Monodraught

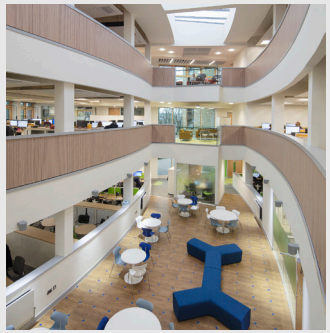
NATURAL COOLING

Award winning, innovative natural cooling systems

COOL-PHASE

THE QUEEN'S AWARDS
FOR ENTERPRISE:
INNOVATION
2018


Monodraught
We are
Pioneering British Greentech



Cover image:
Cool-phase / Harrogate Civic Headquarters
Photo credit: John Kees Photography

Back cover image:
Sunpipe / Battersea Power Station
Photo credit: Battersea Power Station Development Company

CONTENT

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info@monodraught.com

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Monodraught

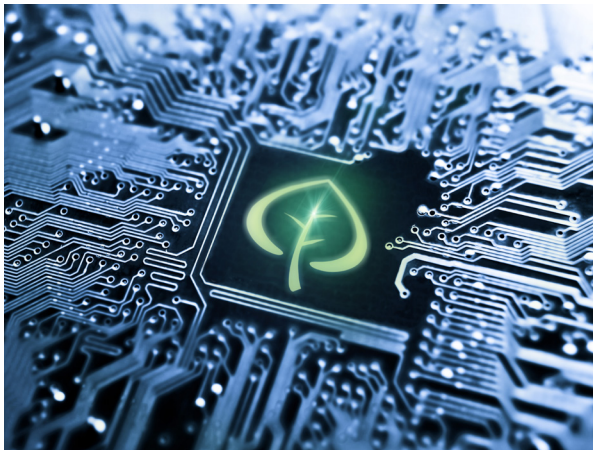
We are
Pioneering British Greentech

As a pioneering British Greentech company, we design, install and maintain ventilation, cooling, heating and lighting solutions to commercial buildings in the most sustainable way possible.

We believe that businesses like ours have a responsibility to invest in our community. We purchase our materials from local suppliers, recycle where possible and are proud to partner with a local mental health charity, Buckinghamshire Mind.

Monodraught are committed to minimising the carbon footprint of every building to which we supply our products and services. Our in-house design team model the building, select the most energy efficient equipment and design controls to maximise comfort whilst reducing running costs. We continue to monitor performance post-installation ensuring that it continues to be effective year after year. We can provide on-going service and maintenance of our installed products which ensures systems are all always running at optimum performance whilst keeping costs to a minimum.

Trading for over 45 years, we are proud of our record of awards for innovation from prestigious organisations. These include Ashden, CIBSE and the Queen's Award for Enterprise.



Awards & Accreditations:

- Queen's Awards for Enterprise: Innovation 2018 - COOL-PHASE
- CIBSE Building Performance Awards 2017 Shortlist - COOL- PHASE Hybrid
- Best Product/Service Range Category at the 2016 Best Business Awards
- Company of the Year Award 2016 - Buckinghamshire Business First
- Best Business in Wycombe District 2016 Award - Buckinghamshire Business First
- Ashden - Award for Energy Innovation for COOL- PHASE
- ISO 9001 and ISO 14001: Established quality and environmental management certificates
- BSI (British Standards Institute) Members
- CIBSE Building Performance Award 2012 - COOL- PHASE

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2018

Ashden Award winner 2013

CIBSE BUILDING PERFORMANCE AWARDS 2012 WINNER
RECOGNISING EXCELLENCE IN MAKING BUILDINGS WORK

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With you all the way

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Natural **Cooling**

Cool-phase - Herschel Building, Newcastle University

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WHY CHOOSE COOL-PHASE?

Low Running Costs

The system has low servicing, maintenance and energy costs, combined with a long life that provides an impressive payback on the capital cost of the system and enables the building owners and occupants to significantly reduce their carbon footprint.

Energy & Carbon Saving

The COOL-PHASE system uses an energy efficient variable speed fan with no compressors, pumps or other energy intensive components. A 5A single phase mains supply is all that is required.

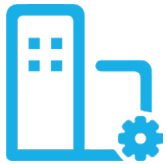
No Refrigerants

The COOL-PHASE system does not use the coolants often found in conventional cooling approaches. Therefore regulations controlling the use and disposal of refrigerants do not apply to COOL-PHASE.

Healthy & Productive

The COOL-PHASE system creates a healthy and productive environment by monitoring internal air quality and ensuring there is a supply of fresh air.

No External Units



The system does not require any external units. This makes COOL-PHASE particularly suitable in applications where access to outside space or planning constraints are an issue and has a positive impact in terms of external acoustics.

Modular Design

It can be installed in modular spaces or large open plan offices, above false ceiling or suspended below to suit a range of environments. It can also be installed and integrated with new or existing mechanical ventilation and cooling schemes to offer local decentralised ventilation.

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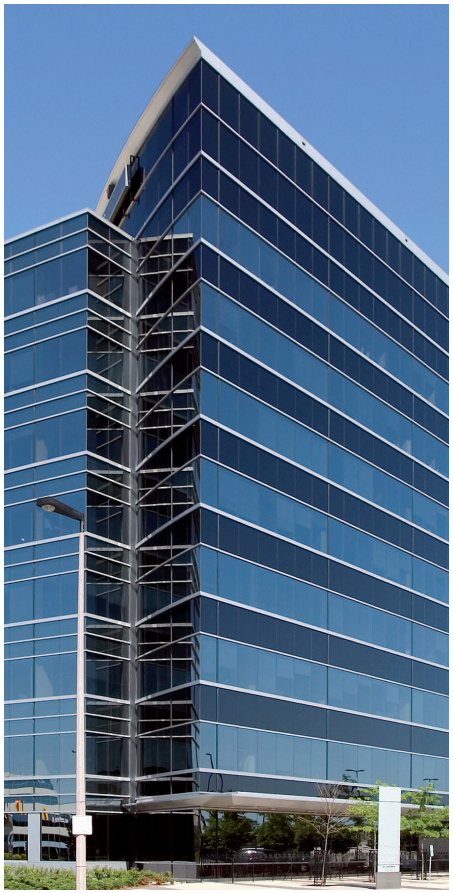
COOL-PHASE

WHAT IS COOL-PHASE?

