

A I R D I S T R I B U T I O N
PRODUCTS

PRODUCT:
EOS

eos 
THE SMART DIFFUSER

F O C U S
01



ADVANCING THE SCIENCE OF AIR DISTRIBUTION

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.

Perimeter Overhead Heating & Cooling

All engineers want to design the perfect system. But historically, HVAC design has been a game of compromises. The goals are occupant comfort, energy savings, system controllability and installed cost.

The comfort of perimeter zones in commercial buildings is a perfect example of these compromises. Almost all buildings require seasonal heating and cooling to counter perimeter load during different seasons of the year. Most commercial buildings in the US are overhead mixed systems. Overhead systems work well in cooling with proper diffuser selection. Overhead heating can be challenging.

A good solution could be to provide overhead cooling and baseboard heating but providing two systems, may be cost prohibitive. Here the engineer is faced with their first compromise. A fairly common compromise is to provide a perimeter slot diffuser with either a dedicated down blow section to provide some heat to the floor or a diffuser with split pattern control so half of the air can always be directed down while the other half is directed horizontally across the ceiling.

As a compromise, this may meet ASHRAE minimum requirements, but it is not the optimum solution. In both heating and cooling modes, half the supply air is being discharged in the wrong direction for optimal comfort and energy savings. In heating, half of the supply air is discharged horizontally causing stratification along the ceiling. In cooling, half of the supply air is discharged vertically causing unwanted drafts along the floor.

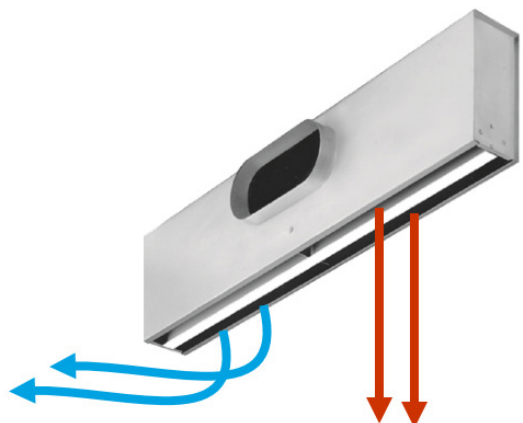
The Titus EOS is a plenum slot diffuser designed to address the imperfect perimeter compromises by providing the perfect perimeter solution. The EOS automatically changes the air discharge pattern to horizontal for cooling or vertical for heating.



Traditional Overhead Heating / Cooling Dilemma

In the cooling mode, 50% of the supply air is directed down the exterior walls – which also wastes energy and causes drafts near the floor.

- » 50/50 throw pattern is the best compromise for both heating and cooling
- » Half of the air is always directed in the wrong direction, wasting energy
- » T150 to 4' - 5' AFF (Above Finished Floor)
- » Max $\Delta t = 15^\circ\text{F}$
- » ASHRAE Standard 62.1



The EOS Solution

When 100% of the supply air is effectively utilized, the room temperature reaches set-point faster allowing the HVAC system to run for a shorter duration of time – which saves energy. Lab tests show the savings to be as high as 30% which makes it a great choice when designing buildings for LEED certification.

The EOS increases occupant comfort and saves energy without the use of any external power source. The auto-changeover action is powered by a unique energy harvesting system which uses solar or ambient light energy to power a miniature motor/actuator assembly. A PC board with temperature sensor uses smart logic to monitor supply air temperature and quickly change the air discharge pattern.

With the EOS, Titus continues as the industry leader in innovative design by providing an energy efficient and cost effective solution for the perimeter heating/cooling dilemma.

