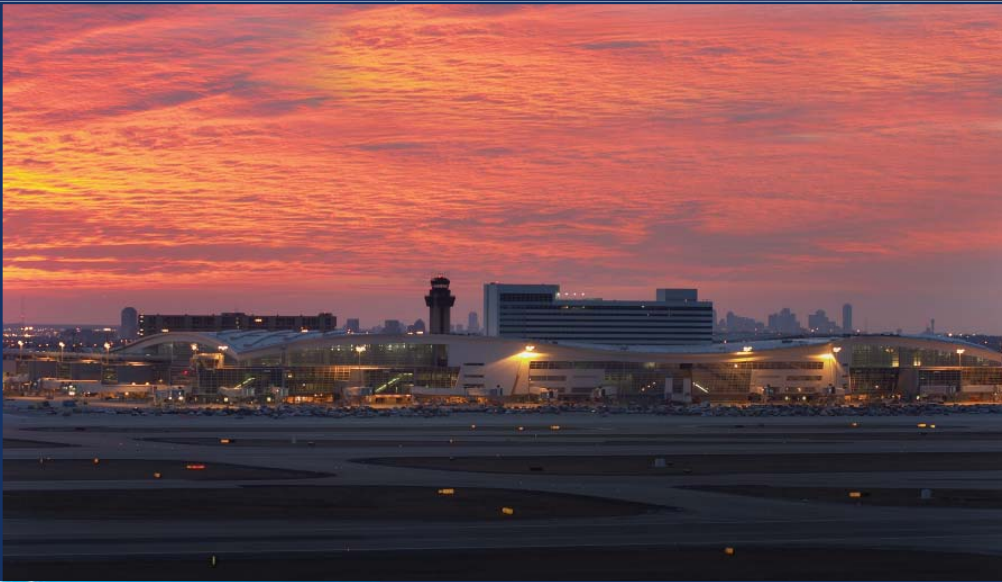


DFW International Airport Terminal D & the People Mover System



DFW International Airport, International Terminal D, DFW Airport, Texas USA

Titus Sales Representative

Dale Goetz,
ADW Corporation
Carrollton, Texas USA

Design Engineers

Friberg & Associates,
Fort Worth, Texas USA

Freese & Nichols
Dallas, Texas USA

Figure 1: DFW International Airport Terminal D as seen from the southwest runway with the Dallas skyline in the background.

DFW

Dallas/Fort Worth International Airport Terminal D is the world's-largest, post-9/11, airport construction project. With 80-foot ceilings and 2,000,000 square feet, the \$1.2 billion facility is designed to create an environment that is visually appealing, safe and comfortable for the 6 million passengers estimated for 2006, making this the 3rd busiest airport in the world. Also part of the design was the Skylink people mover system, which would help to move the passengers safely and comfortably between terminals.

Construction began on Terminal D prior to 9/11 and the repercussions of that event significantly added to the complexity of the project. Manufacturing response time became critical due to the numbers changes taking place to accommodate all of the security changes brought about by new regulations. Security concerns changed with that event and the architectural design of the terminal was greatly affected.

Friberg and Associates were responsible for Terminal D and Freese and Nichols worked on the 10 Skylink terminal stations. The Titus Sales Representative was ADW Corporation and included Dale Goetz, Sales, and John Trigg, Sales Engineer (retired).

"In our dealings with the DFW Airport Authority, there were 5000 documented clarifications and approximately 400 revised sets of documents." Dale Goetz, ADW Corporation said. "There were numerous occasions when the revisions

were incorporated into the design while the construction proceeded to meet the completion date. It was a challenge to incorporate and coordinate these changes between the various disciplines involved in such a large project within the time restraints demanded by the schedule."

The project designs were the result of a joint effort between the engineering firms of Friberg and Associates, Freese and Nichols, and the architectural firms HKS Inc., Corgan Associates

Project Highlights

- 2,000,000 sq ft
- \$1.2 billion project
- 3rd busiest airport in the world
- \$6 million yearly budget for art
- Largest post-9/11 airport project
- Over 6 million international passengers projected for 2006
- www.dfwairport.com

"This was a project of monumental proportions. More than 500 companies and 12,000 people from around the world worked more than 10 million man-hours to complete this terminal."

