i-TunneL™
intelligent lighting solutions

Breakthrough to the future of tunnel lighting

with i-TunneL – the leading road tunnel lighting and control specialists

Indal
WRTL

i-TunneL – take total control of tunnel lighting - and the cost

Södra Länken - Stockholm, Sweden

Charing Cross - M8, Glasgow, United Kingdom

Dartford Crossing - London, United Kingdom

i-TunneL - at last a partner that can deliver fully integrated intelligent lighting and control systems for road tunnels. Our unique expertise in this area is proven to reduce installation and lifetime costs, improve reliability and, of course, make the management of tunnel lighting simple. R est assured, today's smartest way thr ough your tunnel lighting project is with i-TunneL.

Fully integrated lighting and control from one supplier

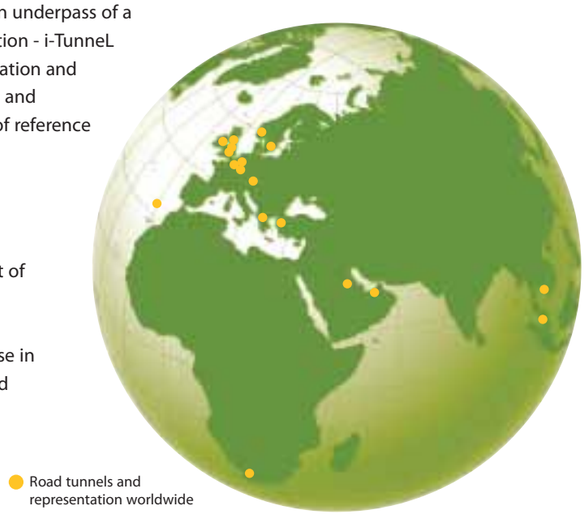
Partnering i-TunneL means str eamlining your supply chain and guarantees seamless systems integration. We develop and produce both luminaires and control systems, designed to work together from the start. You'll never have to worry about the compromises or integration problems that can arise when sourcing from different suppliers.

Supporting your tunnel project from start to finish

Whatever your project needs - a tunnel of many kilometres, an underpass of a few hundred metres or r epairing/refitting an existing installation - i-TunneL can take care of everything. From design and supply to installation and commissioning, training, operational assistance, maintenance and refurbishment or r etrofit installation. We're a single sour ce of reference and assistance wherever your project is located.

The i-TunneL pedigree

i-TunneL is a specialist division of WRTL Exterior Lighting, part of the Industria group and leading European designers and manufacturers of exterior lighting equipment with unrivalled technical and manufacturing r esources. Together, our expertise in lighting and control systems for tunnels is second to none and enables us to of fer you this unique service.



Road tunnels and representation worldwide

The i-TunneL solution vs. traditional contactor-based switching systems

Lower total capital and installation costs through:

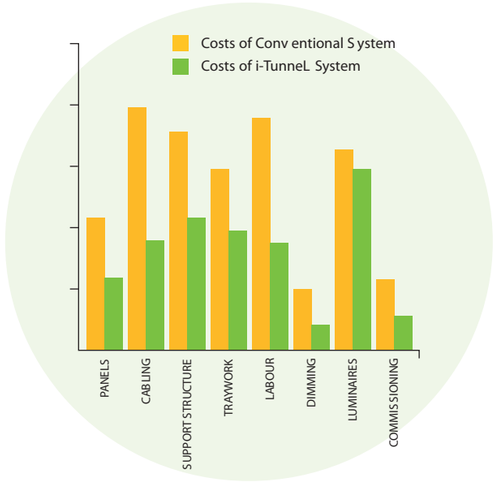
- Less cabling (only power and looped signal cable required)
- 'Plug & Play' communication
- Non-specialised installation
- Option of modularised luminaires
- Lower weight and more compact in tunnel
- Reduced mounting requirements
- Quicker installation
- Lower labour requirement

Lower maintenance and operating costs through:

- Greater system reliability, less mechanical equipment
- High impact and environmentally resistant luminaires
- Easy and rapid maintenance access to luminaires
- High efficiency luminaire performance
- Rapid, efficient luminaire control to meet changing conditions
- Increased functionality and control/monitoring, including lamp out, lamp condition, lamp burn hours, dimming etc.
- Increased lamp life
- Toolless access, simple component replacement
- Reduced site visits

