

# Fan Array Systems



## Fan Array

- > 10,000 CFM and up
- > Up to 16 IN W.G
- > Adjust to any air tunnel geometry
- > Multiple Control Options
- > Retrofit and New Construction

## Fan Array Concept

The Fan Array arrangement has gained popularity due to the benefits of this system:

1. Reduced footprint of unit
2. System Redundancy
3. Improved acoustical benefits
4. Reduced connected load for larger systems
5. Improved Maintenance

The modular construction, utilizing multiple small fan/motor assemblies versus single large fan/motor assembly, allow end

users the flexibility to retrofit the Fan Array into existing Air Handlers. The retrofitting of the Fan Array can provide many benefits, such as: immediate redundancy, reduced brake horsepower, and improved acoustics.

The modular Fan Cell construction works well within constraints of the typical mechanical room offering easy handling logistics during the shut down . Overall space savings are pro-

vided once installed.

Similar advantages can also be achieved in new construction. Built in redundancy in the fan array systems insures uninterrupted continuous air-flow. Better sound signature, reduced connected load for large systems and space savings have proven to be the major points considered by engineers and end users.

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### Benefits in Retrofits



Fan cells can be transported without heavy lifting equipment.

The ease of handling and installation of the Fan Array System into an existing Air Handler minimizes the downtime of the system being retrofitted. Due to the utilization of smaller Fan Cells, the construction crew can avoid the need for heavy duty lifting equipment.

The additional energy savings of the new system are achieved by reducing the connected load through using more efficient fans and motors, thereby improving the motor horse power utilization.

More even airflow distribution pattern and possible reduction in sound power levels can also lead to energy savings through the elimination of equalizer plates and/or sound traps.

The mechanical redundancy of the fan array can be improved by using the multi-VFD control schemes to insure the redundancy of the controls also.



Backdraft damper installation.

### New Construction

The Fan Array provides significant reduction in the length of the Air Handling Unit giving back valuable real estate to the owner in mechanical equipment rooms. The utilization of multiple small fans/motors requires shorter airway space in the unit.

As an additional benefit, the smaller components require shorter maintenance clearances. Direct drive construction with use of the multiple fans can allow for lower connected load on the larger systems (50,000 CFM and above). Eliminating the sound traps or reducing their

length, provides reduction in the Total Static Pressure of the system with additional savings in the motor horse power.

The redundancy feature is a great additional benefit for stand alone air-handlers.

### Design Consideration



Fan cells in cleanroom application.

Most of the retrofit installations will benefit with systems designed with smaller fan cells and motors in order to provide ease of handling and minimize the tear down.

Nevertheless, the larger fans typically have higher efficiency than smaller ones and larger motors will have higher efficiency than smaller ones. Therefore, the fan array with lesser number of fans shall be considered for the new construction based on the following:

- A lower number of components within assembly will increase the reliability of the system.
- The smaller quantity of larger motors will also have higher peak load at part load operation

relative to the smaller ones.

- Full redundancy can be achieved most of the times with four to six fan array systems while maintaining the lowest connected load for the specific system.
- Selecting the larger size fans will allow for use of the motors with the lower RPM, effectively extending the time between scheduled bearing lubrication.
- Motors selected in the above 60 Hz operating range will eliminate the need for the de-rating.
- Systems with the requirements for fan redundancy shall consider the use of the blank off plates in lieu of back-draft dampers to prevent the additional pressure drop throughout the life of the system.

## Control Options

The most commonly used approach to control the Fan Array is to operate all fan cells with one Variable Frequency Drive. Each motor in the Fan Array will have individual motor circuit protection and motor status indicating light. Indicator light will allow the maintenance personnel to identify the failed motor. The VFD will be controlled by CFM or a static pressure sensor in ductwork in order to maintain system set point in the event of a

fan failure. In critical applications a redundant Variable Frequency Drive can be provided.

The Redundant Variable Frequency Drive will start upon failure of the primary drive. The system will immediately resume the last set-point of the primary Variable Frequency Drive.

The other most common configuration has each motor wired to an individual VFD. This configuration

offers full redundancy of motors and VFD's. The signal repeater will allow to deliver the common speed reference signal from Building Management System or Air Flow Measurement System to all VFD's simultaneously.

## Reduced Maintenance

With the built-in redundancy, the failed motor replacement can be postponed to the next facility shut down without disrupting the supply of the airflow.

Direct drive fan design eliminates the need for the belts replacements and belts adjustments.

Smaller motor sizes allow for improved serviceability and eliminates the need for additional lifting equipment.

Optional use of the sealed isolated bearing will eliminate the need for the bearing grease replacement.

## Sound and Vibration

Precise balance of the smaller fans along with the vibration isolation of each individual fan, insures vibration levels acceptable to the most critical facility. Neoprene vibration isolation mounts are selected to insure low material stress levels thereby guaranteeing an isolator life span of the isolator that is in

line with the life span of the building.

Sound power levels produced by smaller fans effectively shift the peak noise generation by one or two octave band higher allowing for easier attenuation with shorted sound traps. Selecting the fan with 11 or 12 blades will

provide additional improvement of the sound quality relative to the fans with 9-blade arrangement.



Control cabinets for 18 cell fan array.



Factory acceptance testing.



Fan balancing at the factory.



Fan cell assembly area.

We're on Web!  
[www.seasons4.net](http://www.seasons4.net)



Neoprene vibration isolator.



Shaft grounding system installation.

Seasons 4  
 4500 Industrial Access Road  
 Douglasville, GA 30134-3949

Phone: 770-489-0716  
 Fax: 770-489-2938

Contact your local representative for additional information and design assistance.

## Special features

- Fan cells can be manufactured using the fan wheel sizes ranging from 12" to 36". Larger fan cell sizes, up to 49", can be done in knock-down construction.
- Aluminum or steel wheel are available. Each configuration is carefully selected and provided with wheel Class (I, II or III) to match the capacity requirements.
- In addition to being able to size fan cells to match the specific air tunnels geometry, the knock-down feature allows for additional flexibility to the fan retrofit systems with the access restrictions.
- Fan Cell can be manufactured with insulation and without to satisfy facility with the wash-down requirements.
- The fan cell construction will allow for systems with up to 16 IN. WG in total static pressure requirements.



Fan cells installation in  
 40 years old existing unit.