Titus
Redefine your comfort zone.™

CASE STUDY PROJECTS

APPLICATIONS

06

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

LEED PROJECTS

Rethink what air management systems can be.
Revise your notion of functionality.
Redefine your comfort zone.™

Comfort, Redefined.

Since 1946, Titus has focused on technologically advanced products that create the highest degree of comfort.

We've consistently led the industry by breaking the barriers of expectation and convention when it comes to technology. We've redefined how technology drives, influences and supports air management. And by being first to market with the most innovative approaches to air distribution, we're proud to say that the marketplace has taken notice, and is counting on us to lead the way into the next decade. A challenge we're more than happy to accommodate.

Titus has raised the bar on design, proving that functional can also be beautiful. And we've redefined what it means to be energy efficient, with a collection of smart technology products that optimize the use of natural resources.

Titus has also redefined what it means to work with an air management products partner. We pride ourselves on listening and responding so that we can not only meet expectations, but also exceed them. Service has been, and will always be, our main focus at Titus. And, it's why so many of our customers keep coming back.

Welcome to your new comfort zone. It starts here.

PROJECT - WALNUT CREEK PUBLIC LIBRARY

Walnut Creek, CA

CLIENT - CITY OF WALNUT CREEK
ARCHITECT - GROUP 4 ARCHITECTS
CONTRACTOR - WEST BAY BUILDERS
LEED CERTIFICATION - LEED GOLD CERTIFIED

ABOUT THE PROJECT

The new Walnut Creek Library opened on July 17, 2010. Designed by Group 4 Architects to achieve LEED Certification, this new facility has many amenities that the young and old can utilize for several years to come. Eventually earning LEED Gold Certification from the USGBC, the library contains a large meeting room, conference room and a new technology center that can be used by anyone. The children's area is designed to foster reading in an open and inviting environment that has views of the garden while the young adult area is designed for the technologically advanced teens of today.

The library also incorporates a wide variety of Green Building design elements, including daylight harvesting, an advanced mechanical system

TAF-R | FLOWBAR

FEATURED PRODUCTS

WALNUT CREEK LIBRARY
interior photos

and utilizing recycled materials. The placement of 80% of parking spaces under the building and plaza areas reduces the heat island effect of paving and preserves space in the Civic Park as well.

THE TITUS SOLUTION

An equally important and vital piece to the green design was to have an energy-efficient HVAC system in place that offered sustainable features as well. The Walnut Creek Library selected the Titus UnderFloor Air Distribution (UFAD) system as well as the FlowBar to achieve this goal.

The main underfloor product featured in the library was the TAF-R diffuser. The TAF-R is a GreenSpec Listed™ product that is available in standard light gray or black. All components are constructed of a high-impact polymer material that is designed to resist damage from foot traffic found in libraries. Additional colors, including wood grain optional finishes, may be specified to match any building's interior scheme. Another benefit of the TAF-R is the ease it can be adjusted. The top of the unit can be turned clockwise or counterclockwise to reduce or add airflow into the occupied space. This model can help contribute toward achieving LEED credits.

Another high performing and energy saving product that can be found in the library is the Titus FlowBar. The FlowBar is an architectural linear diffuser that maximizes engineering performance without sacrificing aesthetic considerations of the design architect. FlowBar's outstanding performance

allows higher airflows than conventional linear diffusers. The wide array of slot widths allow for more CFM per linear foot while minimizing noise and pressure loss.

Conventional linear diffusers are supported by the duct system and in most cases are installed after the ceiling system is in place. For complete ceiling integration, the FlowBar system is offered with a large selection of flange styles compatible with various ceiling applications. Our unique clip/hanger support system allows for quick and easy installations. The FlowBar system actually supports and becomes an integral part of the ceiling system and is installed along with the ceiling suspension system.

The Titus FlowBar offers a new concept of air distribution that fully integrates with all ceiling systems. The FlowBar system is available in continuous linear, incremental linear and square configurations. This entire series of diffusers is available with two unique pattern controllers as well.

THE END RESULT

The Walnut Creek Library is a shining example of what can happen when the community and the designer are fully engaged with the design of a new facility. This collaboration allowed the Group 4 Architects to create an aesthetically pleasing building that will service this community for many generations to come.