Clay Paslay,
Executive Vice President
of Development,
DFW Airport

www.titus-hvac.com



Figure 2: Sections of special CT diffusers located in one of the two terminal building concession areas. Note the modular style of the architecture.

Inc. and HNTB. Their goal was to combine 21st century technology and functionality with an aesthetically pleasing interior to compliment the \$6 million worth of contemporary artwork.

There were two main problems that needed to be solved on the terminal building, how to create an air distribution system that would provide maximum occupant comfort with specific airflow

requirements in a large, open area while adhering to stringent architectural designs that compliment the vast amount of artwork. The open design, with high ceilings, curved walls and many exterior windows for natural lighting, presented a challenge with respect to the air distribution products. In addition, the ambient temperature extremes of the Dallas climate throughout the day presented variable load requirements that had to be addressed as well.

Through the design stage of the terminal's air distribution, Titus engineers realized the standard CT diffuser would not meet the special performance requirements necessary for the large open spaces of the terminal building. Titus design engineers and members of the manufacturing group from the plant joined to find a solution.



Figure 3: Curved FlowBar diffusers in the entry from the terminal into the Grand Hyatt hotel reception area.

During the planning stage, a decision was made to use two of Titus's premier architectural products, the CT linear grille and FlowBar™ linear diffuser, to solve these air distribution problems. Both products have outstanding performance characteristics and meet the stringent aesthetic requirements necessary for the building's design.

In the main terminal, the airflow distribution problem was solved by using a special CT linear grille, which would provide special air plumes to evenly wash across the large, open areas of the main terminal and provide the required airflow volume. This also solved the problem of providing a diffuser that matched the architectural design of the building.

The result was a special 30"x63" CT diffuser developed by the Titus Special Products Group and Leon Kloostra, Titus' Chief Engineer. This special CT diffuser addressed the extreme load requirements and space requirements of the building.

"They wanted the joints of the CT to match the modular theme of the architectural components throughout the terminal." Leon Kloostra, Chief Engineer for Titus said. "We also set the deflection of the blades to create a plume to evenly distribute the airflow pattern."

This special CT diffuser was necessary in order to handle the large volume of air required to condition the space and provide superior comfort, as well as reduce the NC level and blend with the building's architecture. The CT linear diffusers were custom fabricated in sections of 63x30" and shipped to the jobsite in specially designed shipping crates. A total of 7,000 linear feet of CT were installed in the terminal ticketing area.

Product highlights for the CT linear diffuser:

- Special field mounting to provide continuous sections
- Custom curving
- Multiple air patterns

Two special challenges on the air distribution side were the curved walls and the floating wood ceilings in the terminal gates and food court areas. To meet this challenge, Titus engineers, along with the design team, selected the FlowBar diffuser. Flowbar is an extremely versatile product that can be custom curved for ceiling or sidewall applications.

After curving, the diffuser's air pattern controllers were adjusted to satisfy the different air pattern requirements in the terminal. With numerous mounting options and excellent performance, this product provided the perfect solution for specific areas of the terminal including the curved walls. 15,000 linear feet of FlowBar diffusers were installed in the new terminal.

Product highlights for FlowBar diffuser:

- Special field mounting to provide continuous sections
- Custom curving
- Multiple air patterns



Figure 4: View of wide CT diffusers set into the window framing that is installed above the ticketing counters and along the walls of the inside security area. (Inset is a close-up view of the wide CT diffuser.)

