



## Colt Car Park Ventilation Systems

Smoke Control



# Introduction

Front Cover: The Postbox Apartments, Birmingham

## CAR PARK VENTILATION SYSTEMS

Car park ventilation systems are required to achieve two objectives.

Firstly, when the car park is in general use, it is important that the exhaust gases produced by vehicles are effectively removed and that there are no pockets of stagnant air.

Secondly, in the event of a fire, assistance needs to be given to the Fire Service to clear smoke from the car park during and after the fire.

Car park ventilation systems may in addition be designed to provide clear smoke free access for fire fighters to tackle the seat of the fire, or alternatively to protect means of escape from the car park. These more complex systems are in excess of Building Regulations requirements and are used as compensating features when other requirements are not met.

This leaflet is intended to provide an understanding of the legislative framework and how car park ventilation systems can help meet legislative requirements and achieve the design objectives.

## LEGISLATION AND STANDARDS

The ventilation requirements for car parks are detailed in:

- Approved Document B to the Building Regulations (England and Wales); Scottish Buildings Standards Technical Handbooks (Scotland); Technical Booklet E (Northern Ireland).
- Approved Document F - Ventilation
- BS 7346-7: 2006
- CFD Modelling for Car Park Ventilation Systems – a guide for designers and regulators (FETA, 2007)
- BS 5588 Series
- APEA Code of Practice
- SVA guidance
- BR 368

With regards to BS 7346-7: 2006, "Components for Smoke and Heat Control Systems. Code of practice on functional recommendations and calculation methods for smoke and heat control systems for covered car parks", this gives design guidance on ventilation of car parks, including both Building Regulations compliant systems and fire engineered systems.

The Approved Documents describe three traditional methods of ventilation for car parks, as follows.

### 1. Open Sided Car Parks

These are completely above ground level with permanent wall openings on each level, equal to 5% of the plan area, arranged to provide cross ventilation. These openings are considered to provide sufficient ventilation for clearance of both smoke and vehicle exhaust fumes.

### 2. Naturally Ventilated Car Parks

These have permanent wall openings on each level, equal to 2.5% of the plan area, arranged to provide cross flow ventilation. This is sufficient ventilation for smoke clearance, but in addition mechanical extract providing three air changes per hour is needed to remove exhaust fumes.

Note: The 5% and 2.5% areas are defined in the 2006 edition of Approved Document F as "equivalent areas". For openings that are obstructed in any way, by louvres, screens, etc, the aerodynamic coefficient of the obstruction is required for the calculation of the equivalent area.

*East Side Plaza, Gunwharf Quays, Portsmouth  
8 Cyclone induction fans and 3 Jetstream impulse fans  
move the air from the entrance ramp towards the  
extract system, which was also supplied by Colt.*



### 3. Mechanically Ventilated Car Parks

Where natural ventilation is not possible, a mechanical extract system should be used. For mechanically ventilated car parks, the basic requirements are that there should be a mechanical ventilation system that will provide 6 air changes per hour (ACH) for general ventilation on all levels and 10 ACH on the fire floor in the event of a fire. The system should be capable of operating at temperatures of up to 300°C for 60 minutes and ductwork and fixings should be made from materials that have a melting point above 800°C. The system should have at least 2 extract fans, each providing 50% of the extract, with a secondary power supply to operate in the event of a mains power failure. Extract points should be designed with 50% of the outlets at high level and 50% at low level.

Colt Car Park Ventilation Systems can be designed to meet the requirements of other international standards such as the NFPA and Australia/New Zealand standards, and Colt has installations of Car Park Ventilation Systems in many countries around the world.

We would be pleased to assist you in the development of designs for your car park wherever it may be.

### MECHANICALLY VENTILATED CAR PARKS

There are a number of issues relating to ducted mechanical extract systems which often cause problems for designers:

- The ductwork runs underneath the ceiling, reducing the already restricted height normally available.
- Downstand beams require the ducting to be set down below them, thus diminishing the height even further.
- Low level extract points are required, often needing protective barriers to surround them, and these take up valuable floor space.
- The ductwork gives the car park a cluttered look and can interfere with CCTV coverage.

# Impulse Ventilation Systems

## CAR PARK FIRES 2002

- *116 fires (estimated) occurred in car park buildings*
- *Of these 60 fires started in vehicles*
- *One of the 60 cases spread to 9 other vehicles. 1 fire spread to 1 other vehicle*
- *Approx 50% of fires were “deliberate”*
- *At least 2 cases of fires in car park buildings of 14 storeys*

Source: BRE

## WHAT ARE IMPULSE VENTILATION SYSTEMS?

In recent years jet fan or impulse technology has established itself as the new standard in car park ventilation. Impulse ventilation systems are an alternative to ducted mechanical extract systems, overcoming many of the problems associated with such systems.

An impulse fan is similar to a tunnel jet fan, but has a reduced diameter in order to maximise headroom. It comprises an axial fan with inlet and exhaust attenuators and any necessary guards and flow distribution control devices.

A series of such free- blowing fans, mounted under the ceiling, induce air movement from the air inlet openings towards pre-designated extract points, moving smoke and fumes with it. The number and location of fans are carefully chosen to match the system design requirements, and in order to ensure that there are no dead spots for fumes and smoke to stagnate and collect.

