



Auto Dealer's HVAC Design may Change Future Auto Service Center Aesthetics/IAQ



Revolutionary design using fabric duct air dispersement and 32 exhaust fans create superior employee and customer air comfort.

PHOENIX – It's uncertain whether the new 149,000-square-foot Bill Luke Chrysler, Jeep, & Dodge Service Center might be the largest in the country, but one thing is for sure, the service department's state-of-the-art indoor air quality (IAQ) for employees and customers is second to none.

up the facility's interiors with over 100 vintage oil and automobile brand signs. Implementing Luke's solution took some innovative design from the engineering department of Tri-City Mechanical, a Chandler, Ariz.-based mechanical contractor and one of 12 founding members of publicly-traded Comfort Systems USA.



After touring 40 southwest car dealer service buildings prior to constructing the \$9 million facility, President, Don Luke, knew exactly what he didn't want. "After just a short visit to some service departments

The superior air quality may be subliminal, but what stands out is the absence of tailpipe exhaust hoses and metal ductwork littering the ceiling. In quest of a clean, neat, and high-tech appearance, the Tri-City Mechanical engineering team used lightweight, cost-saving and aesthetic fabric ductwork by DuctSox, Dubuque, Iowa; and 32 two-speed Breidert, Jacksonville, Fla., wall exhaust fans; and efficient cost-saving evaporative coolers by United Metal Products, Tempe, Ariz.

Even though Tri-City Mechanical operates a 51,000- square-foot sheet metal shop with spiral metal duct fabrication capabilities, the design/build contractor still specified fabric duct. Using fabric air dispersion, which requires smaller installing crews and less man-hours to install, saved the project over \$15,000 in labor costs versus round metal duct. "As a contractor you want to keep your sheet metal shop working, but not at the expense of a client when something like fabric duct can save them money," said Steve Mullins, director of preconstruction services, who has specified fabric duct for several other past Tri-City projects.

we either had a headache or our clothes smelled like car exhaust," recalled Luke, who heads the 76-year-old, 18-acre dealership that ranks as the nation's 45th largest in sales.

Luke's solution isn't earth shattering, but it has escaped many engineers and dealerships in the past. "You've got to pump in a lot of clean air and then suck it out," said Luke, who also dressed

Case Study

Since it is easily disassembled in minutes from its double-hung cable system, Luke plans to have the fabric duct laundered by in-house personnel annually to maintain the service center's pristine air quality and appearance.

DuctSox's Sedona on the lower level plus TuffTex models on the second floor body shop and parts storage areas also aided Tri-City's strategy of air comfort without drafts. The fabric duct's linear diffusion, which consists of factory engineered orifices at 3 o'clock and 9 o'clock positions the entire length of the six 175-foot-long, 46-diameter duct, disperses air at a gentler rate than metal duct with registers every 10 feet. Occupants don't feel the air, only the temperature comfort, according to Mullins.

Air temperatures of up to a 35°F differential from outdoor ambient temperatures are supplied by four 78,000-cfm evaporative coolers that were aesthetically located in an indoor mezzanine rather than distract from the building's clean exterior appearance. The evaporative coolers supply zones with a 100-percent outdoor. All indoor air is exhausted and not re-circulated. The



through the workspace. "With the old system, you're supplying and exhausting at the roof level, which creates stratification or airflow dead spots," explained Mullins. Our system disperses air throughout the workspace and draws it down to 12 inches off the floor where people work. Our system of four evaporative coolers versus many smaller units costs less to operate. Plus, the larger evaporative coolers have a longer life expectancy than smaller models. More importantly however, this system is far more effective in indoor air comfort than the typical service department cooling strategy," said Mullins, who has specified HVAC designs for many other southwestern car dealerships.

Adding to the air comfort is a network of eight carbon monoxide (CO) sensors

that automatically switch one or all four banks of eight exhaust fans into a high-speed 7,560-cfm purge mode in the event CO levels surpass ASHRAE recommended levels resulting in a complete air change in 3.5 to 4.5 minutes. Controlled by an American Auto-Matrix, Export, Penn., only two purge incidences—both involving diesel engine start-ups—have occurred in the first six months of operation, according to Luke.

Other HVAC equipment used include 26 direct expansion (dx) split systems by Carrier Corp., Syracuse, N.Y., for the offices that overlook the service area, combined with 15 one-ton minisplit Carrier systems for the service write-up area.

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The project took 12 months to complete and is the first phase of a three-phase \$22 million construction cycle that will produce additional showroom space and a detail shop.

According to Mullins, other dealers should take a note of the Bill Luke's state-of-the-art facility because it might become the 21st Century standard for future auto service center HVAC.

gray DuctSox disperse air at heights of approximately 15 feet while 64 two-speed exhaust fans installed 12-inches off the floor pull the air out at the presetting of 3,700-cfm each. Air induction is approximately 2.25-cfm/s.f. and exhaust air is 1.50-cfm/s.f., which creates a positive building pressure to push out unwanted engine combustion pathogens. This far exceeds the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) outdoor air standards and OSHA Occupational Safety & Health Administration (OSHA) codes, according to Mullins.

This system has proven superior to the standard ventilation design of many car dealership service departments. Typically service areas use many rooftop evaporative coolers with single discharges through the roof and no air dispersion. Then, one or two ceiling relief fans are relied upon to draw the cooler air



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