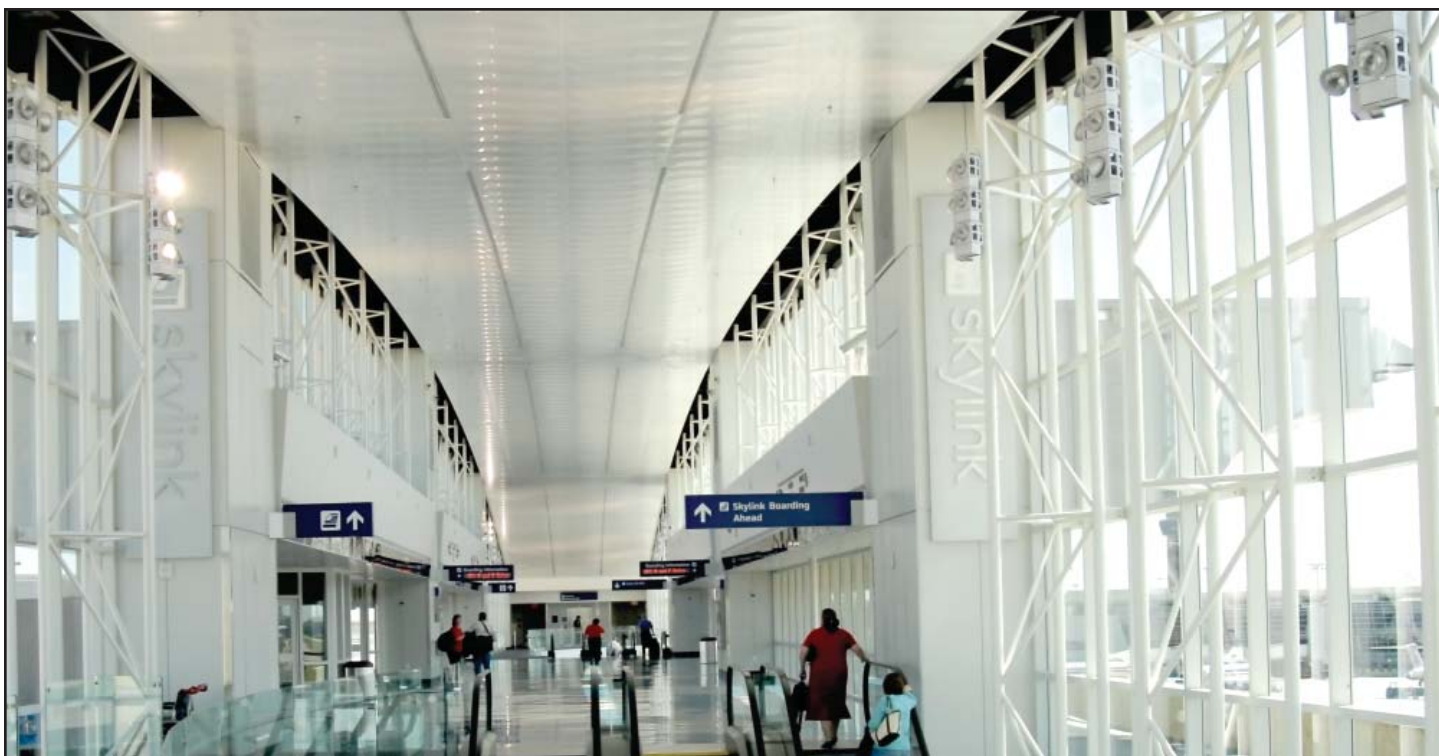


Figure 5: One of the 10 Skylink train station terminals showing the arched ceiling with the special curved CT with blank-offs installed in the ceiling.

The Skylink People Mover System presented similar issues as the main terminal ticketing area. There are 4 train station terminals within Terminal D and another 6 in the other airline terminals. Each train station terminal was 60' x 25' with 30' arched ceilings. The curved, high ceilings created the problem of how to create a spreading airflow plume evenly throughout the room.

What Leon Kloostra developed was a special type of CT, which has three deflection modes. A 0° on the inside, 15° in the middle and 30° on the outer fins to give an even spread pattern. The diffusers were installed to overlap the spread of the 2 diffusers within the room at 8' from the floor so the occupied zone would have complete plume coverage in order to provide maximum occupant comfort.

“Several meetings developed between Leon Kloostra, myself and Askok Desponde, Engineer with Freese & Nichols Engineers.” John Trigg, Sales Engineer (Retired) for ADW Corporation, said, “Airflow patterns had to be developed by Leon for a special CT product and an air flow diagram with blank-offs to accommodate the rising ceiling from 8' high to a height of 30' and down to 8' again with a 2-story drop from the ceiling around the escalators.”