COOL-PHASE is an award winning, low energy cooling and ventilation system that creates a comfortable, fresh and healthy indoor environment and reduces the running cost of buildings.

COOL-PHASE uses a thermal energy store utilising a Phase Change Material (PCM) in combination with an intelligently controlled Air Handling Unit, to actively ventilate and cool the building. The COOL- PHASE system can maintain temperatures within the comfort zone, while dramatically reducing energy consumption by up to 90% when compared to an equivalent conventional cooling system. Furthermore, COOL- PHASE uses neither refrigerants nor compressors, unlike conventional systems, making it environmentally friendly both in its manufacture and operation.

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2018



Tiffin School (top) - Sheffield Hallam University (bottom) - Cool-phase above ceiling

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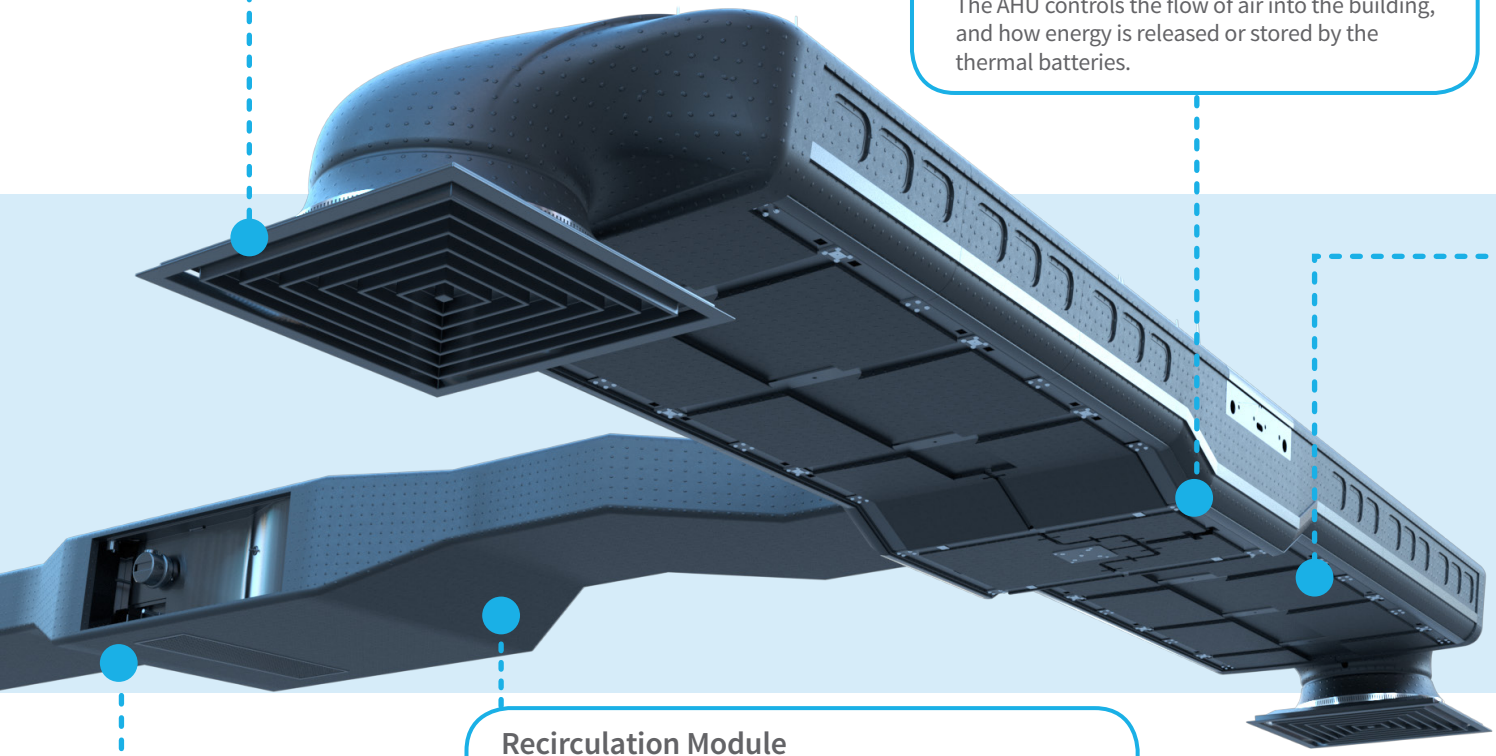
KEY FEATURES

Diffusers

Air diffusers are built into the units to ensure air can circulate around the room evenly and prevent uncomfortable draughts.

Air Handling Unit (AHU)

The AHU contains an energy efficient EC fan, control actuator, intelligent control system and sensors. The control system monitors indoor air quality and temperatures both inside and outside. The AHU controls the flow of air into the building, and how energy is released or stored by the thermal batteries.



Modular Thermal Battery

The thermal batteries form a modular heat exchanger store. These allow heat energy to be transferred from the air to the thermal batteries or vice versa.
The system uses the concept of **"Thermal Battery"** to capture and store heat and cooling energy. The Thermal Batteries use the latent heat property of a **Phase Change Material (PCM)** to store large amounts of energy. This PCM changes phase at room temperature and is charged and discharged by passing air through its thermal batteries, releasing the stored energy when it is required.
The thermal battery module has no moving parts and does not require any power, therefore, they are highly reliable, have a long life and require minimal maintenance.

Thermal Battery

Duct

An acoustic insulated duct connects the COOL-PHASE system to the outside air.

Recirculation Module

A G4 filter is positioned to remove particles from the incoming external fresh and recirculated air. Volume control dampers manage the proportions of fresh and recirculated air to maintain the optimal internal environment. Pressure sensors indicate when filter media needs to be cleaned or replaced.

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EDUCATION

Each COOL-PHASE system includes CO_2 monitoring as standard and can accurately control the level of fresh air within classrooms to provide the ideal teaching environment. The system is capable of meeting the requirements of BB101 and Priority School Building Programme (PSBP) even in tough areas, such as an IT classroom.