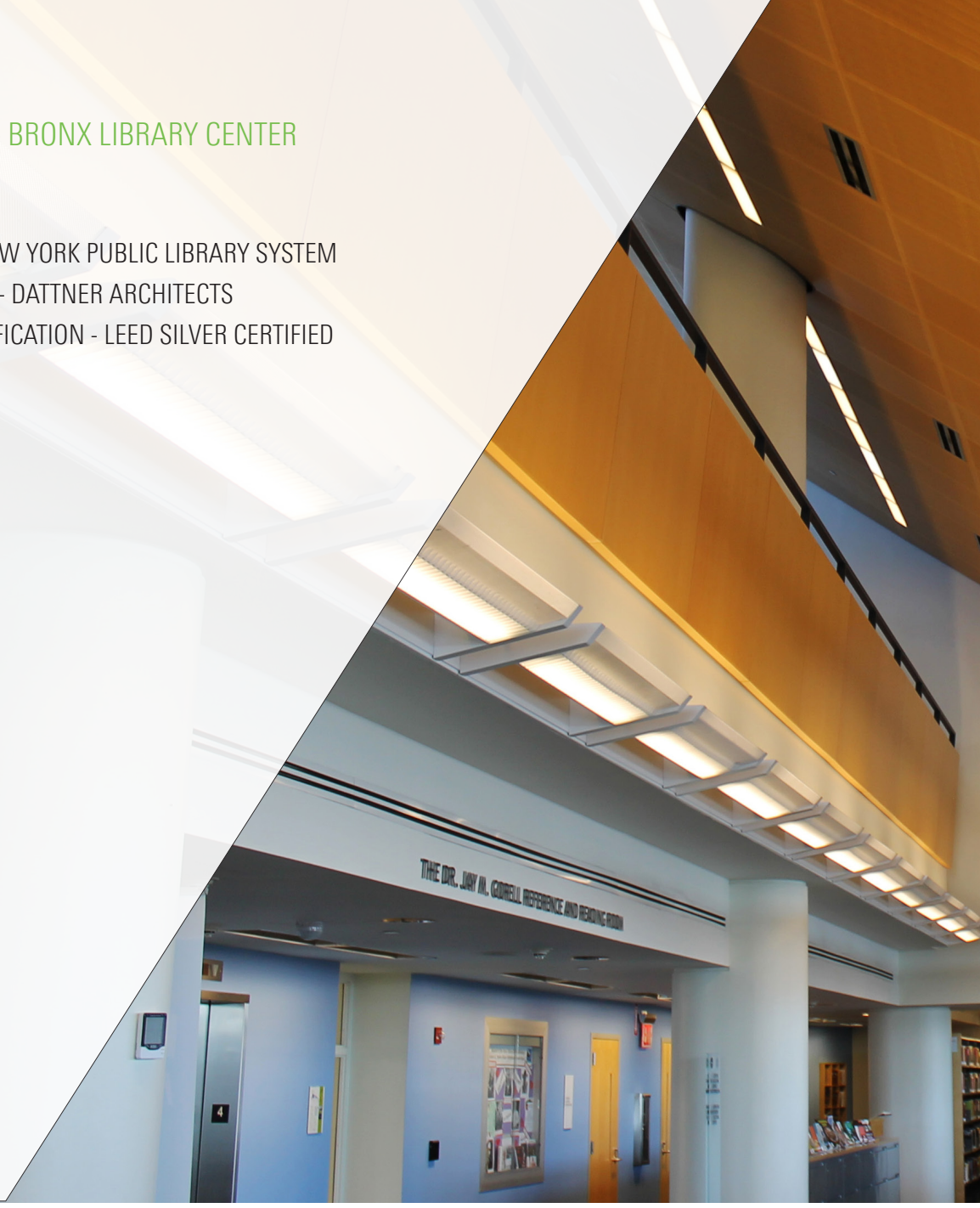
PROJECT - BRONX LIBRARY CENTER

Bronx, NY

CLIENT - NEW YORK PUBLIC LIBRARY SYSTEM

ARCHITECT - DATTNER ARCHITECTS

LEED CERTIFICATION - LEED SILVER CERTIFIED



ABOUT THE PROJECT

The Bronx Library Center is a 78,000 square foot facility that offers many amentities and opportunities to grow and learn for its surrounding neighborhood. Designed by Dattner Architects, this LEED Silver Certified building provides its guests with an expanded circulation and reference collection, state-of-the-art technology, educational classes for all ages, literacy classes, and also houses the Latino and Puerto Rican Cultural Center.

Dattner Architects utilized many green sustainable features throughout the new library center. The glass curtainwall creates an abundance of natural light is seen throughout the building. The reading areas are strategically placed to take full advantage of this; thus providing excellent lighting to enhance the visitor's experience at the new library. Photosensors and

FEATURED PRODUCTS

BRONX LIBRARY CENTER
interior photos

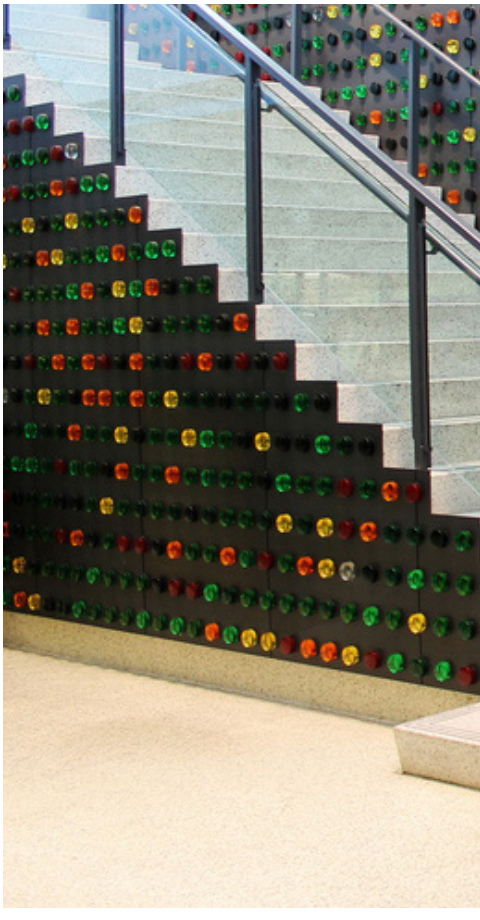
occupancy sensors are also used in the facility. Early estimates state the Bronx Library Center will save 20% on electricity. The lights also dim automatically depending upon how light is able to penetrate the building. Other sustainable features are the use of a roof that reflects solar heat and utilizing recycled materials. These materials are used both inside and outside of the library.

THE TITUS SOLUTION

The HVAC system also has Green Solutions. Titus has many air distribution products that provide the heating and cooling for the new facility. The FlowBar, ML and OMNI diffusers are the primary air outlets while the DTQS fan powered terminal unit is one of the terminal units featured.

The FlowBar is a unique linear diffuser system that maximizes engineering performance without sacrificing aesthetic considerations of the designer. It delivers higher airflows than conventional linear diffusers. With its immense amount of available slot widths, the FlowBar provides more cfm per linear foot while minimizing noise and pressure loss.

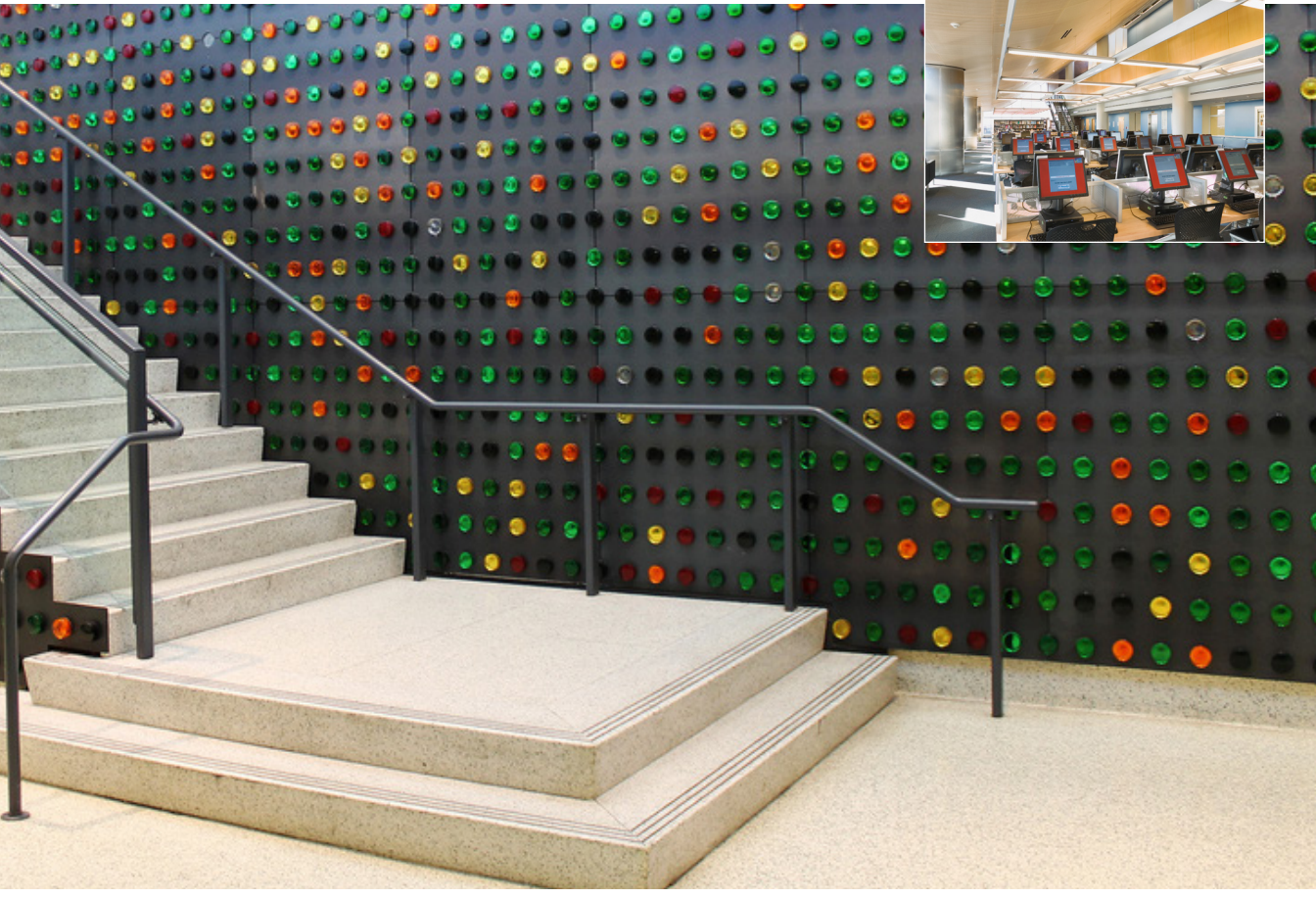
The ML and OMNI ceiling diffusers are excellent selections for air distribution as well. The ML is a high performance linear slot diffuser that allows both changes in air volume and direction from the face of the diffuser. The OMNI diffuser delivers a uniform 360 degree horizontal air pattern without excessive noise or pressure drop. The DTQS is a fan powered terminal unit.



