



## **NATURAL LIGHTING**

Delivering Healthy Natural Light Inside







## We are Pioneering British Greentech





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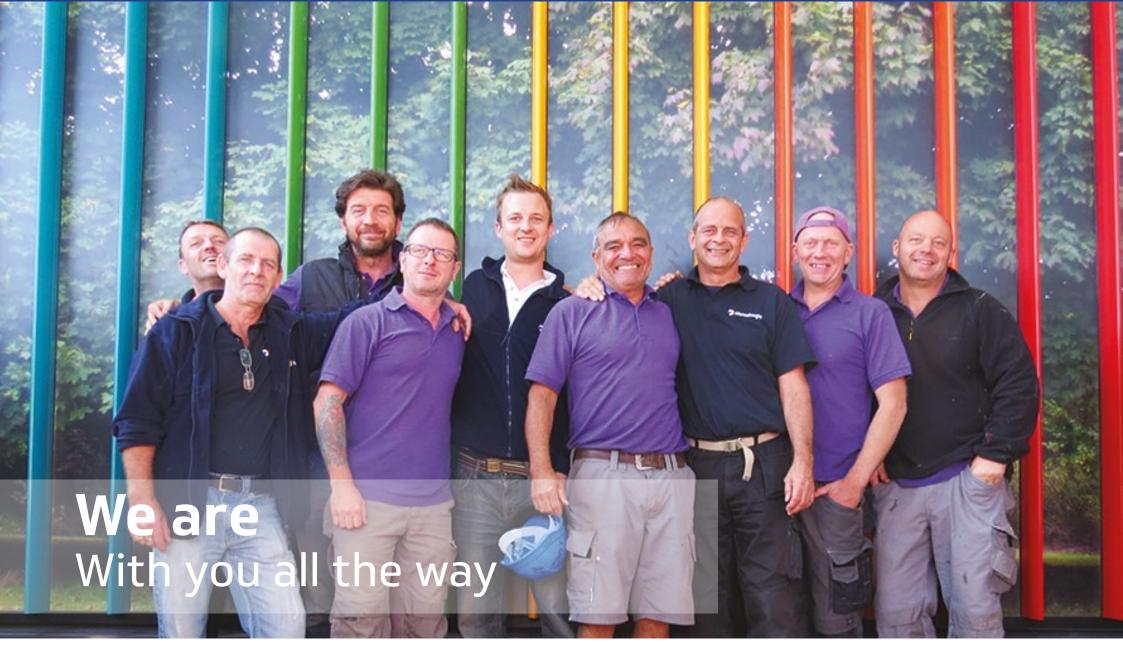
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Back cover image: Sunpipe / Battersea Power Station Photo credit: Battersea Power Station Development Company

O 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





## Natural **Lighting**

Monodraught









## WHAT IS SUNPIPE?

## NATURAL LIGHTING SYSTEM

Sunpipe is a natural lighting system that maximises the concept of renewable energy by channelling natural daylight from roofs to indoor environments.

Sunpipes create healthier, cost-effective and more productive environments.

Sunpipes are suited to almost any application and have been installed anywhere from residential buildings to the Olympic Handball Arena in London. Sunpipe are also designed for optimum efficiency and long working life, offering a **10 year guarantee**.

## **HOW DOES SUNPIPE WORK?**

The Sunpipe system collects daylight using a patented high impact Diamond Dome, passing through a Super-Silver<sup>®</sup> mirror finished aluminium tube which reflects and directs the natural daylight to the diffuser.

The diffuser distributes the natural daylight evenly in the room.



Battersea Power Station (left) - Olympic Handball Arena (top) - Village Centre Old Cinema (bottom)





## WHY CHOOSE SUNPIPE?

Increased Productivity

Productivity in offices served by natural lighting shows a 20% increase in output from office employees along with reduced absences because of sickness.

It is considered that natural lighting systems have marked effect on the reduction of the incidence of Sick Building Syndrome (SBS) and provide a stress-free, soothing, and far healthier office ambiance by eliminating the glare and conflict of the electric lighting and computer screens.