## FEATURES AND BENEFITS OF IMPULSE SYSTEMS

**Easier and quicker installation** - Impulse fans are much quicker and easier to install than extensive ducting

**Lower excavation costs** - Low profile fans can be kept within downstand beams

**Lower maintenance** - No distribution ductwork to clean

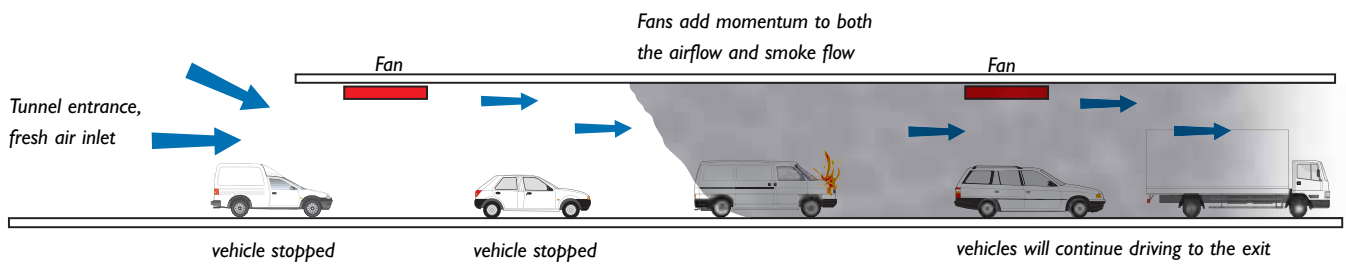
**Optimal use of space** - Increased headroom or lower car park build height, with an increased number of parking bays

**Better car park security** - No ducting improves CCTV coverage, keeping the environment safer and lighter

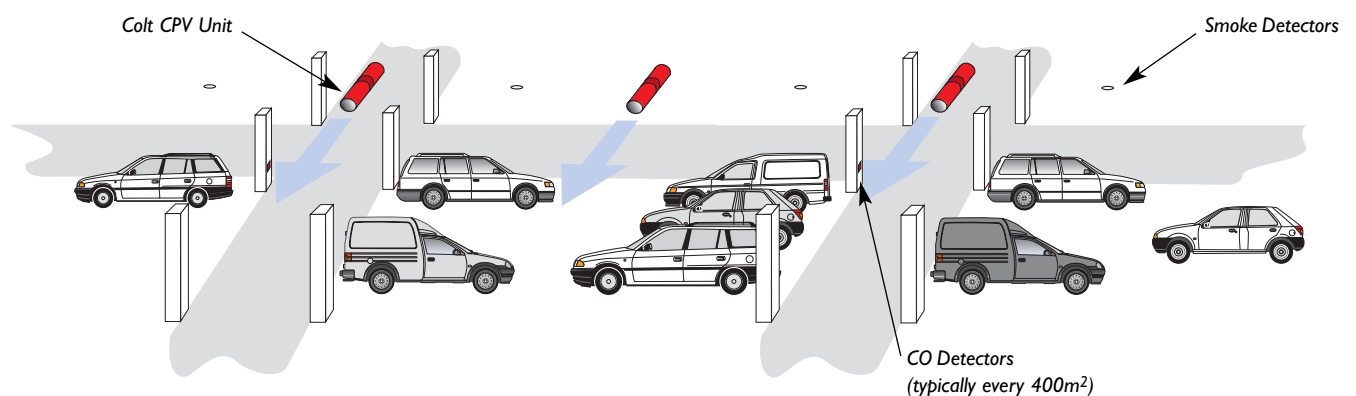
**Sprinklers** - Impulse systems are eminently suitable for use with sprinkler systems. Where legislation requires sprinklers, it is possible for the approving authority to accept the deletion of sprinklers where an improved car park ventilation will be installed. In this instance, the impulse system will need to be able to maintain clear access conditions for fire-fighters.



*Becad Hospital, Middlesex*  
By re-assessing the design, Colt was able to  
reduce a competitor's 35 impulse fans to 12  
Cyclone induction fans.



The principles of car park impulse ventilation have been developed from procedures used for tunnel ventilation. In the event of a fire, smoke will be 'pushed' and 'pulled' to the exit. Vehicles in front of the fire will continue through to the exit, whilst vehicles behind the fire will, of course, have to stop. Although trapped, these vehicles should be safe from the smoke.



Fan positioning needs to take into account roof geometry (particularly deep downstand roof beams) and risk of airflow blockage by tall vehicles.

The introduction of CO detectors allows use of a more sophisticated control system to match the ventilation rate to the car park usage, further reducing running costs and noise levels.

# The Colt Jetstream Impulse Unit



## THE COLT JETSTREAM IMPULSE UNIT

### General description

The Jetstream impulse unit comprises an axial fan with inlet and discharge attenuators. Its two sizes, 315mm and 400mm fan diameter, give either 335mm or 427mm total depth.

### Versions

Versions are available to match most customer requirements:

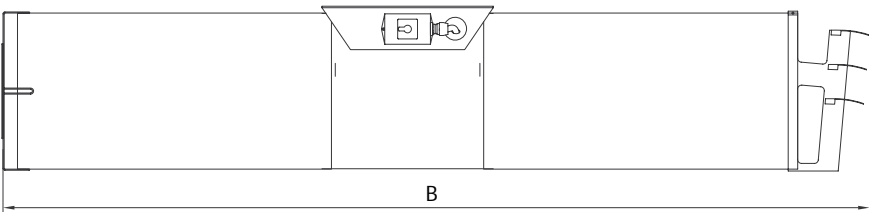
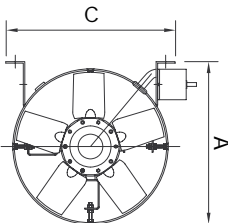
- Two fan sizes, 400mm and 315mm diameter, with overall depths of 427mm and 335mm respectively
- Thrusts of up to 50N and 20N respectively
- Uni-directional or truly reversible for additional design flexibility
- Two speed, or single speed with potential for inverter control
- Ambient or high temperature smoke operation
- A range of attenuator options

### Finishes

Jetstream is hot dipped galvanised, with the option of any polyester powder coating to a RAL colour. A polyester powder light grey coating RAL 7035 is standard.