The quiet unit comes with built-in sound baffles that produces low sound levels. An energy efficient fan motor is mounted with vibration isolators that provides constant air delivery and temperature blending by utilizing pressure independent airflow control. The DTQS maintains the variable air volume (VAV) energy savings at the central fan.

THE END RESULT

The Bronx Library Center is the largest public library in the Bronx. It has extensive collections of print and non-print materials for adults, young adults, and children. The center is New York Public Library's first Green facility and the first public facility in New York to achieve LEED accreditation.



PROJECT - AMBER TRAILS COMMUNITY SCHOOL

Winnipeg, MB

CLIENT - SEVEN OAKS SCHOOL DIVISION
ARCHITECT - PRAIRIE ARCHITECTS
CONTRACTOR - BOCKSTAEL CONSTRUCTION LTD.
MECHANICAL CONTRACTOR - THOR PLUMBING & HEATING LTD.
LEED CERTIFICATION - LEED PLATINUM CERTIFIED

ABOUT THE PROJECT

Students at Amber Trails Community School in Winnipeg, Manitoba, are being taught by a new teacher – the building itself. The creative team from Prairie Architects partnered with the Seven Oaks School division to design a school to serve as a teaching tool for its students, one that highlights the impact facilities have on their communities. The new school is intended to challenge the existing standards about school design and to create exciting new visions for education based on a welcoming entrance, family home-like scale, natural daylight, atelier spaces, transparency courtyards, flexibility, and a fusion of inside and outside environments. The abundance of fresh air, sustainable design elements and natural light not only teach the students about sustainability but also help them study by providing a healthy learning environment. In addition to housing the K-8 students, the 78,000

CBAL-24

FEATURED PRODUCTS

AMBER TRAILS COMMUNITY
interior photos

square foot facility will also serve as a neighborhood daycare and public library. This is great platform to keep all of the community in one central location.

THE TITUS SOLUTION

HVAC SYSTEM BOLSTERS SUSTAINABILITY

To match its sustainable design, the building uses chilled beam products as its primary source of air distribution. The beams feature the aerodynamic properties of Titus' ceiling diffusers and benefit from the use of using hydronic coils and induced air, reducing energy consumption associated with removing sensible thermal loads.

After being discharged through nozzles located along the beams, the primary air is supplied to the beam's mixing chamber. The nozzles inject this air into the mixing chamber at velocities capable of inducing room air through one or two coils and where it mixes with the primary supply air. This air mixture is then discharged through the ceiling slot diffusers into the space, providing high cooling outputs with low amounts of primary air. The reduced volume of air leads to smaller (and less expensive) air handlers and ducts and less energy consumption.

The supplied air from the air handling unit is tempered and dehumidified to handle the latent load. The remaining loads in the space are addressed via the chilled beam's heat exchanger. Applications with low latent cooling loads could potentially use 100 percent outdoor air, allowing for a dedicated outdoor air system with energy recovery that would further reduce total system energy consumption.

The chilled beams used for this project can be used for both heating and cooling and are offered in multiple sizes – 12-inch and 24-inch widths and 2ft to 10ft lengths. They can be easily integrated into different grids styles within a suspended ceiling or even in drywall ceilings. The low overall height of these chilled beams make them ideal for reducing space required for false ceilings.

Additional air distribution products helped to complete an impressive school for the community. Chilled beams provide a great alternative to conventional overhead heating and cooling.

THE CHILLED BEAM ADVANTAGE IN SCHOOLS

Studies have shown that excessive noise levels can adversely affect student performance. Conventional HVAC systems typically used in schools today (fan-powered VAV, fan coils, unit ventilators), rarely meet prescribed background noise level requirements - ANSI standard S12.60 for classroom acoustics requires a maximum background noise level of 35 dBA (about NC-27) – this is difficult, if not near impossible to attain with traditional equipment.

Furthermore, student performance is affected by space humidity and ventilation levels. HVAC systems whose primary airflow rate is modulated while the classroom is occupied often do not comply with the requirements of ASHRAE 62.1. Ventilation airflow rates are difficult to maintain at part load conditions with modulating the primary airflow rates. Chilled beams are systems where zoned based hydronic-heating and/or cooling devices compliment the conditioning of the primary air ventilation system, allowing for optimization of all heating, cooling and ventilation functions and providing opportunities for savings in energy, ceiling cavity space and maintenance as well as increased occupant performance.

Most conventional HVAC systems depend on the delivery of large volumes of air to condition the classroom. Chilled beam systems typically reduce ducted air requirements by as much as 60% by relying on their integral heat transfer coils to offset most of the space sensible cooling and heating requirements. Since water is more efficient for space cooling and heating than air, chilled beams use considerably less overall energy than the other options available, such as VAV, VRF, and fan coil units.

Since chilled beams allow classroom ducted airflow rates to be reduced to that which is required for space ventilation and latent cooling, they are ideal for use with 100% (DOAS) outside air systems. This allows the beams to provide a constant volume of ventilation air to the classroom at all times. Chilled beans also contribute toward achieving LEED certification.

THE END RESULT

The new school, which opened its doors in January 2015 was designed to meet the requirements for LEED Gold but actually achieved LEED Platinum Certification and now has a total occupancy of 775 students and staff. With dedicated spaces allotted for day care, early childhood education, play areas and a public library, Amber Trails Community School is a vital piece of a Winnipeg community's puzzle. Thanks to a sustainable design and energy efficient HVAC system, the multipurpose space serves as a daily reminder to students, teachers and the overall community about how buildings can have a positive impact on communities beyond their intended uses.

