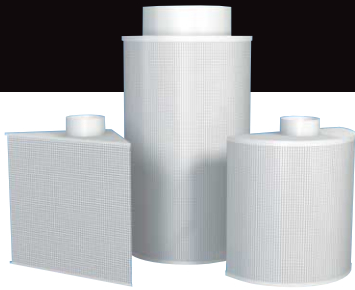


DISPLACEMENT VENTILATION CASE STUDY

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► **PROJECT**
The Edgewater Casino

► **DESIGNED BY**
VEL Engineering,
Patrick Cotter Architect,
Broadway Refrigeration &
Air Conditioning

► **PRICE REPRESENTATIVE**
E.H. Price Limited, Burnaby



photo by Garry Cotter

The Edgewater Casino • Vancouver, British Columbia Canada

► THE CHALLENGE

The Edgewater Casino is a 70,000 ft² two-story casino that opened to the public in February 2005 and features 600 slot machines and 48 gaming tables. The owner, Edgewater Management Inc. wanted to create a contemporary gaming facility that would integrate into the urban, downtown location while maintaining an interior experience that is consistent with a glass building. Paramount to the owner was to provide an environment with the highest level of thermal comfort and indoor air quality for its patrons and employees to enjoy. It was also critical to deliver exceptional energy efficiency, all the while maintaining the inviting atmosphere.

The site for Edgewater Casino was to be on Vancouver's inner harbor in a building that had been built for Expo '86 World Fair but had stood vacant for several years. The

existing structure was a glass building with vaulted ceilings and limited mechanical systems, and was considered to be unsuitable for a casino which traditionally has no natural light and totally enclosed interiors.

The fact that the skin of the building was 90% glass posed a large problem to the design team. The solar heat gain in the space was enormous. This, combined with the building's vaulted ceilings, required innovative solutions both mechanically and architecturally. Patrick Cotter Architect led the architectural and interior design of the space, while Broadway Refrigeration teamed with VEL Engineering to design the mechanical system. Together, they would design one of the most innovative HVAC solutions the west coast had ever seen.

► THE SOLUTION

Due to the building’s large vaulted ceilings as well as the requirement for exceptional indoor air quality, thermal comfort and energy efficiency, it was evident from the start that this project would not be able to use a traditional mixing air distribution system. The decision was made to design a hybrid displacement system. This would include a floor displacement system in the lower space where the slot machines would be installed, and a low level sidewall displacement system on the upper level where the gaming tables were to be located.

A displacement system would supply cool, conditioned air at a low level in the space (see Figure 1). This would then permit the heat given off by the equipment and occupants to warm the surrounding air, causing it to rise and be replaced by the cool supply air from below. By pooling the supply air on the floor and having it pulled into the thermal plumes caused by heat sources, it naturally gravitates to the areas which need cooling or ventilation. The higher supply air

temperatures characteristic of displacement ventilation systems, in this case between 65° and 69° F, extend the system’s free cooling band significantly, leading to a corresponding reduction in energy consumption.

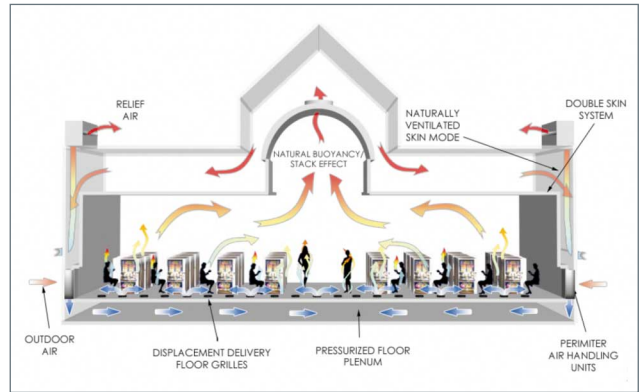


Figure 1. How the displacement system works in the Edgewater Casino

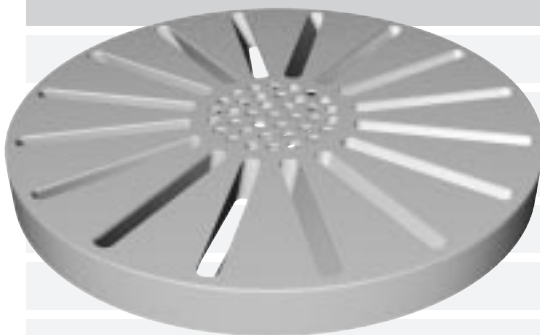


Edgewater Casino before construction

The use of a raised floor system on the main floor was considered as it would allow the slot machines to be easily relocated when desired. The Price ARFHD displacement diffuser was suggested by the local Price rep Gerry Smith, as it was designed to be used with a raised floor system. This concept would also eliminate most of the duct work in the building and create a low pressure system that further increased energy savings.