### Certification

Jetstream and its standard isolator fully meet the F300 time/ temperature classification of the EN 12101-3:2003 standard following independent tests, demonstrating that the unit will operate at 300°C for 120 minutes. It is CE marked. Test Certificates are available on request.



### Noise output

CIBSE Guide Volume A: 2006, Environmental Design, sets out a recommended maximum noise level of NR55 in car parks. All Colt Jetstream units are designed to achieve a maximum noise level of NR55 within the car park at 3m from the unit in normal day to day operation.

Type	Jetstream 400	Jetstream 315
<b>CE marking</b>	High temperature 300°C for two hours	High temperature 300°C for two hours
<b>Fan diameter</b>	400mm	315mm
<b>Overall height A</b>	427mm	335mm
<b>Overall width C</b>	445mm	400mm
<b>Overall length B</b>	2880mm	1990mm
<b>Thrust</b>	50/ 15* N	20/ 5* N
<b>Motor power</b>	1.3/ 0.28* kW	0.75/ 0.17* kW

\* With two speed controls



# CASE HISTORY

**Arsenal**

ARCHITECT: HOK Sport  
MAIN CONTRACTOR: Sir Robert McAlpine  
SERVICES CONSULTANT: Buro Happold

## FEATURES AND BENEFITS

**Proven performance** – Independently tested and certified in accordance with EN 12101-3: 2002

**Durable** – Hot dipped galvanized finish with a 4mm thick fan casing, resistant to potential corrosion.

Adjustable pitch aerofoil section impellers, set and tested in the factory, to provide optimum aerodynamic performance.

A minimum protection to IP55 on fan electrics enables fan maintenance and cleaning by pressure washing. External padlockable isolator switch protected to IP65.

**Slimline appearance** - Standard version uses spigot fixing of attenuators and streamlined attenuator lining to maintain a slim, clean profile.

**Truly reversible** - For additional design flexibility, as part of a comprehensive scheme, the control system can direct the airflow in either direction.

**A wide variety of silencer arrangements are available** – to suit noise criteria.

**Quality of manufacture** – Jetstream is manufactured under the BS EN 9001 quality standard. Each unit is given a functional test before despatch.

A Colt impulse ventilation system has been installed at the new Emirates Stadium, constructed by Sir Robert McAlpine Ltd for Arsenal Football Club, in north London. Colt also supplied plant room louvres in a contract worth £1.2 million in total.

The Colt impulse system consists of 59 reversible Jetstream fans, four 1800mm extract fans, and all their associated carbon dioxide, smoke and heat detectors and controls. The fans are mounted under the ceiling around the car park, to move air and smoke towards each extraction point, avoiding the need for the extensive ductwork that would be required for a traditional system.

The benefits of the system include a more open environment, better CCTV coverage and lower initial and running costs. In the interests of maximum efficiency, with the reversible impulse fans linked to a wind direction sensor, the system can move the airflow around the car park in either a clockwise or anti-clockwise direction depending on the wind direction.

# The Design Approaches

## THE DESIGN APPROACHES

### Smoke Clearance

The systems described in Approved Documents B and F are not intended to assist means of escape in case of fire, but to assist fire fighters by providing smoke clearance. Even a casual inspection of the requirements shows that these methods cannot be expected to do more than limit smoke density and speed smoke clearance once the fire is extinguished.

Where impulse fans are used, they are located over the roadways in a layout engineered to ensure there are no areas where it would be possible for fumes to build up due to lack of air movement. In most car parks only a single large extract point is required, located as far as possible from the main air inlet openings. This method satisfies the requirements of both Approved Documents.

These systems are suitable for use in sprinkler protected car parks. Close co-ordination is needed to maximise the benefits of both sprinklers and ventilation.

### Smoke Control

The alternative approach is to control smoke movement in order to provide clear access for fire-fighters to tackle the source of the fire. The system requires an addressable fire detection system so that the site of the fire can be pinpointed. A control system then starts the selected impulse and extract fans to control the direction of the smoke and provide clear air upstream of the fire. This will allow fire fighters to access the car park behind the fire and bring it under control.

By virtue of the improved fire-fighter access it may be possible to delete sprinklers from car parks where they would otherwise be needed.

This method can also be used to protect means of escape in large car parks with excess travel distances. However it is generally a more expensive option, requiring more complex controls and additional extract.

### CFD

Design of impulse systems is usually proven by use of CFD (Computational Fluid Dynamic) analysis.

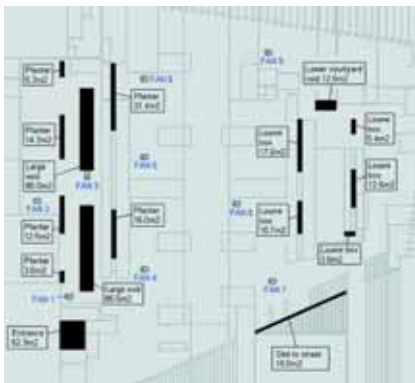
This allows detailed computation of airflow in car parks, taking into account the often complex geometry of individual buildings. This is often essential to demonstrate to the local authority that designs will perform satisfactorily, by showing that sufficient air movement is provided throughout the car park and, for smoke control systems, the extent of the smoke spread.

CFD modelling has the objective of confirming the viability of the ventilation scheme. Colt offers CFD modelling of the system and a full technical report for local authority approval prior to installation. Just to be sure that its CFD modelling approach was reliable, Colt undertook a series of empirical full scale hot smoke tests. See next section.