RETAIL

Retailers are under increasing demand to slash their energy consumption and COOL-PHASE has been shown to make significant savings compared to conventional cooling approaches.

CORPORATE

The COOL-PHASE system can operate on its own to provide thermal comfort conditions or can operate alongside conventional cooling systems to provide a fine level of climate control that even the most demanding client might expect, but still radically reduce running costs.

Harrogate Borough Council
Rothamsted Research
Derbyshire County Council
Merrist Wood College
Animal Management Centre

OFFICES

The COOL-PHASE system has been designed to meet the requirements of clients who wish to have a greater level of control over internal temperatures than is achievable with other low energy approaches, but without the high energy and maintenance costs of conventional cooling solutions.

Woking Borough Council
Allianz
Wessex Water YTL Group
University of Cambridge Greenwich House Offices

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Hybrid **Cooling**

Cool-phase Hybrid - Harrogate Civic Headquarters

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COOL-PHASE
HYBRID

WHY CHOOSE
COOL-PHASE HYBRID?

Precise Control

The COOL-PHASE Hybrid system allows for more precise room temperature control as it will have the capacity required to achieve a set point temperature with consistency.

Direct Comfort

In the case that the thermal batteries run out of capacity, the new system will have the capability to cool or heat the room directly by supplying air at the required temperature.

Multiple Systems

Multiple COOL-PHASE Hybrid systems can be run from one heat pump if they are all serving at the same space, however, independent heat pumps will be required to serve individual spaces.

Temperature Set Point

In cooling mode, the thermal batteries are usually charged during the night when the temperature drops. However, during certain times in the summer period, the temperature at night, especially around relatively warm buildings, cannot drop below certain point and allow for the batteries to be charged. In such cases, the COOL-PHASE Hybrid can utilise the heat pump to charge the thermal batteries, by allowing cold air to pass through the system.

Extreme Conditions

If the inside of the building is not warm enough to provide enough heat to the batteries, the heat pump can supply warm air to the thermal batteries in order to fully charge them.

Unit Reduction

The new system will allow the amount of COOL- PHASE units required for a given application to be reduced.

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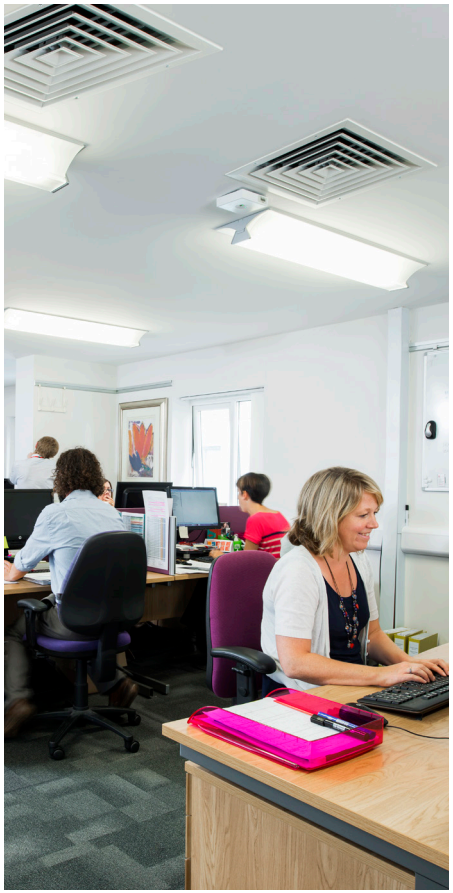
COOL-PHASE HYBRID

WHAT IS COOL-PHASE HYBRID?

COOL-PHASE Hybrid is an innovative low energy cooling and ventilation system with the ability to create a comfortable, fresh and healthy indoor environment to within a tight set of tolerances. It integrates two proven low energy technologies, Phase Change Material (PCM) and high efficiency Air Source Heat Pumps.

When these technologies are combined with Monodraught's intelligently controlled Air Handling Unit (AHU) and a duct mounted Low Temperature Hot Water (LTHW) Coil, COOL-PHASE Hybrid is able to actively ventilate and thermally control indoor conditions and CO_2 levels to within a range of specific set points. With the addition of free cooling, hybrid ventilation and night time ventilation COOL-PHASE Hybrid greatly reduces energy consumption, the buildings carbon footprint and running costs, when compared to an equivalent conventional cooling system.



UWE Bristol (Left) - Alderman Knight School (Top) - Bournemouth University (Bottom)

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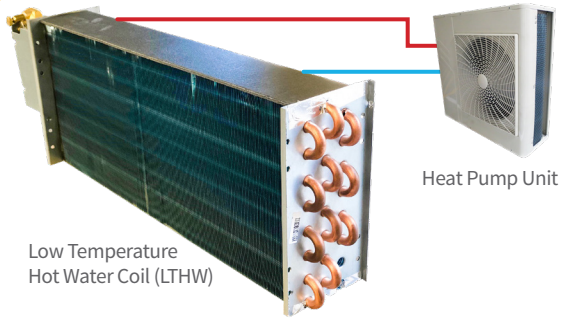
COOL-PHASE
HYBRID

