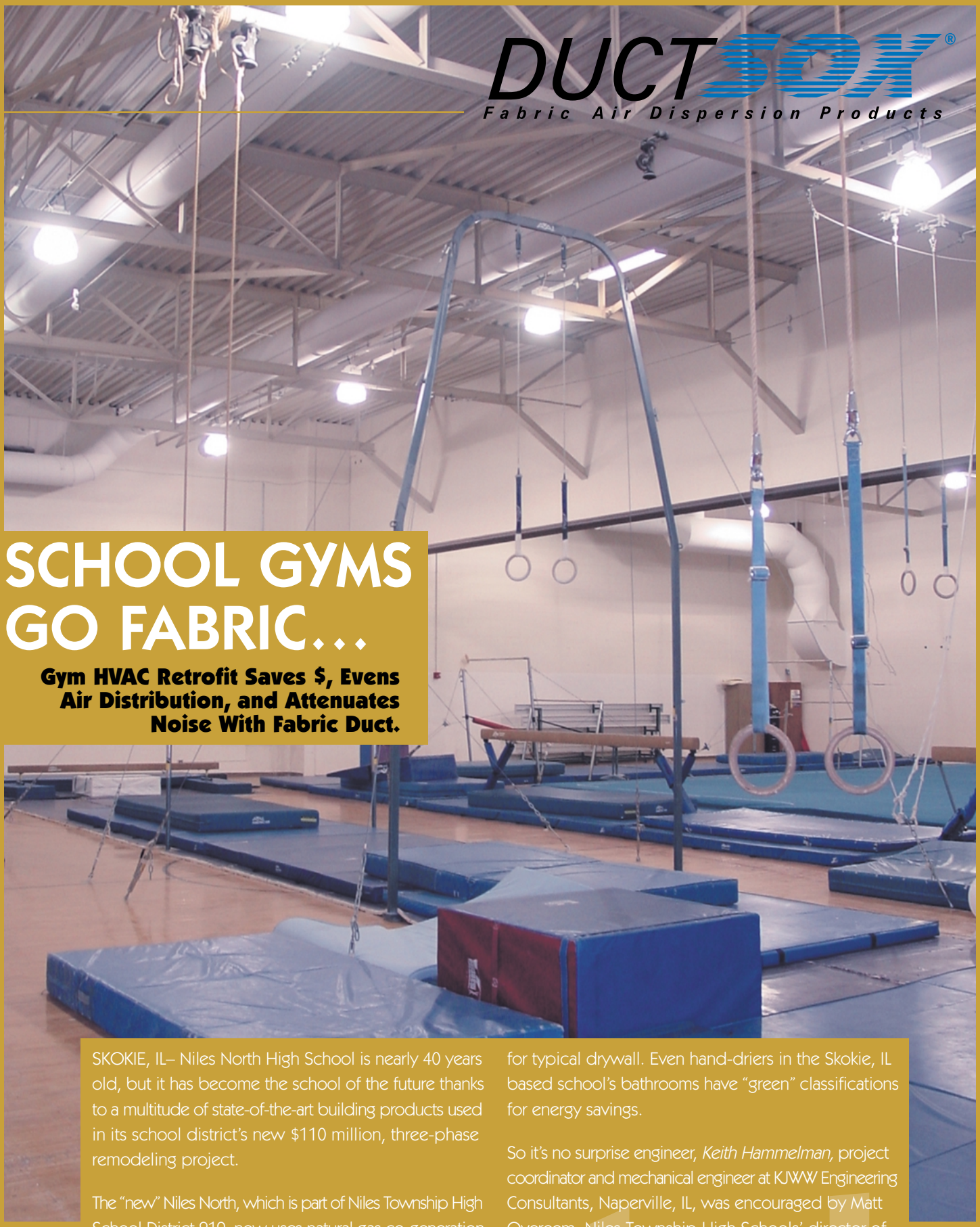
DUCTSOX®
Fabric Air Dispersion Products



SCHOOL GYMS GO FABRIC...

Gym HVAC Retrofit Saves $, Evens Air Distribution, and Attenuates Noise With Fabric Duct.

SKOKIE, IL– Niles North High School is nearly 40 years old, but it has become the school of the future thanks to a multitude of state-of-the-art building products used in its school district's new $110 million, three-phase remodeling project.

The "new" Niles North, which is part of Niles Township High School District 219, now uses natural gas co-generation and produces 95 percent of its own electricity. In the wake of nearby St. Charles High School's, St. Charles, IL, closure last year due to sick building syndrome, mold-resistant wall materials have been substituted for typical drywall. Even hand-driers in the Skokie, IL based school's bathrooms have "green" classifications for energy savings.