PROJECT - DENVER ANIMAL SHELTER

Denver, CO

CLIENT - CITY OF DENVER

ARCHITECT - ANIMAL ARTS

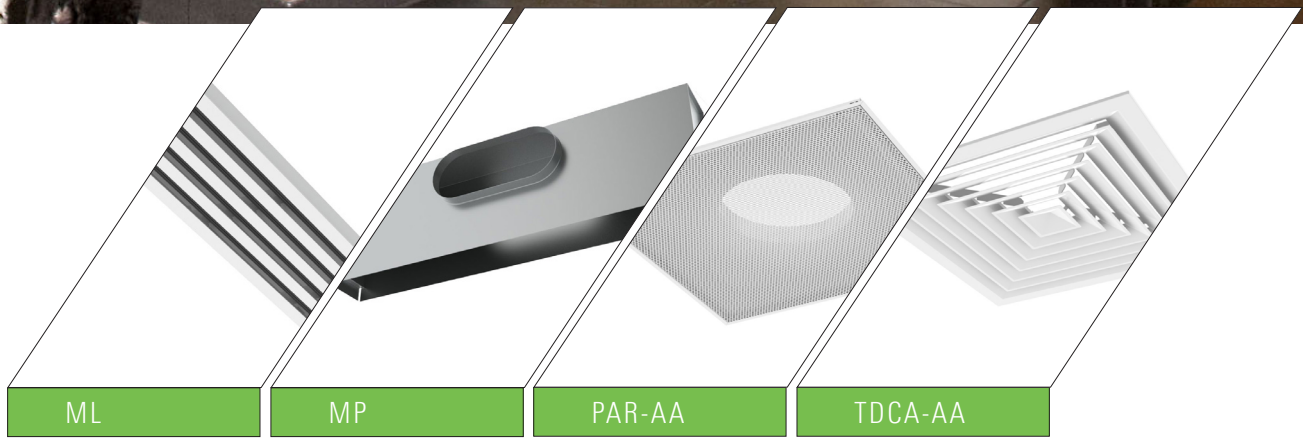
CONSTRUCTION - GOLDEN TRIANGLE CONSTRUCTION

LEED CERTIFICATION - LEED PLATINUM CERTIFIED

ABOUT THE PROJECT

Proving high quality animal care is becoming more and more important in our society today. Animal shelters that were once housed in older buildings are being cast aside and new and impressive structures are being built in their place. Denver is the latest city to follow suit. Opening in June 2011, the new Denver Animal Shelter is a 36,000 square-foot facility that is twice the size of the previous one. With more space to meet the needs of a growing community, the new shelter now offers the city the latest technology in humane animal care.

The Denver Animal Shelter is the first and only animal shelter in the US designed with Green Building concepts. The architects at Animals Arts created a facility that achieved LEED Platinum Certification. The sustainable



FEATURED PRODUCTS

DENVER ANIMAL SHELTER
interior photos

elements and energy saving features definitely places the new shelter head and shoulders above the competition. The kennels have radiant-floor heating installed which is not only energy-efficient, but aids in reducing the spread of disease throughout the shelter. The roof of the building incorporates a photovoltaic-ready design, making the addition of solar panels at a later date a simple installation. Other sustainable elements include the use of daylight sensors to automatically control the lights and energy usage, the reuse and preservation of the site in which it was constructed and utilizing recycled content to build the shelter. The HVAC system and products used also have a major role in the building earning LEED recognition.

THE TITUS SOLUTION

Green Building design and providing HVAC energy solutions is nothing new to Titus. We have been the industry leader for many years. We provided many air distribution outlets for the shelter including: the ML diffuser and MP plenum, the PAR-AA perforated diffuser, and the TDCA-AA diffuser.

The ML Modulinear diffuser is a high performance, high quality linear slot supply diffuser. The "ice tong" deflector blades allow for both changes in air volume and direction from the face of the diffuser. The MP is an optional plenum for use with the ML modulinear series. When the MP is combined with the ML diffuser, the MP provides a tight horizontal air pattern that clings to the ceiling even at low volumes.

The PAR-AA is an aluminum perforated ceiling diffuser. Perforated ceiling diffusers are typically selected to meet architectural demands for air outlets that blend into the ceiling plane. Their features include a perforated face with 51% free area, round or square inlets, and multiple mounting options. Titus perforated diffusers can be selected with round or cross flow discharge patterns to maximize capacity or throw. The Titus TDCA-AA diffuser handles an unusually large amount of air for a given pressure drop and noise level. Its pleasing appearance harmonizes with various architectural details, especially in modular ceiling systems.

THE END RESULT

The city of Denver is generating a lot excitement with construction of new buildings that are not only filling a need, but are built with sustaining the environment as well. The new animal shelter is just another in a long line of impressive structures that can be seen throughout the city.

PROJECT - VISTEON VILLAGE

Van Buren Township, MI

CLIENT - VISTEON CORPORATION

ARCHITECT - SMITHGROUP

LEED CERTIFICATION - LEED GOLD CERTIFIED

ABOUT THE PROJECT

The Visteon Corporation is a leading innovator in the automotive design industry and produces components, systems, and modules that appeal to drivers and passengers throughout the world. Their corporate headquarters is a unique collection of buildings designed to create a community-style work environment while promoting green building concepts.

They strongly believe in corporate responsibility with environmental management among their highest priorities. Visteon preserved the wetlands on the site and also conserves energy by utilizing extensive daylight harvesting. The Titus underfloor products used to provide the air distribution are the DLHK terminal unit, the CT-TAF-L linear bar grille, and the TAF-R underfloor diffuser in numerous locations along the perimeter of the

FEATURED PRODUCTS

VISTEON VILLAGE CORP.
interior photos

building's interior to provide the necessary airflow for the load requirement.

THE TITUS SOLUTION

SmithGroup, a full-service architecture and engineering firm, had a ingenious idea for the underfloor application. George Karadis, PE, Vice-President and Director of Mechanical Engineering for SmithGroup, envisioned an integrated system for the building perimeter that did not utilize fan coil filter units, underfloor partitions or a myriad of control devices. The solution satisfies all perimeter heating, ventilating and air distribution requirements through one linear floor grille assembly.

Incorporated into the continuous CT linear bar grille frame are varying sets of segmental nuanced aperture plates, blank-offs and deflector wings that are mounted into heating, cooling or return plenums. The next stage of development involves actuation of a sliding aperture plate beneath a fixed one. This will modulate the open area through which the air jets pass. Variable cooling requirements will be met while maintaining a nearly constant velocity of air and plume heights. Titus engineers went through the process of taking their concept and turning into a viable product - The TAF-L Perimeter System.

