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DISPLACEMENT VENTILATION

Low-Velocity Air Distribution Systems

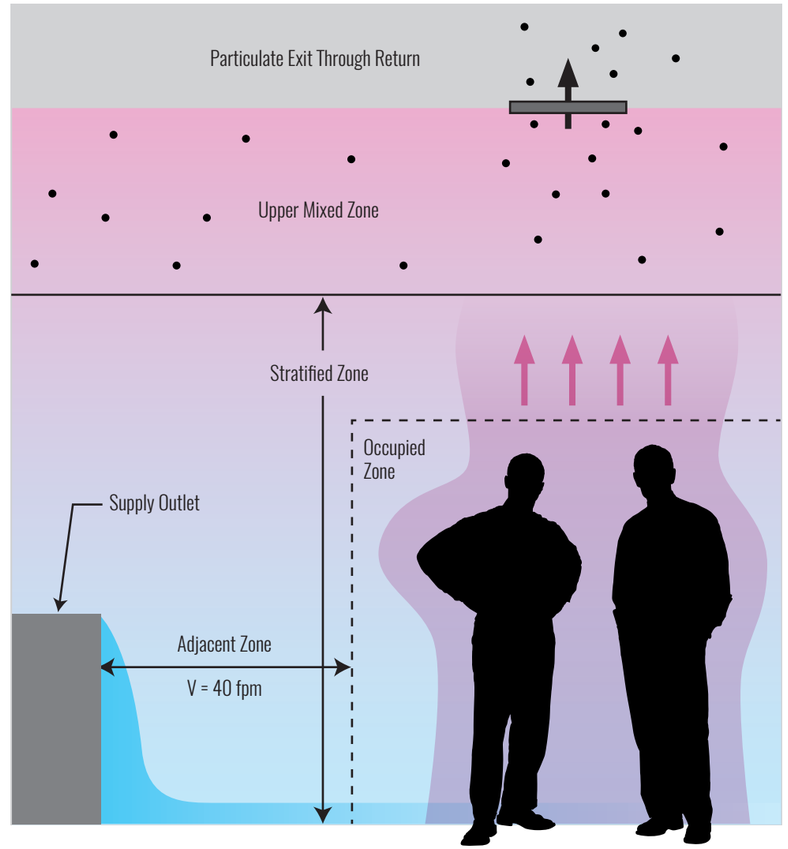
KRUEGER

INTRODUCTION

Displacement Ventilation (DV) is a technology that was first introduced in Europe in the late 70's to supply fresh air for industrial applications. Since that time, DV has become a popular air distribution method throughout North America for commercial applications due to its many benefits, including thermal comfort, indoor air quality, energy efficiency, low sound characteristics, and layout flexibility.

HOW DISPLACEMENT WORKS

1. Cool, fresh supply air enters directly to the occupied zone.
2. As the air distributes across the floor and comes into contact with heat sources, it warms and begins to rise, creating thermal plumes.
3. These thermal plumes catch dust and other contaminants in the air, where they are lifted up out of the occupant zone towards the ceiling.
4. The warm air and contaminants then exit through return grilles located in the ceiling or high on walls, completing the process.



ADVANTAGES OVER MIXING SYSTEMS

THERMAL COMFORT

DV reduces drafts and noticeable temperature changes by entering the occupied zone at low velocities, around 40 FPM, and higher temperatures, about 10° cooler than room air. Mixing systems enter at higher velocities, around 50 FPM, and require cooler supply air temperatures, around 55°F.

INDOOR AIR QUALITY

As cool, supply air warms and rises through the occupied zone, dust and other contaminants also rise, where they exit through ceiling or high wall returns. Mixing systems aim to reduce stratification and condition the entire space by mixing the supply air with existing room air, which means any contaminants in the space are mixed throughout the occupied zone.

ENERGY EFFICIENCY

DV exhibits lower pressure drops. This may translate into smaller fan components and reduced fan energy usage. Warmer supply air temperatures provide an opportunity for extended economizer hours, taking advantage of free cooling. Traditional mixing systems exhibit higher pressure drops and provide supply air at cooler temperatures, which may require more energy and fewer economizer hours.