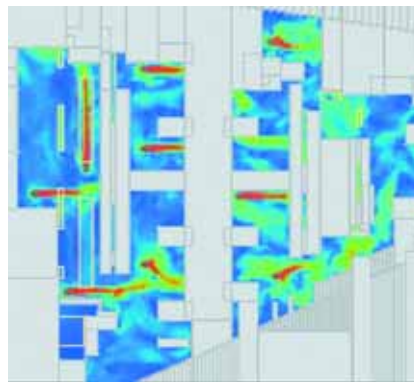
Since CFD is a key component of car park ventilation design, and there has been inadequate guidance on this element, members of the Smoke Control Association have produced A Guide to CFD in Car Parks to complement BS 7346-7. The guidance will make it easier for designers to validate their designs and for building control bodies to sanction them. This guide is available from the Federation of Environmental Trade Associations.



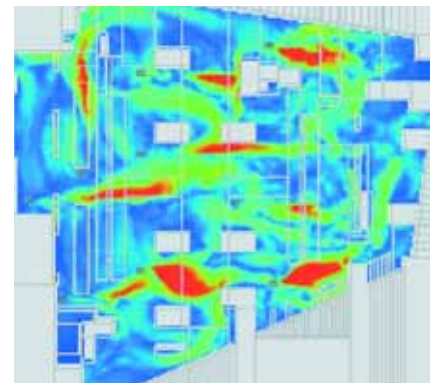
The Observatory Apartments, Walsall



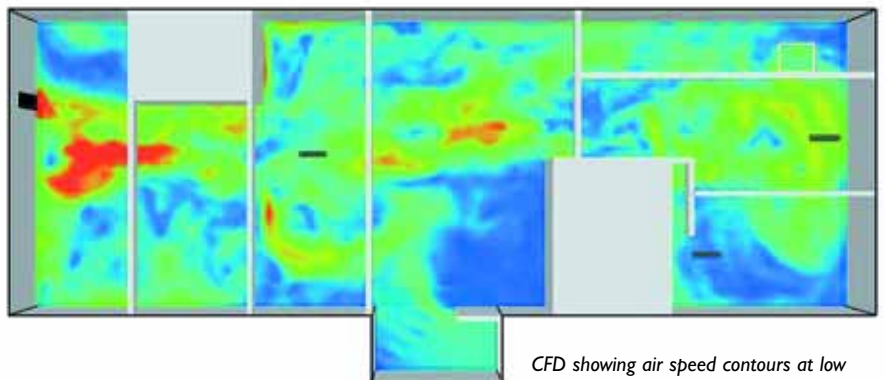
CFD plan of a typical car park showing Colt Cyclone fan locations, openings and areas



Air speed contours at high level, day-to-day ventilation

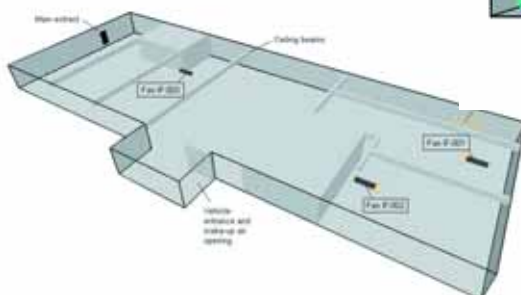


Air speed contours at low level, day-to-day ventilation



CFD showing air speed contours at low level for smoke control

Typical CFD plan of a typical car park



# Testing

## TESTING UNDERTAKEN BY COLT

In 2004 Colt conducted the first UK full scale comparative tests between traditional methods of mechanical ventilation and impulse ventilation in Bristol.

These tests demonstrated that properly designed impulse systems can clear the smoke more quickly than ducted systems. For more information please see leaflet: PD 56 “Full Scale ‘live’ Smoke Tests”.

A video is available to view at [www.coltinfo.co.uk](http://www.coltinfo.co.uk).



The Deputy Chief Fire Officer of Avon Fire & Rescue, Jerry O’Brien commented

*“The speed that the new products cleared the smoke compared to the old ducted system that we and maybe some others are using, is just remarkable. It is very impressive”*



VISIBILITY	SYSTEM		
	Traditional	Impulse	Induction
10 metres	At start	1 minute	1.5 minutes
20 metres	3.5 minutes	8 minutes	6 minutes
30 metres	13 minutes	13 minutes	9.5 minutes
40 metres	23 minutes	16 minutes	12.5 minutes
Rear wall details	27 minutes	18.5 minutes	16.5 minutes
Clear of smoke	41.5 minutes	32.5 minutes	28 minutes

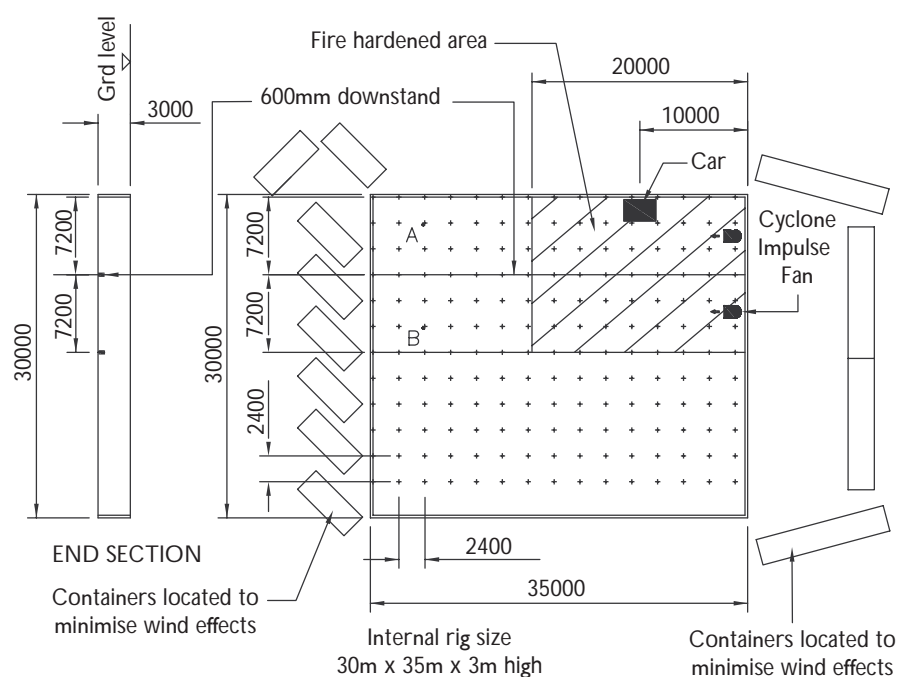
The table shows the range of times taken in the demonstrations to achieve visibility distances and for the car park to become clear of smoke.