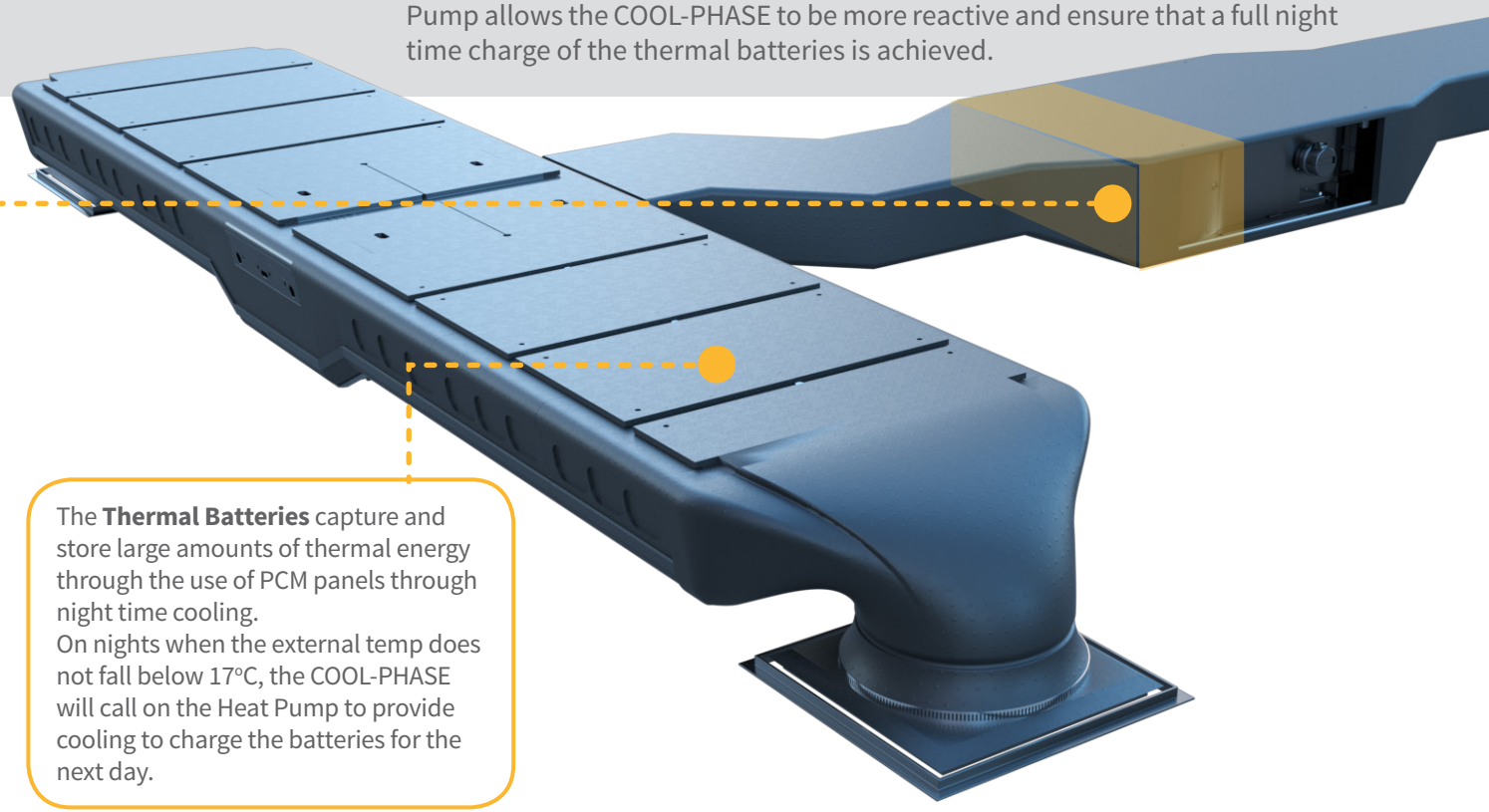
KEY FEATURES

COOL-PHASE Hybrid monitors both internal and external temperatures and CO_2 levels in order to intelligently profile a room's conditions. This data allows the system to actively control the air supply to a room, varying factors such as air quality and temperature, the system then delivers this air in the most efficient way possible.

Through Monodraught's innovative integration of the complementary, low energy technologies COOL-PHASE Hybrid gains benefits from each that would not be possible if they were standalone. The PCM allows for energy from the Heat Pump to be stored and therefore minimising waste, whereas the Heat Pump allows the COOL-PHASE to be more reactive and ensure that a full night time charge of the thermal batteries is achieved.



The use of a specifically designed duct mounted **Low Temperature Hot Water (LTHW) Coil** allows the COOL-PHASE Hybrid to call upon an Air Source Heat Pump or other water source to provide top-up heating or cooling at an instance. The use of this system can add an additional cooling capacity of 3.6kW and additional heating capacity of 7.5kW per Hybrid system, when compared to the standard COOL- PHASE system.



The **Thermal Batteries** capture and store large amounts of thermal energy through the use of PCM panels through night time cooling.
On nights when the external temp does not fall below 17°C, the COOL-PHASE will call on the Heat Pump to provide cooling to charge the batteries for the next day.

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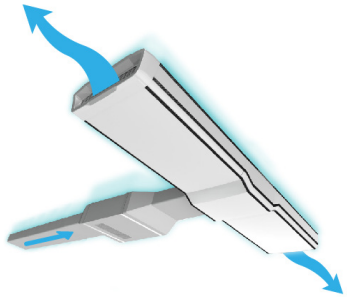
During the daytime the system uses its intelligent control algorithms to automatically ventilate and maintain healthy and comfortable temperature and CO_2 levels.

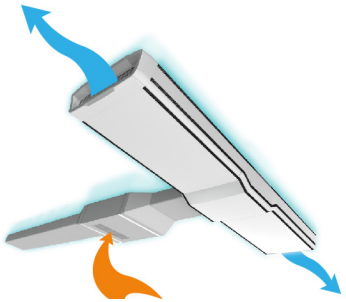
Should the temperature in the room exceed a pre-set level, the system will provide cooling to meet the requirements of the space, varying the damper positions and fan speed:

VENTILATION OPERATION MODES



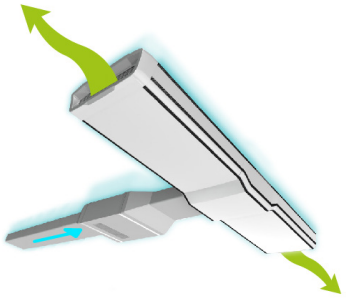
OUTSIDE AIR VENTILATION & COOLING

This is used when the temperature differential between inside and outside air is insufficient to cool the space but the outside temperature is still lower than the temperature within the room. Air is passed from outside over the thermal batteries to drop the temperature of the air and cool the room sufficiently, whilst also providing fresh ventilation to reduce the CO_2 level.



RECIRCULATION & COOLING

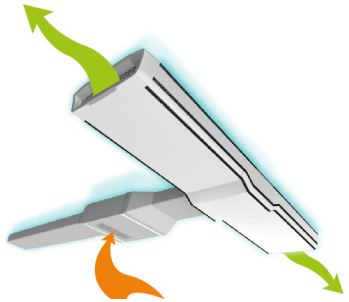
This strategy is used when the temperature outside is higher than inside and cooling is required, the unit re-circulates air from within the room and passes it over the thermal batteries to provide cooling. A proportion of air can be drawn from outside to maintain the ventilation levels, a CO_2 sensor and pre-set level determines the level of ventilation to be provided.