Benefits of i-TunneL, compared to building inter ior lighting management systems, include:

- Proven within hostile, high EMC tunnel environments
- One single-level robust protocol throughout
- Can control up to 4000 lamps, to 600W and over 4km, without additional subsystems or interfaces within tunnels
- Easy on-site configuration of settings
- Lower total capital and installation cost
- Many years of proven reliability in high stress, high safety r equirement conditions



i-TunneL – our unique approach to your tunnel lighting project

Södra Länken - S tockholm. Sweden

M6 Toll - M6, West Midlands, United Kingdom

Choice of luminaires to meet all performance demands

Our range of luminaires has been developed specifically for tunnel lighting and will deliver the lighting and operating performance you demand. Models include single module luminaires for individual installation as well as designs for multiple lamps with extended bodies. All have been developed to withstand hostile tunnel conditions, while remaining simple to mount, install and maintain.

Wide lamp choice and the latest lamp technology

Our luminaires and control systems have been developed for the widest selection of light sources, to meet the demands and complexities of today's tunnels. Whether you are looking at the latest low energy white light fluorescent sources, or the proven features of HID lamps, i-TunneL ensures the highest reliability and performance.

Control systems and lighting made for each other

Both our tunnel lighting luminaires and our tunnel lighting control systems are developed specifically for use in road tunnels. While able to be specified independently, they are also designed for each other. This means you can have complete confidence in their trouble-free installation, commissioning and operation.

Seamless integration from one source

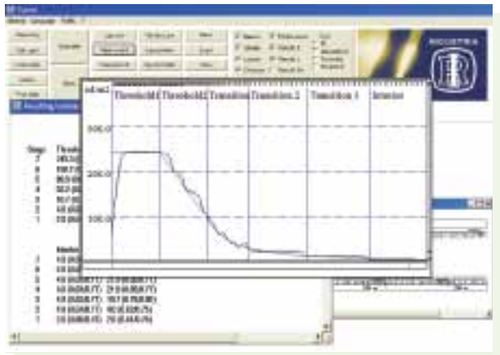
Our lighting and controls deliver seamless integration, avoiding potential conflicts of system design and compatibility issues teamed with our service and support from one source. Your complete i-TunneL lighting and control system is our total r esponsibility, and we will work in partnership with you throughout all phases, from design and specification through to operation and lifetime system maintenance.

Control systems for any size or complexity of tunnel

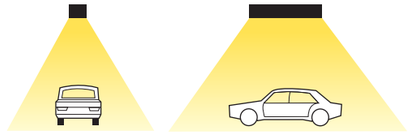
Our luminaires and simple, modular control systems have the versatility and scalability to enable us to provide integrated tunnel lighting contr ol to meet your needs precisely. Whether a section of high traffic density motorway with maintenance and traffic management issues, or many kilometres of tunnel with multiple exits/entrances, i-TunneL systems hav e been pr oven in operation. Retrofits and refurbishments are also simple to accomplish, and we have provided significant upgrades in functionality and reliability in major relighting projects.

Unique lighting design software to meet your requirements precisely

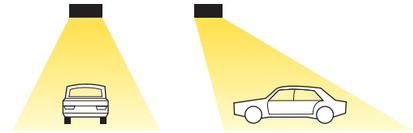
Our in-house lighting scheme design service uniquely provides y ou with the scheme to meet y our specified performance exactly. The effects of different configurations and solutions, from asymmetric to counter and pro-beam styles, can be precisely modelled and demonstrated, giving you the information you need.