In 2005 Colt carried out large scale hot smoke testing with the Building Research Establishment (BRE) in Middlesbrough to prove both the concept of maintaining clear areas in a car park and to validate the CFD modelling approach used by Colt.

The aim of the tests was to demonstrate how an impulse ventilation system can be used to control the flow of smoke within a car park, keeping large areas effectively smoke free.

The results of the tests clearly indicated that impulse systems are capable of controlling the spread of smoke from a car fire and keeping significant areas of a car park effectively smoke free. BRE confirmed that the smoke movement during the fire with the impulse fans running was as predicted by the CFD modelling Colt had carried out before the tests. For more information please see leaflet PD 61 "Impulse Ventilation for Smoke Control". A video of the tests is available to view at [www.colinfo.co.uk](http://www.colinfo.co.uk).



Average smoke temperatures (°C)			
Time period from ignition	Location	Measured	CFD
210-310s	A, 1m above floor	23.4	25.8
210-310s	A, 2m above floor	25.9	30.0
210-310s	B, 1m above floor	22.0	20.7
210-310s	B, 2m above floor	25.8	25.3
210-310s	C, 1m above floor	22.6	22.1
210-310s	C, 2m above floor	32.1	30.2
Ambient		18.8-19.3	20.0

The table shows time averaged smoke temperatures as recorded during the demonstrations and predicted by the CFD analysis.

# Induction Ventilation Systems

## INDUCTION VENTILATION SYSTEMS

Induction ventilation is a further enhancement of the impulse ventilation concept.

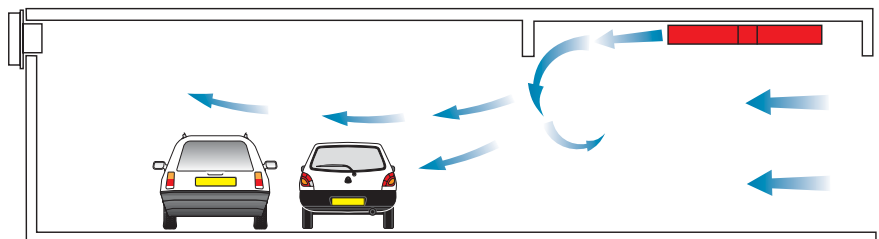
Using the same principles as impulse ventilators, induction fans are yet slimmer, more efficient and powerful, thus reducing the number of units required. A typical induction fan has a throw of approximately 40 m as opposed to 20 m for an impulse fan. The floor area ventilated per fan is significantly greater, equating to a requirement for fewer units.

Slimmer units can allow a reduced excavation cost and lower car park height. For comparison purposes, a typical Impulse Unit such as the Colt Jetstream is 427mm deep, a Colt Cyclone 100 is 320mm deep and a Colt Cyclone 50 is 255mm deep. Ducted systems are often deeper in places and need to be run under any downstand beams whereas fans can be located between them. This demonstrates the potential savings both in excavation and in build height for the developer and contractor.

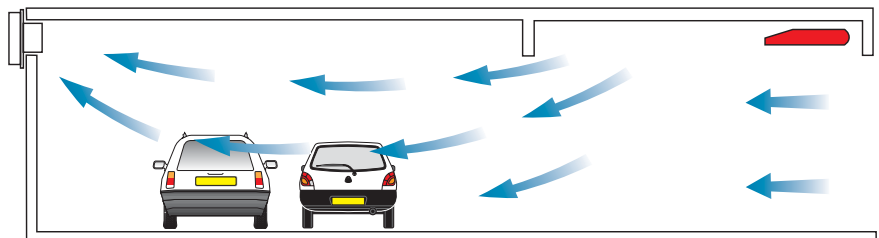
*In a recent project in the centre of London, Cyclone fans were specified since they saved significant dig-out costs. The contractor would have needed to spend an additional £248,000 excavating an additional 150mm of earth in order to accommodate the greater unit depths of an alternative system*

Fewer units mean lower cabling and controls requirements and lower installation and maintenance costs.

In addition, the units are inverter controlled for a further reduction in power consumed.



*Air turbulence created by the downstands when using a typical impulse fan*



*Air turbulence is dramatically reduced when using a Colt Cyclone CPV fan*



## CASE HISTORY

### Paradise Street

ARCHITECT: Building Design Partnership  
MAIN CONTRACTOR: Laing O'Rourke/Crown House  
SERVICES CONSULTANT: WSP  
FIRE CONSULTANT: Tenos

In 2006 Colt won the contract for what was believed to be the UK's first smoke control system for a car park. It has been designed specifically to enable occupants to escape from a car park and to assist fire-fighting crews, rather than simply as a smoke clearance system that is commonly applied to car parks.

