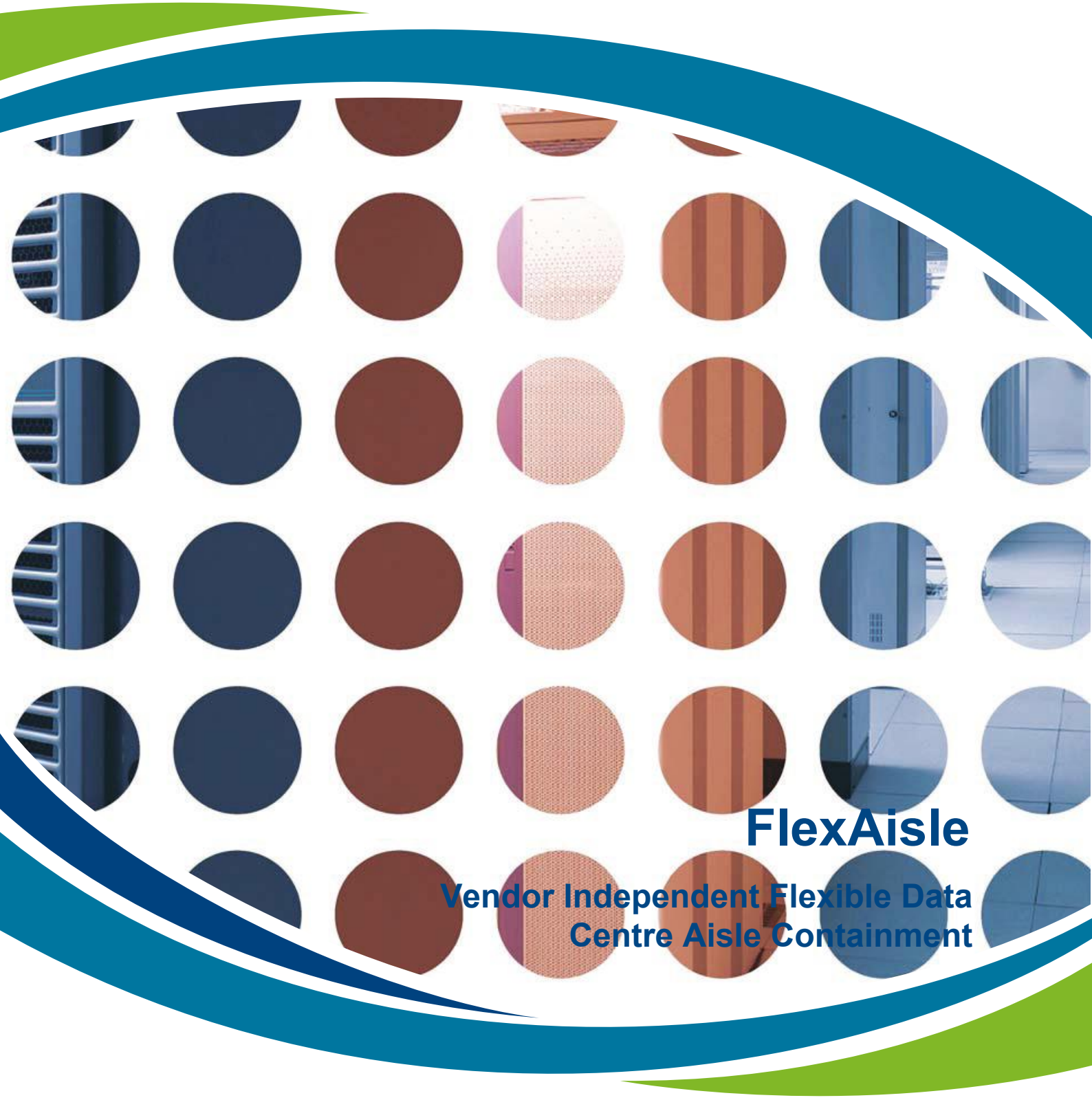
Workspace Technology Limited



FlexAisle

Vendor Independent Flexible Data Centre Aisle Containment

flexaisle®

www.workspace-technology.com

Data Centre Solutions Expertly Engineered

vendor independent flexible Data Centre aisle containment

FlexAisle® is an aisle based vendor independent flexible Data Centre airflow containment solution by Workspace Technology.

