NALMCO SPRING SEMINAR

Jacob Palombo
Industrial Lighting – What You Need to Know

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Industrial Lighting

- LED High Bays are everywhere, but many of them on the market are not designed to last in true industrial applications.
- Industrial lighting applications are tough! High Temps, dust, dirt, grime, moisture, chemicals, industrial solvents, bugs, poor power quality, etc!
- Generic import low-quality LED High Bays such as the “UFO” and the “Ultra-Low Cost Linear” are hitting the market.
- While they may seem like a good bargain, there is a huge amount of risk with using these types of products – and you might be replacing all of your lighting in a very short time period.
- Here is what you need to know about Industrial Lighting.
Industrial Lighting Applications – What To Think About

**Warehousing**

- Warehousing spaces can be hot at the ceiling! Your fixture needs to properly rated to ambient temps **45°C to 55°C**. If the fixture does not have a CSA/UL Temp Label, its not rated for high Temps!
- Power Quality can be a major issue in industrial spaces. Fixtures need a min **ANSI Surge 6kV**
- IP5+ rated optics are a must to keep out bugs, dust, dirt, debris, etc

**Manufacturing**

- Chemicals, solvents, lubricants, etc can react with LED’s and plastics. Look for Fixtures with IP65 Sealed Glass Optics for LED Protection
- Power Quality can be a major issue in heavy industrial spaces. Fixtures need a min **ANSI Surge 6kV-10kV**
- Optics and Uplight are important for good uniformity, Vertical Foot Candles, and a comfortable working environment

**Education/Commercial**

- Fixture Aesthetics and Uniformity is key here – Smooth optics, diffuse lenses, uplight create spaces people want to be in
- Wireless controls increases usability and energy savings
## All Industrial LED Products Are Not The Same

### How to evaluate an Industrial LED Fixture

<table>
<thead>
<tr>
<th>What?</th>
<th>Why You Should Care?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lumen Maintenance (L-Value)</td>
<td>Tells you how long the fixture will deliver the light level you paid for. Varies by operating temperature and lumen package</td>
</tr>
<tr>
<td>Driver Life</td>
<td>How long will the driver last? Failed driver = failed fixture</td>
</tr>
<tr>
<td>Surge Protection per ANSI</td>
<td>LED is more susceptible to power quality events than HID. ANSI Standards for Industrial Surge Protection are min 6kV. Heavy Industrial is 10kV</td>
</tr>
<tr>
<td>standards</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>Is the fixture serviceable?</td>
</tr>
<tr>
<td>Ambient Temperature Rating</td>
<td>Tells you what ambient temperature fixture can operate in. Fixture needs to have a UL/CSA sticker showing the ambient temperature</td>
</tr>
<tr>
<td>Light Output at High Temp</td>
<td>Some fixtures have high temp listings, but have a significant drop in light output at higher temp</td>
</tr>
<tr>
<td>Optics</td>
<td>Are they sealed, or will they let in dirt, dust, bugs, chemicals, water?</td>
</tr>
<tr>
<td>Controls</td>
<td>Embedded Sensors and wireless controls allows you to save 50% more energy compared to LED alone, and provides additional functionality</td>
</tr>
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</table>
Lumen Maintenance

<table>
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<tr>
<th>What?</th>
<th>Typical Import LED</th>
<th>Quality Fixture</th>
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<tr>
<td>Lumen Maintenance (L-Value)</td>
<td>L70 @ 50,000 Hours</td>
<td>L88-L90 @ 60,000 Hours</td>
</tr>
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</table>

- L70 of 50,000 Hours means you lose **30% of your light within 5 years** at room temp 25C!
- Warehousing/Mfg spaces are hotter than 25C, so timeline is accelerated even faster. 5 Years could = **30-40% loss**
- If you designed your warehouse to 30FC IES Standards, your customer could be seeing 21 FC within a few years, and out of IES compliance.
- Low Lumen maintenance means lowest quality LED’s, Drivers, and poor fixture thermals
Driver Life

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<th>What?</th>
<th>Typical Import LED</th>
<th>Quality Fixture</th>
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<tr>
<td>Driver Life</td>
<td>Low Cost Drivers could last as little as 30,000-37,000 Hours!!</td>
<td>Lasts twice as long, up to 100,000 Hours</td>
</tr>
</tbody>
</table>