The £2.5 million project - part of Liverpool's £920 million Paradise Street retail, leisure and residential development- has involved the supply and installation of a Colt impulse car park ventilation system for the massive 56,000m<sup>2</sup>, 2,000-space car park that is being built beneath Chavasse Park in Liverpool.

The four-storey underground car park has been fitted with 80 Cyclone induction fans and 22 Jetstream impulse fans. These are designed to keep smoke completely away from the escape routes without the need for smoke curtains or physical barriers.

John Perry, senior consultant at Colt, explained: "Nearly all of the car parks we have done in the UK so far are smoke clearance systems, not smoke control systems. With the former, you have a designated extract rate.

This car park is different because it is so large (with the largest level being 232m by 95m) that we have to move smoke from a potential fire into defined corridors.

So, this is a fully designed scheme rather than a simple air change rate scheme. We are not merely clearing the smoke - we are controlling it."

Prior to the award of the contract, engineers from Colt and the Building Research Establishment demonstrated the effectiveness of the Colt impulse scheme for the Paradise Street project by conducting a series of hot smoke tests in a simulated car park in Middlesbrough. These established the accuracy of CFD modelling Colt had made before the test, and predicted that the scheme of impulse fans would be capable of controlling the spread of smoke from a car fire and keeping significant areas of the car park smoke free.

Smoke control for means-of-escape is described on page 8. See page 19 for a schematic diagram of this project.



# The Colt Cyclone Induction Unit



## COLT CYCLONE INDUCTION UNIT

### General description

The Cyclone induction unit comprises a backward curved centrifugal impeller with a high temperature external rotor motor rated at 300°C for one hour, fitted within a streamlined casing with a directional outlet diffuser.

### Versions

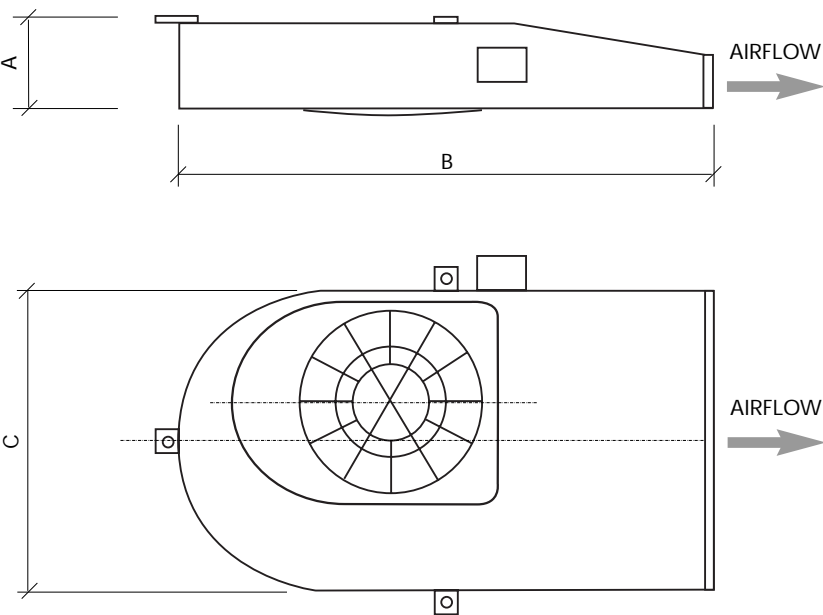
- Two fan sizes, with overall depths of 320mm and 255mm respectively
- Thrusts of 100N and 50N
- Single speed for inverter speed control

### Finishes

Cyclone is supplied in polyester powder light grey RAL 7035, with the option of a polyester powder coating to any RAL colour.

### Certification

Cyclone 100 and 50 with their standard isolator fully meet the F300 time/temperature classification of the EN 12101-3:2003 standard following independent tests, demonstrating that the unit will operate at 300°C for 60 minutes. They CE marked. Test Certificates are available on request.



Type	Cyclone 100	Cyclone 50
<b>CE marking</b>	High temperature 300°C for one hour	High temperature 300°C for one hour
<b>Unit height A</b>	320mm	255mm
<b>Unit length B</b>	1670mm	1260mm
<b>Unit width C</b>	1150mm	820mm
<b>Overall depth</b>	320mm	255mm
<b>Thrust</b>	100 N	50 N
<b>Motor power</b>	2.6 kW	1.4 kW



## CASE HISTORY

### The Postbox, Birmingham

CLIENT: Cala Homes  
ARCHITECT: Ian Darby Partnership  
MAIN CONTRACTOR: Taylor Woodrow  
M&E CONTRACTOR: Rotary North West

#### Noise output

CIBSE Guide Volume A: 2006, Environmental Design, sets out a recommended maximum noise level of NR55 in car parks. All Colt Cyclone units are designed to achieve a maximum noise level of NR55 within the car park at 3m from the unit in normal day to day operation. Lower noise levels are possible on request.

#### FEATURES AND BENEFITS

**Slimline design** – Only 320mm or 255mm deep.

**Proven performance** – Independently tested and certified in accordance with EN 12101-3: 2002.

**Durable** – The streamlined casing is manufactured from 3mm 2-pack epoxy coated steel with directional outlet diffuser.

**Quality of manufacture** – Cyclone is manufactured under the BS EN 9001 quality standard. Each unit is given a functional test before despatch.

The Postbox, Upper Marshall St, is a large mixed use development comprising apartments and office space in Central Birmingham spread over three blocks.

Colt provided smoke control systems for the apartment corridors and underground car park.