FlexAisle® provides a simple and cost effective passive method for eliminating the mixing of hot and cold airflows within a Data Centre or Server Room environment. The goal of **FlexAisle®** is to maximise the performance, uptime and life expectancy whilst reducing operating costs.

FlexAisle® can be installed as new, or retrofitted within existing Data Centre and Server Room environments. FlexAisle® is a non intrusive easy fit solution which provides Data Centre Managers with the ability to re-organise and expand facilities in-line with business requirements.

FlexAisle® uniquely provides the ability to support multiple cooling configurations and is independent of cabinet vendors. This enables Data Centre Managers to support a mix and match of server and communication rack systems.

FlexAisle® Installation Benefits

The deployment of **FlexAisle®** will have an immediate and positive impact on any Server Room or Data Centre facility.

The core function of **FlexAisle®** is to eliminate the mixing of hot and cold air flows to provide better control of equipment inlet temperatures. This in turn enables cooling system temperature set points to be increased (thereby saving energy) whilst still supplying the load within recommended ASHREA* operating temperatures.

FlexAisle® deployment benefits include:-

- **Eliminates air recirculation**
- **Reduced CO^2 Emissions**
- **Reduced AC energy consumption and operating costs**
- **Improved DCiE / PUE ** Room Ratings**
- **Improved company "Green Credentials"**
- **Increased air-conditioning cooling capacity**
- **Improved "inlet" temperature control**
- **Reduced downtime of server equipment**
- **Reduction of humidification/dehumidification costs**
- **Flexible airflow configuration options**

* ASHREA - American Society for Heating, Refrigeration and air-conditioning

** Data Centre Infrastructure Efficiency/Power Usage Efficiencies are industry recognised standards for data centre room efficiency measurement introduced by the Green Grid.

FlexAisle® Configuration Options

Data Centre Managers are faced with the continued trend of increasing cabinet heat densities combined with a multitude of options for cooling, each having unique airflow characteristics.

FlexAisle® is a flexible vendor neutral airflow containment system that can be configured to match individual Data Centre cooling and physical room characteristics.

Cold Aisle Corridor Classic configuration for data centres with raised access floors and perimeter down flow cooling solutions.

Hot Aisle Containment Suitable for aisle based InRow cooling technology.

Hot Aisle Return Plenum Delivers maximum flexibility supporting a range of multi-cooling technology options.

FlexAisle® Configuration	Perimeter Downflow Cooling	InRow Cooling	Rear Rack Cooling	Self Contained Rack Cooling	Room Airflow Exchange
Cold Aisle Corridor (CAC)	Yes	No	No	Yes	No
Hot Aisle Containment (HAC)	No	Yes	Yes	Yes	Yes
Hot Aisle Return Plenum (HARP)	Yes	Yes	Yes	Yes	Yes

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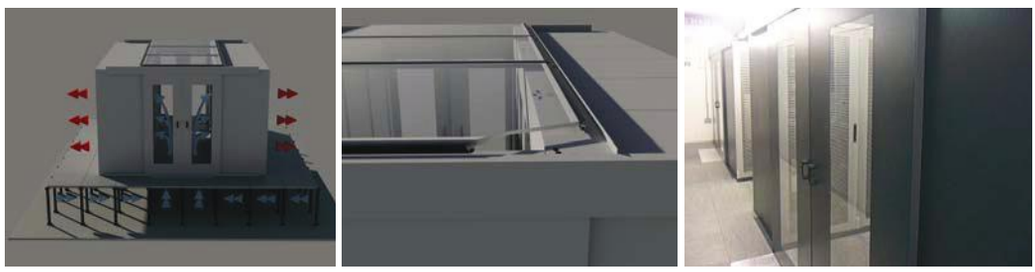


Cold Aisle Corridor - Configuration Option 1

Many Data Centres and Server Rooms with perimeter downflow CRAC units use Hot Aisle/Cold Aisle cabinet alignment whereby the cool air is supplied via perforated floor tiles in front of the cabinet. This air is directed into the cabinets through perforated doors where server fans will force air through to the rear doors to exit to the hot aisle.