Studies have shown that people work and live better in a naturally lit environment and it has been shown to alleviate some of the symptoms of Seasonal Affective Disorder (SAD). Exposure to natural lighting is believed to have the following benefits by boosting the production of vitamins and hormones:

- Maintains the Circadian Rhythm
- Reduces fatigue and depression
- Alleviates pain
- Improves sleep pattern and mood



Energy costs can be saved as the need for electric lighting can be reduced by as much as 75%.

Sunpipe is sustainable energy in action, not only can reduce energy, it also leads to a considerable reduction in CO<sub>2</sub> emissions.







KEY FEATURES

## **Features**

- **Glazing details:** Clear impact modified diamond dome (Hiimpact acrylic for Ø230/300/450mm, and Polycarbonate for Ø530/750/1000mm.
- Lining: SUPER-SILVER finish aluminium tube in 610 mm lengths
- **Ceiling diffuser:** Prismatic with white ceiling trim and 3 mm plywood (we do not supply plywood with the 750 or 1000 systems)

## **Advantages**

- Generally no structural alterations required, easily fits between joists and rafters
- No maintenance required
- Top domes are self-cleaning due to their shape

## **Standards**

- BS EN ISO 14001 and BS EN ISO 9001
- The Fire-guard ceiling diffuser has been tested to comply with BS 476-20: 1987
- The Fire Choke collar has been fully tested to current British and European standards (test report TE 39902)

## **Options**

• Other bespoke arrangements are available. For sizing guidance or further details, please contact Monodraught Head Office











## SUNPIPE

We are the pioneers of Sunpipes.

They are designed to channel natural daylight from outside to wherever in the indoor environment is required.

Sunpipes are a great solution that enable the user to create a brighter and sustainable indoor environment for happier, healthier and more productive occupants.

Sunpipes are suited to almost any application and have been installed in environments ranging from residential buildings to the Olympic Handball Arena in London, Battersea Power Station and even a 0.5 km long Falcon breeding Centre in Dubai.

## Advantages

#### Education

- Increased achievement rates
- Reduced fatigue factors
- Improved health and attendance
- Enhanced general development

#### **Health Care**

- Alleviates symptoms of Seasonal Affective Disorder (SAD)
- No maintenance = No disruption
- Typical payback period of 5 6 years

#### Retail

• Addition of skylights proven to produce a 40% increase in sales

#### Offices

- 20% increase in employee output
- Reduced absence because of sickness
- Reduced instances of Sick Building Syndrome (SBS)

#### **Improved Health**

• Boosted levels of Dopamine, Endorphins, Cortisone, Testosterone in men, and Vitamin D







## SELECTION CRITERIA



### **Choose Diamond Dome or Square Sunpipe**





**Diamond Dome** 

**Square Sunpipe** 

## 2 Choose your system size

	imensi	ons					
	230	300	450	530	750	1000	1500
Sunpipe Diameter (mm)	230	305	457	535	750	1000	1500
Roof and ceiling opening Ø (mm)	250	320	470	550	770	1020	1520

## 3 Choose Roof Type





**Pitched Gallery** 

Pitched

Flat

www.monodraught.com info@monodraught.com







**Slate Roof** 



Plain Tile Roof

Bold Roll Roof





Contact us for more information on metal roofs.

- Flat Felt/Asphalt Membrane Roof
- Flat EPDM Rubber Roof
- **5** Choose from our range of ceiling diffusers
- 6 Choose Additional/Optional Components (Please refer to page 15)





## ABOVE ROOF

### **Diamond Dome Sunpipe**

We use high impact acrylic in our patented Diamond Domes which maximises the penetration of natural daylight for Ø230/300/450mm Sunpipes. We use polycarbonate for Ø530/750/1000/1500mm Sunpipes to maximise impact resistance.



### Gore<sup>®</sup> Vent Technology

Gore vent technology uses waterproof membrane whilst still allowing the pipe to breathe. This ensures the pipe is completely sealed against dust and water ingress and ensures that there will be no condensation on the inside of the dome. (Only provided with EcoShield).