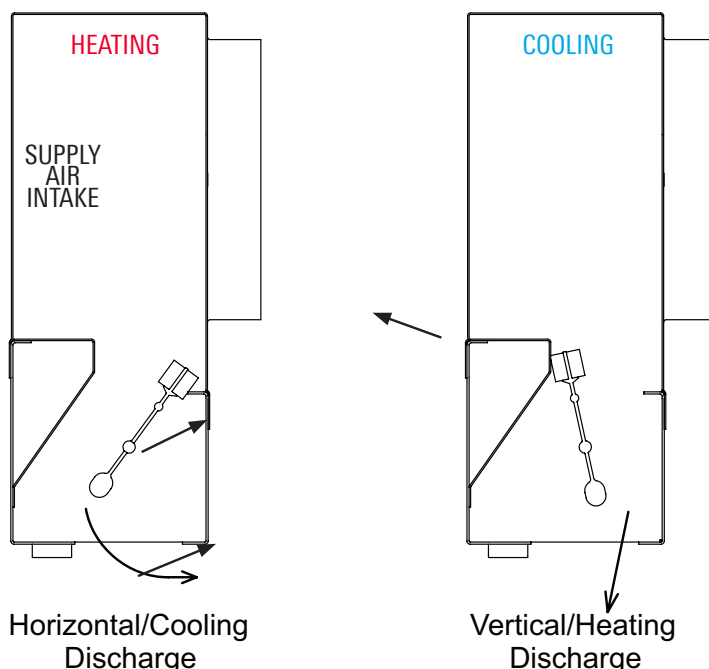
Dual Mode Operation

TITUS SPECIFICATION EXCERPT

The slot of the supply diffuser shall have a single inlet and single discharge slot. Airflow shall be directed by an extruded aluminum pattern controller with a tight sealing gasket at the top of the blade which seals against the inside plenum wall and provides full horizontal airflow in cooling mode or vertical airflow in heating mode.

WHY IS THIS IMPORTANT?

- » Changeover diffusers save energy and provide optimal comfort
- » Vertical pattern controller provides downward jet at an angle toward the perimeter glass



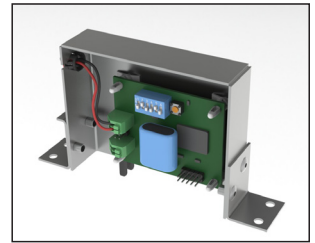
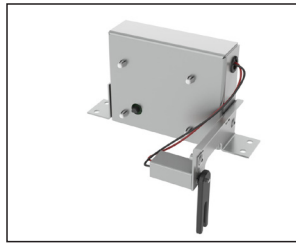
Electronic Control and Motorized Actuation

TITUS SPECIFICATION EXCERPT

Supply diffusers shall have an internal mounted self-powered actuator/ motor assembly with P.C. board and logic programming.

WHY IS THIS IMPORTANT?

- » Onboard power storage capability provides up to two weeks of power after fully charging
- » Smart logic provides three modes of operation; normal, sleep and low energy in which supply temperature, light level and stored energy is monitored accordingly to provide continuous operation regardless of changing light levels or occupation
- » The Titus electronic logic provides us the highest precision and narrowest temperature dead band and instantaneous changeover



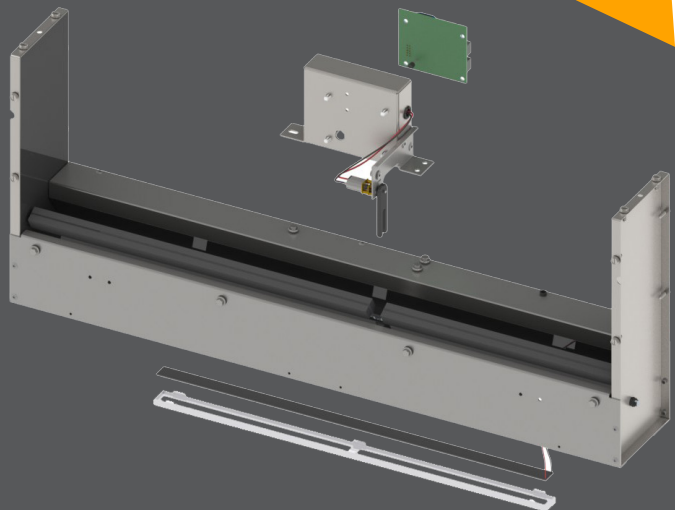
Ambient light-powered, energy harvesting diffuser for perimeter applications

TITUS SPECIFICATION EXCERPT

Supply diffusers shall have a solar cell mounted on the face to collect light energy to power the onboard electronics and actuator assembly to provide bi-directional airflow.

WHY IS THIS IMPORTANT?

- The Titus solar collection makes the unit a completely self-contained, electronically controlled package that does not require wiring or controls



Primary / Secondary Functionality

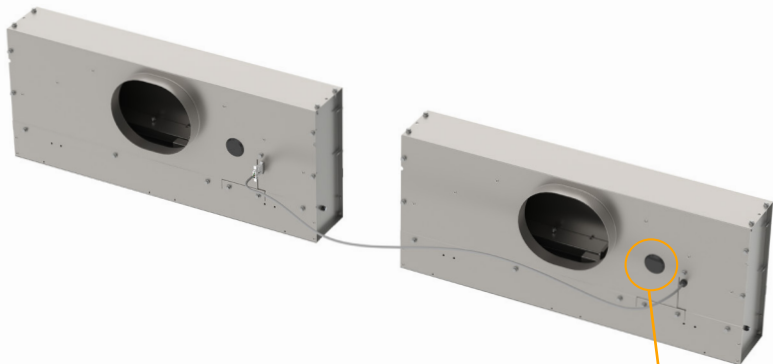
TITUS SPECIFICATION EXCERPT

Diffuser shall be equipped with a connector port that allows for connection of secondary unit via control cable.

