SCANLIGHT

Lighting Control System

SYSTEM INTEGRATION FOR TRANSPORTATION INFRASTRUCTURE

SCANLIGHT is a Dimmable Addressable lighting control system developed specifically for Road Tunnel Applications to economically deliver optimum lighting conditions best matching the Luminance Reduction Curve, with performance far exceeding conventional or switched stage systems, and capital and running costs substantially lower than conventional switched systems. SCANLIGHT offers the following benefits:

- Improved Luminaire Reliability
- Highest System availability
- Lowest through life operating cost
- Reduced maintenance / tunnel closures

SCANLIGHT can be configured for any application where efficient delivery of optimum lighting can yield enhanced safety or operational cost savings. SCANLIGHT offers dramatic savings in Installation and Energy Costs, High System Integrity, Self Maintaining Illuminance, Simplified Maintenance and Lower Operational Costs, delivering optimal "high comfort" luminance.

Demonstration / test facilities are available at Thorlux in Redditch and PDS in Derby.

"Advanced functionality, proven reliability and cost effective solutions"

P. DUCKER SYSTEMS LTD.

P. Ducker Systems Ltd, Olympus House, Stephenson's Way, Wyvern Business Park, Derby. DE21 6LY ENGLAND.
Tel: +44 (0) 1332 280195 Fax: +44 (0) 1332 281002 Email: info@pdslimited.co.uk
www.pdslimited.co.uk

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Technical Description

The principles for road tunnel lighting are defined in BS5489-2:2003; artificial lighting levels in the tunnel entrance zone must be balanced with that on the approach carriageway to enable drivers to have good visibility into the tunnel from their safe stopping distance.

Once inside the tunnel, as driver vision becomes adapted to lower lighting levels, the appropriate artificial lighting level can be reduced in intensity with time/distance travelled, a relationship known as the "Luminance Reduction Curve".

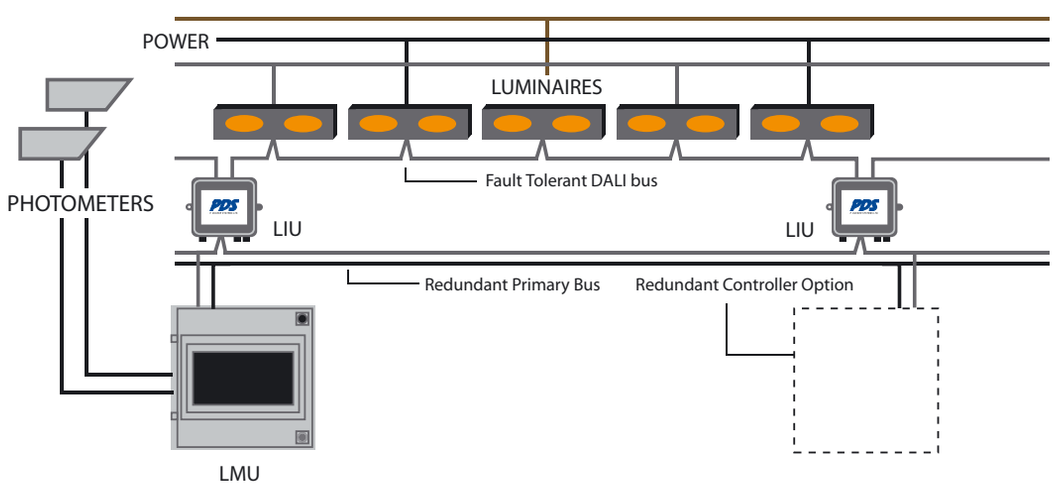
The lighting design usually includes a maintenance factor to compensate for the depreciation of artificial lighting due to dirt accumulation and lamp depreciation between routine maintenance visits. The maintenance factor often results in a deliberate over-lighting/over-powering during initial stages by up to 40%.