VENTILATION

Should the CO_2 levels within the space rise above a pre-set level, the system will provide ventilation proportional to the requirements of the space by modulating the external damper and vary the fan speed until the desired CO_2 levels are achieved. Should the outside air temperature be low enough to overcome any overheating in the room this temperature difference can be utilised to provide cooling. By bypassing the thermal batteries the loading on the fan is reduced and the cooling capacity of the thermal batteries is preserved for when it is most needed.

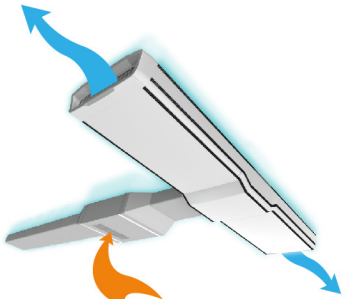
HEAT RECOVERY



HEAT RECOVERY

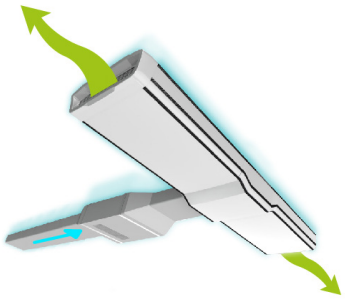
In winter, the COOL-PHASE system works in reverse, trapping waste heat and using it to warm up cool fresh air entering the building. Whenever the internal temperature exceeds a pre-set level, or at the end of the day when the space is unoccupied, warm air from inside the space is passed through the thermal batteries to charge them. When ventilation is required, cool air from outside is drawn in; this cooler air can be mixed with re-circulated room air and passed through the heater batteries, warming the air entering the space and reducing the load on the heating system.

HYBRID OPERATION MODES



HYBRID COOLING

Should the temperature in the room exceed the seasonal pre-set level, the system can activate the Hybrid circuit to introduce additional cooling into the system and further cool the air that it is providing to the space. Warm external air is cooled by passing it through the Heat Exchanger. It can then be passed directly into the room to reduce the internal temperature or it can be passed through the PCM heat exchanger to charge the PCM batteries.



HYBRID HEATING

Should the temperature of the air leaving the system be calculated to be too cool, the Hybrid circuit can be activated, allowing the air to be pre- heated before entering the room. This can also be utilised to introduce warmth into the thermal batteries.
Cold external air is warmed by passing it through the Heat Exchanger. It can then be passed directly into the room to supply fresh air without cold drafts.

EXPOSED VOID (EV)

For exposed structure or open plenum applications, COOL-PHASE can be installed in a more subtle fashion to the “fascia” model. Fascias and grilles are replaced by two 90° down turns and 4 way diffusers to allow the system to sit unnoticed in a plenum, with all components supplied in black.

SUSPENDED CEILING (SC)

COOL-PHASE can be installed above suspended ceilings with a void of at least 400 mm to completely conceal the unit. Air is cooled and distributed via ceiling diffusers to provide cool, fresh air to the area below. The system can be installed flush to the slab or suspended from larger voids.

FASCIA (F)

In applications where COOL-PHASE is on display, the system is fitted with covering fascia panels and high quality grilles to give COOL-PHASE a smooth, contemporary aesthetic.

MODULAR OPTIONS

- **CPN4** - Four thermal battery modules, two positioned each side of the air handling unit, totalling 6kWh thermal store.
- **CPN6** - Six thermal battery modules, three positioned each side of the air handling unit, totalling 8kWh thermal store.
- **CPN8** - Eight thermal battery modules, four positioned each side of the air handling unit, totalling 10kWh thermal store.

MULTIPLE SYSTEMS

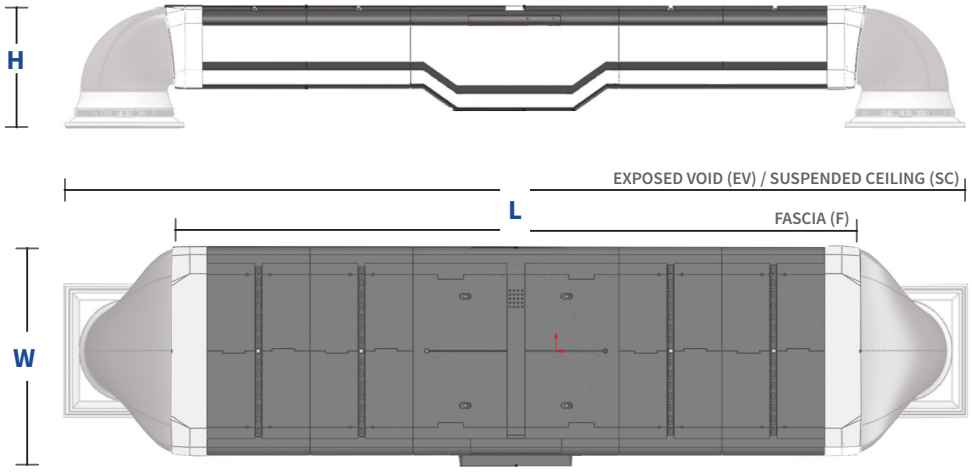
The COOL-PHASE system can be operated as a standalone system supplied with 1No. wall mounted control system serving a single room or area.

Multiple COOL-PHASE systems can be installed alongside each other independently with their own wall mounted control system or a maximum of four COOL-PHASE units can operate in a Primary/Secondary unit at the commissioning stage, with one unit being set as the Primary unit with all additional units set as Secondary units. This allows multiple COOL- PHASE units to operate in a single room or zone of a building.

A maximum of two units can be installed to be served by one duct which includes one Heat Exchanger Coil for cooling or heating.