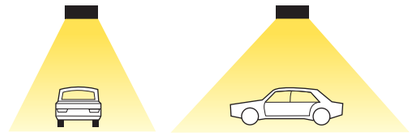
Symmetrical - Line



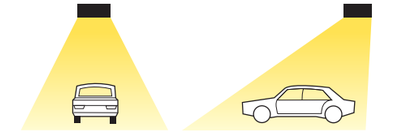
Counter-beam



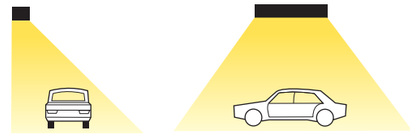
Symmetrical - Point

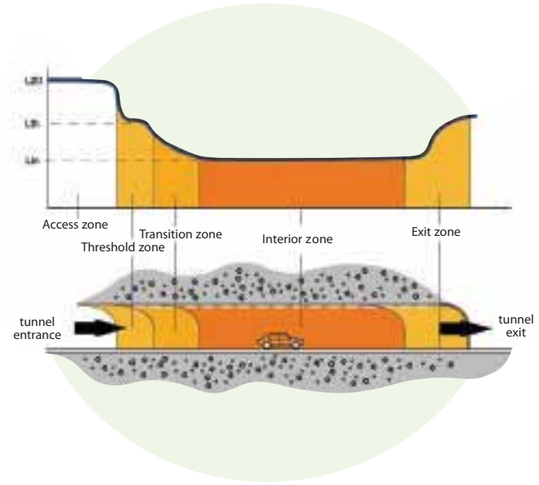


Pro-beam



Asymmetrical





i-TunneL – lighting control at your fingertips

Intelligent systems for complete control of operation, monitoring and maintenance

Management of a modern road tunnel requires intelligent systems that combine complete control and optimum status monitoring information with trend and fault history logging. Lighting control is an essential element of total tunnel operation. i-TunneL's B-Cub and B-Scout systems put complete control of the lighting system at your central command, with an operation overview from the portal photometer signals, through stage or lamp switching and dimming, to lamp life burn reports and system faults.

Total in-house design ensures reliability and simplicity

The simplicity of the i-TunneL control system concept, and its implementation through our designs proven under the harshest tunnel conditions, are key factors in its long term reliability and low lifetime costs. The system comprises a master central control with slave switching/monitoring units located in each luminaire. Cabling to the luminaires is limited to a power cable and a looped RS- 485 control cable.

This system simplifies every installation, operation and maintenance action, from testing, mounting and commissioning to fault tracing and lamp changing. Yet the system can be specified to your exact management and information requirements.

Seamless integration at every level

The simplicity, modularity and versatility of the i-TunneL system ensure it operates seamlessly at every level, and can be fully integrated with other tunnel management systems.

In comparison with traditional contactor-switched arrangements, i-TunneL systems can demonstrate the following advantages:

Benefit comparison

	B-Cub System	B-Scout System	Traditional System
Infrastructure Savings	High	High	Low
Design Savings	High	High	Low
User Interface	Keypad, LCD Screen & "Hot" Keys	15" Touch-screen PC, keyboard & mouse pad	None usually
Load Monitoring	No	Yes	No
Soft Switching	Yes	Yes	No
Inrush Limiting Switching	Load Shedding	Cascade Switching	No
Lamp Life Equalisation	No	Yes	Not Usually
Load Dimming	No	Yes	Additional switched cable runs required
System Fault Alarm	Yes	Output (optional) triggered by any of over 40 events	Limited
Simple Installation	Yes	Yes	No
Simple User Interface	Yes	Yes	No
SCADA Compatible	No	Yes	Limited
User Configurable	Yes – Simple Menu System	Yes – Full GUI	No – Usually requires software updates
Remote Control	Yes	Yes – Full PC Control	Limited
Future Proof	Medium	High	Low
Plug & Socket Connectors	Yes	Yes	N/A
Photometer cd/m² Trending	Data stored in "CSV" system log	Dedicated photometer logs & graphical display	No

One source of supply for system design, installation, support and maintenance

With i-TunneL, all your needs are met by one specialist team, which takes full project management responsibility for all aspects of the lighting control system and luminaires.

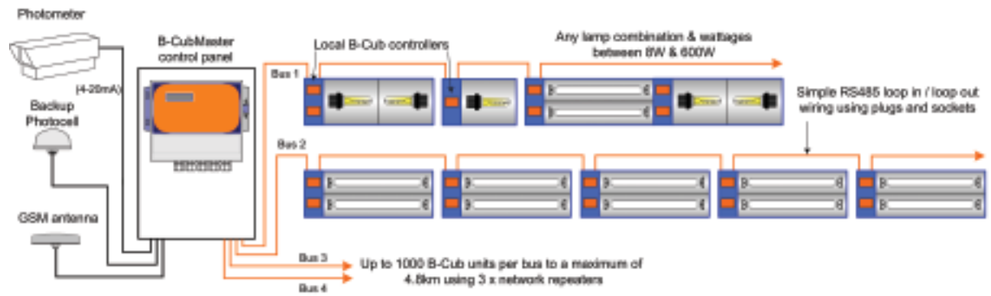
Topology that fits your tunnel layout, whatever its complexity

As can be seen below, the B-Cub and B-Scout systems are simple in concept, but versatile enough to meet the requirements of the most complex tunnel projects where required.