THE END RESULT

By arranging the floor grille over the aperture plates, it created room air induction, thus raising the temperature of the air jets and reducing the

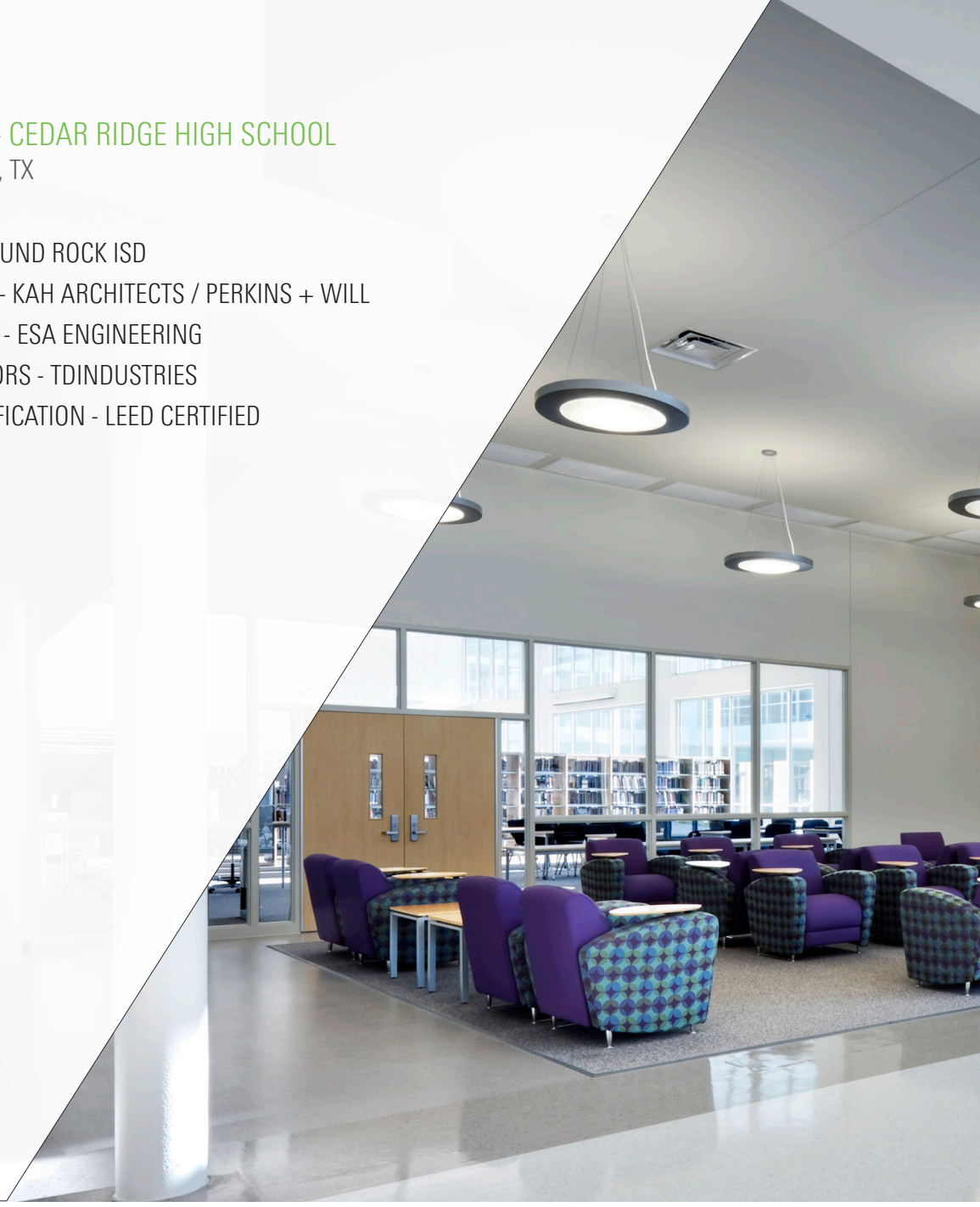
height of the vertical plume. The Visteon project design utilizes a floor pressure of .07"w.g. which discharges 225cfm of conditioned air in a 6-7' vertical plume at an angle of 5°. This mixes the air in the occupied zone without disturbing the stratified layer overhead.

The TAF-L Perimeter System is designed to address the challenges of handling perimeter loads in a modular system. It is comprised of a modular cooling plenum, the TAF-L-V, a linear diffuser return plenum, the TAF-L-R, and two heating plenums, the TAF-L-W and the TAF-L-E. The CT-TAF-L linear bar diffuser, which mounts into the TAF-L's cooling, heating or return plenum, is designed to handle the high loads of the perimeter while maintaining the engineered plume height throughout its operating range. The CT frame drops into the perimeter slot and sits on top of the carpeting. It installs into the TAF-L plenums from the top surface and removal of the flooring is not required.

PROJECT - CEDAR RIDGE HIGH SCHOOL

Round Rock, TX

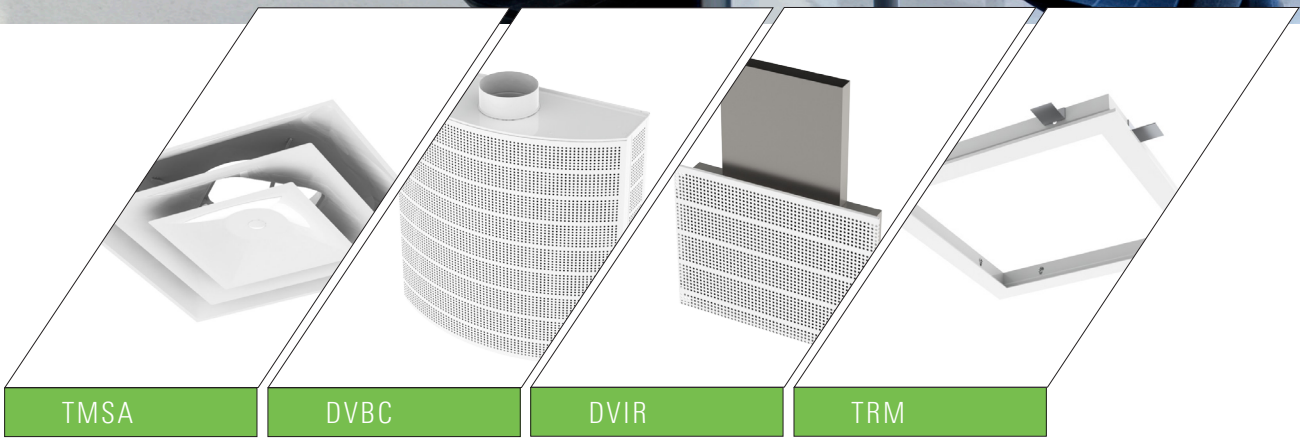
CLIENT - ROUND ROCK ISD
ARCHITECT - KAH ARCHITECTS / PERKINS + WILL
ENGINEERS - ESA ENGINEERING
CONTRACTORS - TDINDUSTRIES
LEED CERTIFICATION - LEED CERTIFIED



ABOUT THE PROJECT

Round Rock ISD envisioned a sleek, modern new campus that would foster growth and development for its students. They wanted a high school capable of unlocking the hidden abilities of their students and one that would aid their teachers in preparing their students for the next chapter of their lives. Cedar Ridge High School is the result.