DIMENSIONS

System Variant	Length (mm)	Width (mm)	Height (mm)	Weight (kg)
CPN4EV	4850	966	410	195
CPN6EV	5805	966	410	285
CPN8EV	6040	966	410	375
CPN4SC	3945	966	410	195
CPN6SC	4600	966	410	285
CPN8SC	4800	966	410	375
CPN4F	3040	966	350	210
CPN6F	3995	966	350	300
CPN8F	4195	966	350	390



Materials	Main body - EPP (Expanded Polypropylene)
	Fascia panels (Installation option) - Vacuum Formed ABS
	Grille - Powder Coated Aluminium
	Support Frame - Powder Coated Mild Steel
	PCM Panel pressed Aluminium
Flowrates/SFP	Max Day - 150l/s - SFP 0.11
	Max Day Boost - 260l/s - SFP 0.24
	Max Night - 300l/s - SFP 0.30
Electrical Requirement	230VAC Mains with switched fused 5A Sput
Power Consumption	7 -91W
Thermal Energy Storage	6 - 10kWh (See Dims Page 23)
Sensors	AHU temp. sensor -20°C to +90°C
	2No. Supply temp. sensor -20°C to +90°C
	Room temp. sensor within wall controller -20°C to +90°C
	Room CO_2 sensor within wall controller 0-2000ppm
Data Monitoring	Data logging functionality as standard: All system operations, sensor readings and davmper positions logged every 1 minute
Additional Functions	Self Test Mode - via wall controller
Installation	Minimum ceiling void of 500mm if required or 2.6m min. ceiling height if Fascia System
	Unit supported by drop rods, Gripple or similar. (4No. AHU & 2No. per battery module)
System Requirements	Connection to clean outside air source, inlet to be positioned away from sources of pollution/ heating vis Recirc Mode
	External weather louvre with minimum free area of 0.1m - to be supplied fitted with anti-bird mesh
	Exhaust Damper with minimum free area of 0.1m - connected to suitable louvred wall opening or roof cowl with bird guard
	Connection to Recirc Unit via Monodraught interconnect cable
Ducting	Single System: Minimum supply duct size 500mm(w) x 150mm internal(h)
	Twin System: Minimum supply duct size 600mm(w) x 250mm internal(h)

Guarantee	5 Year warranty
	Mechanical and electrical components have a 1 year warranty
Options	CPN4: Four Thermal Battery Modules / CPN6: Six Thermal Battery Modules / CPN8: Eight Thermal Battery Modules
	Installation: Exposed Void (EV) / Suspended Ceiling (SC) / Fascia (F)
	BACnet / Modbus
Optional Electrical Connections	System Enable Input - NC volt-free contact to activate and deactivate the system
	Fault Output - NC relay output for fault indication
	CAT5e Slave Connection - 2-4No. Cool-phase units synchronised to work in a Master/Slave configuration in a single zone
	VENTSAIR systems acting as automatic opening window
	Heating/Cooling Output - 0-10VDC output
	LED Window Indicator

RECIRCULATION MODULE

Materials	Powder coated mild steel frame
	Specialist acoustic panels
	ABS low maintenance plastic panelling
	Grille - Powder coated Aluminium
Dimensions	Single standard system - 830mm (w) x 315mm (h) x 1075mm (l)
	Twin standard system - 1200mm (w) x 340mm (h) x 1075mm (l)
Weight	Single standard system - 30kg
	Twin standard system - 45kg
Electrical Requirements	Connection to COOL-PHASE system via Monodraught interconnect cable
Sensors	External temp. sensor -20°C to +90°C
	Recirculation temp. sensor -20°C to +90°C
Installation	Minimum ceiling void of 500mm, if required of 2.6m min. ceiling height if Fascia system
	Unit supported by drop rods, Gripple or similar. (4No. Recirc Module)
Ducting	Single System - Minimum supply duct size 500mm x 150mm internal
	Twin System - Minimum supply duct size 600mm x 250mm internal

Cool-phase - Ford Runcorn Offices

Materials	Main body - EPP (Expanded Polypropylene)
	Fascia panels (Installation option) - Vacuum Formed ABS
	Grille - Powder Coated Aluminium
	Support Frame - Powder Coated Mild Steel
	PCM Panel pressed Aluminium
Flowrates/SFP	Max Day - 150l/s - SFP 0.11
	Max Day Boost - 260l/s - SFP 0.24
	Max Night - 300l/s - SFP 0.30
Electrical Requirement	230VAC Mains with switched fused 5A Sput
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	2No. Supply temp. sensor -20°C to +90°C
	Room temp. sensor within wall controller -20°C to +90°C
	Room CO_2 sensor within wall controller 0-2000ppm
Data Monitoring	Data logging functionality as standard: All system operations, sensor readings and damper positions logged every 1 minute
Additional Functions	Self Test Mode - via wall controller
Installation	Minimum ceiling void of 500mm if required or 2.6m min. ceiling height if Fascia System
	Unit supported by drop rods, Gripple or similar. (4No. AHU & 2No. per battery module)
System Requirements	Connection to clean outside air source, inlet to be positioned away from sources of pollution/ heating vis Recirc Mode
	External weather louvre with minimum free area of 0.1m - to be supplied fitted with anti-bird mesh
	Exhaust Damper with minimum free area of 0.1m - connected to suitable louvred wall opening or roof cowl with bird guard
	Connection to Recirc Unit via Monodraught interconnect cable
Ducting	Single System: Minimum supply duct size 500mm(w) x 150mm internal(h)
	Twin System: Minimum supply duct size 600mm(w) x 250mm internal(h)
Guarantee	5 Year warranty / Mechanical and electrical components have a 1 year warranty

Options	CPN4: Four Thermal Battery Modules / CPN6: Six Thermal Battery Modules / CPN8: Eight Thermal Battery Modules
	Installation: Exposed Void (EV) / Suspended Ceiling (SC) / Fascia (F)
	BACnet / Modbus
Optional Electrical Connections	System Enable Input - NC volt-free contact to activate and deactivate the system
	Fault Output - NC relay output for fault indication
	CAT5e Slave Connection - 2-4No. Cool-phase units synchronised to work in a Master/Slave configuration in a single zone
	VENTSAIR systems acting as automatic opening window
	Heating/Cooling Output - 0-10VDC output
	LED Window Indicator