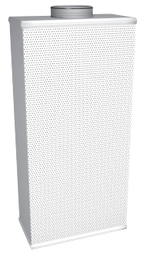
LOW SOUND

Operating at low velocities, DV exhibits extremely low sound characteristics, from < 10 NC to 25 NC, on average. Mixing systems operate at much higher velocities, creating higher noise levels, typically between 35 NC and 40 NC.

LAYOUT FLEXIBILITY

DV is extremely versatile. Units can be installed along or inside walls, inside step risers or center spaces, in the ceiling, or anywhere space may be limited. Mixing systems are typically installed in the ceiling and will require adequate duct space to function properly.

PRODUCT SELECTION



AFA
Rectangular

AFB
U-Shaped

AFC
Round

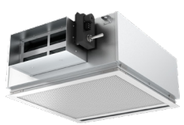
AFD
Rounded Triangle

AFE
Flat-Faced, Wall-Mount

AFF
Half-Flat, Oval

AFP
Half Round

AFQ
Corner Round



AFH
Ceiling Mount with Cooling and Heating Changeover

AFL
Flat-Face, Rectangular with Frame, Ceiling Mount

AFR
Flat-Faced, Recessed, Rectangular without Frame

OFFICE APPLICATIONS

Employee focus and productivity are at their highest when environments are comfortable and well-ventilated. Because DV supply air enters at warmer temperatures and lower velocities, unwanted drafts can be avoided. Thermal plumes created from people and equipment help lift dust and other air contaminants up and out of the occupied zone, providing improved ventilation and indoor air quality.

POPULAR APPLICATIONS

- Offices, lobbies, and hallways
- Conference rooms
- Cafeterias and break rooms
- Auditoriums and theaters

EXAMPLE SOLUTION “A” | USING MODEL AFH

Mounted from the ceiling, AFH units provide automatic changeover between heating and cooling for perimeter spaces. Pair with AFR or AFL units to satisfy interior cooling needs.