Cedar Ridge High School is a unique two-story, 375,000 square-foot high school divided into four distinct academies: Academy of International Business and Economics, Academy of Professional Studies, Academy of Science, Technology, Engineering, and Mathemathics, and the Academy of Visual and Performing Arts. Each academy houses its own media center, administration suites and planning areas for teachers. The common areas



FEATURED PRODUCTS

CEDAR RIDGE HIGH SCHOOL
interior photos

for all students are the cafeteria, the athletic facility and the outdoor courtyard which is considered the heart of campus and is home to several multi-purpose events.

The design team and Round Rock ISD wanted this school to be an environmentally friendly facility. This LEED Certified school has several sustainable elements featured. It uses local limestone materials on the exterior of the buildings and offers an abundance of natural light. All the windows allow natural light to penetrate deep into the occupied spaces.

THE TITUS SOLUTION

The HVAC system featured in the high school also contributed toward it achieving LEED Certification. Titus has an abundance of products installed that provide energy savings for the school. Several areas in the new high school utilize displacement ventilation, which is a unique alternative for air distribution.

The DVIR and DVBC are rectangular displacement diffusers. The DVIR is a unidirectional discharge diffuser designed for flush mount applications. The DVBC has a curved face and discharges air via a three-way pattern. Both units provide air distribution by supplying large volumes of air at low velocities into the occupied zone. Easily adjustable air pattern controllers inside the units can create different airflow patterns in the space to optimize occupant comfort.

Some additional products featured in the school are the TMS diffuser and the TRM mounting frame.

The Titus TMSA is a steel diffuser that features adjustable vanes which vary the discharge pattern between vertical and horizontal for heating and cooling applications. These diffusers deliver supply air in 360º pattern and are designed to protect ceilings from smudging. All sizes have 3 cones providing a uniform appearance. The TRM is an aluminum mounting frame used to make installation of grilles & diffusers and other ceiling components in plaster and sheet rock ceilings as simple as inserting them in a standard T-bar type ceiling. For typical applications, the frame has adjustable fastening clips which adapt to a variety of plaster and sheet rock ceiling thicknesses.

THE END RESULT

There have been numerous studies on the importance of proper ventilation in our schools. Cedar Ridge High School has a state-of-the-art HVAC system that provides superior performance for its students and faculty. The new high school is also a beautiful campus that has created the best learning environment for the students of Round Rock, Texas. The teachers, staff and administration now have a technologically advanced partner that will assist them in molding the future leaders for the next generation.

PROJECT - ANACOSTIA LIBRARY

Washington, D.C.

CLIENT - DC PUBLIC LIBRARY SYSTEM
ARCHITECT - THE FREELON GROUP
CONSTRUCTION - FORRESTER CONSTRUCTION
LEED CERTIFICATION - LEED SILVER CERTIFIED

ABOUT THE PROJECT

The DC Public Library System continues to enrich its neighborhoods with impressive libraries. The Anacostia Library opened its doors on April 26, 2010. This two-story building is 22,000 square feet of inviting spaces for adults, teens and children to enjoy for many years to come. Designed by The Freelon Group, the new library offers many amenities to choose from. There are 40,000 books, dvds, cds, and other material for all age groups. This LEED Silver Certified building also has comfortable seating for 200 customers, quiet study areas and two conference rooms. Visitors have access to free Wi-Fi internet, laptop computers and Mac computers. There are also separate designated reading areas for adults, teens and children.

Sustainable solutions can be seen on the inside and exterior of the building.

FEATURED PRODUCTS

ANACOSTIA LIBRARY
interior photos

The building was built on a previously developed site and is located near several bus routes and a subway station. Other green features include daylight harvesting, high building insulation, occupancy sensors, and solar panels.

THE TITUS SOLUTION

The highly efficient HVAC system used in the new library was selected to help achieve LEED certification. The Titus UnderFloor Air Distribution (UFAD) system was selected to be the primary source of airflow for the new library because this innovative system affords architects and building owners options long after the building is finished. The TAF-R diffuser is a round underfloor product that is architecturally pleasing and designed for use in high induction raised floor applications. It is constructed of a high impact, polymeric material that's durable enough to resist foot traffic.

The diffuser now has the fastest installation in the industry with the new innovative spring clip design and it can be easily relocated to another location simply by relocating the floor panel it is installed in. The TAF-R diffuser is also a GreenSpec Listed™ product that can help contribute toward achieving LEED credits. Another benefit of the TAF-R is the ease in which it can be adjusted. The top of the unit can be turned clockwise or counterclockwise to reduce or add airflow into the occupied space.

The TBDI-30 is an insulated high performance plenum slot diffuser that

utilizes the Titus Modulinear pattern controller. This feature allows for 180 degree adjustment of the discharge direction as well as volume control from the face of the diffuser. The CT linear bar grille. Titus CT linear bar diffusers are designed for both heating and cooling applications, supply as well as return. It is available in eight different core styles plus a wide selection of frames and borders. These diffusers can be used for ceiling, side wall, or sill installations. Accessories such as directional blades, dampers, blank-offs, access doors and mitered corners make these diffusers even more versatile.

An added bonus of the CT and TAF-R diffusers is they both are available in wood grain finish options which can add to the architectural beauty of any interior.

THE END RESULT

The Anacostia Library incorporated many elements in its design. Green Building concepts and the surrounding community itself played integral roles in the design of the new library. By being open to meeting the needs of the surrounding community, The Freelon Group created a library that teaches everyone about the environment while creating an innovative and welcoming facility for all to enjoy for many generations to come.

PROJECT - STEINBACH REGIONAL SECONDARY SCHOOL

Steinbach, MB

CLIENT - HANOVER SCHOOL DIVISION
ARCHITECT - STANTEC ARCHITECTURE
ENGINEERS - STANTEC CONSULTING LTD
CONTRACTOR - PENN-CO CONSTRUCTION CANADA
MECHANICAL - WESTWOOD MECHANICAL INC
LEED CERTIFICATION - LEED GOLD CANDIDATE

ABOUT THE PROJECT

Class is back in session and the teachers have a little more help this year. The newly renovated Steinbach Regional Secondary School in Steinbach, Manitoba is assisting the faculty with a great lesson for the students on the environment and the impact buildings make. Stantec Architecture and the Hanover School Division envisioned a school built to serve as a learning tool for its existing student population as well as the growing community. The new high school serves grades 9-12 and will offer more chances for students to learn and develop skills that will prepare them for life after high school. After the renovation and new addition, the students now have the opportunity to learn real-world skills to gain employment in fields such as cosmetology, construction, power mechanics, and welding.

CBAL-24

FEATURED PRODUCTS

STEINBACH REGIONAL SEC.
interior photos

The sustainable design elements and the abundance of natural light now present in the school will not only teach the students about sustainability, but also help them study by providing a healthy learning environment. On top of housing the 9-12 grade students, the 300,000 square foot facility also serves as a neighborhood daycare for the ever-growing population in Steinbach.

THE TITUS SOLUTION

ALIGNING WITH SUSTAINABILITY

To align with the sustainable design elements already in use, the high school incorporates chilled beam products as its primary source of air distribution. The beams feature the aerodynamic properties of Titus' ceiling diffusers and benefit from the use of using hydronic coils and induced air, reducing energy consumption associated with removing sensible thermal loads.