RECIRCULATION MODULE

Materials	Powder coated mild steel frame	Coil Materials (Located within Recirculation Module)	Copper Piping
	Specialist acoustic panels		Galvanised Steel Casing
	ABS low maintenance plastic panelling		Aluminium Fins
	Grille - Powder coated Aluminium		
Dimensions	Single standard system - 830mm (w) x 315mm (h) x 1075mm (l)		
	Twin standard system - 1200mm (w) x 340mm (h) x 1075mm (l)		
Weight	Single standard system - 30kg / Twin standard system - 45kg		
Electrical Requirements	Connection to COOL-PHASE system via Monodraught interconnect cable		
	4-Core connection to LTHW Valve Actuator		
Sensors	External temp. sensor -20°C to +90°C		
	Recirculation temp. sensor -20°C to +90°C		
	Air-On LTHW temp. sensor -20°C to +90°C		
	Air-Off LTHW temp. sensor -20°C to +90°C		
Installation	Minimum ceiling void of 500mm, if required of 2.6m min. ceiling height if Fascia system		
	Unit supported by drop rods, Gripple or similar. (4No. Recirc Module)		
	Suitable Hot and Cold water supply for Hybrid function		
	Suitable Water Control Valve to work in conjunction with LTHW Valve Actuator		
Ducting	Single System - Minimum supply duct size 500mm x 150mm internal		
	Twin System - Minimum supply duct size 600mm x 250mm internal		


COOL-PHASE
HYBRID
3
2
1

COOL-PHASE wall controllers are designed to be mounted within a zone and control up to 4 units, in a master and slave arrangement. Two versions of the COOL- PHASE wall controller are available: Smart Screen Controller and Oval Controller. Both these options have a temperature and CO_2 sensors, allowing the system to monitor the room temperature and CO_2 levels and also enable the user to control the fan speed and turn off the fan.

SMART SCREEN CONTROLLER

The Smart Screen Controller is a high quality interface that provides a graphical insight into the operation of Monodraught ventilation systems. Through the capacitive touchscreen interface, a user can explore how the system works, adjust settings, and find out information on the system in order to maintain a comfortable environment with minimal energy use.

The screen design is divided into 3 sections:

- **Information**: This will display to the user the time, CO_2 level, fan speed and temperature.
- **Menu**: This will display to the user the options go to the homepage, change the fan speed and view information regarding the system.
- **Graphic Display**: This will indicate which mode the system is in, displaying external, internal and mixed temperatures.

For more information about this control please ask for the Smart Screen Controller card.

OVAL CONTROLLER

1. **High Button**: Will assess the ability for cooling and if further cooling is possible will run the fans for a period of 1 hour.*
2. **Medium (Auto) Button**: Returns the system to automatic mode. The system automatically adjusts the speed depending on CO_2 and temperature levels.
3. **Low Button**: Runs the fans at lower speeds for quieter operation.
4. **Off Button**: Places the system back into dormant (off) mode for a period of 1 hour.*
5. **Auto Button**: Places the system back into automatic mode.
6. **CO_2 sensor**: Updates the system with the current CO_2 level within the room once per second.
7. **Temperature sensor**: Updates the system with the current room temperature once per second.

* After the 1 hour period, the system reverts back to the automatic mode.

COOL-PHASE SYSTEM

Season	Spring	Summer	Autumn	Winter
Start / Finish Dates	01 - March / 30 - April	01 - May / 30 - Sept	01 - Oct / 30 - Nov	01 - Dec / Last day of Feb
Occupied hours (Day time)	• Cooling provided when room temperature reaches > 23°C • Ventilation provided when internal CO_2 levels reaches > 900 ppm	• Cooling provided when room temperature reaches > 22°C • Ventilation provided when internal CO_2 levels reaches > 800 ppm	• Cooling provided when room temperature reaches > 23°C • Ventilation provided when internal CO_2 levels reaches > 900 ppm	• Cooling provided when room temperature reaches > 24°C • Ventilation provided when internal CO_2 levels reaches > 1000 ppm
Unoccupied hours (Night time)	PCM recharge mode	Summer recharge mode and pre-cooling of the space	PCM recharge mode	Heat recovery mode, or winter recharge mode

COOL-PHASE HYBRID SYSTEM

Season	Spring	Summer	Autumn	Winter
Start / Finish Dates	01 - March / 30 - April	01 - May / 30 - Sept	01 - Oct / 30 - Nov	01 - Dec / Last day of Feb
Occupied hours (Day time)	• Cooling provided when room temperature reaches > 21°C • Hybrid Cooling provided when room temperature reaches >23°C • Ventilation provided when internal CO_2 levels reaches > 900 ppm	• Cooling provided when room temperature reaches > 21°C • Hybrid Cooling provided when room temperature reaches >23°C • Ventilation provided when internal CO_2 levels reaches > 800 ppm	• Cooling provided when room temperature reaches > 23°C • Hybrid Cooling provided when room temperature reaches >17°C • Ventilation provided when internal CO_2 levels reaches > 900 ppm	• Cooling provided when room temperature reaches > 24°C • Hybrid Cooling provided when room temperature reaches >17°C • Ventilation provided when internal CO_2 levels reaches > 1000 ppm
Unoccupied hours (Night time)	PCM recharge mode and Hybrid PCM recharge mode if internal temperature reaches > 17°C	PCM recharge mode and pre-cooling of the space and Hybrid PCM recharge mode if internal temperature reaches > 17°C	PCM recharge mode and Hybrid PCM recharge mode if internal temperature reaches > 17°C	Heat recovery mode, or winter recharge mode

COOL-PHASE

CASE STUDY

HARROGATE CIVIC HQ

HARROGATE CIVIC HQ SHORTLISTED FOR PRESTIGIOUS CIVIC DESIGN AWARDS

- **Sector:** Government/Council

- **Contacts:**
  - **Architects:** Farrell & Clark
  - **Consultants:** Ramboll
  - **Construction:** Harry Fairclough Ltd
  - **End-customer:** Harrogate Borough Council
  - **Location:** Harrogate, Yorkshire

- **Products Installed:**
  - 30 No. Monodraught COOL-PHASE systems
  - 2 No. 1800mm WINDCATCHER Classic Bespoke Circular GRP Systems
  - 1 No. iNVent Control system.

The new civic headquarters for Harrogate Borough Council have been shortlisted for a Civic Trust Award. The new council offices were designed by Yorkshire based architects Farrell & Clark.