The B-Cub System

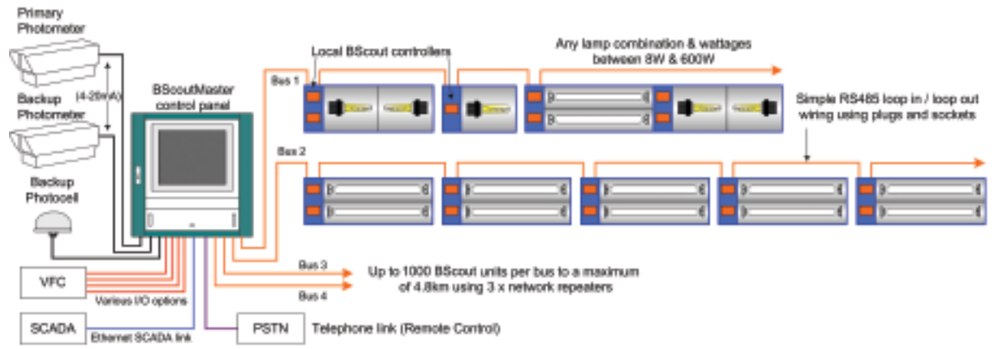
An intelligent, cost-saving replacement for the traditional switched control system, the B-CubMaster continuously monitors the portal photometer input and, after comparison with the pre-determined values, digitally instructs B-Cub slave units in each luminaire to switch lamps on or off. Group switching is set for each stage and can be altered at any time, along with all other settings using either the front panel keypad, or PC-based Cublink software via cable or modem.

1



The B-Scout System

The B-Scout System incorporates all the advantages of intelligent, digital control of individual lamp switching and dimming, whilst r etaining all the cost saving elements of the i-T unneL concept. In addition, the B-ScoutMaster will request information fr om the B-Scout 1 slave units to deliv er lamp and system status r eports and other information such as lamp burn hours and faults. Detailed history reports of events and values can be viewed, printed and transmitted externally.



i-TunneL – road tunnel lighting luminaires

Road tunnel luminaires must deliver precisely controlled light distribution which enables road users to make the safe transition from exterior to interior lighting conditions. Additionally, because of the harsh environment in road tunnels, luminaires must resist dirt, moisture and impact. i-TunneL's luminaires are designed to reduce installation and maintenance difficulties associated with tunnels.

i-TunneL's range of road tunnel luminaires has been specially designed to provide you with simple, secure mounting and cabling for easy cleaning and maintenance. These are teamed with advanced light technical performance, the widest choice of light sources, versatility in body configurations and a rugged build that will resist everything in the tunnel environment.

As i-TunneL luminaires are frequently built and configured to specific tunnel requirements, for further information and technical details, please contact us on +44 (0) 1745 582918 or e-mail i-tunnel@wrtl.co.uk

Minimal maintenance requirements

- Totally closed and O-ring sealed for 25 years plus design life – no maintenance requirements apart from lamp changing
- Simple access without tools, when required

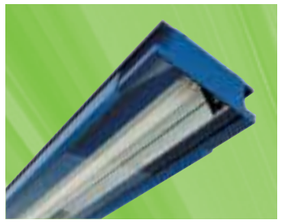
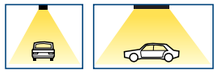
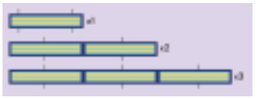
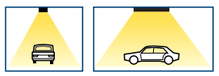
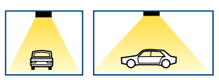
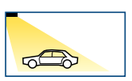
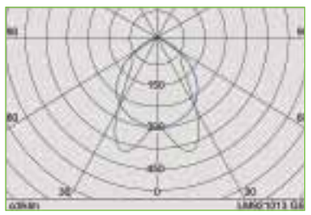
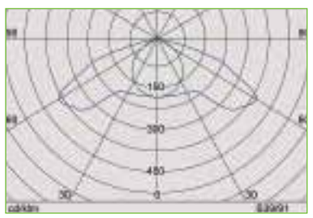
Simple, swift installation

