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Modular/Field-Adjustable HVAC Fabric Duct Saves Costs

M/FA is being utilized in smaller ventilation projects because of its cost-cutting measures.

By [Cary Pinkalla](#)



Sometimes, plan/spec fabric duct is not practical and metal can be significantly costlier with small projects. Modular/Field-Adjustable fabric duct offers an alternative to metal duct because of its lower installation costs and numerous other inherent advantages.

Smaller ventilation projects using M/FA fabric duct/diffuser system have shown air-distribution installation time reductions of 40%–80% and 15%–50% less material costs, depending on marketplace geography. The result is a significantly larger profit-margin potential for the HVAC contractor and better bid price competitiveness for smaller projects. Besides price, M/FA fabric duct—which is constructed of a polyester woven fabric—is easy to design and install, and is available to a jobsite within 24 hours.

These features separate M/FA from conventional plan/spec fabric duct, which commands a sizeable share of air distribution in the open architectural ceiling project market today. Plan/spec fabric duct is custom-manufactured and designed for applications by consulting engineers in a process that typically takes weeks to complete. Applications are typically large projects such as gymnasiums, convention centers, big box retail, office buildings and other commercial buildings with open architecture ceilings.

Plan/spec fabric duct is decades old and is an integral part of many prestigious projects such as the David Lawrence Convention Center, Pittsburgh; the 13,300-square-foot Georgia Tech Aquatic Center, Atlanta; the \$60 million, 110,000-square-foot Corona Park Pool & Ice Rink adjacent to Shea Stadium in Flushing Meadows, and also thousands of other applications in factories, warehouses, schools, and any other commercial building with an exposed architectural ceiling.

M/FA fabric duct is more similar to metal duct in that it is not a breathable fabric and it has non-linear diffusers that replicate registers. Therefore it is a practical option with smaller open-architecture ceiling projects, such as a 5,000-sq-ft strip center retail store; a commercial room addition; a new factory/warehouse that needs a straight heating/cooling duct run with some diffusion with one or two elbows; or any other simple, straight-run ventilation project costing less than \$2,500.

In the bidding

Running a 100-ft run of 18-in.-diameter metal duct costs an estimated \$2,832 or more in materials and labor, whereas the same project using modular fabric ductwork, field-adjustable diffusers can be charged at \$1,550—a healthier margin than the contractors bidding metal.

All types of fabric duct pose advantages over metal duct such as cost, lightweight, and ease-of-installation. Typically a system is made up of 15-ft, 5-ft and 1.5-ft lengths that can be combined to accommodate most any run 6,000 cfm and smaller. Diameters range from 12, 16, 20, 24 and 28 inches. Components include an inlet collar for connecting to a metal plenum or duct; an adjustable flow device for internal duct air-flow throttling; a 90-degree elbow; an end cap; and the adjustable air outlet, which is an alternative to a metal register/damper. While an elbow is available for horizontal transitions and circumventing obstacles, runs utilizing multiple elbows (three or more) are not recommended. Systems are suspended with a cable kit, 100-feet of cable, two eyebolts, two turnbuckles, two thimbles and four cable clamps.

With M/FA, the 2-ft-long AAO has four orifices (two per side) in small, medium and large diameters. The orifices can be throttled, blocked or fully opened in many combinations of one, two, three or all four orifices. And while conventional metal registers can be throttled, they are generally inflexible as to direction and placement frequencies in the run. One M/FA AAO can provide anywhere from 0–920 cfm for a 28-in.-diameter system. Air direction can be positioned to 10 and 2 o'clock or at 4 and 8 o'clock by reversing the AAO via its dual start zippers.

Designing a system does not require consulting engineers and is simple when using basic metal duct ventilation principles. Designs begin with the duct run's cfm and the amount of AAO positions required. Once these two factors are determined, then air throw distance, direction and other variables are determined. Because the systems are so flexible and reconfigurable, any miscalculation along the way typically can be remedied as it occurs. Some manufacturers have design tools—such as slide charts, online calculators, and customer support for design and installation assistance.