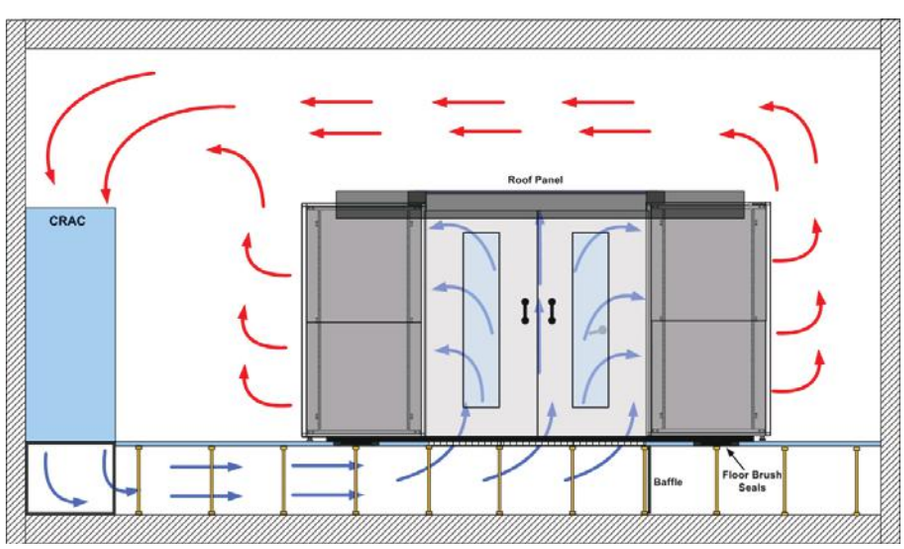
In this traditional configuration, air recirculation occurs which leads to a substantial decline in the efficiency of the system. The maximum capacity of a traditional Hot Aisle/ Cold Aisle configuration is effectively limited to 3/4Kw per cabinet due to this recirculation effect.

FlexAisle® will improve the performance of the classic hot and cold aisle arrangement with the deployment of the Cold Aisle Corridor configuration.

The system is based on the principle of complete separation of hot and cold air flows which leads to significant improvements in efficiency.

This is achieved by enclosing the cold aisle with roof panels. These roof panels are transparent and will allow for natural light into the corridor. Both ends of the cold aisle are sealed off using sliding doors to create a “Cold Aisle Corridor”.

Airflow Schematic Cold Aisle Corridor



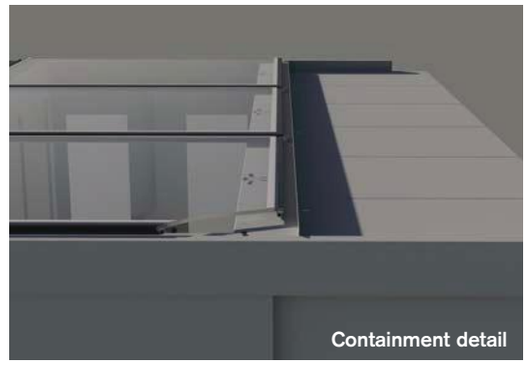
The temperature between the bottom and top of the rack will become constant. This enables the deployment of servers at any position in the rack.

AC supply air temperature can be increased. Temperatures of between 22°c to 24°c are considered acceptable within the cold aisle corridor. With the associated increase in the return air temperatures to air handling units, the effective Net Sensible cooling capacities are increased.

