



Furniture Manufacturer Saves Over \$200,000 In HVAC Retrofit With Fabric Ductwork.

Superior air dispersion aids furniture production and improves IAQ, however Karges Furniture discovers not all fabric duct is the same.

EVANSVILLE, IN. After spending thousands of dollars annually maintaining its leaky and antiquated boiler and radiant heat piping system, **Karges Furniture**, decided replacement would be more cost efficient.

In fact, the 115-year-old furniture manufacturing building's piping had become so unreliable, that the heating system was routinely shut down at night to prevent after hours pipe breaks which could damage Karges' in-progress furniture pieces, which are all handmade works of art sold to interior designers and fine furniture retailers. The maintenance expenses combined with poor temperature control and production floor downtime to repair constant pipe breaks finally prompted management to find a solution. "Over the years we cut off and capped so many leaking rotted sections of pipes that eventually we didn't have anywhere for the heat from the boiler to go," said David Woolston, production manager. "During wintertime operation, early morning start-ups took us sometimes half a week to reach an adequate temperature of 65°F."



Two proposed HVAC replacements included a new \$270,000 boiler and radiant piping system or a totally new approach with a \$304,000 space heater system for the Evansville, IN-based 150,000-square-foot, three-story factory. Karges eventually settled on a \$344,000 state-of-the-art system consisting of high tech fabric ductwork, make-up air units, and a commercial humidifier.

It is the high tech fabric ductwork that makes the system totally unique and the most cost effective. Specifying conventional metal duct would have added another \$250,000 in labor/materials to the system's cost, not counting the extra support the building would need to bear the 90-percent heavier weight of metal duct, according to Woolston. Additionally, metal duct would have taken up more ceiling space and reduced maneuverability of fork lifts and larger furniture pieces.

"If you run into metal duct you either ruin it or at the very least dent it, but fabric duct just sways out of the way upon contact," added Russell Groeninger, facilities director. "We also liked the fact that we can remove all the dirt and grime of furniture production from the ductwork by simply disassembling it and laundering it."

Fabric duct, which disperses air gently through linear diffusers, has proven to be more conducive to furniture sanding and lacquering than metal duct's more drafty registers positioned every five or 10 feet. Too high an air flow in furniture production can also stir up dust that affects finish quality during sanding or dry out glazing prematurely before the finisher has a chance to rub it out, according to Groeninger.

In concept, the system was an excellent solution; however Karges quickly found out that all brands of fabric duct are not all the same. In only three weeks, Woolston and Groeninger noticed the white fabric duct that was factory engineered by the original duct manufacturer turned yellow. Months later the fabric began ripping. After almost two years the fabric duct was unusable because of tearing. "It looked more like confetti than fabric duct," quipped Woolston.

An independent research laboratory later discovered that the original duct fabric was nylon instead of the polyester blend originally displayed in a sales presentation. "The lab tests indicated that the nylon failed because it is hydroscopic and the thread count was too lightweight for the specified air velocity," added Woolston.

Woolston and Groeninger decided to stay with the fabric duct concept, because they had witnessed its success in other industrial applications. Using money awarded in an out-of-court settlement with the Europeanbased fabric duct manufacturer, Karges switched to DuctSox, a Dubuque, IA-based manufacturer of several grades of fabric including its TufTex[™], an American-crafted polyester blend fabric specifically manufactured especially for industrial applications.

We compared the failed fabric duct to what we have now and there's a noticeable difference, Groeninger said. The TufTex has a four times heavier thread count; it isn't hydroscopic, and the stitching is much more durable."

DuctSox also customized the 2,000 linear feet of fabric duct's linear mesh vents, to diffuse air at 9 and 3 o'clock positions. The previous ductwork was more drafty with half-inch holes on 65 percent of the duct at the 8 and 4 o'clock positions whereas the DuctSox dispersion method of linear mesh vents is a slit that runs the entire length of the duct with the exception of fabric elbows, tees, and end caps. Manufacturers representative, Matt

Trentham, president, R.L. Craig Co. Inc., Louisville, KY, recommended an additional 100-linear feet of DuctSox to decrease the velocity. "We obviously had a lot of design questions after the first failure," Groeninger noted, "but the engineers from DuctSox and R.L. Craig Co. answered everything and helped make the second system a more customized air distribution system than the first."

Because the duct is custom engineered, Trentham also specified various air flow velocities, throws, and direction for different stations of furniture production.

Using the existing cable support system of the original

installation, mechanical contractor, Midwest Roofing and Sheet Metal, Evansville, IN, installed the new fabric duct in half the estimated hours, which was reflected in the final invoice. Midwest's previous fabric duct installation experience at other Evansville buildings, such as the Girl Scouts



of America's headquarters, Bristol-Myers' headquarters, and a Target Stores warehouse, helped produce the speedy installation, according to Midwest president, Larry Goedde. The heat-only system uses 100,000-cfm and 80,000-cfm make-up air units by Rapid Air, Comstock, MI, that supply the factory's second and third floors while using the first floor for return air.

Because winter time furniture production requires 50 percent relative humidity, the system uses plenum-mounted steam humidifiers by Armstrong Inc., Three Rivers, MI. A 50-hp. Sellers Boilers, Danville, KY, boiler for domestic hot water was also part of the original \$344,000 outlay.

Taking advantage of off-peak utility costs and cool summer nights, the make-air units bring in cooler outside air run from 2 a.m. to 6 a.m. to bring decrease temperatures, which the factory retains throughout most of the day.

"What we liked about DuctSox is that they kept asking us for our input, whereas the first company dictated everything themselves and wound up not following their original bid," said Woolston. "Our company's reputation is based on quality and fixing anything the customer doesn't think is right, so we were surprised when the first duct company gave us the wrong product and then just walked away from it."



4343 Chavenelle Road = Dubuque<mark>, IA 52002-2654</mark> 866-382-8769 = www.ductsox.com 563-589-2754/FAX