So it's no surprise engineer, *Keith Hammelman,* project coordinator and mechanical engineer at KJWW Engineering Consultants, Naperville, IL, was encouraged by Matt Overeem, Niles Township High Schools' director of buildings, to use fabric duct instead of conventional metal duct in seven gymnasiums totaling 40,000 square feet that were included in the HVAC retrofit portion of the three-phase project.

case study

Niles North High School

"With our ongoing retrofit program, we're always on the look out for something innovative, green (ecological), or energy efficient that will help our engineers, architect (Legat Architects, Waukegan, IL), and HVAC contractors (Admiral Heating & Ventilating, Hillside, IL, and Siemans Building Technologies, Mt. Prospect, IL) "think outside the box" said Overeem. "So it made perfect sense to reduce our roof's weight load with lightweight fabric duct instead using tons of steel. Fabric duct is easier to clean, it looks high tech, and it has better air distribution than round metal duct with widely-spaced registers."

Main Gymnasium

Previously the gyms-consisting of a dividable gymnastics room, dividable wrestling room, and a main gym with two balconies that are regularly partitioned off were hot and stuffy for athletes and spectators due to outdated air handling systems that supplied and returned air from only single wall grills.

Hammelman, whose firm has a long track record of successful high school HVAC projects such as the Chicago suburbs of Highland Park, Barrington, and Geneva, took Overeem's fabric duct suggestion and specified Comfort-Flow" fabric ducts manufactured by DuctSox®, Dubuque, IA. Comfort-Flow, combined with the high-end, aesthetic appearance of Sedona fabric allows 15 percent of the air flow through its factory-engineered permeable fabric, which limits dust build-up. The other 85 percent of the airflow is dispersed gently and evenly through two linear mesh vents that run the entire length of the duct at 4 o'clock and 8 o'clock positions.

The main gym's six indoor packaged McQuay International, Minneapolis, MN. Vision Series air handlers totaling 80,000 cfm are installed in the joists and supplied by the school's existing hot water loop. The other four air handlers supplying the gymnastics and wrestling gyms are rooftop models.

Gymnastics I

Hammelman began designing the main gym's air distribution around the standard of six volumetric air changes per hour which typically allows for a 10-degree breakpoint for non-cooling situations.

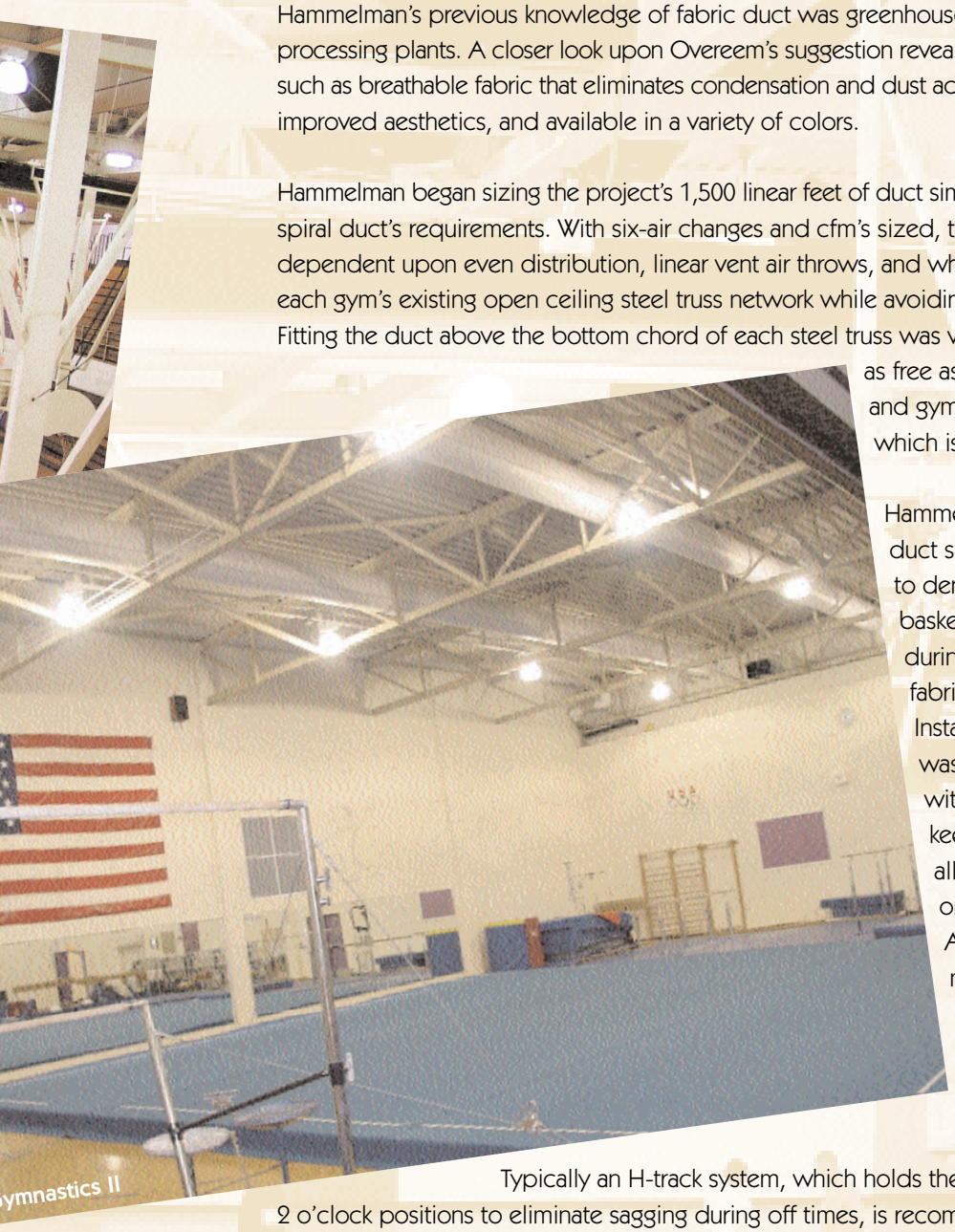
"With these high airflows, what you have to watch out for in large gyms is the fact that spectators and athletes get drafty blasts of air if they're under registers on spiral or fiberglass duct, both of which we've used in previous applications," said Hammelman. "With registers placed every 10 to 15 feet