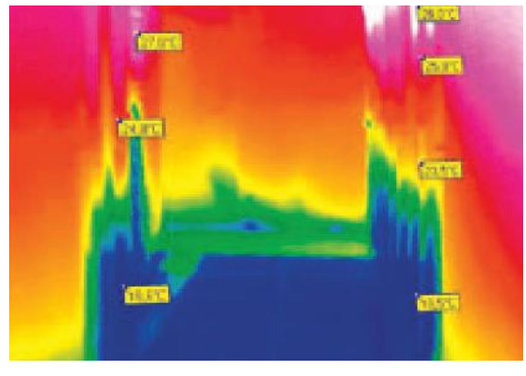
Advantages of the **FlexAisle®** Cold Aisle Corridor configuration are summarised below :-

- **Increased cooling capacity to maximise the use of existing data centre resources**
- **Life extension of the conventional data centre by several years**
- **Cost-effective and simple to deploy solution**
- **Higher Delta T and therefore more cooling power with thermal management system airflow remaining constant**
- **Predictable cooling capacity for each cold aisle**

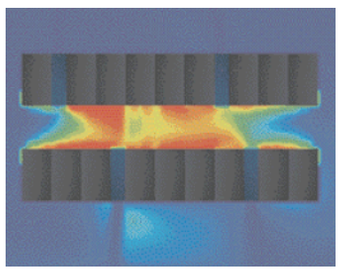
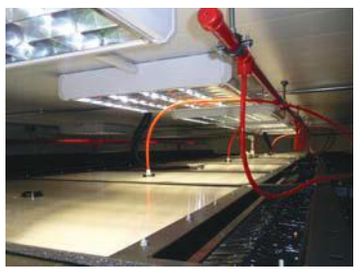
Example of a Cold Aisle Corridor



Containment detail



Cold Aisle CFD Thermal Image

Hot Aisle Containment - Configuration Option 2

As a reverse to "Cold Aisle Corridor" (CAC) the "Hot Aisle Containment" (HAC) configuration increases cooling predictability in extreme high density environments within rack level solutions that neutralise the hot exhaust air at the rack or row level.

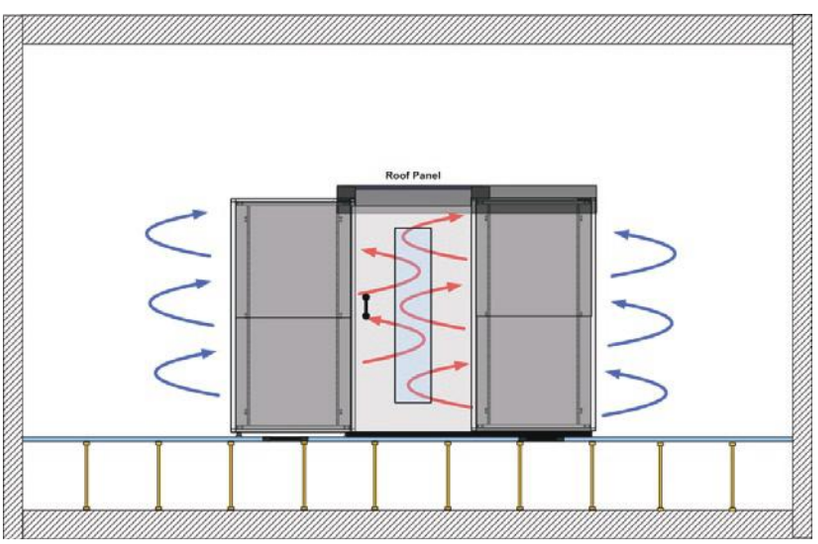
With the FlexAisle® Hot Aisle Containment configuration, high density technology is clustered together in two rows of cabinets within the general data centre floor space. These systems are usually deployed with "InRow" cooling units which provide cold air to the front of the equipment cabinets. A containment system is used to enclose and prevent the escape of hot cabinet exhaust air into the general data centre environment. The "InRow" cooling units will then draw the hot air back and re-circulate it as cold air to the front of the cabinets.