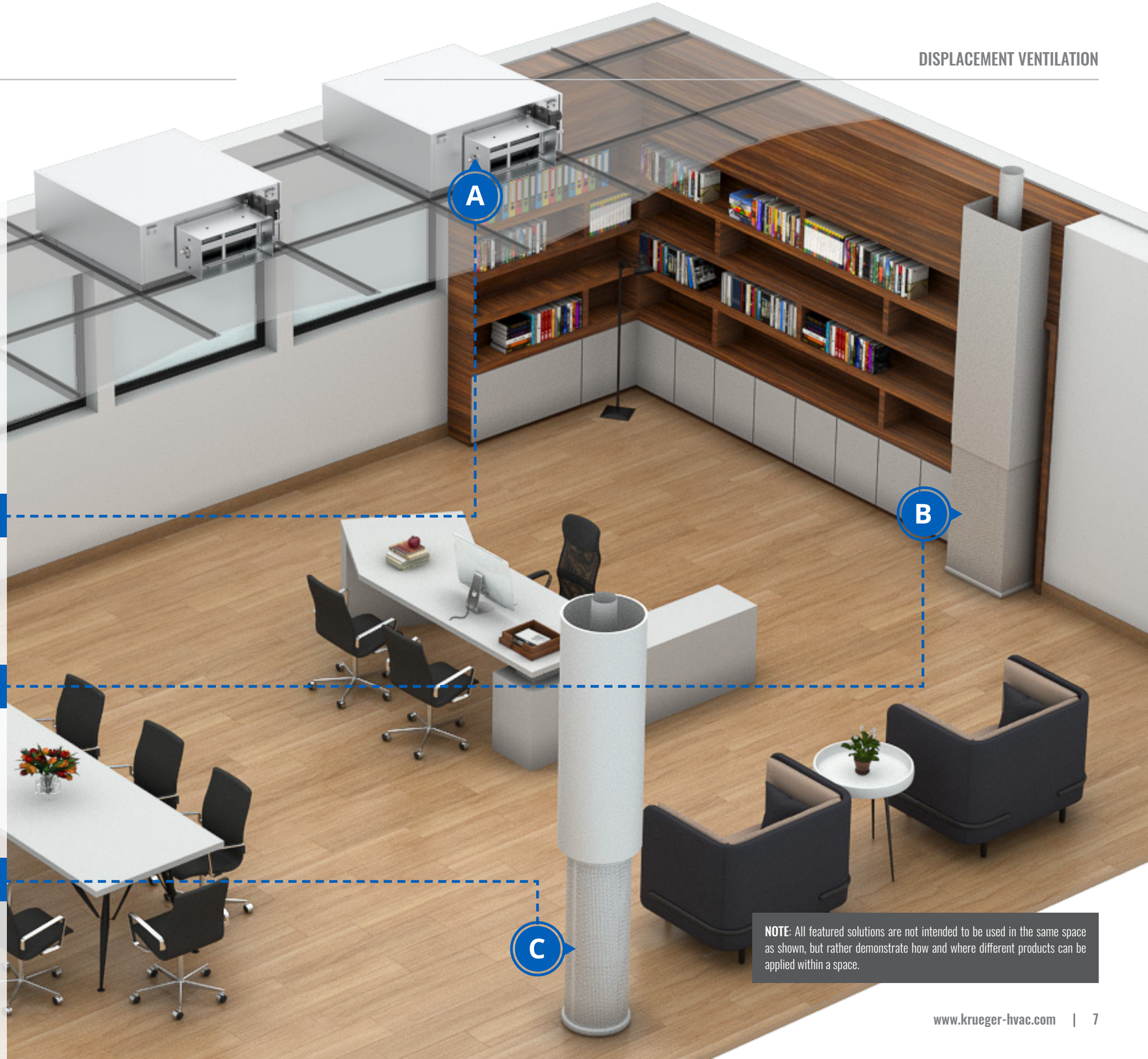
EXAMPLE SOLUTION “B” | USING MODEL AFA

Placed around the perimeter, AFA rectangular units can be functional accents. Krueger duct covers can be added to create a seamless structure that blends with the architecture of the space.

EXAMPLE SOLUTION “C” | USING MODEL AFC

Used in wide, open spaces, AFC units provide 360° of cool, low velocity supply air to the occupied zone. Krueger duct covers can be added to create an architectural, column-like effect.

DISPLACEMENT VENTILATION



NOTE: All featured solutions are not intended to be used in the same space as shown, but rather demonstrate how and where different products can be applied within a space.

SCHOOL APPLICATIONS

A quiet, comfortable, well-ventilated environment is key to promoting student health and performance. DV, with its whisper-quiet operation, thermal comfort characteristics, and high ventilation effectiveness, is a great solution for a variety of school environments.

POPULAR APPLICATIONS

- Classrooms and auditoriums
- Offices, lobbies, and hallways
- Libraries
- Locker rooms
- Gymnasiums
- Cafeterias

EXAMPLE SOLUTION “A” | USING MODEL AFH

Mounted from the ceiling, AFH units provide automatic changeover between heating and cooling for perimeter spaces. Pair with AFR or AFL units to satisfy interior cooling needs.