### **Squared Rooflight Frame**

690 mm x 780 mm rooflight with a double glazed cover measuring 475 mm x 570 mm which finishes virtually flush with the roof surface. Supplied with code 4 lead skirt to enable suitable weathering. A square to circular transition piece completes the arrangement.

### EcoShield

When combined with the double glazed Micro Prism diffusers, the EcoShield effectively makes the Sunpipe system a quadruple glazed system ensuring an extremely low U-Value and sound transmission through the system.

## Sealing Gasket

Brushed nylon condensation sealing gasket.



## **Code 4 Lead Flashing and ABS Collar** (For profile tile roof)

It will mould to suit any profiled/bold-roll tile, providing a completely watertight finish. Supplied with an ABS collar for diamond dome to fit on.



#### ABS Flashing Plate (for slate roof)

The ABS flashing plate is manufactured from 3.5mm thick ABS, capped with PMA for a long lasting, durable finish. It is suitable for the majority of slate roofs.



The Composite EPDM Flashing Plate is fully watertight and is designed to meet strict installation procedures for weathering into a flat rubber-cover roof.



#### ABS Flashing Plate with Weathering Skirt and Foam (For plain tile roof)

Manufactured from 3.5mm thick ABS capped with PMA for long lasting, durable finish. It is suitable for the majority of plain tile roofs. Supplied with code 4 lead flashing for suitable weathering.

#### **Galvanised Flashing Plate and ABS Collar**

Manufactured from 0.8mm galvanised mild steel which is corrosion resistant and suitable for felt, membrane and asphalt roof finishes. Supplied with an ABS collar for dome to fit mounting.





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## BELOW ROOF

## The Pipe: SUPER-SILVER finish aluminium tube

#### 610mm Extension Pipe

The 610mm extension pipe has a crimped end in order to connect to a plane end pipe. It is manufactured from a silverised PVD coated mirror finished aluminium with a total reflection of 98%.



## 610mm Plain End Pipe

This 610mm plain end pipe is the first section of the Sunpipe that integrates with the roof fixing arrangement.

## Slip Length

The 250mm ceiling extension is the last section of the Sunpipe that integrates with the collar in the diffuser arrangement.



## Elbows

## 45° Adjustable Elbow

The 45° adjustable elbow is fully adjustable to allow navigation around roof void obstacles.



## 30° Adjustable Elbow

The 30° Adjustable elbow is fully adjustable to allow navigation around roof void obstacles.



## **Ceiling Diffusers**

Choose from our range of ceiling diffusers the style that best suits your project.







## CEILING DIFFUSER OPTIONS

The following range of diffusers is available for the **Sunpipe 230mm, 300mm, 450mm and 530m.** We offer a high quality product both in terms of aesthetics and installation.



### Stylish options to choose from:

You can choose a **white satin** or **stainless steel bezel**. (**Opaque Glass panel** is only available with stainless steel bezel and for 230 and 300mm Sunpipe)



**Contemporary** (Flat Microprism)



Elite (Flat Frosted Polycarbonate)







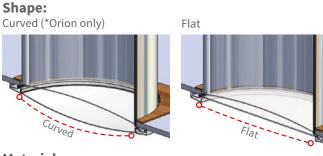
## Step 1: Type of bezel (Colour/Material)

**White Satin** (Not available with opaque glass)





## Step 2 & 3: Type of Diffuser Panel (Shape/Material)



**Material:** Microprism Polycarbonate





\* All diffusers are able to be retrofitted to existing Sunpipe installations and a new backing template will be provided in all new orders.

**Opaque Glass** 







## ADDITIONAL COMPONENTS

## **Security Bars**

Provides extra security by means of integrating stainless steel security bars which do not impact the light output of the system.





Intumescent 'Fire Choke' fire collars can be integrated within the system to prevent the spread of smoke and fire through the roof to give up to 2 hours protection.

## **Fire-guard**

Fire-guard ceiling diffusers can be used in place of the standard polycarbonate diffusers to provide up to 1 hour of fire resistance. (Larger ceiling opening required).