Aftermarket flexibility also is strong. A system can be reconfigured just as easily as it was originally installed, making it a perfect candidate for factory production floor areas that are periodically changed. The M/FA fabric duct also is quickly unassembled, commercially laundered and reassembled, which is an advantage in IAQ sensitive environments.

Anatomy of applications

Retail—Using a 2,500-sq-ft retail store in a small 10-store strip center as an example, a typical heating/cooling duct run for this application might be a 100-foot-long, 18-inch-diameter of spiral metal ductwork. According to Everything You Ever Wanted to Know About Sheet Metal Estimating, But Were Afraid to Ask by Herbert C. Wendes, P.E., a Chicago-based member of the mechanical contracting industry, running a 100-ft run of 18-in.-diameter low-pressure spiral duct down the middle of the store requires 1.4 man hours per 10 ft of duct, for a total of 14 hours—this does not include travel time and the fact all the supplies are ready at jobsite.

Since 10 registers are required at 1/2-hour/register, another five hours are added for a total of 19 installation hours. At a market average of \$80/hr—which includes salary, company overhead, cost of doing business, profit margins and other miscellaneous expenses—labor to install the duct is 19 hours x \$80 = \$1,528. Material costs are 10 lengths at \$50/10-ft length = \$500; 10 couplings at \$15/coupling = \$150; 20 registers (to throw air from the both sides of the duct) at \$20/register = \$400; 20 boots for the registers at \$12/boot at \$240; and one end cap at \$10. The total for materials is \$1,300. The grand total for labor (\$1,528) and materials (\$1,300) is a grand total of \$2,828 for the project.

Running the length with M/FA fabric duct would carry a significantly lower price. The industry does not make an 18-in.-diameter model, so a 16-in.-diameter model would be sufficient after paying close attention to adjusting the orifices for more cfm's. Labor

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is estimated at 4 hours for one installer x \$80/hr for a total of \$320, or \$1,208 less than the metal estimate.

The M/FA fabric duct design consists of 9 AAO's at 2-ft long each for a total of 18 feet. The remaining 82 ft consists of 16 5-ft-long lengths (80 ft), one air inlet (1 ft), one end cap (1/2 ft) and one 1.5-ft length (1.5 ft). The cost for these materials is \$956.44 including the cable assembly kit. The grand total for the project is \$1,276.44.

Industrial Application—One of the first users of M/FA fabric duct is the sheet-metal shop of mechanical contractor, State Automatic Heating & Cooling in Batavia, IL. Originally, the company had installed a gas-fired furnace without ductwork. Although inefficient, it was a quick-fix for wintertime sheet-metal worker warmth in the 1,000-sq-ft sheet-metal fabrication area that is part of its offices and warehouse.

Eventually the company decided to install duct above the area for more even heating and improved indoor employee air comfort. When Vice President James Gates priced the project at 11 man hours to hang and install 54 ft of ductwork and eight registers versus two hours for M/FA fabric ductwork, it did not take long to choose fabric over metal. Fabric material costs also were lower even though State Automatic had its own sheet-metal shop. Shipping was \$8 and total materials cost was \$676, which included: three 15-ft and one 1.5-ft lengths of 20-in.-diameter duct; one inlet collar and end cap; four AAOs; and one hanging kit consisting of 100-ft of cable, U-bolts and turnbuckles.

An additional advantage is reconfiguration flexibility, since State Automatic has a history of reconfiguring the shop's metal-fabricating machinery layout every few years to accommodate company growth and evolving customer base needs. The next reconfiguration may simply necessitate switching out several AAOs or adjusting the orifice throws or direction, rather than a major overhaul of the entire duct run.

The future

Whether or not this new type of heating and cooling delivery system takes a significant portion of the small-project ventilation market is dependent on contractors. Typically, new products penetrate the market due to economic conditions. Odds are that market share will continually grow when contractors discover missed opportunities of high profit margins in an age of shrinking profit margins.

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