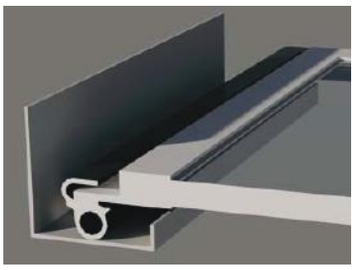
This approach effectively eliminates mixing of cold and hot air to maximise system efficiency. There is a neutral impact on the overall server room environment.

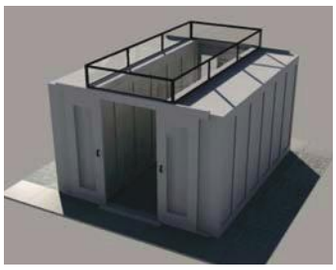
Advantages of the FlexAisle® Hot Aisle Containment configuration are summarised below:-

- **Increased cooling capacity to maximise the use of existing data centres**
- **Higher Delta T resulting in increased Net Sensible cooling capacity of cooling equipment**
- **Comfortable working temperature for general room environment Neutral effect**
- **on remaining data centre space**

Airflow Schematic Hot Aisle Containment with InRow Cooling





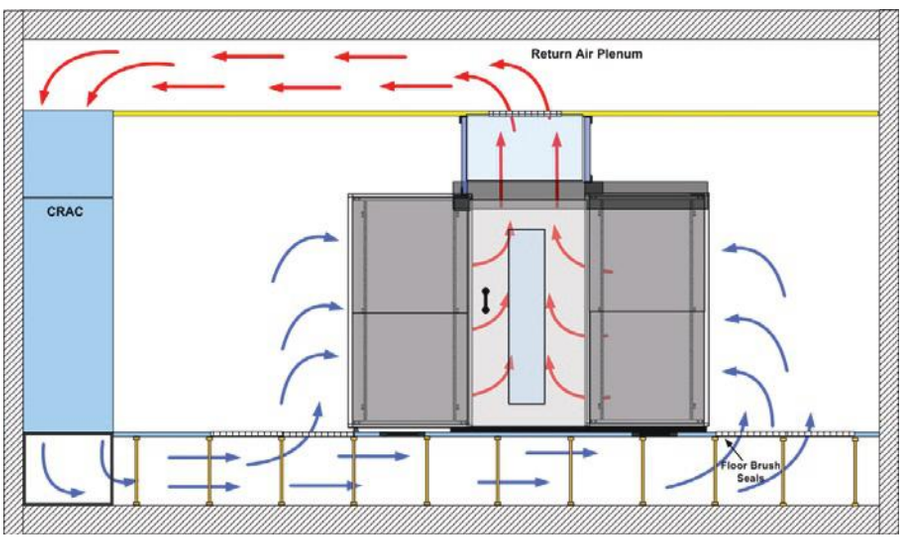


Hot Aisle Return Plenum - Configuration Option 3

The FlexAisle® - Hot Aisle Return Plenum - HARP configuration utilises the ceiling plenum return air path which is a standard feature in many traditional and newly built data centre facilities.

The HARP configuration delivers the improved efficiency benefits of Hot Aisle Containment with the advantage of the support for traditional downflow cooling which is still predominant in both existing and new data centre builds.

The FlexAisle® HARP configuration simply combines a demountable vertical transparent panel section with the sliding doors and top hat bracket sections used on CAC and HAC solutions.