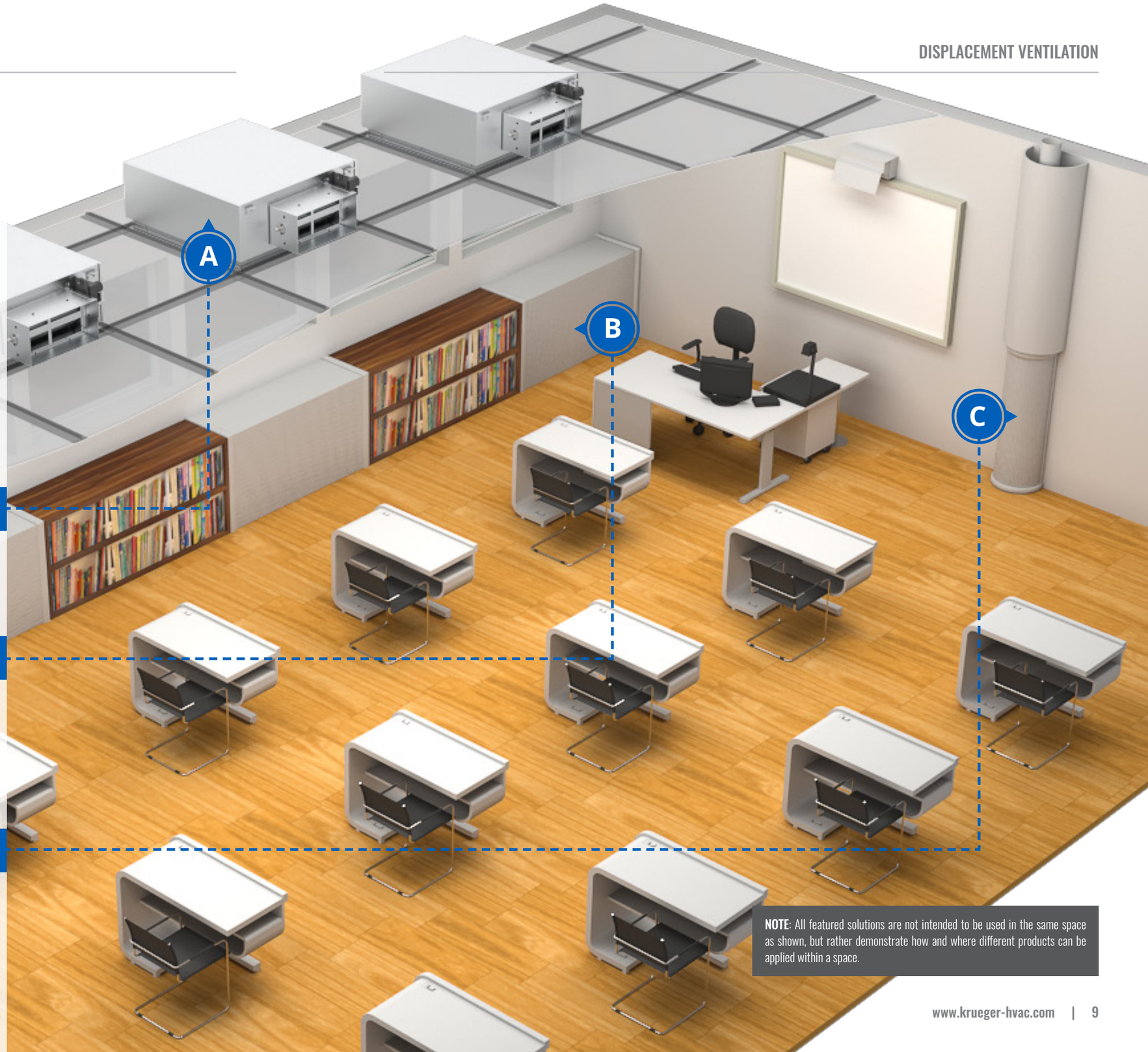
EXAMPLE SOLUTION “B” | USING MODEL AFA

AFA rectangular units are versatile, providing engineers with the flexibility to integrate the product with the architecture of a space. When placed in perimeter areas, air will gradually move to the interior to provide occupants with a quiet and comfortable environment.

EXAMPLE SOLUTION “C” | USING MODEL AFB or AFP

Used along perimeter spaces, AFB or AFP units supply low velocity air in a 180° air pattern, directing air towards interior regions. Pair with Krueger duct covers to create an architectural, column-like effect.

DISPLACEMENT VENTILATION



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HEALTHCARE APPLICATIONS

The primary goal of air distribution systems in healthcare applications is to protect patients, staff, and guests from contaminants while promoting patient recovery. DV not only delivers on those requirements, but also provides the benefit of thermal comfort, quiet operation, and potential energy savings.