![Graph showing driver life comparison](image_url)

- 37,000 Hours
- 80,000 Hours
Surge Protection

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<th>Quality Fixture</th>
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<tr>
<td>Surge Protection</td>
<td>Most have no ANSI Surge Protection = Completely unprotected</td>
<td>6kV-10kV ANSI Standard Surge Protection Included</td>
</tr>
</tbody>
</table>

- ANSI Surge Stds call for a min **6kV** for Industrial/**10kV** heavy industrial, tested to ANSI Standards and Procedures
- Almost all import high bays are cutting cost, and do not design to meet these requirements
- Industrial spaces create challenging power quality environments- Motors, Machinery, VFD’s, Conveyors, etc cause many types of dirty power, that can kill an unprotected fixture quickly
- What happens when you don’t meet Surge Standards? Your fixtures could go out like Popcorn Surge Video!
- Fixtures with ANSI Surge Protection could last years longer than unprotected fixtures
Serviceability

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<th>Typical Import LED</th>
<th>Quality Fixture</th>
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<tr>
<td>Driver Serviceable?</td>
<td>Almost all UFO’s drivers are not serviceable Throw-away if the fixture fails</td>
<td><strong>Serviceable Driver</strong></td>
</tr>
</tbody>
</table>

- If the driver fails because of surge, power quality, heat, etc almost all import UFO drivers cannot be changed.
- They are soldered to the optical assembly.
- If/When the driver fails, you have to throw the entire fixture away.
- This goes against the entire value proposition of long-term-solution LED Lighting!
- A good quality round like the Lithonia JEBL has a serviceable driver— Easily disconnect and reconnect a new one!
- Other quality fixtures have a door or easily access driver channel.
Real Ambient Temp Ratings

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<th>Quality Fixture</th>
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<td>Ambient Temperature</td>
<td>Many claim an “Operating Temp” on the spec sheet, but lack true fixture rating</td>
<td>True Tested/Listed Ambient Temperatures</td>
</tr>
</tbody>
</table>

- Industrial Spaces are hot at the ceiling – The fixture should be CSA/UL listed to high temperatures – 45-50°C +
- To know what a fixture is listed/tested to, the fixture will have a sticker like this ➔
- Many import high bays do not have this sticker, meaning it has not been tested/listed to any elevated ambient
- CSA/UL Considers a fixture without an elevated ambient sticker rated to 25°C
- This is a major risk – LED’s and Drivers could be operating unsafely, and fail

• Temp Video!
Optics – IP Protection

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<tr>
<td>Optics</td>
<td>Optics are not IP rated or sealed to dust or debris</td>
<td>Minimum of IP5X Optics to keep dust, dirt, debris</td>
</tr>
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</table>

- Using a low cost linear high bay? Most all are not sealed or IP rated and will let in dust, dirt, bugs, and debris
- This reduces light output, hurts aesthetics, and just looks plain bad
- If there is humidity, water, moisture in the air, this could damage LED’s and electronics
- Going up to each fixture in a lift and cleaning the lens is a maintenance nightmare
- Fixtures like Lithonia IBG have an **IP5X rating**, which means they are dust resistant
- Fixtures like Lithonia XIB are completely **IP65** sealed to dust, dirt, and water, etc
- IP65 is highly recommended for cold storage, indoor/outdoor, manufacturing
Optics – Light and Glare Control

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<tr>
<td>Optics</td>
<td>Clear Glass - Spot Lights, High Glare, Poor Uniformity</td>
<td>Prismatic Glass Reflector/Refractors</td>
</tr>
</tbody>
</table>

Prismatic Optics deliver **70% Better Uniformity** and **10% More Vertical Foot Candles** than a flat Glass UFO

Using a fixture with optics may allow you to use less fixtures and space the fixtures further apart vs clear flat glass.
### Chemicals/Solvents/Industrial Fluids can degrade LED’s and Plastics