or so, some people get a draft and some people won't. With the ability of fabric duct manufacturers to sew in linear diffusers along the duct-at a lower installed cost than installing linear diffusers on round metal duct – this problem is eliminated. It's much easier to sew in a linear diffuser and the aesthetics are better."

Hammelman's previous knowledge of fabric duct was greenhouses, manufacturing, and food processing plants. A closer look upon Overeem's suggestion revealed recent product innovations such as breathable fabric that eliminates condensation and dust accumulation, as well as improved aesthetics, and available in a variety of colors.

Hammelman began sizing the project's 1,500 linear feet of duct similar to its alternative, single-wall spiral duct's requirements. With six-air changes and cfm's sized, the linear feet of duct was dependent upon even distribution, linear vent air throws, and what diameter would fit inside each gym's existing open ceiling steel truss network while avoiding electrical and utility lines. Fitting the duct above the bottom chord of each steel truss was vital for keeping ceiling space as free as possible for basketball shots and gymnastics equipment, some of which is ceiling-hung.

"Diameters selected to fit through joists evenly."



ymnastics II

Hammelman also notes that metal duct surfaces would be susceptible to dents from errant baseballs, basketballs and other flying objects during indoor practices, however fabric duct doesn't sustain dents. Installation of all the gym ducts was performed in less than a week with six-man crew which helped keep the two-month summer time allotment for the gyms' retrofits on a fast-track, according to Admiral's Sam Gattuso, project manager. "I like the fact that we didn't have to paint it and it required a short learning curve to install it," said Gattuso.

Typically an H-track system, which holds the duct at the 10 o'clock and 2 o'clock positions to eliminate sagging during off times, is recommended for ceiling truss hanging. However to accommodate the existing Niles North ceilings, DuctSox engineers recommended a custom double-row cable suspension system that was easier to mount through ceiling joists. Preventing the fabric from any accidental contact with the bottom of the joists eliminates premature material wear from vibration.

Typically each air handler connects to straight duct trunk runs ranging from 22 to 34-inches in diameter. DuctSox's DuctBuckle strap fastener connects the fabric to a round metal collar that Admiral fabricated for the transition. A fabric sleeve covers the connection to simulate a seamless joining. Although metal elbows were sometimes used on the air handler-handler side of the transition to avoid obstructions, generally Hammelman kept trunk lines straight.

Dance/Multipurpose Gym

Other equipment installed for the retrofit included: three 450 h.p. flexible water tube boilers by Bryan Steam LLC, Peru, IN. The former pneumatic control system was replaced with a DDC (direct digital control) building automation system under a performance contract with Siemens Building Technologies, Buffalo Grove, IL All air handlers are equipped with full economizer modes. Loren Cook Company, Springfield, MO, exhaust fans combined with Siemens variable speed drives are activated depending on the pressure in each spaces.

Also part of the retrofit was the replacement of two 300-ton chillers with two 550-ton McQuay chillers that supply a chilled water loop – that when combined with another future chiller – will someday be connected to four of the main gym's air handlers that are equipped with air conditioning coils.

Since activities in the spaces can vary from just a few athletes at practice to a full spectator event with hundreds of occupants, outside air and return air ratios are monitored and controlled according to CO_2 levels. ■

Fitness Gym

Another advantage fabric duct has over metal duct with registers is balancing. While metal duct would have required balancing, fabric duct needs only the assurance that the airflow through the air handler is within guidelines, which greatly reduces system balancing time.

Fabric duct also has sound attenuation qualities as well, which is important since the gyms have the dual purpose of athletic and speaking events. Air noise is lessened because of the decreased reverberation fabric offers versus metal. Additionally, linear vents can produce the same cfm but at a quieter velocity than metal ducts' registers. "You can always attenuate sound with insulated metal duct, but with today's IAQ concerns, insulation-lined duct can be a dust collector is costly and difficult to clean. If fabric duct gets dirty, the facility's in-house maintenance staff can take it down, machine-wash it, and just re-hang it," Hammelman added.

Wrestling/Multipurpose Room

DUCTSOX®
Fabric Air Dispersion Products

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