POPULAR APPLICATIONS

- Patient rooms
- Offices, lobbies, and hallways
- Locker rooms
- Cafeterias
- Infection control isolation rooms

EXAMPLE SOLUTION “A” | USING MODEL AFH

Mounted from the ceiling, AFH units provide automatic changeover between heating and cooling for perimeter spaces. Pair with AFR or AFL units to satisfy interior cooling needs.

EXAMPLE SOLUTION “B” | USING MODEL AFE

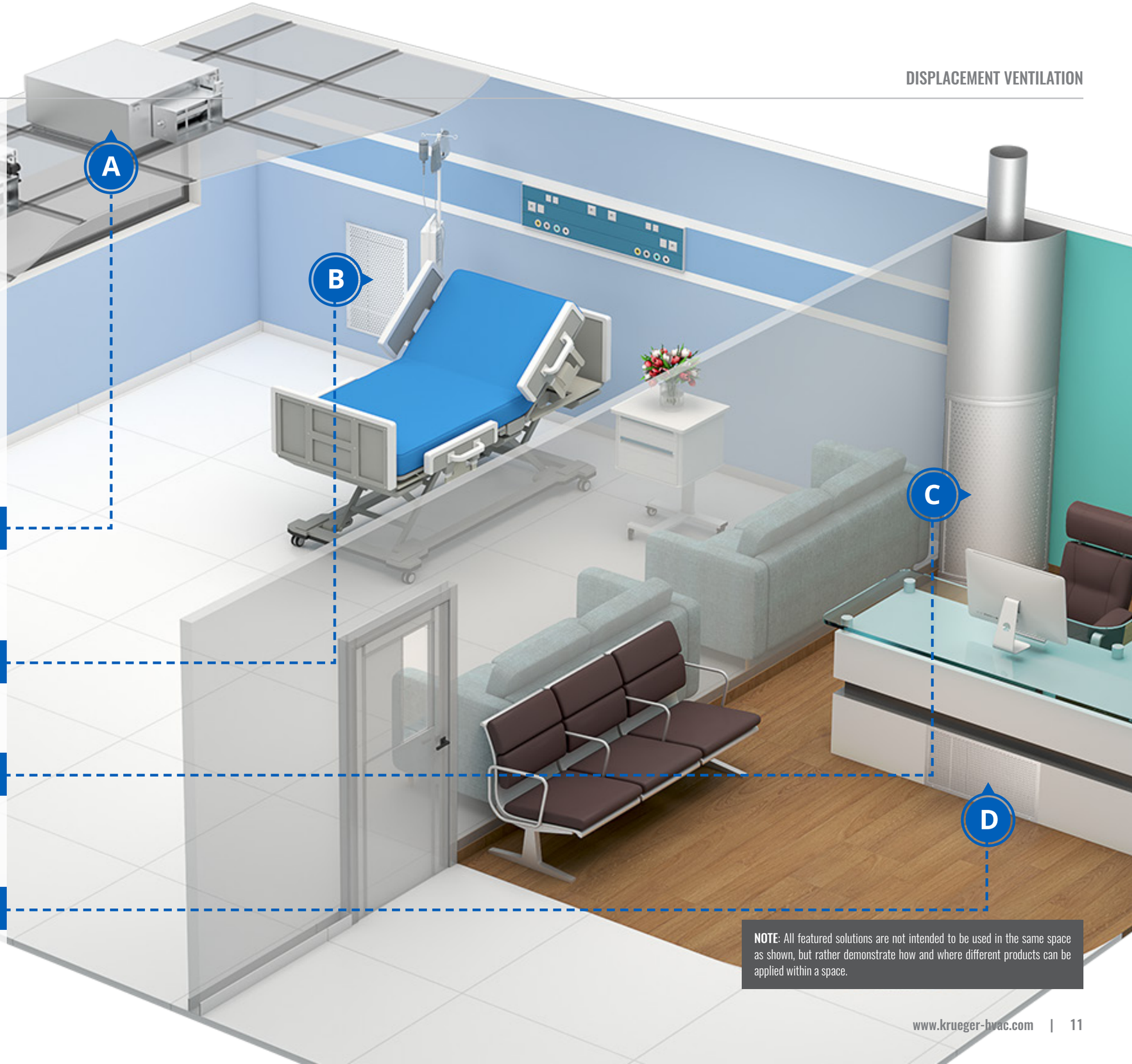
AFE units installed within walls provide a clean, non-intrusive solution to deliver low velocity air to the occupied zone.