After being discharged through nozzles located along the beams, the primary air is supplied to the beam's mixing chamber. The nozzles inject this air into the mixing chamber at velocities capable of inducing room air through one or two coils and where it mixes with the primary supply air. This air mixture is then discharged through the ceiling slot diffusers into the space, providing high cooling outputs with low amounts of primary air. The reduced volume of air leads to smaller (and less expensive) air handlers and ducts and less energy consumption.

The supplied air from the air handling unit is tempered and dehumidified to handle the latent load. The remaining loads in the space are addressed via the chilled beam's heat exchanger. Applications with low latent cooling loads could potentially use 100 percent outdoor air, allowing for a dedicated outdoor air system with energy recovery that would further reduce total system energy consumption.

The chilled beams used for this project can be used for both heating and cooling and are offered in multiple sizes – 12-

inch and 24-inch widths and 2ft to 10ft lengths. They can be easily integrated into different grids styles within a suspended ceiling or even in drywall ceilings. The low overall height of these chilled beams make them ideal for reducing space required for false ceilings.

Additional air distribution products helped to complete an impressive school for the community. Chilled beams provide a great alternative to conventional overhead heating and cooling.

THE FRESH AIR ADVANTAGE IN SCHOOLS - CHILLED BEAMS

Studies have shown that excessive noise levels can adversely affect student performance. Conventional HVAC systems typically used in schools today (fan-powered VAV, fan coils, unit ventilators), rarely meet prescribed background noise level requirements - ANSI standard S12.60 for classroom acoustics requires a maximum background noise level of 35 dBA (about NC-27) – this is difficult, if not near impossible to attain with traditional equipment.

Furthermore, student performance is affected by space humidity and ventilation levels. HVAC systems whose primary airflow rate is modulated while the classroom is occupied often do not comply with the requirements of ASHRAE 62.1. Ventilation airflow rates are difficult to maintain at part load conditions with modulating the primary airflow rates. Chilled beams are systems where zoned based hydronic-heating and/or cooling devices compliment the conditioning of the primary air ventilation system, allowing for optimization of all heating, cooling and ventilation functions and providing opportunities for savings in energy, ceiling cavity space and maintenance as well as increased occupant performance.

Most conventional HVAC systems depend on the delivery of large volumes of air to condition the classroom. Chilled beam systems typically reduce ducted air requirements by as much as 60% by relying on their integral heat transfer coils to offset most of the space sensible cooling and heating requirements. Since water is more efficient for space cooling and heating than air, chilled beams use considerably less overall energy than the other options available, such as VAV, VRF, and fan coil units.

Since chilled beams allow classroom ducted airflow rates to be reduced to that which is required for space ventilation and latent cooling, they are ideal for use with 100% (DOAS) outside air systems. This allows the beams to provide a constant volume of ventilation air to the classroom at all times. Chilled beans also contribute toward achieving LEED certification.

THE END RESULT

Having opened its doors in August 2014, Steinbach is designed to meet the requirements for LEED Gold Certification. Thanks to a sustainable design and an energy efficient HVAC system, this multipurpose building serves as a daily reminder to students, teachers and the overall community about how buildings can have a positive impact on neighborhoods as they continue to grow over time.

PROJECT - PALO VERDE ENERGY EDUCATION CENTER

Buckeye, AZ

CLIENT - APS

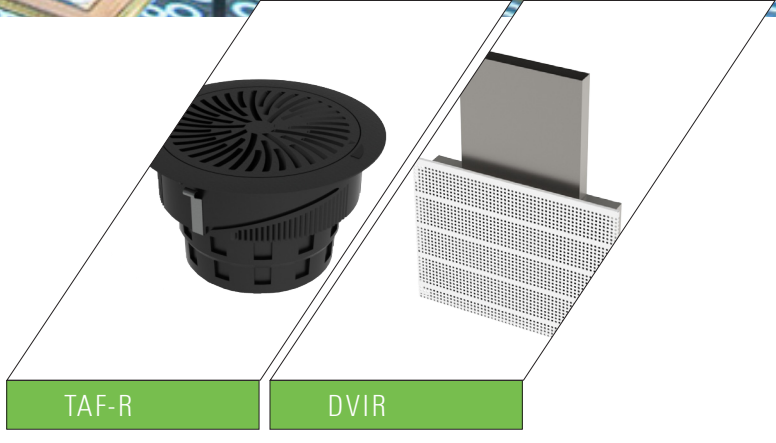
ARCHITECT - ARRINGTON WATKINS ARCHITECTS

LEED CERTIFICATION - LEED GOLD CERTIFIED

ABOUT THE PROJECT

The Palo Verde Energy Education Center (EEC) opened in 2011. The main purpose for this facility is to serve as an emergency base of operations in the event of a crisis at the Palo Verde Nuclear Generating Station (PVNGS), which is conveniently located 22 miles away. During non-emergency times, the center is used as a technical and education facility. Information from the PVNGS is displayed via live data streams and monitored closely by employees at the facility. They are able to communicate instanly with the individuals at the plant and other officials around the world if any issue arises at the nuclear plant.

The EEC was designed by Arrington Watkins Architects to be an energy-efficient, state-of-the-art building and incorporates the latest technologies



FEATURED PRODUCTS

ENERGY EDUCATION CENTER
interior photos

in creating sustainable structures to achieve this goal. "We designed the facility to not only help officials with the dissemination and flow of information, but also make it as efficient as possible in terms of sustainability and functionality," Michael Conder, project director for Phoenix-based Arrington Watkins Architects, said. Some of the Green Building concepts utilized in this LEED Gold Certified facility are that it uses heavy insulation for the building envelope, has specialized sizing and shading on all the windows installed and the air distribution system.

THE TITUS SOLUTION

The HVAC system in the EEC uses Displacement Ventilation and UnderFloor Air Distribution (UFAD). "Our design team felt that underfloor distribution of air, power, and data was going to be the best way to ensure flexibility for the multiuse functions of the building," Conder said. A Displacement Ventilation system is similar to an UnderFloor system in that is uses warmer supply air and lower pressures then a conventional overhead system. As a result, displacement ventilation systems have many of the same benefits of UFAD systems, such as longer economizer periods, potential energy savings from the warmer supply air and lower horsepower fans, and quiet operation. Both systems allow fresh, conditioned air to distribute properly throughout the center.

The main products featured in the Palo Verde Energy Education Center are the TAF-R UnderFloor diffuser and the DVIR Displacement Ventilation diffuser. The TAF-R is a GreenSpec Listed™ product available in either standard light gray or black. All components of the unit are constructed of a high-impact polymer material designed to resist damage from heavy foot traffic. Additional colors may be specified to match any building's interior scheme. This model can help contribute toward achieving LEED credits as well. Another benefit of the TAF-R is the ease it can be adjusted. The top of the unit can be turned clockwise or counterclockwise to reduce or add airflow into the occupied space. As an added bonus the TAF-R and the face of the DVIR are available in wood grain finish options to add elegance to the interior of the space.