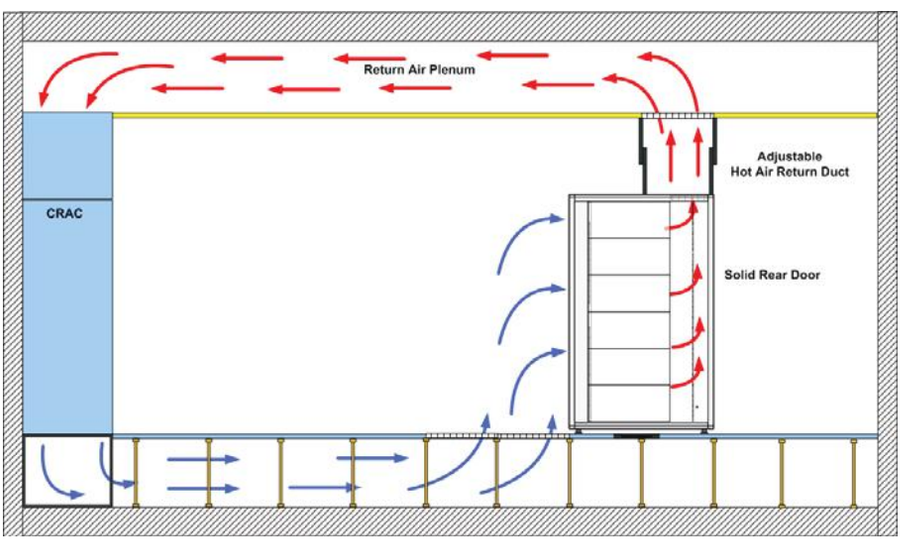


Airflow Schematic Hot Aisle Return Plenum

Where there are requirements of standalone equipment cabinets FlexAisle® offers the Adjustable Hot Air Return Duct. This system can be retrofitted or installed complete with a 1200mm deep rack, depending on the configuration of existing equipment cabinets.

Advantages of the FlexAisle® Hot Aisle Return Plenum configuration are summarised below :-

- **Support for multiple cooling technologies and airflow arrangements.**
- **Allows the deployment of self contained HAC systems to sit alongside traditional down flow perimeter cooling.**
- **Simple to retrofit into existing DCs with return air ceiling plenums.**
- **HARP provides a comfortable working temperature for general room access.**
- **Increased system cooling capacity through increased Delta temperature and inlet temperature control.**
- **Flexibility to position additional floor grille tiles anywhere out side of the hot aisle.**



Airflow Schematic Adjustable Hot Air Return Duct

FlexAisle® System Components

The FlexAisle® solution from Workspace Technology consists of a range of standard pre-engineered components. These standard components are common across all configuration options allowing simple reconfiguration during the life of a facility.

The contemporary modern design of FlexAisle® fits in well with both existing and new data centre deployments.

The system supports multiple vendor equipment cabinets through the deployment of variable height “top hat” brackets.

FlexAisle® Configuration	Function	Options
T Bars	T Bars bridge cabinets aisles to support roof panels.	Lengths include - 950mm, 1.2m and 1.8m aisle widths.
Horizontal Roof Panels	Steel framed c/w rubber seals transparent panels loose lay on T Bars to create Hot or Cold aisle system.	Lengths include - 950mm, 1.2m and 1.8m aisle widths. Widths to support 600mm, 750mm, 800mm, 1.2m & 1.6m centres.
Vertical Roof Panels	Steel framed transparent panels fixed to top hat blanks to create Hot Aisle Return Plenum.	Length include 600mm, 750mm, 800mm, 1.2m & 1.6m centres. Heights – custom to suit room ceiling grid finish.
“Top Hat” Brackets	Custom brackets fit to top of cabinets to adjust height.	Standard 50mm custom finish to support multivendor environment.
Door Systems	Single or double sliding door sets which fit at the end of the corridor. Options for standard and security lock systems.	Widths to support 950mm, 1.2m and 1.8m aisles.
Infill Panel	Custom Panel to infill non standard areas.	Infill Panel.
L Brackets	Support where cabinets face perimeter walls.	50mm x 50mm standard.