## **Motorised Shut Off**

Features a butterfly light shut-off damper controlled by a 230V motorised actuator for use in areas such as lecture theatres, conference halls, etc.







## Sound-guard

Sound-guard ceiling diffusers can be used in place of the standard polycarbonate diffusers to provide sound attenuation of up to 37 dB.



- 610mm Extension lengths and 30° 45° adjustable elbows.
- Other bespoke arrangements are available. For sizing guidance or further details, please contact Monodraught Head Office.







## TECHNICAL PERFORMANCE

## - External Illuminance (LUX)

	Sunpipe Size (mm)	Full Summer Sun 75 k	Overcast Summer 50 k	Overcast Winter 25		
		Lumen Output				
	300	5157	3438	1717		
	450	8560	5707	2851		
	530	12782	8521	4256		



Sunpipe's U-Value compares favourably alongside a double glazed roof-light.

As the actual area of a Sunpipe is only a small percentage of that of a typical roof-light, the contribution to heat loss from the building or heat gain is greatly reduced.

The performance of Sunpipe has also been assessed as part of a European study of light-pipe performance, TC3-38. The introduction of the double glazed ceiling diffusers has further enhanced the U-Value of Sunpipe, lowering the figure to 1.66W/m<sup>2</sup>K for a typical application of 1.5m length of Sunpipe - This is further improved to a value of 1.38W/m<sup>2</sup>K when incorporating EcoShield.

## 

Multilayer Sound-guard<sup>™</sup> laminated glass can be incorporated into Sunpipe ceramic ceiling diffusers, and provides a performance of RW 37 dB (Rtra 33 DB).

## () Monodraught

## Lengths & Bends

Smaller sizes have recommended total maximum pipe length of 8m. Larger sizes allow for longer lengths to be used.

There is a 12% reduction of light output for each 45° bend used and there is a 6% reduction in light transmission for every metre of Sunpipe.

30° & 45° adjustable elbows can be used with all Sunpipe applications to direct daylight to where it is required.

## Standards

- BS EN ISO 14001 and BS EN ISO 9001
- The Fire-guard ceiling diffuser has been tested to comply with BS 476-20:1987
- The Fire-choke collar has been fully tested to current British and European standards (test report TE 39902)

## 🟠 Advantages

- Generally no structural alterations required, easily fits between joists and rafters.
- Virtually no maintenance required.
- Top domes are self-cleaning due to their shape.









# PERFORMANCE **DE**

At Monodraught we pride ourselves on the quality of our engineering. Because of this, we design our systems very carefully in accordance with the message we want to convey:

- Performance
- Innovation
- Sustainability
- Reliability

We firmly believe that Sunpipe is demonstrably the best balance of outright performance, durability and longevity on the market today.

To quantify this, we subjected one of our Sunpipe Natural Daylight systems to both light Transmittance Test and an Accelerated Ageing Test against one of our leading competitors to compare their performance.

The aim of the test was to observe how the materials in each system perform over the life cycle of the product in a simulated outdoor environment.

## **The Test**

Samples of materials used in the dome and tube parts of both Monodraught and a leading competitor's product were sent to BRE's research facility in Watford.

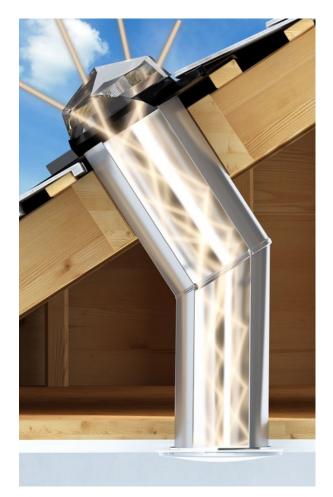
These samples would be tested to determine their **specular reflectance** and **light transmittance** for the tube and dome samples respectively.

They would then be placed in an accelerated ageing chamber to simulate the effects of the natural environment on the samples and removed periodically to be retested to determine the effects.