On each of the two levels of the car park, four Colt Cyclone induction fans move the air from the entrance ramp towards the extract system, which has also been supplied by Colt. The Colt extract system comprised attenuated high temperature axial fan units. Colt also provided a main control system as well as addressable carbon monoxide detectors. For day to day operation the system monitors the carbon monoxide levels within the car park and once a set point has been reached the system increases the ventilation rates.

Emergency control is fully automatic from the fire alarm detection systems or manually from the Fireman's Override Switches.

Colt was also contracted to provide the CFD report which confirmed the viability of the ventilation scheme.

# Extract Systems

## EXTRACT SYSTEMS

There needs to be an adequately designed ventilation system to extract the air. In addition, where the natural air supply is insufficient, supply fans may also be required.

Depending on the scope required, Colt is able to provide a wide variety of mechanical extract fan and motor assemblies to suit the required duty and temperature rating. These include long case, short case and plate mounted axial fans.

There are 14 standard sizes ranging from 315mm up to 2000mm diameter, with duties of up to 100 m<sup>3</sup>/s, and motor power ratings of up to 75 kW.

All Colt extract fans have been tested to the exacting standards of EN 12101-3: 2002.

All Colt extract systems are designed to produce a maximum of 55 dBA externally at 3m from the extract fan discharge grilles and NR 55 at 3m inside the car park in day-to-day mode. Lower noise levels are possible on request.

Colt is able to mix and match components to suit the requirements of almost any mechanical extract system.

## OTHER ANCILLARIES

Colt also provide:

- Ductwork, including attenuators, grilles, volume control dampers, shut-off dampers, bends and transitions.
- Weathered external terminations, including louvres, dampers, turrets, gravity shutters, cowls and motorised ventilators such as the Seefire and Meteor.



*Extract plant at the Observatory Apartments, Walsall*



*B5 Southside, Birmingham*  
2 Inlet Fans, 13 Cyclones, 2 Extract  
Fans, Dampers and Grilles, CO &  
Smoke Detectors



*Louvre terminations at the  
Observatory Apartments, Walsall*



*Extract fans at The Foundation, Liverpool*



*Extract plant at Gunwharf Quays, Portsmouth*



# Controls & Sensors

## CONTROLS AND SENSORS

The design of the controls and sensors is an integral part of the car park ventilation system. The arrangement of sensors is determined at the design stage, along with the controls cause and effect, which determines the way in which the equipment responds to any given conditions.

### Day to day condition

The simplest (but rarely used) option is to run the system at a constant speed, providing a ventilation rate of 6 ACH throughout the car park. To reduce energy costs a CO detection system is used to allow the system to run at a reduced ventilation rate in periods when vehicle movements are low.

Using a single output detector, two stage control can be provided, typically switching at 15-20ppm of CO. Using variable output detectors, the system can provide additional stages or modulate to match the ventilation rate to the car park usage.

### Fire condition

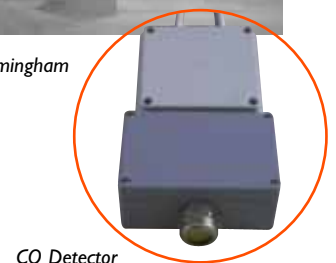
For a smoke clearance system, detection is required to indicate which level of the car park contains the fire, if the car park has more than one level. Upon detection all fans on that level operate at high speed, all other fans are switched off and the extract fans are switched to full speed, extracting only from the fire level.

For a smoke control system, addressable detection is required to pinpoint the fire location to allow correct selection of fan operation to maintain the required clear areas.

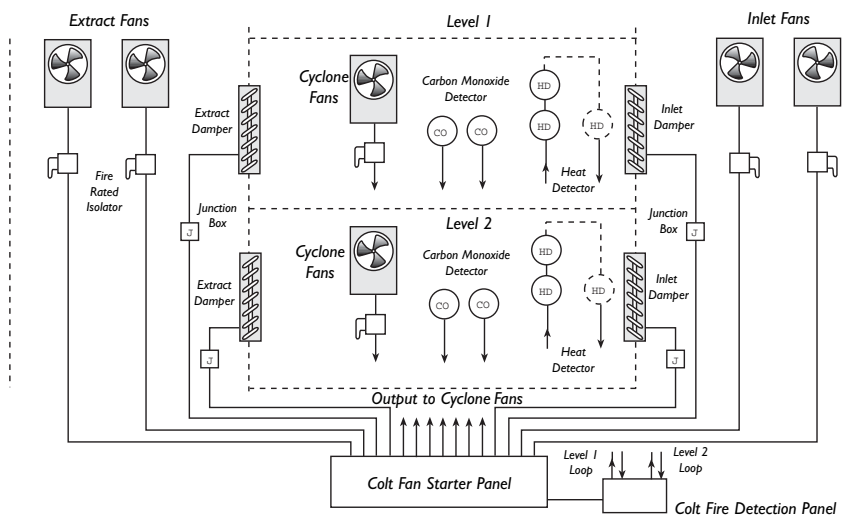
Colt can provide carbon monoxide detectors, heat/smoke sensors and fire alarm inputs along with all their necessary controls and battery back up facilities, linked into an addressable fire detection system.