WHY IS THIS IMPORTANT?

- » Two units can be used in a common space and provide identical performance at an initial cost savings
- » Primary: complete unit w/ PC board, smart logic and connector port
- » Secondary: complete unit, no PC board, Connectors and cable included (12' length)

Adjustable Temperature Dead Band

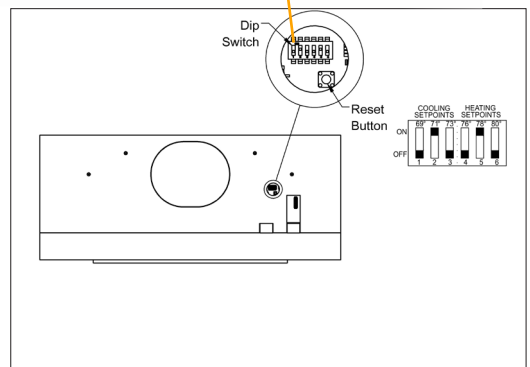


TITUS SPECIFICATION EXCERPT

Supply diffusers shall contain dip switches to adjust the cooling and heating temperature set points.

WHY IS THIS IMPORTANT?

- » Unique applications, loads, occupant types require customized set points to optimize comfort and proper operation



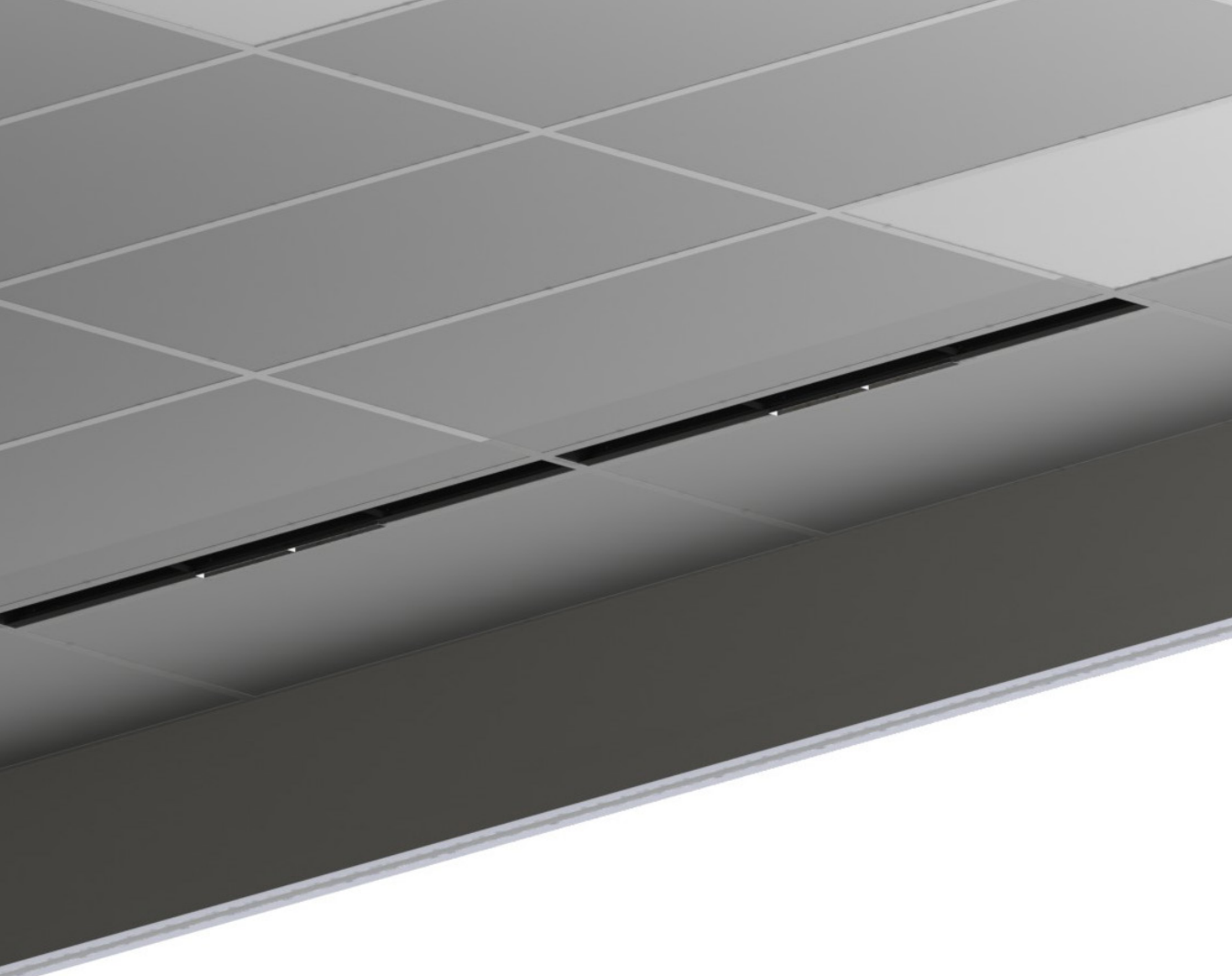
Improve Comfort / Save Energy

- » The EOS is an auto-changeover diffuser with a bi-directional air pattern for cooling and heating applications
- » Available in two styles: Standard (ST) & Secondary (DR). The standard unit can function as a stand-alone unit or a primary unit in a primary-secondary setup. The Secondary comes with 12' attached cable for connection to the primary.
- » The EOS (ST) & (DR) features energy-harvesting technology from solar and ambient room light to power an internal actuator
- » An internal temperature sensor monitors supply air temperature and automatically adjusts the air pattern for horizontal airflow (cooling) or vertical airflow (heating)
- » Operates on a narrow temperature band (71°F to 78°F). Each temperature set point is adjustable in one increment of 2 degrees up or down for maximum flexibility.



- » Smart logic programming on internal P.C. board checks supply air temperature in 10 minute intervals to ensure proper airflow direction is maintained for cooling and heating applications