#### **Specular Reflectance & Total Reflectance**

Specular reflectance refers to the mirror-like reflection of light from a surface, in which light from a single incoming direction is reflected into a single outgoing reflection.

Light reflecting materials are most often marketed using values of Total Reflection, which takes into account both specular and diffuse reflection light.









## TEST RESULTS

## Tube sample specular reflectance

The specular reflectance tests confirm our hypothesis of polymer laminate films susceptibility to direct UV damage.

Over a simulated 4 year period, the unprotected polymer laminate tube samples lost between **77.8%** and **84.9%** in specular reflection.

Conversely, the unprotected Monodraught samples experienced a maximum drop in performance of only **2.8%.** 

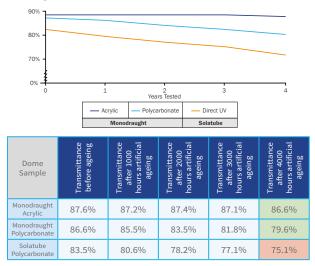
Dome Sample	Reflectance before ageing	Reflectance after 1000 hours artificial ageing	Reflectance after 2000 hours artificial ageing	Reflectance after 3000 hours artificial ageing	Reflectance after 4000 hours artificial ageing
Monodraught sample 1	93.6%	92.5%	91.4%	91.5%	90.8%
Monodraught sample 2	93.3%	93.5%	92.8%	93.0%	93.3%
Monodraught sample 3	92.9%	92.2%	91.5%	91.0%	91.1%
Solatube sample 1	98.7%	94.6%	87.6%	66.0%	16.0%
Solatube sample 2	98.8%	94.7%	86.3%	57.0%	13.9%
Solatube sample 3	98.8%	94.6%	86.9%	67.6%	21.0%

\* 1000 hours is broadly equivalent to one year of UV exposure in the natural environment.

## Clear dome light transmittance

Monodraught's acrylic dome had the highest initial transmittance of **87.6%** and suffered a 1% drop in performance - within the boundaries of experimental error.

Leading competitor's Polycarbonate dome sample had the lowest initial transmittance of **83.5%** and the highest drop in performance of 8.4%.



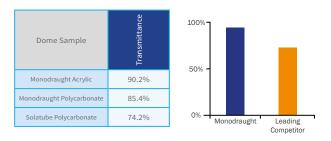
\* For Clear Dome Sample Tests, clear sections were cut from each dome to determine the materials transmittance. This meant that dome redirecting technology did not interfere with results.

### Full dome light transmittance

The three domes from which the samples were taken were also tested, unmodified in any way, for their light transmittance. This is to clarify what effect the light redirecting technology in each dome affected the total light transmittance.

Monodraught's acrylic diamond dome had the highest transmittance of **90.2%**.

Leading competitor's Polycarbonate dome had the lowest transmittance of **74.2%**.



\* For Full Dome Transmittance tests, each dome was placed, unmodified, over an opening sized to suit the diameter of the pipe it would accommodate. This means all dome redirecting technology is accounted for in the test.





## SUNCATCHER

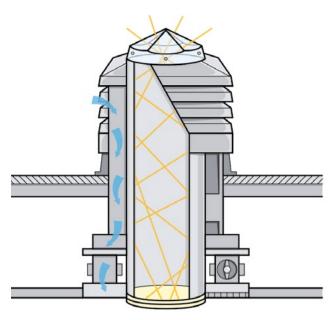
The Monodraught Suncatcher systems are a method of effectively conveying Natural Lighting and Natural Ventilation from roof level, down into the building below by combining the principles of the Monodraught WINDCATCHER system with the SUNPIPE system.

#### **How does Suncatcher work?**

The Windcatcher is divided internally into four quadrants so that one or more face into the wind. Any prevailing wind pressure carries a continuous fresh air supply through weather protected louvres on the windward side of the system at roof level. The wind movement is encapsulated by internal quadrants which turns the wind through 90° forcing the air down through internal ducts into the room below.

Warm stale air is expelled from the room by the passive stack ventilation principle of differential temperatures and the natural buoyancy of air movement. Manual or motorised dampers at the base of the system control the rate of ventilation.

