The application of LED's in runway lighting systems
Introduction

• Airfield Ground Lighting is a tough environment in which shocks, vibrations and great changes in temperature (frost or intense heat from the sun and surrounding tarmac).

• Currently the main provision for AGL is still in the form of incandescent lamps using a filament.

• These suffer from a number of weaknesses, in particular a relatively short average life as filaments are burnt out after 1,000 to 2,000 hours.

• Other weakness of incandescent lights is their "poor spectral emission"
BENEFITS

- Service Life extended from 1 to 7 years!
- Reduced Power Consumption
- Low maintenance
- Lower Voltages to improve safety
- No Filters- LED’s create the required colour!
- Better Colour – narrow spectrum
- Low temperature operation
- Resistance to Vibration – Robust
Advantages of LED

- Average Lifespan
- Operating Costs
- Light Spectrum Characteristics
Taxiway Edge

- Elevated Fittings
- Low Candela Output
- Inset Fittings
Taxiway Guidance Signs
Taxiway Centreline and Stop Bars

Higher Light Output

Wide Angle Coverage
Runway Applications

- High Intensity
- Inset
- Elevated
LED High Intensity RGL

ICAO compliant High Intensity > 3.000 cd
Service Life without lamp change > 5 years
New LED Developments

- Medium Intensity LED Lighting System
- Portable LED Lighting System
- Low Profile High Intensity Runway Airfield Lighting
Airfield lighting system using LED lights

Targeting:
- General Aviation airports
- Private Airfields
- Jungle strips
- Military Forward Support Bases

For Operations in Visual Meteorological Conditions.
Features

Easy to install.
- Pug & Play
- No specialized skills required
- Limited civil works

One or Two circuit DCR Regulator

1.4 Amp DC Power Supply

3 Step Light Dimming & Remote Control Option
The Clear Approach to Airports

Benefits of PEARL

- low investment cost
- low power consumption
- minimum maintenance
- great photometrics
<table>
<thead>
<tr>
<th>Application</th>
<th>Colour</th>
<th>Peak</th>
<th>Main Beam</th>
<th>Secondary Beam</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>cd</td>
<td>Horizontal</td>
<td>Vertical</td>
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<tr>
<td>Approach</td>
<td>White</td>
<td>1500</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
</tr>
<tr>
<td>Thresh. Uni</td>
<td>Green</td>
<td>1300</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
</tr>
<tr>
<td>Threshold</td>
<td>Green</td>
<td>650</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
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<tr>
<td>R/W Edge</td>
<td>White</td>
<td>1100</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
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<tr>
<td>R/W End</td>
<td>Red</td>
<td>350</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
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<tr>
<td>R/W End Uni</td>
<td>Red</td>
<td>2000</td>
<td>-5°/+5°</td>
<td>1°/5°</td>
</tr>
<tr>
<td>T/W Edge</td>
<td>Blue</td>
<td>36</td>
<td>360°</td>
<td>0°/45°</td>
</tr>
</tbody>
</table>
Installation

Two interleaved Circuits - Using Standard Components

FAA L-823 Factory moulded connectors.
The Clear Approach to Airports

Installation

Primary Cable, 2 circuits, with factory moulded FAA L-823 Two-Pole Receptacles

Y-Connection
DCR

- 1.4 A DC Power Supply – One or Two 500 W outputs
- Low output voltage below 400 Volts
- Brightness control in 3 steps
- Open Circuit Protection
- Over Current Protection
- Input Power 120/220 VAC 50/60 Hz
- EMI compatible
- Efficiency at full load higher than 90%
- Air Cooled
- Local/Remote selection switch
- LCD display for display of status information
- Optional Remote control by Radio Control L-854 or multi-wire
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SOLAR VERSION
Mounting Options
Mobile Systems
Summary

Versatility & Low maintenance & low cost
Ease of installation & Good Photometrics
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Features

- **Same Light Output as PEARL**
- **Up to 20 hours light output between charges.**
- **Recharge in 8 hours.**
- **Can withstand jet blast.**
- **Control options: Manual (Standard), photocell or radio.**
- **No lamp changes for life of light unit.**
Applications

The POLARIS is available in any aeronautical colours for different applications:

- Runway Edge (White)
- Taxiway Edge (Blue)
- Approach (White)
- Runway End (Red)
- Threshold (Green)
- Temporary Taxiway Closure or Obstruction Lighting (Red)
- TLOF Heliport Light (Green)
- FATO Heliport Light (White)
You’re looking at the future
Iris – LED Centre Line Fitting
Eco friendly design

Total airfield uniformity

< 6 mm profile with no negative slope

Optimised power consumption maximises life span of the fitting

Active monitoring of actual light output to maintain a selected brilliancy
IRIS – Features

All this with no negative slope!