- » Standard configuration includes 10" plenum height, 2" slot width and Earthquake tabs (2 per unit)





Ambient Light-Powered Diffuser

The Titus EOS linear diffuser is the world's only ambient light-powered, auto-adjusting linear diffuser. The EOS is designed with a smart-logic mechanism that quickly adjusts the angle of air diffusion in response to the narrowest temperature band between heating and cooling — as small as 3° — reducing the time and energy for optimal thermal comfort. Ultimately, the combination of wireless installation, light power, and quick air changeover results in significant energy savings. This product saves energy and can contribute toward LEED certification.

CASE STUDY

Quicken Loans Building "The Qube"

Detroit, Michigan

Client - Quicken Loans

Representative Office - Fontanesi & Kann

Architect - Rosetti Architects

Engineers - MA Engineering

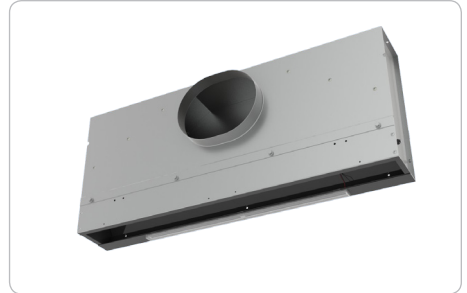
LEED Certification - None



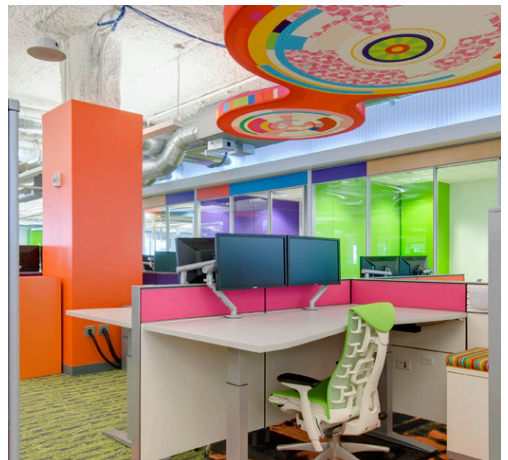
ABOUT THE PROJECT

The Qube, formerly known as Chase Tower, has been a landmark of the Detroit skyline since 1959. Standing at 14 stories high, it also occupies the site of Detroit's first skyscraper. Having been purchased by Quicken Loans, the company moved forward on a complete remodel of the facility in 2011. The remodel was intended to bring the building up to date and add designs to match the company's modern style. MA Engineering was brought in to take on the mechanical engineering aspects of the project. As a firm that incorporates aspects of sustainable design into every project, they were a good fit for ensuring good indoor air quality, comfort and sustainability.