- Universal mounting with easy external access for securing to support structure
- Isolated mounting clamps (requiring M8 bolts) can be positioned at any point along the housing profile, so simplifying the luminaire support designs

Long, totally reliable service life

- Designed and built to EN60598, and for 25 years plus performance life
- Totally protected to IP66 for life
- Longitudinal closing system ensures an even, consistent pressure on sealing, with the O ring between housing and glazing frame protected from damage

- Impact resistant rated to IK09
- Protected from corrosion by chromated pre-treatment of all aluminium elements to 6+level by total isolation from the support structure and no use of dissimilar metals

Luminaire Model	Distribution type	Construction	Lamp Types	Standard Dimensions (mm)	Mounting / Options	Typical Distribution
2811 & 2812 	 Symmetrical - Line  Asymmetrical	• 2.5 mm gauge extruded aluminium profile • Polyester powder coated RAL 5007 (Blue) • Thermally toughened glass within pr ofiles • Universal hinging / opening profiles, hand operation	2811 1 x Fluorescent T8/T5, 2 x Compact Fluorescent	2811 L 1585 mm (58W T8) W 240mm D 98mm	• Longitudinal orientation 	
2815 	 Symmetrical - Line  Asymmetrical		2812 2 x Fluorescent T8/T5, Compact Fluorescent	2812 L 1585 mm (58W T8) W 354mm D 98mm		
2816 	 Symmetrical - P oint  Counter-beam  Pro-beam		2 x Fluorescent T8, 2 x HID (Max 400W)	L 1585 mm W 354mm D 151mm	• Optional factory fitted flying leads	
			2 x HID (Max 400W)	L 618mm W 442mm D 180mm	• Orientation Transverse for Symmetrical, Longitudinal for Counter/Pro-beam • Optional factory fitted flying leads	

The above represent a selection of our popular luminaire range, details of other lamp types, arrangements and distributions, housing colours, or bespoke requirements on request. i-TunneL embraces the latest technology in materials employed, lamps and manufacturing processes.

i-TunneL – intelligent lighting con trol and monitoring systems

– a choice of integrated intelligent systems with advanced functionality for intelligent control configured to suit your tunnel operation parameters

Lower cost of installation and operation

- Reduced infrastructure costs – less cable, less switchgear, smaller control rooms, less tray work required etc.
- Quick installation – no control supply cabling and 'plug and play' bus reduces labour costs
- Simple installation – only three system components; master unit, slave units and RS-485 plug-in cables
- Reduced design costs – simpler and therefore quicker electrical and mechanical design
- Simple maintenance – all operating parameters can be changed without need for software engineers or i-TunneL support
- Practicalities – all on-site control and monitoring functions including parameter alterations can be performed remotely through a standard PSTN telephone line (internal GSM modem option for B-CubMaster)

High functionality for control and flexibility

- Soft-switching mechanism & cascade / load shedding switching – improved lamp life, reduced in-rush current (reducing cable size and distribution systems)
- Lamp life equalisation – further lamp life improvements
- Simple user interface – entire system based on simple Windows ® based touch screen user interface
- SCADA system compatible – project specific SCADA interface provided
- Generic, field-tested application software – can be easily reconfigured to reflect your specific application

Excellent upgradeability and adaptability

- Intelligent, adaptable system – industry standard architecture ensures versatility to meet tunnel operator requirements
- Windows ® style interface – industry standard, user-friendly programming simplifies upgrading and system management
- Future-proof system design – B-Scout / B-Cub units are compatible with any lamp up to 600W, plus flexible settings allowing simple r econfiguration

High r eliability thr ough har dened RS-485 Bus C able

- Own high specification , i-TunneL TSS-1CS bus cable, LS0H and developed specifically for tunnel use
- ESD resistant – ESD protection to 15,000 V (HBM)
- Interference rejection – high level industrial grade shielding over twisted pair
- Simple luminaire-to-luminaire daisy chain connection using fitted IP67 plug and socket
- S upplied as standar d in pr e-wired and tested lengths for dir ect mating to integral sockets on luminaires

B-CubMaster

Usually mounted in the main control room, this compact unit can be more conveniently located elsewhere if required. It accepts photometer and photocell external controls, and can be remotely controlled. It controls up to 1000 B-Cub1 units, in up to 32 pre-set stages with 6 totally independent lighting regimes. An internal logging system for system events and audible fault alarm provide valuable additional facilities.

