



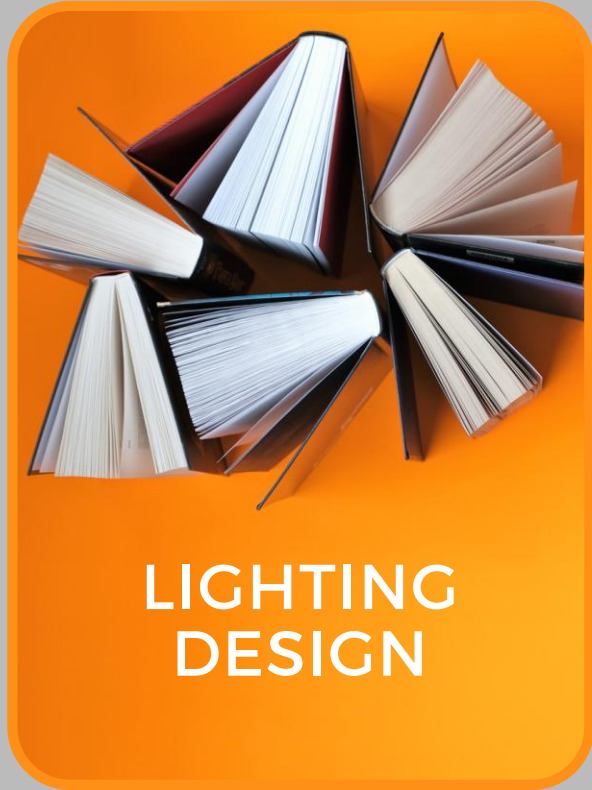
ELEMENTARY TECHNOLOGIES

LIGHTING DESIGN Retrofit Lighting Guide

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Retrofit Lighting Guide

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Introduction

As energy efficiency and sustainability become top priorities in industrial operations, retrofitting existing lighting systems with LED solutions is one of the most impactful upgrades businesses can make. Industrial spaces, often characterised by vast areas, high ceilings, and continuous operation, present unique challenges and opportunities for retrofitting.

Furthermore, with electricity tariffs regulated by NERSA (National Energy Regulator of South Africa) experiencing an average annual increase of 15% over the past five years, and proposed further hikes in the future, reducing energy consumption is no longer optional but essential for cost management and operational sustainability.

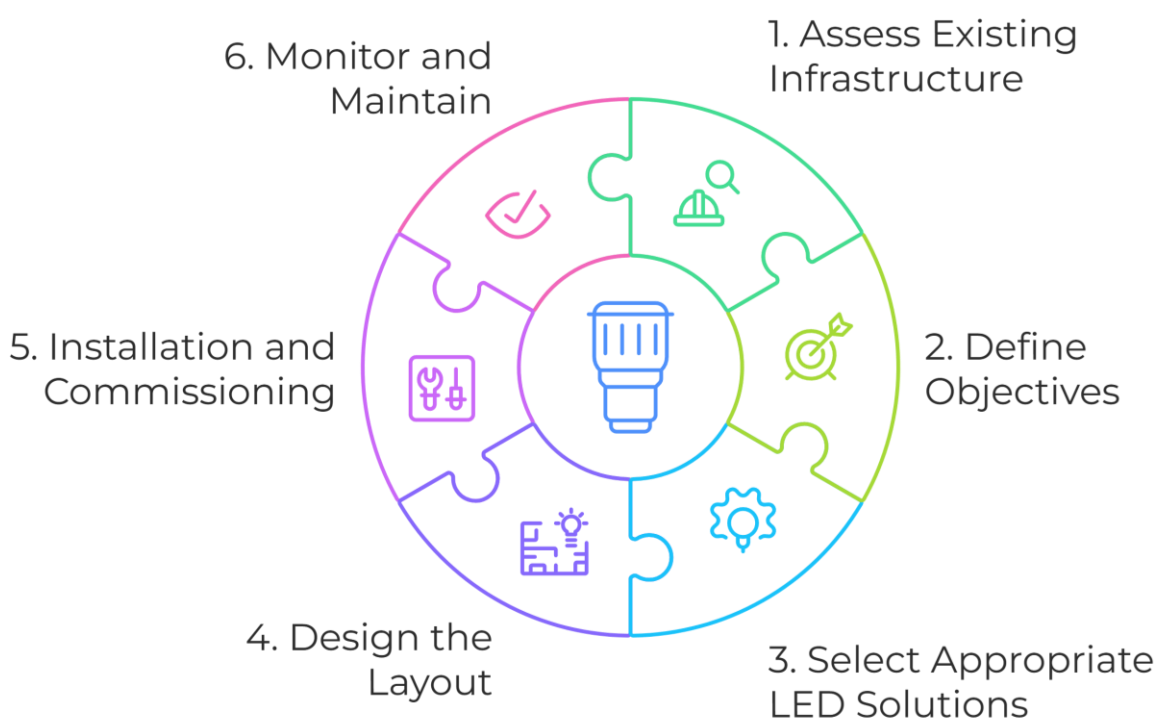
This guide provides a step-by-step approach to retrofitting industrial lighting systems with LED technology, placing a strong emphasis on lighting control protocols such as DALI and D4i, and deploying strategies like daylight harvesting, occupancy control, and scheduling to achieve maximum efficiency. Additionally, compliance with SANS codes, such as SANS 10114-1 for interior lighting optimising energy savings, and improving operational efficiency are key focuses.

