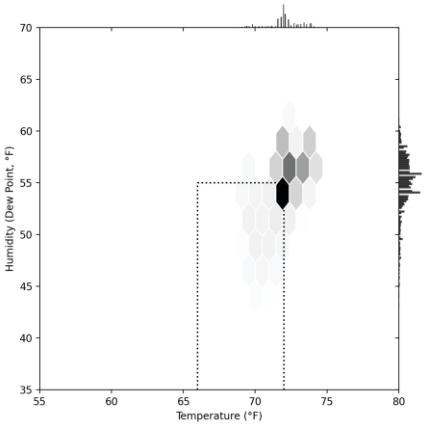
Dining Area



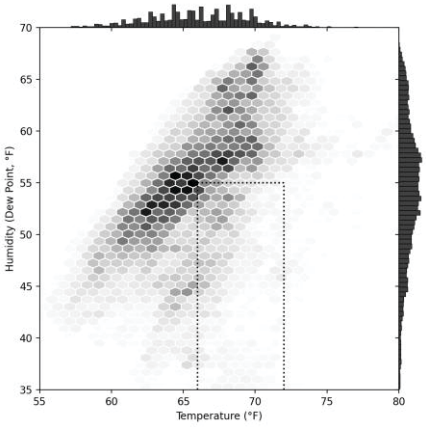
Dining Area



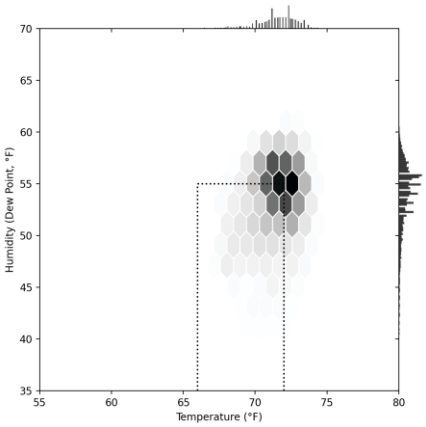
Kitchen Area



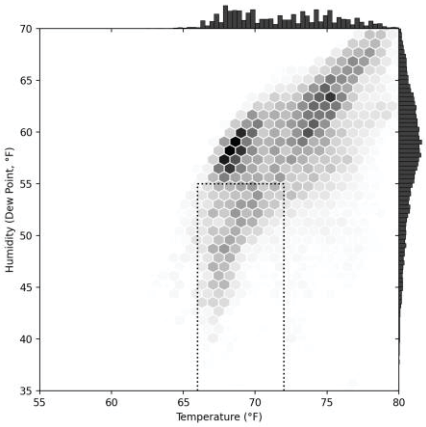
Kitchen Area



Hood Area



Hood Area



COMPARE CONSISTENCY ACROSS AREAS

COMPARE PRECISION ACROSS LOCATIONS

FARS is **comfortable**. Notice how the darkest shaded region of each FARS plot is precisely on the corner of the dotted box (box represents target set points), indicating the space is always comfortable. The darkest shaded region of each traditional plot is far away from the set points. Above the box is too humid while left/right is too cold/hot.

FARS is **precise**. Notice the width and height of the shaded region on each FARS plot compared to the corresponding traditional plot. Narrow width and height indicate minimal fluctuation in the temperature and humidity over time. Sprawling shaded areas indicate significant comfort fluctuation.

FARS is **consistent**. Notice how the shaded region in each area compares to other areas at the same location. If you overlay the FARS plots, they almost perfectly overlap, indicating consistent comfort throughout the building. If you overlay the traditional plots, there's little overlap and therefore inconsistent comfort.t