Operating from a 1930's headquarters building and four administration offices, Harrogate Borough Councils' brief was to provide a single site for staff, councillors and the public facilitating a "One Council" culture with reduced running costs and improved operational efficiency.

Monodraught

COOL-PHASE

CASE STUDY

HARROGATE CIVIC HQ

Built over five stories, the design maximises internal daylight and natural ventilation with the majority of the building integrating intelligent COOL-PHASE units with manually opening windows and controller louvered ventilation for managed occupant comfort. Pre-cast concrete floors and roof provide thermal mass whilst curved external walls are Structural Steel Framed with traditionally built local Yorkshire stone panels or curtain walling with profiled aluminium cladding.

The curved roof is a radial zinc standing seam, except at low level, where a green roof sits under the tree canopy and at high level where the flat roof accommodates an extensive array of photovoltaic panels.

Monodraught were specified to provide natural cooling and ventilation to all areas in an open plan office arrangement, whilst a central atrium space is ventilated by our bespoke ventilation system. Monodraught provided 30 No. COOL-PHASE systems and 2 No. WINDCATCHER Classic Bespoke Circular GRP systems.

Monodraught's COOL-PHASE system contribute credits towards BREEAM standards for sustainability across a variety of factors, including credits for lifecycle costs, indoor air quality and for the use of low and zero carbon technologies. In 2018 Monodraught won the Queen's Award for Enterprise, Innovation for its COOL-PHASE system.

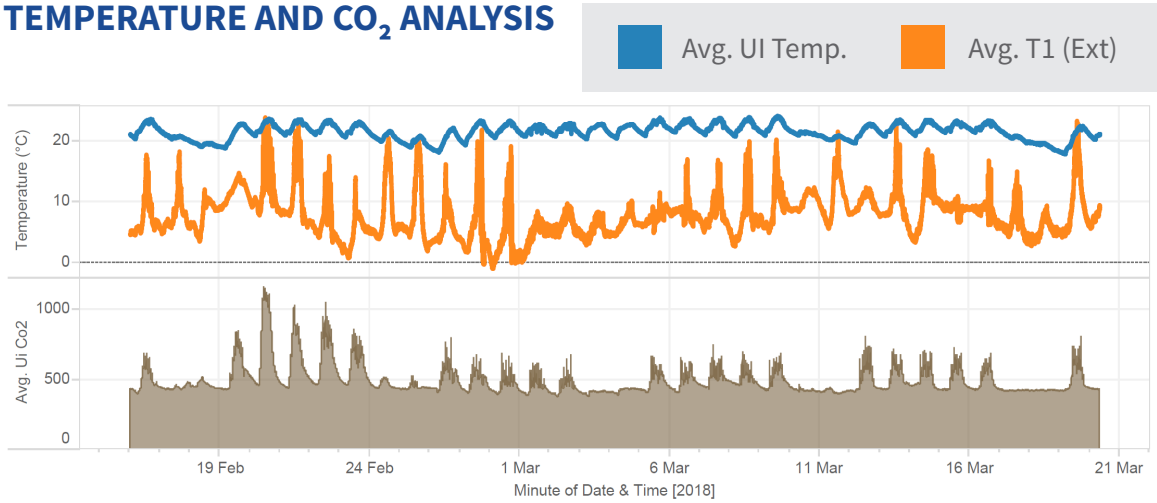
COOL-PHASE is a low-energy cooling and ventilation system that creates a thermally comfortable, fresh and healthy indoor environment by monitoring internal air quality and ensuring there is a supply of fresh air.

www.monodraught.com
info@monodraught.com

Monodraught

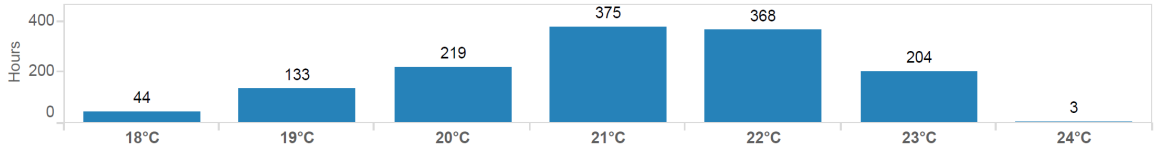
Data Analysed between 06.02.18 - 04.04.18

TEMPERATURE AND CO_2 ANALYSIS



TEMPERATURE DISTRIBUTION

This graph is a histogram of the number of hours it spends at each temperature



AVERAGE INTERNAL TEMPERATURE RESULTS

This table shows the overall average daily temperatures

	Avg. Temp.	Max. Temp.	Min. Temp.
Temperature (˚C)	21.5 ˚C	24.2˚C	16.8˚C

AVERAGE INTERNAL CO_2 RESULTS

This table shows the overall average daily CO_2 levels

	Avg. CO_2	Max. CO_2	Min. CO_2
CO_2 level (ppm)	499	1,165	378

MAX. CO_2 THRESHOLD

This table shows the number of hours that the internal CO_2 has spent above 1000ppm, 1200ppm and 1500ppm during the logged period.

	1000ppm	1200ppm	1500ppm
above	7h (0.73%)	0h (0%)	0h (0%)
below	999h (99.27%)		


Welcome

WE ARE

WITH YOU ALL THE WAY

R&D and Manufacture

Our large R&D team are continually challenging the boundaries developing new products to ensure customers continue to receive market leading products for which Monodraught are renowned. These products are all manufactured within our High Wycombe factory and as R&D is in the same location as production, then the highest levels of quality can be ensured.

Installation

We have a team of contract managers who will work with you and your clients from order creation through to delivery and maintenance if required. Our own team of installers work across England and Wales with partner agencies installing in Scotland, Ireland and worldwide. We will visit your site ahead of installation to ensure that everything goes smoothly.

Building Simulation

To help architects and consultants deliver ultra low energy efficient designs, Monodraught and building performance analysis specialist IES have developed Performance Components.
Our Project Design Engineers are able to work with you to create the right design for your building.

Maintenance

We can provide on-going service and maintenance of our installed products. This helps provide performance data for our customers and structured feedback that can assist product development, resulting in a system running at optimum performance whilst keeping costs to a minimum.

Monodraught

Copperbox Arena - Olympics Handball Stadium

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