Displacement Ventilation is a great alternative to conventional overhead ceiling supply systems and operates very similar

to an underfloor system. Displacement ventilation provides design flexibility, energy savings, and the highest level of indoor air quality (IAQ). The higher supply temperature and smaller air handler/system can generate energy savings. Also, the addition of more free cooling days from bringing outside air in contributes toward energy savings. On the IAQ side, DV has a ventilation effectiveness factor of 1.2 which translates to a 20% bonus when designing for ventilation requirements per ASHRAE Standard 62.1.

The DVIR is a rectangular displacement diffuser with a one-way discharge air pattern designed for flush mount applications. Constructed of galvanized steel and aluminum, the DVIR is designed for in-wall applications and supplies a large volume of air at low velocities into the occupied zone.

"These products allowed us to have multiple mechanical zones in large open areas, accommodating temperature control at an individual scale, rather than the space as a whole," Conder said.

THE END RESULT

The Palo Verde Energy Education Center is equipped to handle any emergency situation that would arise from the nearby nuclear plant. Plant personnel and government leaders would be able to relay information to news, media and law enforcement officials in the event of any emergency. Having a facility such as this ready to provide assistance at a moments notice will definitely ease the concerns of the surrounding community in the event of a crisis.

PROJECT - SPERTUS JEWISH INSTITUTE

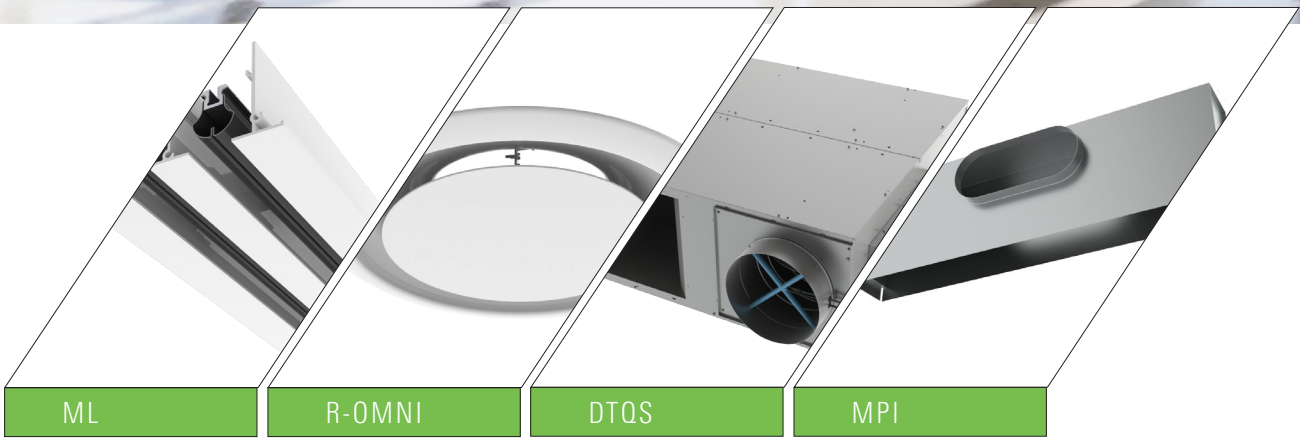
Chicago, IL

CLIENT - SPERTUS JEWISH INSTITUTE
ARCHITECT - KRUECK & SEXTON ARCHITECTS
FACADE DESIGN - ADVANCED STRUCTURES INC (ASI)
LEED CERTIFICATION - LEED SILVER CERTIFIED

ABOUT THE PROJECT

The Spertus Institute of Jewish Studies is deeply rooted in Jewish values and invites people of all ages and backgrounds to explore the multi-faceted Jewish experience. Through its innovative programs and facilities, Spertus inspires learning and fosters understanding for Jews and people of all religious faiths from around the world. The new facility for Spertus is a mixed-use program containing exhibition galleries, a library, a 400-seat multi-use auditorium and much more.

Designed by the award-winning architectural firm of Krueck + Sexton Architects, this LEED Silver Certified building is an innovative and environmentally sustainable facility that features interconnected interior spaces and a one-of-a-kind, ten-story faceted window that provides



FEATURED PRODUCTS

SPERTUS JEWISH INSTITUTE
interior photos

spectacular views of the Chicago skyline. A 6,700 square foot green roof - planted with special vegetation - manages storm water, absorbs air pollution and helps keep the building cool in the summer. The glass wall is built from over 700 individual pieces of glass in 556 different shapes. Thanks to recent advancements in technology, it was possible to delineate and engineer a glass shape as complex as the ones used in the glass wall of the Spertus building. for all students are the cafeteria, the athletic facility and the outdoor courtyard which is considered the heart of campus and is home to several multi-purpose events.

THE TITUS SOLUTION

The Titus products selected for this project were the ML linear slot ceiling diffuser, the DTQS fan powered terminal, the R-OMNI ceiling diffuser, and the MPI plenum. The Titus ML Modulinear diffuser is a high performance diffuser that utilizes uniquely designed “ice tong” deflector blades. These deflector blades allow for both changes in the air volume and direction from the face of the diffuser by gradually moving the pattern controllers. ML diffusers are designed for variable air volume systems (VAV) and project a uniform blanket of air that adheres to the ceiling even at low flow rates.

The DTQS is a fan powered terminal unit that provides constant air and blends the temperature well while maintaining the variable air volume energy savings at the central fan. The MPI plenum is an insulated plenum that utilizes the Modulinear diffuser’s excellent VAV performance to keep the air on the ceiling in a tight horizontal pattern. The R-OMNI’s smooth face is adjustable in three positions for horizontal or vertical airflow. It can be used effectively in heating or cooling applications.

THE END RESULT

The Spertus Building is an amazing blend of Green Building concepts that maintains the respect for the period in which it was contructed. Originally constructed in the period after the Chicago fire, this building creates an interesting dynamic that harmonizes with the surrounding buildings.

Even though the glass facade is huge collectively, individually they are the same size as the other buildings on Michigan Avenue. The glass facade also consistently allows natural light to penetrate from several angles and expands the views of the interior. This emphasis on light echoes the logo of Spertus - a flame accompanied by the biblical phrase yehi meaning "let there be light." This symbolizes both physical light and the light of learning. The building has also received numerous accolades since opening its door in 2007. It has been honored with the following:

- LEED-NC Silver
- Patron of the Year, 2007 | Chicago Architecture Foundation
- Building Award, 2008 | AIA Chicago Chapter
- Divine Detail Award, 2008 | AIA Chicago Chapter
- Building of the Year, 2008 | Interior Design Magazine
- Crystal Achievement Award | Most Innovative Curtain Wall

Today, Spertus is powered exclusively by renewable energy. Over the course of three years, this process will reduce the CO^2 level by 6,200 tons from entering Earth's atmosphere. It also saves 40 tons of waste from entering landfills through recycling initiatives each year. Spertus continues to do its part in healing the world and hopes others will follow suit for future generations.

Titus
Redefine your comfort zone.™

CASE STUDY PROJECTS

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

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