EXAMPLE SOLUTION “C” | USING MODEL AFQ

Conveniently located in the corner, AFQ units supply air to interior spaces in a 90° air pattern. Pair with Krueger duct covers to create an architectural, column-like effect.

EXAMPLE SOLUTION “D” | USING MODEL AFR

Disguised within the desk structure, AFR units provide a creative method to deliver supply air to interior spaces.



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LARGE APPLICATIONS

Designing an air distribution system for large public applications can be especially challenging with varying ceiling heights, occupancies, and (quite often) special architectural features. DV is one of the most flexible solutions, as it focuses on conditioning the air within the occupied zone (up to 6ft). Units can be integrated into the wall or floor, or customized for stair risers and other architectural structures.

POPULAR APPLICATIONS

- Airports, malls, and convention centers
- Theaters, museums, and places of worship
- Sports venue lobbies, locker rooms, suites, and offices
- Hotel lobbies, hallways, and ballrooms

EXAMPLE SOLUTION “A” | USING MODEL AFC

Placed within the interior of a space, the rounded shape of the AFC unit integrates well with a building’s architecture. Accent the product with a duct cover or a “lipstick” top to prevent objects from being placed on the unit.

EXAMPLE SOLUTION “B” | USING MODEL AFE

AFE units installed within walls provide a clean, non-intrusive solution when designing for large, open areas that may experience high traffic.

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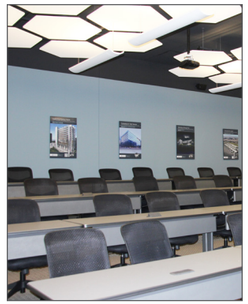
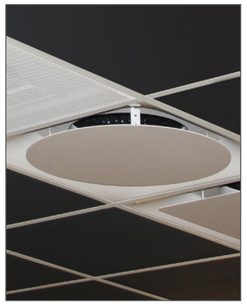
LABORATORY CAPABILITIES

Krueger's state-of-the-art product showroom and test laboratory is located in Richardson, TX. Each of its spaces are specially designed to demonstrate a variety of products at different operating conditions.



TRAINING CENTER

This space features theater seating for 40 people, creating a great place for in-depth group discussions.



THROW BAY

A flexible ceiling structure allows for demonstration of many Krueger air distribution products, from overhead square ceiling diffusers to sidewall grilles and nozzles.

HOSPITAL OPERATING ROOM

This space allows for demonstration of Krueger's full size Sterilflo® Operating Room Air Distribution System with laminar panels and proprietary air curtain system.

CRITICAL ROOM LAB MOCK-UP

Outfitted with functional fume hoods, this space allows for demonstrations of Krueger's radial face, critical environment products for laboratory applications.

SPECIALTY DISPLAY

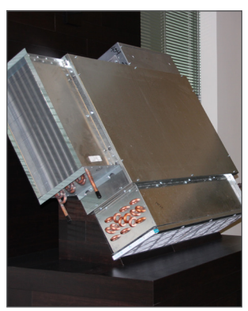
Separated from the Throw Bay by a Cold Wall, this space allows for demonstration of Krueger Displacement Ventilation and Chilled Beam products.

INSITU ACOUSTICAL EVALUATION ROOM

Constructed to simulate a typical office building conference room, this room aids in the prediction of real-world sound levels.

REVERB ROOM

Used for sound data acquisition, this room has been independently tested for compliance to the Engineering Accuracy of the ANSI specifications for reverb rooms.