The design team, consisting of the owner, mechanical contractor, mechanical engineer, architect and local rep, made a trip to Price’s Winnipeg Head Office for presentations on displacement ventilation technology as well as a demonstration of the proposed products. Using the mock-up room in the Price Laboratory, Price was able to demonstrate the

Product Highlight: ARFHD - Aluminum Round Floor Horizontal Diffuser



- Architecturally pleasing design
- Horizontal air pattern for displacement ventilation applications
- Tough aluminum construction
- Available in mill or powder coat paint finish
- Ring nut installation allows for a secure installation in the floor
- Bottom edge locks with frame to resist spinning when supporting weight

performance of the ARFHD diffuser, and how it would perform in a casino environment, complete with simulated slot machines and occupants. Price also demonstrated the capabilities of the remainder of the displacement ventilation product line. The design team was impressed with the performance of displacement ventilation technology and with the family of Price displacement ventilation diffusers. As a result, it was decided to use displacement systems to serve all areas of the building.

As displacement ventilation diffusers are typically large and intrusive, the architect was concerned of how they would look in the sculpted interior of the building. It was decided that the diffusers would have to be integrated into the interior design of the space. The design team was impressed with the DF1R's ability to blend into room elements, as it was originally designed to integrate into a stair riser or baseboard. To feed the air volumes required in the Edgewater Casino, these diffusers would have to be much bigger than originally intended.

Price responded by reconfiguring a product that was designed to an 8" x 48" maximum size, making it suitable for this application in the sizes required, up to 36" x 72".



DF1Rs are installed along the wall near the gaming tables on the upper level.

► THE INSTALLATION

Because of the tight construction schedule, Price was asked to supply the 1300 floor displacement diffusers and 220 wall displacement diffusers with a very short lead time. Price responded by having the original order of 200 wall diffusers on site in two weeks and a second order of the diffusers on site one week later. The floor displacement diffusers were installed in pre-cut floor tiles supplied by the flooring manufacturer. DF1Rs were installed throughout the

space in wooden cabinets, serving as supply plenums. As a result, the system was essentially self-balancing. *"This was the easiest balancing job we have ever had to do, you just turn it on and it works."* ~ Laird O'Connor, Broadway Refrigeration

► THE RESULT

Today, the displacement system installed in the Edgewater Casino continues to perform beyond the expectations of the design team. *"This system provides a consistent high level of thermal comfort and indoor air quality from one corner of the facility to the other. Even though large volumes of air are being delivered, draft is not a problem."* ~ Albert Bicol, VEL Engineering.







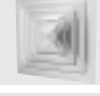
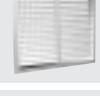

Broadway Refrigeration has validated the design by taking measurements of the room air temperature throughout the space. With a temperature set point of 69° F, there was less than 1° F in temperature fluctuation throughout the entire building. Whether one is standing in an open area away from occupants, in the restaurant on the main floor, or in the middle of a densely occupied gaming zone on the second floor, the zone temperature is consistent throughout the space.

The Edgewater Casino is an excellent example of an integrated design process where the contractors, engineers, architect and product manufacturers collaborated to create a building that exceeds everyone's expectations. Edgewater Casino, with its innovative displacement system, demand ventilation, double skin, low-pressure mechanical system and energy efficiency raises the bar for the design of public buildings and open spaces.



A bird's eye view of the finished Casino floor showing the installed ARFHDs.

EDGEWATER CASINO PRODUCT LIST

Product	Description	Image
DF1R - 1-Way Diffuser for Recessed Applications	<ul style="list-style-type: none"> Architecturally pleasing & discreetly designed Low air mixing is coupled with low noise levels 	
DR180 - Half Round Displacement Diffuser	<ul style="list-style-type: none"> Low turbulence flow with low velocities Typically placed against a wall or other flat surface 	
DR360 - Full Round Displacement Diffuser	<ul style="list-style-type: none"> Low turbulence flow with low velocities Available in Duct Hanging (DH) configurations 	
ARFHD - Round Floor Horizontal Diffuser	<ul style="list-style-type: none"> Ring nut design ensures secure installation Low turbulence flow with low velocities 	
FDBU5000 - Fan Powered Underfloor Terminal Unit	<ul style="list-style-type: none"> Clean & efficient design Low noise generation for quiet operation 	
80 Series - Egg Crate Return	<ul style="list-style-type: none"> Popular ceiling return High free area/low sound and pressure drops 	
SCDA - Adjustable Square Cone Diffuser	<ul style="list-style-type: none"> Adjustable horizontal and vertical air patterns 	
22 Series - Airfoil Louvered Face Supply	<ul style="list-style-type: none"> Individually adjustable airfoil blades Durable aluminum construction 	
ATG1 - Single Duct Terminal Unit	<ul style="list-style-type: none"> Attractive sightproof appearance Designed for door or partition applications 	

The founding principles of our company have never changed - business integrity, first class service and a commitment to people. Price manufacturing endeavours arose from our belief that we could supply superior products and services at a reasonable price. Our mission is to become the worldwide supplier of preference for air distribution products and services. You can rely on Price – our products and services – with confidence.



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Product Improvement is a continuing endeavour at Price. Therefore, specifications are subject to change without notice. Consult your Price sales representative for current specifications or more detailed information.

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Grilles, Registers & Diffusers



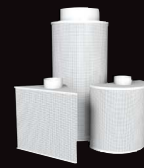
Terminal Units



Underfloor Products



Security Products



Displacement Ventilation