Based in Birmingham, Mich, John Richards at MA Engineering, served as the lead mechanical engineer and project manager of the renovation. His team was tasked with the complete renovation for nine of 14 floors, equaling 280,000 square feet. One of the renovation challenges was that the project did not call for new infrastructure. This meant that MA Engineering had to find a way to reuse the dual duct system that included all overhead air distribution. MA Engineering was concerned about occupant comfort near the windows because the original building design incorporated a slot air distribution device in the base of each window, creating a blanket of air over the buildings single pane windows. The new architectural design eliminated the slot at the base of the windows, but the single pane windows remained,



EOS





creating a challenge to maintain comfort along the windows. In addition, the new office layout included workstations directly along the windows.

THE TITUS SOLUTION

COMFORT

Richards turned to Fontanesi and Kann, a company committed to providing the very best products, services and support to owners, contractors and design engineers through their variety of professional project and construction management services. As a result the two approached Titus HVAC, the world leader in air distribution to help solve the challenge. “Our firm is always watching for new, sustainable technologies to provide additional value to customers and Titus offers the best technology for perimeter challenges,” said Richards. “That’s why we decided to look at the Titus EOS for this project.”

The EOS is the industry’s first light-powered, energy-harvesting diffuser. With its wireless, energy-harvesting technology it pushes the HVAC science of air distribution to new heights. It was designed to improve comfort and save energy while providing a solution to challenging building perimeter applications.

Having previous experience with the Titus Dynafuser, Richards and his team were familiar with the overall concept of the new EOS technology. As Richards describes it, “EOS is better than typical diffusers because it has a ‘brain’ and can automatically adjust according to the temperature need so the area by the windows now maintains better comfort in both heating and cooling modes.”

The EOS is designed to address the imperfect split compromises that are commonly found in the perimeter of a building’s system, like the Qube. Its smart system delivers both heating and cooling by utilizing an auto-changeover function that eliminates wasteful compromise by automatically changing the air distribution pattern. Because comfort was the primary objective it became clear that the EOS was the right diffuser for the job.

“With the EOS, the air is sent horizontally in the cooling mode and vertically down over the single pane window, creating a blanket in the heating mode. In addition, the unit runs on solar power which makes it more appealing to the client and can also save on energy costs,” said Richards.

THE END RESULT

ADVANCING THE SCIENCE OF AIR DISTRIBUTION

Another challenge on the project was that the office space featured an open ceiling with exposed ductwork and air diffusers. MA Engineering worried that a normal diffuser might not get the cooling flow needed. In order to make sure the cooling mode could project the air out into the space; Joe Fontanesi worked with the Titus HVAC lab to engineer a “lip” that helped make the air projection horizontal instead of vertical. The lip would ensure that the EOS distributed air more evenly and throughout



the entire building rather than just one area. The Titus HVAC lab used videos to show the engineers how the new lip would work.

“Being able to see the demonstration videos and the projection the lip would make was incredibly helpful,” said Richards. “Titus eliminated the guess work and helped us to better understand and explain how it would work in this particular building.”

SUSTAINABLE


Having been listed as one of the ‘Top Places to Work in America’ for many years running, the solar aspect of EOS was important to Quicken Loans. As a light-powered energy-harvesting diffuser, the EOS is powered completely by natural light making this smart system cost effective and sustainable. In fact, the energy harvesting feature on the EOS can provide up to 30 percent energy savings during heating over a split compromise system. The solar aspect also supports the company’s progressive brand image as solar powered and green systems are popular aspects among the young professionals the company is looking to attract. Not only does the company win in the eyes of its employees, but Quicken Loans is able to improve their bottom line.

Because MA Engineering had so much success with the EOS on the Qube project, they are already incorporating it into other projects as well. As Richards pointed out, “The EOS and support from both Fontanesi and Kann and Titus far exceeded expectations,” said Richards. “They provided us with the technology that allowed our engineers to be successful on the job. We intend to work with them and use the EOS on future projects.”




Harness the power of the sun to improve comfort while saving energy. EOS is more than just a smart choice. With adjustable temperature band and the ability to harvest energy from any light source; the auto-changeover EOS combines intelligence with flexibility, making it The Smartest diffuser.

Icons



contributes toward energy savings by reducing operating costs of air distribution devices

energy solutions




supplies both heating and cooling from one air device

dual-function



energy harvesting & savings feature of an HVAC device powered by ambient light

light powered



unit contains smart logic mechanism enabling it to adjust the temperatureband between heating & cooling

smart logic

Notes



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