Less than 6mm above grade

Less than 70mm deep
Iris – Optical cartridge

Clear / Clear

Clear / Blank
IRIS – Features

- Self contained electronics package
- Monitor: Presents an open circuit on the AGL power input when the light output falls to 50% or when more than 25% of the LEDs have failed
- Manufactured with 80% recycled material
- RoHS compliant
D.L.O
Dynamic Light Output
DLO - Features

- Removes any LED binning issues with supplier
- Protects the ability to supply spares in the future
- Manages temperature changes effect on the operation of LED
- Manages LED’s degradation over time
- Monitored photometric performance
- Even illumination across the airfield
- Greater energy efficiency
DLO - Features

- Uses efficient state-of-the-art microprocessor-based switched-mode power supply technology which results in efficient conversion of input power to light output.
- Active power factor correction (>0.95) is employed so that the ground transformer secondary load is effectively purely resistive
- Figure shows the relationship of the A.C. supply voltage (yellow trace) and current (blue trace)
- Open-circuit functionality is incorporated so that fittings work with existing PLC systems
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Looking Inside:

- Optical light engine
- LED array
- Internal electronics
- Heat sink
Optical light engine assembly

- LED array
- Thermal management
- Optical sensor
- Configuration & Calibration IC
IRIS – Power Consumption

- Runway Centreline: 15 Watts
- Taxiway Centreline: 5 Watts
- Stopbar: 3 Watts
• **Switch**
  – Integrated ‘switch facility’. Available in Fail ON and Fail OFF configurations

• **SMARTswitch**
  – Integrated SMARTswitch / monitor with true light output feedback and advanced condition monitoring for Total Preventative Maintenance (TPM)

• **Arctic heater kit**
  – For operation in harsh environments. Prevents ice formation on the lenses

• **Asset Tag**
  – Integrated RFID tag for asset tagging
The Clear Approach to Airports

The Micro 200

- High Power Factor
- Low Harmonics
- Low running costs
- Small Foot print
- Fast response time
- LED Technology
- EN61822 Compliant
- Optional extras
Theory of Operation

- About 1µS Reaction time to load changes
- Continuous power to electronic loads
- Lower Harmonic output
6.60 Amps, 0.99 PF

Phase Angle Based CCR (6.6 Amps)
6.30 Amps, 0.95 PF

Phase Angle Based CCR (6.6 Amps)
5.35 Amps, 0.80 PF

Phase Angle Based CCR (6.6 Amps)
4.55 Amps, 0.68 PF

Phase Angle Based CCR (6.6 Amps)
3.89 Amps, 0.58 PF

Phase Angle Based CCR (6.6 Amps)
3.37 Amps, 0.50 PF

Phase Angle Based CCR (6.6 Amps)
2.90 Amps, 0.44 PF

Phase Angle Based CCR (6.6 Amps)
2.57 Amps, 0.38 PF

Phase Angle Based CCR (6.6 Amps)
Sine wave CCR

Simulation
6.60 Amps, 1.00 PF

Sine wave Based CCR (6.6 Amps)
6.30 Amps, 1.00 PF

Sine wave Based CCR (6.6 Amps)
5.35 Amps, 1.00 PF

Sine wave Based CCR (6.6 Amps)
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Sine wave Based CCR (6.6 Amps)
Alternative Power Supply System

DCR

• 1.4 A DC Power Supply – One or Two 500 W outputs
• Low output voltage below 400 Volts
Currently:
- 3 installations running in Canada since 2004
- One installation in Italy
LED’s Bringing a new light to an old industry

Any Questions?