The Sunpipe collects daylight using a patented diamond dome, passing it through a Super-Silver mirror-finished aluminium tube, finally distributing it evenly through use of a ceiling diffuser.









## SEASONAL OPERATION





During mid-seasons, in the evenings, or at weekends, when the building is unoccupied, the Suncatcher will still continue to operate providing all the benefits of this Natural Ventilation. The system is not dependent on openable windows or vents in the side of the building, which allows the building to be fully secured.

This is particularly important at night-time when the system will cool the room ready for the next day, removing all heat from the fabric of the building.

Volume control dampers at the base of the system at ceiling level, will precisely control the amount of airflow through the system. If the internal temperature falls below  $15^{\circ}$ C the dampers will automatically close to prevent over-cooling.





In the summer months, perimeter windows can be utilised to aid cross flow ventilation. With fresh air coming through the windows on the windward side of the building, stale air will be exhausted through the passive stack element of the Suncatcher system.

Warm air will naturally rise to ceiling level but at the same time, any prevailing wind on the Suncatcher system carries a supply of fresh air down into the room below, thereby slightly pressurising the building and increasing the outward flow of stale air.





To minimise ventilation heat loss, control is essential to ensure that the ventilation rate is continuously matched to meet occupant loading and to prevent excessive air change rates during unoccupied periods. Such control can most efficiently be achieved by ensuring that the building structure is airtight and by monitoring and maintaining CO<sub>2</sub> levels in the 1000 ppm to 1500 ppm range.

At night-time, demand for ventilation is greatly reduced and ventilation heat loss can largely be eliminated. Natural ventilation may therefore be expected to provide reliable winter ventilation, at the full rate demanded by occupants, without resulting in excessive energy loss.





## **Copper Box - Hanball Arena**

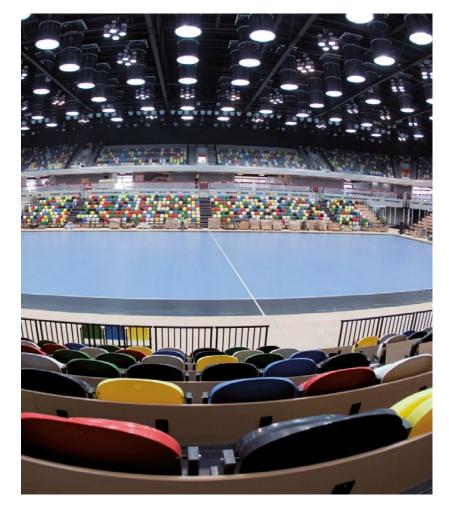
- Location: London
- Application: Leisure/Sports Centre
- Sector: New Build
- Architects: Make Architects
- Consultants: ARUP
- Products Installed:
  - 88 No. SUNPIPE Monodraught Natural Lighting systems

Originally named the Handball Arena, the Copper Box was built to be the goal ball venue for London 2012 Olympics & Paralympics. As one of the legacy buildings of the Olympics, the Copper Box will be adapted to become a multi-sport arena for local community use, athlete training and other multi-use events.

Make Architects, responsible for the design set out a strict environmental criteria for the project of sustainable energy. Along with rainwater harvesting, the use of natural daylight would assist in reducing carbon and energy costs. Having used the SUNPIPE® natural daylight systems on previous projects Make Architects entered in to discussions with Monodraught Ltd in May 2008 to investigate the possibilities of using this technology on the project. Make Architects specified a system that could deliver a 4% daylight factor.