B-Cub1

This is a slave control unit with an 8-600W capacity and is usually mounted in the luminaire body using an industry standard 11-pin base. It also features a lamp test button, and LED indicators for load override status and RS- 485 bus integrity. Soft switching circuitry, combined with load shedding algorithms prolong lamp life and reduce in-rush currents.

B-CubLink

Allows engineer r emote access using either a desktop PC or laptop with mobile phone, enabling full site control and information log interrogation. Lighting stages, photometer ranges, r egime setup and all internal settings can be easily checked and altered. The software can also be set to retrieve log data and change seasonal settings on an automatic basis.

B-Scout Master

Usually main control room mounted, this features Windows-style graphical software with touch screen, keyboard and mouse control. From the programmed database and complex configured lighting stages, it individually switches, dims and monitors up to 4000 B-Scout1 units and logs fault data for download via modem or SCADA link. Up to 2 photometer and 2 photocell inputs can be accepted and r emote control of its operation can be ef fected via modem or SCADA systems.

B-Scout

This slave control unit has an 8-600W capacity with soft-switching and load dimming. It is usually mounted in the luminaire body using an industry standard 11-pin base. It monitors parameters such as current-based load status, fuse error detection and lamp burn hours data. It also features a communications test button and LED indicators for load status and RS-485 bus integrity to aid site testing/commissioning. Soft switching circuitry, combined with sequential B-Scout load control prolong lamp life and reduce in-rush currents.

A selection of tunnel lighting projects includes:

UK
A1 – Holmfield
A1 – Longbull
A13
A102M
Beech Street
Blackwall
Blackfriars Underpass
Braunestone Way
Caernarfon
Canary Wharf
Charing X – M8
Clyde Cycleway
Dartford Crossing
Doncaster Interchange
Holloway
Hyde Park Underpass
Isle of Dogs
M6 Toll Road – J11A M6 interchange
Manchester Airport – 2 off
Meir
Ramsgate
River Bollin
Stansted Airport
Saltash
Upton Park Station

Germany
Bindeslebener Knie

Greece
Athens City Underpass
Egnatia Highway x 9 Tunnels

Hong Kong
Eastern Harbour Crossing
Junk Bay
Tate's Cairn

Ireland
Jack Lynch – Cork
Dublin Port
Newbridge

Madeira
Portugal Coastal Road Madeira

Malaysia
KLCC Lorong Kuda Access

Netherlands
A4-HSL
Ajax Arena
Aquaduct Grouw
Benelux 1 and 2
Coen
Drecht – 2 off
Gouwe Aquaduct
Heinenoord
Hellesgatsplein
Konings
Maas
Margriet
Markt-Maas
Noord
Piet Hein
Rotterdam Metro
Schiphol – 5 off
Sijtwende
Utrechtse Baan
Velser
Willemsspoor Rail
Wijker
Y Tunnel and Tram Tunnel
Zeebrugge
Zuidtangent HOV Tunnels
Vlake

Norway
Spiralen

Saudi Arabia
Muna

Sweden
Klara
Södra Länken – Stockholm

Turkey
TAG Motorway

i-TunneL™
intelligent lighting solutions

Indal WRTL Exterior Lighting Ltd
Spectrum House
Unit 33, Llys Edmund Prys,
St. Asaph Business Park
Denbigshire, LL17 0JA

Tel: +44 (0)1745 582918
Fax: +44 (0)1745 585317
Email: i-tunnel@wrtl.co.uk
Web: www.wrtl.co.uk

Indal WRTL Exterior Lighting Ltd
Waterside Park, Golds Hill Way
Tipton, WestMidlands DY 0PU
Tel: +44 (0)121 521 1234
www.wrtl.co.uk

Indal WRTL