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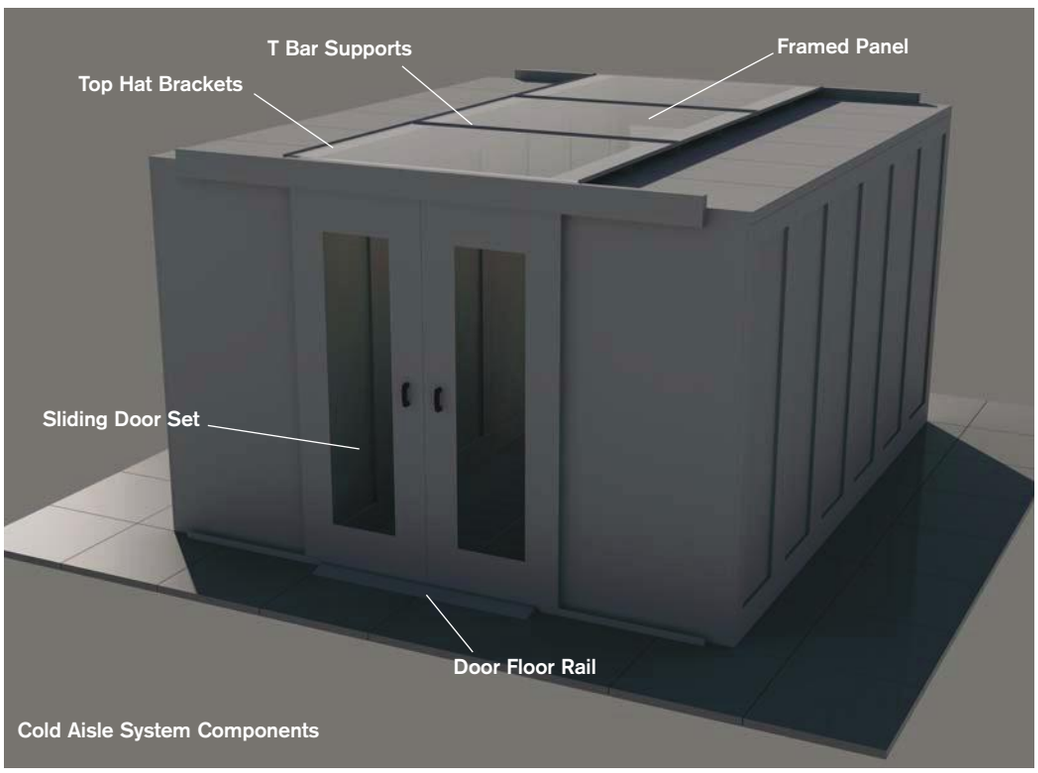


Design and Installation Services

FlexAisle® is manufactured in the UK and is available exclusively through Workspace Technology and its appointed distributors. Workspace Technology is a leading expert in the design and build of communications, server room and data centre facilities.

Workspace Technology's engineers will assess individual client requirements auditing existing cooling technology, physical room configuration, cabinet layouts, airflow and temperature/humidity patterns. Once a complete picture of the existing facility and an understanding of future deployments has been obtained, Workspace Technology's Engineers will produce a site specific FlexAisle® configuration design.

As part of any proposed FlexAisle® solution, Workspace Technology will include all relevant recommendations for any additional passive and active airflow management technology that will be required in order to provide a complete airflow management solution for the client.

Workspace Technology offers additional advice and configuration services for air-conditioning plant to ensure that the maximum benefits are gained from the deployment of a FlexAisle® solution. Examples include relocation of location AC sensors, fine tuning of flow air temperatures to ensure inlet temperatures are set to agreed levels and tuning of humidity settings to reduce operational run times.

Additional Passive Cooling Technology

To provide complete separation of hot and cold air paths the FlexAisle® solution is extended to include airflow management products from leading manufacturers including APC, Plennafil and Koldlok.