Working with ARUP the Consulting Engineer, Monodraught presented a scheme that included 88 number 1500 mm diameter light pipes positioned strategically around the



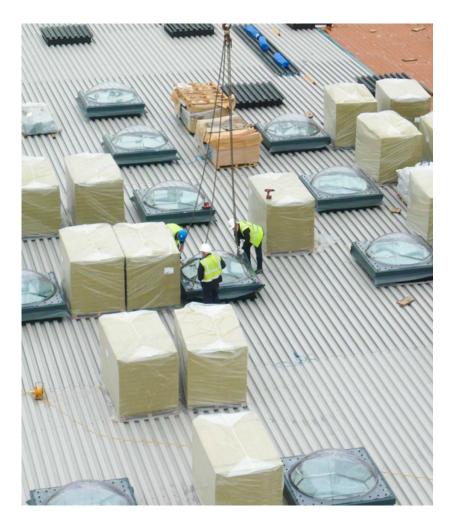








## CASE STUDY



field of play. The systems also needed to be adaptable for when lower light levels were required so light shut off dampers were included along with special acoustic laminated glass.

Due to the nature of the project and the amount of congestion expected near the Olympic site, the systems were manufactured off site and delivered in sections ready to be installed on site.

- Estimated annual savings of 40% against electrical lighting costs
- Double glazed, high impact resistant glass
- Low U & G values
- Automatic damper controls to regulate sunlight
- Low maintenance, long life systems
- 4% daylight factor achieved
- Offsite pre-fabrication





## **ZF Electronics**

- Location: Klasterec Nad Ohri, Czech Republic
- **Application:** Manufacturing/Offices
- Sector: New Build
- Architect: CH PROJEKT PLZEŇ s.r.o.
- Contractor: Kajima Czech Design and Construction s.r.o
- End-customer: ZF Electronics

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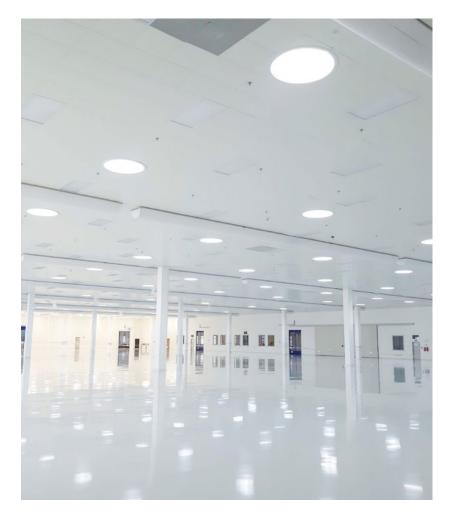
- Products Installed:
  - 112 No. 1000mm diameter SUNPIPE Natural Lighting systems

Using natural daylight in sustainable buildings has been proven to create healthier indoor environments. It leads to more productive and happier occupants and reduces carbon emissions. Sunpipe is a natural lighting system that channels natural daylight from outdoors to indoor environments.

We design and manufacture our Sunpipe systems in the UK and have been doing so since 1974. Independent tests demonstrate the highest sustained reflectance and transmittance compared to competitor solutions. Sunpipe tubes are manufactured from PVD coated aluminium meaning they won't deteriorate over time.

Monodraught work with a selection of export partners across the globe to deliver our zero carbon natural lighting solutions. Monodraught recently supplied over 100 Sunpipe











## CASE STUDY

systems to Kajima in the Czech Republic. The systems have been installed on a customer site of theirs, a manufacturing plant. The Sunpipes were installed above the production area for sensors and switches.

Initial anecdotal feedback from Kajima is positive, commenting on the simplicity of installation. We have been told that there is lots of light in the hall during sunny days. As a result of the Sunpipe installations, it is not necessary to use artificial lighting throughout the day. This brings benefits to employees in terms of natural light being brought indoors. Using natural lighting systems reduces a building's impact on the environment by cutting down on energy use and carbon foot print.





## **Tesco Express**

- Location: Hinkley
- Application: Retail Outlet
- Sector: New Build
- End-customer: Tesco Supermarket

#### • Products Installed:

- 4 No. WINDCATCHER 1000 square Natural Ventilation systems
- 1 No. SUNCATCHER 350 Natural Ventilation & Lighting systems
- 3 No. SUNPIPE Monodraught Natural Lighting systems

This new-build Tesco Express store, opened in June 2008, was the first Tesco convenience store to be built in their Environmental Format.