Blank-offs were designed specifically to spread the air evenly at the 8' point. This solved the arched ceiling issue, which would provide an even spread to the occupants and was also architectural pleasing to coordinate with the artwork within the people mover system. About 3,500 linear feet of CT diffuser was installed in the Skylink train station terminals.

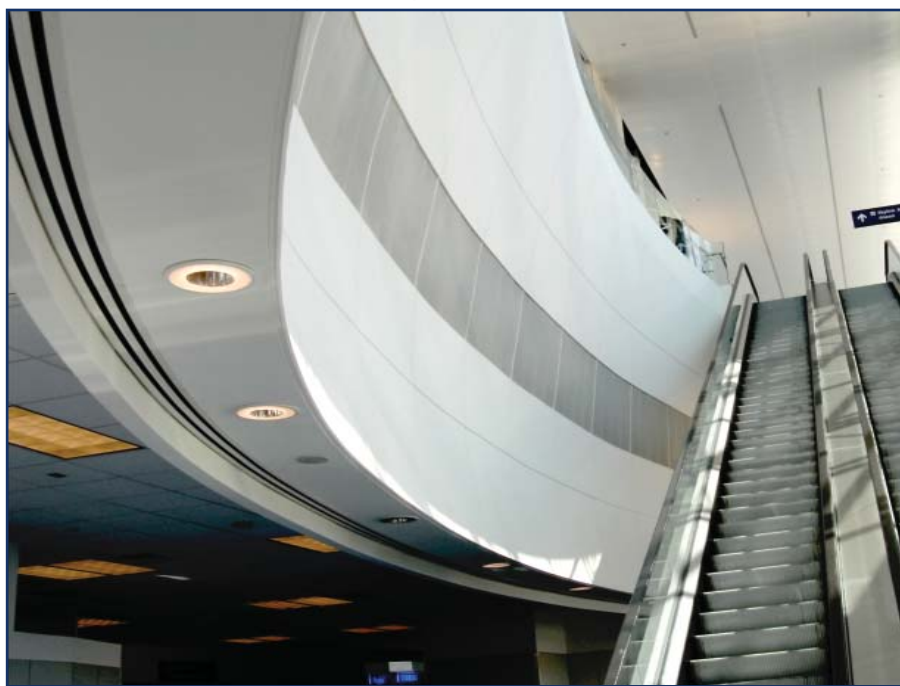


Figure 6: View from the bottom of the escalators below the Skylink train stop. Note the curved CT set into the wall and the curved Flowbar in the ceiling.

2,300 units of the Titus TMSA diffuser and 950 units of the 355RL return grilles were used in various locations in the project. The DFW terminal presented a special challenge for Titus, the engineering and architectural firms and manufacturing plants.

“From the time of the first design meeting to the day we walked away from the project was almost 6 years.” Said Dale Goetz, Fort Worth Sales for ADW Corporation.

Project Product List



FlowBar Diffuser

A continuous slot system that allows air distribution to become inconspicuous, while fully integrating and complementing the ceiling system.

15,000 linear feet.



CT Linear Diffuser

Aluminum linear bar grille, 1/8" bars, 1/4" spacing, 0, 15 and 30 degree deflections.

7,000 linear feet main reception area and 3,500 linear feet in the Skylink terminal stations.



TMS Diffuser

Steel, high-performance three cone diffuser.

2,300 units



355 Return Grille

Aluminum louvered return grille, available with 1/2" blade spacing, 35 degree deflection, long blades.

950 units



Figure 7: Dale Goetz, Sales, ADW Corporation, Fort Worth, Texas.

“After 31 years many jobs begin to appear the same and begin to run together. This is one of those jobs where I can step back and say, ‘I was involved in that.’ There are some jobs that stand out and this is one of them. This is a job I can look at with pride.”

Dale Goetz has over 31 years of experience in the HVAC industry in the Dallas/Fort Worth area. Air Device Warehouse has been a Titus Sales Representative since 1984 and has offices in Carrollton and Fort Worth, Texas.



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