System Description

The SCANLIGHT solution combines a number of system features to provide ease of implementation and long term reliability. The system comprises the following key components:

- Photometers to constantly monitor external approach luminance
- Local manual or central SCADA over-rides
- Lighting Management Units (LMUs) which process the photometer data and automatically control/monitor lighting status
- Primary redundant data buses (CANbus) for communication between LMUs and LIUs
- Lighting Interface Units (LIUs) which interface between the primary CANbus and the local DALI data bus, with unique redundancy via connection to 2 separate LIUs
- Segregated local DALI data buses, each controlling up to 50 ballasts within 300m
- DALI ballasts in each Luminaire providing relay-free lamp switching/control/status and feedback, independent of mains

System Diagram



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SCANLIGHT features

Operating Features

The DALI ballasts provide extensive information, enabling a wide range of operational and maintenance functions unique to the SCANLIGHT system. The system includes facilities to aid both operating and maintenance optimisation, including information on lamp control settings, lamp failures and predicted failures, replacement schedules, and overall operating statistics.

Maintenance Design Factor

Lighting design has to include a factor to compensate for the reduction of light output which occurs due to dirt build up and lamp failures between maintenance visits, on system "switch-on" this can result in over-lighting by up to 30%. SCANLIGHT can be configured to provide the actual demand necessary on day one, increasing the output gradually to counteract the deterioration in conditions which occurs over time, this feature enables the saving of circa 15% energy costs, and through the inclusion of optional tunnel luminescence metering offers the potential to extend the period between closures / wash downs.

Reduced Installation Time

Unlike other addressable control systems SCANLIGHT requires neither the setting of Luminaire dip-switches nor installation in a pre-set sequence. Every DALI ballast and Light Interface Unit has an individual address code programmed during manufacture. This means that components do not have to be installed in predetermined locations which can significantly reduce installation time for both the luminaries and the associated wiring. The Luminaires are supplied with pre-made data cables to connect between each Luminaire, and can also be offered with a pre-made power plug for bus based electrical connections.

Increased Driver Safety

SCANLIGHT features "Maintained Illuminance": loss of light through lamp failure is automatically self compensated by an increase in the output from adjacent lamps. This can significantly increase driver safety and possibly extending the period between major re-lamping.

Fail Safe Operation

The system has numerous modes of safety and dual redundant communications built in, and can quickly locate and report the source of any hardware or cable failures, rerouting communications for continued safe operation. The DALI ballasts also include a pre-programmed failsafe output level in the event of an overall communications failure.

Planned Maintenance and extended component life

SCANLIGHT can be configured to balance lamp operation; spread the potential lamp replacement activities; or with any preferential lighting combinations to match the maintenance strategy. System utilities are included to enable system updates following lamp and ballast replacement.

Adaptable Configuration

The majority of control and monitoring functionality is configured at project implementation stage, and typically would not change following system commissioning. SCANLIGHT is designed to be on-line adjustable: authorised users can enable the adjustment of control set-points, algorithm options and miscellaneous settings, so fine tuning of the installed system can be easily carried out to achieve optimum luminance delivery in the tunnel.

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Specific Benefits

Up to 30% Installation Cost Savings

- No mains switching – saves the cost of switchgear
- Simple circuitry – saves cable & installation cost
- No requirement to install Luminaires in a preset order, no dip switches to set
- Pre-made plug & socket connections: avoiding wiring errors and reducing installation time. Luminaires stay closed during installation

30% + Energy Cost Savings

- Individual lamp dimming enables close fit to Luminance Reduction Curve saving energy compared to crude\stage switching
- Dimming to achieve maintained lighting levels saves energy
- Dimming ballasts provide correct functionality between 206 and 256 volts, reducing voltage drop problems

High Comfort Lighting

- Dimming avoids step changes to lighting uniformity normally associated with conventional stage switching

High System Integrity

- No bespoke electronics or unreliable contactors in luminaires or control system. Solid state components for high reliability, Industry standard DALI protocol guarantees future component availability / compatibility, dual redundant communication available at all levels
- Failed lamp self compensation system to ease maintenance / enhance safety
- Pre-programmed output level in the event of an overall communications failure

Simplified Maintenance / Lower Operational Cost

- Minimisation of different components, the DALI ballast is single piece (integral starting and high power factor)
- Diagnostic fault finding including hardware location
- Predictive lamp life and survival data
- Historical operational data collection
- Can be fully integrated into tunnel control systems (PDS MATRICS or others), with remote dial in control

SCANLIGHT is a Dimmable Addressable lighting control system developed for Road Tunnel Applications and delivers performance far exceeding conventional or switched stage systems. Offering dramatic savings in installation and energy costs, high system integrity with "self maintaining" illuminance, and simplified maintenance with lower operational costs, SCANLIGHT delivers the optimal lighting solution.

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