Why Retrofit to LED Lighting?

Retrofitting to LED systems offers several compelling benefits:

1. **Energy Savings:** LED lights consume up to 75% less energy than traditional lighting systems (e.g., HID or fluorescent).
2. **Longevity:** LEDs offer significantly longer lifespans typically up to 50 000 to 100 000 hours, reducing maintenance costs.
3. **Improved Light Quality:** Enhanced brightness and colour rendering improve productivity and safety in industrial environments.
4. **Environmental Impact:** Reduced energy consumption lowers carbon footprints.
5. **Compliance:** Aligns with SANS 10114-1, which provides recommendations for lighting design, illuminance levels, and uniformity.
6. **Enhanced Efficiency:** Lighting control protocols such as DALI and D4i further optimise energy usage through advanced strategies like daylight harvesting and occupancy-based control.

Step-by-Step Retrofitting Process



1. Assess Existing Infrastructure

- Conduct a lighting audit to evaluate:
 - Fixture types, wattages, and placements.
 - Current light levels (lux) compared to requirements in SANS 10114-1 for industrial spaces.
 - Energy consumption and operational hours.
- Identify areas with poor light quality, excessive energy usage, or non-compliance.

2. Define Objectives

- Establish specific goals, such as:
 - Reducing energy costs by 50%.
 - Achieving minimum lux levels as per SANS 10114-1 standards for specific tasks (e.g., 200 lux for general manufacturing).
 - Minimising maintenance downtime.

3. Select Appropriate LED Solutions

- Choose LED luminaires suited for industrial applications:
 - High Bays for high ceilings.
 - Linear LEDs for assembly lines.
 - Explosion-proof LEDs for hazardous areas.
- Incorporate smart lighting controls such as:
 - Daylight Harvesting: Adjusting artificial lighting based on available natural light.
 - Occupancy Control: Automatically switching off lights in unoccupied zones.
 - Scheduling: Pre-programmed lighting patterns to reduce unnecessary usage.

4. Design the Layout

- Use lighting design software to:
 - Optimise fixture placement for uniformity and compliance with SANS 10114-1 lux level guidelines.
 - Account for glare reduction and beam angle customisation.

5. Installation and Commissioning

- Follow a phased approach to minimise operational disruptions.
- Ensure proper wiring, mounting, and integration with control systems.
- Test all fixtures for:
 - Compliance with designed lux levels.
 - Functionality of smart controls, including daylight and occupancy-based adjustments.

6. Monitor and Maintain

- Set up periodic performance checks:
 - Verify energy savings against initial projections.
 - Use smart diagnostics (D4i) for proactive maintenance.



Case Study: South African Industrial Warehouse Retrofit

Project Overview:

- Objective: Retrofit a 5,000 m² warehouse to LED lighting.
- Baseline:
 - Legacy HID fixtures consuming 250W each.
 - Total energy cost: R200,000/year.
 - Average lux level: 120 lux (below SANS 10114-1 recommendation).

Results:

- Upgrades: Replaced 200 HID fixtures with 150 LED high bays (120W each).
- Energy Savings: 60% reduction, saving R120,000/year.
- Compliance: Achieved 300 lux average.
- Maintenance Savings: LED lifespan of 50,000 hours eliminated frequent bulb replacements.
- Control Integration: Daylight harvesting reduced artificial lighting use by 20% during daytime operations.

Challenges and Solutions:

Challenge	Solution
High Initial Investment	Highlight ROI and energy savings within 2-3 years.
Disruption During Installation	Implement phased retrofits to maintain operations.
Compatibility with Existing Systems	Upgrade standard switching control sensors into wireless BLE control nodes by adding a few components.
Meeting Compliance Standards	Design lighting layouts per SANS 10114-1 and validate post-installation.

Ready to upgrade your industrial lighting systems to energy-efficient LED solutions?
Contact Elementary Technologies today for:

- A free lighting audit tailored to your facility.
- Custom lighting designs compliant with SANS standards.
- Expert guidance on integrating smart lighting controls.

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