Monodraught WINDCATCHER natural ventilation systems were specified by the Tesco Express design team to counter heat gains by introducing fresh air into the building and expelling stale warm air from the underside of the roof level of the building.

Four GRP 1000 Square WINDCATCHERS were installed in the main sales area of the store and 350 mm Monodraught SUNCATCHER systems combining natural ventilation and SUNPIPES, were fitted in the staff toilet facilities. In addition, three 300 Monodraught SUNPIPES were installed in the staff room, store room and bakery preparation area.





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## CASE STUDY



## Marks & Spencers Galasheils

- Location: Galasheils
- Application: Retail Outlet
- Sector: New Build
- End-customer: Marks & Spencer

#### • Products Installed:

- 12 No. SUNPIPE Monodraught Natural Lighting systems
- 3 No. SUNCATCHER Natural Lighting and Ventilation systems

The 9,000 sq ft Galashiels store features 12 SUNPIPE systems and three GRP 800 Square SUNCATCHERS among 'eco-features' that significantly reduce its carbon footprint and improve its energy efficiency.

M&S claims the store uses up to 25% less energy and emits up to 95% less carbon dioxide than an average Simply Food store.

The Galashiels store has been a test bed for developing new initiatives that have since been rolled out in other Simply Food stores across the UK.







## WE ARE WITH YOU ALL THE WAY





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.

**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. Installation



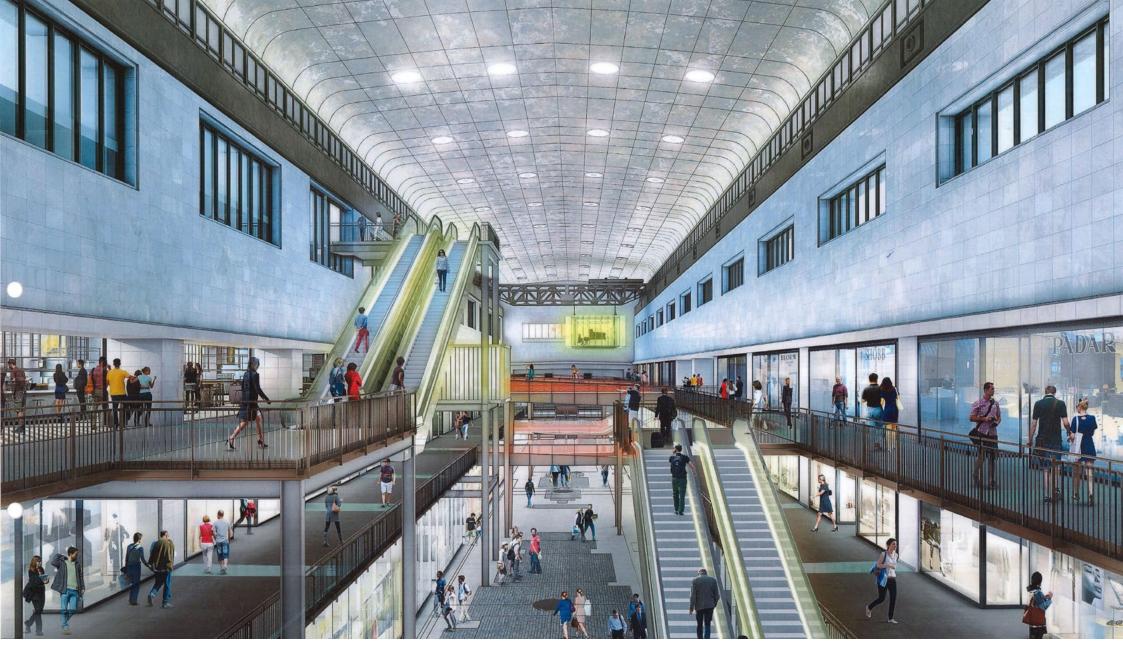
We have a team of contract managers who will work with you and your clients from order creation through to delivery and maintenance if required. Our own team of installers work across England and Wales with partner agencies installing in Scotland, Ireland and worldwide. We will visit your site ahead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



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.













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