Airflow Baffles

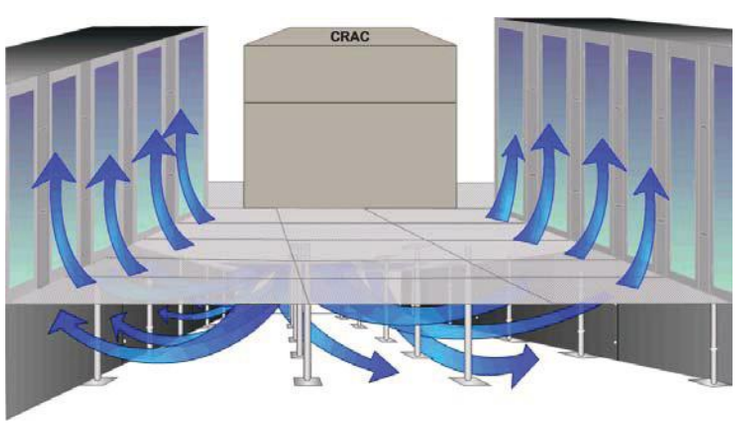
One of the challenges with a Data Centre environment is how to get the air that is beneath a raised floor, through the perforated tiles and into the front intakes of rack mounted vertically integrated server housings which are producing the heat.

The installation of vertical under floor baffle partition systems help to direct airflow within the raised access floor space. Baffles direct the source of the cold air from the air handling units to where the air is or is not needed.

Baffles help maintain the static pressure further away from an air handling unit, providing a simple solution to the cooling of thermal hot spots in information technology equipment centres.

- **Control and Balance Data Centre Airflow**
- **Separate Hot Aisles from Cold Aisles**
- **No Installation Tools Required**
- **On-Site Configurable (Width and Height)**
- **Fits ANY Raised Floor Pedestal**
- **Reduces Energy Consumption and Operating Costs**
- **An Inert, Non-Conductive and Non-Hygroscopic**
- **Material Flammability rating of UL V- 0 per UL94**
- **An Energy Saving and Thermal Tuning Tool**

Baffles can also be used to create dedicated return air paths above ceilings.



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Koldlok Brush Seal Systems

Floor Sealing Systems

When raised access floors are deployed in combination with down flow AC systems, the leakage of cold air in the wrong places will reduce the effective cooling capacity of the system. Increasing cooling capacity to compensate is expensive and wastes energy.

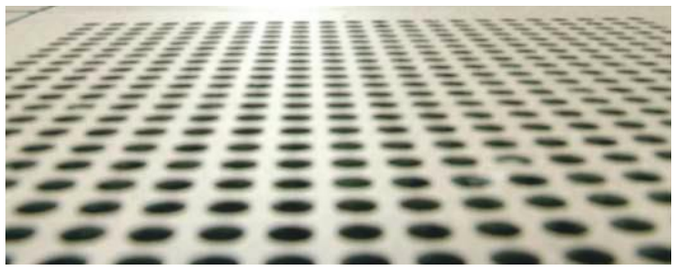
A better solution is to reclaim lost cooling capacity by sealing unmanaged openings that are wasting cold air. This will ensure air is circulated to where it is needed via correctly positioned grille floor tiles.

Typically these openings are found where cable access is required, below cabinets.

The installation of specially designed raised floor brush grommets will help seal the floor and prevent leakage of air where cables are routed into equipment cabinets.

The incorporation of floor sealing systems will help:

- **Increase existing cooling unit capacity**
- **Reduce the need to purchase additional cooling units**
- **Improve equipment reliability and extend equipment life**
- **Increase static pressure under the raised floor and improve cool air delivery through perforated tiles and floor grates**
- **Facilitate cold aisle/hot aisle best practice**



Blanking Panels

IT equipment installed within cabinets cools itself by drawing air from the data centre. Most equipment will draw the cold air in from the front and expel the heated exhaust air from the rear of the equipment. If the hot exhaust air is allowed to recirculate to the inlet air, this will cause mixing of hot and cold creating an overheating condition.

The simple and effective method to prevent air recirculation within cabinets is to install blanking panels as shown on the diagram below. This strategy reduces hot spots and saves energy by increasing the CRAC return air temperature. The use of snap-in tool-less blanking panels makes installation easy and inexpensive.

APC 1U Blanking Panel

Blanking panels should be installed as part of an overall strategy to prevent mixing of hot and cold airflows within the data centre.

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or send us an email at **sales@workspace-technology.com**