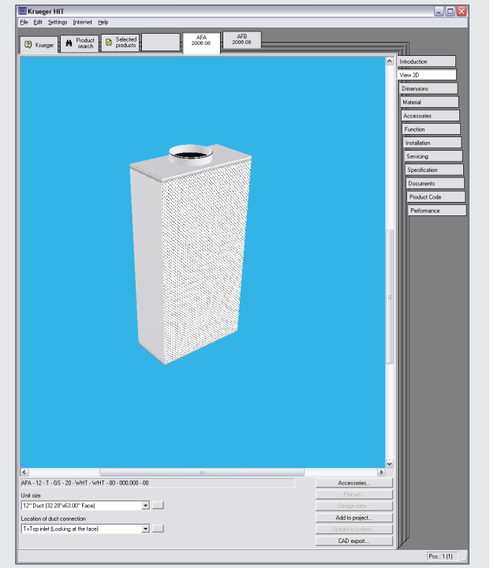


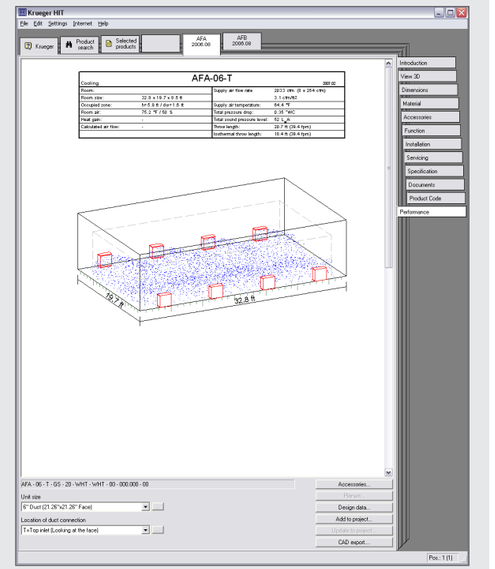
PRODUCT DISPLAYS

A variety of Krueger products are on display throughout the space, including air distribution products as well as terminal units and equipment.

SELECTION SOFTWARE

Krueger's HIT (K-HIT) program is an interactive tool that links complete product data, product selection, and CAD design support for Krueger by Halton Chilled Beam and Displacement Ventilation products.





K-HIT FEATURES & BENEFITS

- Navigate with ease through its intuitive design.
- View 3D images, descriptions, and dimensions per selection.
- View installation, adjustment, and servicing instructions per selection.
- Create design simulations to show product interactions and airflow patterns based on room and design conditions.
- Export to AutoCAD (when option is available).
- Build schedules and export information to Microsoft® Excel®.
- Generate product submittals with features, dimensions, and performance data.

FOR MORE INFORMATION...

- Find additional information about Krueger displacement products and other air distribution solutions by visiting us on the web at the following web address.
  krueger-hvac.com
- Reach out to your local representative with product questions, assistance in developing specifications, or requests for quotes. Find the one nearest you at the following web address.
  krueger-hvac.com/search reps/sales

CONNECT WITH US!

PROUD TO BE YOUR RESOURCE FOR AIR DISTRIBUTION AND EQUIPMENT SOLUTIONS

Let us know how we can assist you in your next building application. For more information, contact your local Krueger representative or visit us on the web at www.krueger-hvac.com.

CLEAN ROOM SOLUTIONS

HOSPITAL SOLUTIONS

LABORATORY SOLUTIONS

CHILLED BEAMS

DISPLACEMENT VENTILATION

TERMINAL UNITS
- Single Duct
- Fan Powered
- Dual Duct
- Bypass & Retrofit

FAN COILS & BLOWER COILS
- Horizontal
- Vertical / Stack

DIFFUSERS
- Plaque & Architectural
- Louvered
- Perforated
- Modular Core
- Linear Slot
- Plenum Slot
- Round
- Air Nozzles

GRILLES & REGISTERS
- Supply
- Return
- Linear Bar
- Security
- Industrial
- Duct Mounted
- Transfer
- Stainless Steel

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Displacement Brochure: 7/2024