The Postbox Birmingham



CO Detector



### TYPICAL CONTROL SCHEMATIC

Shown left is a typical control system for a two level car park with CO control, mechanical exhaust and mechanical inlet





Gunwharf Quays, Portsmouth

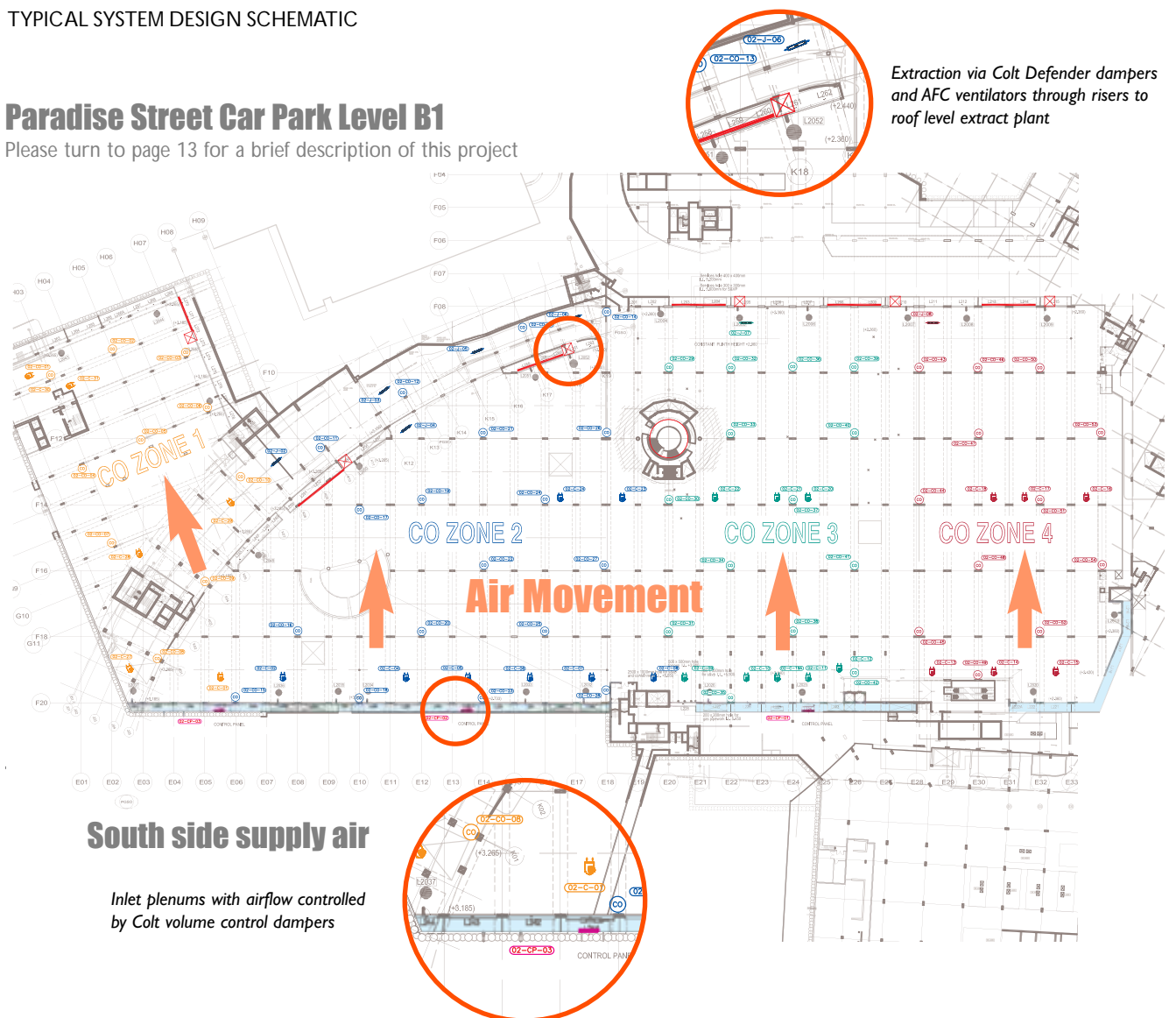


Control panel manufactured by Colt undergoing final inspection

## TYPICAL SYSTEM DESIGN SCHEMATIC

### Paradise Street Car Park Level B1

Please turn to page 13 for a brief description of this project





A Member of the British Parking Association

## THE COLT PACKAGE

Colt can offer the complete package, which could include:

- Scheme design. CFD analysis and report
- Supply of impulse fans, extract and/or inlet fans, ductwork (for extract) and dampers, control systems and wiring, CO and heat/smoke detectors
- Installation and wiring
- Commissioning
- Service and maintenance.

A free full system check will be carried out approximately 9 months after a Smoke Control System has been installed and commissioned by Colt. Besides the opportunity to check that the system is performing as designed, this will allow for any further training of local personnel that may be necessary. Assuming that this visit falls within the warranty period, any defective parts would be replaced free of charge. A test certificate will be issued.

## OTHER REASONS TO CHOOSE COLT:

Colt Smoke Control systems are **suited to both commercial and industrial buildings**, and may be adapted to suit most architectural requirements.

Over the years **Colt has funded a large proportion of the research** into smoke control, and its representatives maintain an **unparalleled level of technical expertise**.

Colt's **CFD modelling approach is reliable** and has been confirmed by empirical full scale hot smoke tests.

Colt's **in-house research and development capability** ensures that Colt fire protection systems are designed, tested and updated by Colt to meet or exceed relevant legislation and standards.

The majority of Colt's Smoke Control systems are **manufactured in the UK** under BS EN ISO 9001:2000 and BS EN ISO 14001:2004.



## COLT SERVICE

Part of the Colt Group of companies, Colt Service offers a comprehensive range of maintenance packages incorporating the maintenance and repair of all building services equipment including non Colt products.

Colt Service provides a 24 hour, 365 day emergency cover as standard.

## MAINTENANCE

Maintenance of a smoke control system is essential. Regular maintenance protects your investment and brings peace of mind that the system will operate effectively in an emergency.

British Standard BS 5588-12 recommends that smoke control systems should be serviced at least once a year and tested weekly.

People feel better in Colt conditions



Architectural Solutions

Climate Control

Smoke Control

Service and Maintenance

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