For challenging spaces, make sure you have IP65 and Glass Optics

<table>
<thead>
<tr>
<th>Fixture</th>
<th>Protection level</th>
<th>Warehouse</th>
<th>General Area</th>
<th>Assembly area with no chemicals</th>
<th>Cold Storage</th>
<th>Welding</th>
<th>Heavy Mfg</th>
<th>Machine Shop</th>
<th>Maint/service Bay</th>
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<tbody>
<tr>
<td>IBE</td>
<td>Non-Sealed Lens</td>
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<tr>
<td>JEBL</td>
<td>Full IP65 Flat Glass Lens</td>
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<tr>
<td>IBG</td>
<td>Dust Resistant Lens</td>
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<tr>
<td>JCBL</td>
<td>IP65 Glass Lens</td>
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<tr>
<td>XIB</td>
<td>Full IP65 Optics</td>
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<tr>
<td>JHBL</td>
<td>Full IP65 Prismatic Glass Optics</td>
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The Standard for Lighting Management Quality since 1953 [www.nalmco.org](http://www.nalmco.org)
Overall Construction Comparison - Round

Driver Isolated from LED's, Fins and Surface Area to Dissipate heat

Tier 1 Drivers, Rated up to 100,000 Hours

Commodity Grade Driver, 50,000 Rated –Not serviceable/replaceable

Flow Through Heat-Dissipating Design

Little to no separation between driver and optical assembly = excessive heat

Robust Cast AL Optical Housing for maximum Heat Dissipation

Integrated Battery Packs for Emergency egress

Clear Glass or Plastic – Maximum Glare, poor uniformity

Replaceable Inline Surge Protection, tested to ANSI Standards 6kV to 10kV

Low Tier LED's with L70 of 50,000 Hours

Prismatic Glass Optics to reduce glare- Tier 1 LEDs

Integrated Battery Packs for Emergency egress

Replaceable Inline Surge Protection, tested to ANSI Standards 6kV to 10kV

No ANSI surge Protection

Easy Access for Maintenance

Unknown true fixture ambient rating- no UL/CSA temp sticker

No EM Battery Pack Capability

The Standard for Lighting Management Quality since 1953 www.nalmco.org
Overall Construction Comparison - Linear

Lithonia XIB

- Full Sealed **IP65** = Protected Electronics and LEDs
- CSA listed true **55C** rating Matching CSA Temp Label
- Sealed Acrylic and Glass Optics – Keeps optics/LEDs clean/protected
- ANSI 10kV Surge Standard
- Tier 1 Drivers and LEDs
  - Drivers lasting up to 100K hours, **L91 @ 60,000 Hours**

Typical Import

- Debris & moisture collects on or enters fixture from back
- No ANSI Surge Protection
- No IP Rating Holes/Vents
- Non-Sealed Plastic Optics, prone to collecting dust/debris
- Commodity Grade Drivers/LEDs
  - L70 50K Hours
  - Drivers lasting 50K hours or less

Video Link

Fixture does not carry CSA Temp Label = **25C** rated Fixture

- Sturdy Cast Aluminum
- NSF Listed Smooth/Clean back, reduced debris collection
- Flimsy Sheet Metal

www.nalmco.org

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<td><strong>Lumen Maint.</strong></td>
<td>Tells you how long the fixture will deliver the light level you paid for.</td>
<td>L70&gt;100 hours, per TM-21 Guidelines. If your fixture is going into Elevated Temperatures, make sure there is a chart that shows lumen Maint vs Temperature. <em>The L70 hours can drop significantly at temps above 25C!</em></td>
</tr>
<tr>
<td><strong>Driver Life</strong></td>
<td>Some fixtures use <em>unknown, unproven</em> manufacturers, lasting &lt;25,000 hrs.</td>
<td>A Tier 1 driver from a reputable supplier, with a driver life of up to 50,000 – 100,000 Hours.</td>
</tr>
</tbody>
</table>
| **Surge Protection**| LED is more sensitive to power quality events that HID, and surge protection is *crucial* for long term operation. | All Fixtures tested to *ANSI Standards and Guidelines*:  
  - Commercial = 2.5kV  
  - Industrial = 6kV  
  - Outdoor (use for Heavy Industrial) = 10kV |
| **Light Output at High Temp** | Heat will kill your LED. Some luminaires have elevated temp listings, but have a significant *drop in light* output at higher temp | For elevated temperature applications, make sure your fixture has a chart showing Lumen output vs temperature. If the luminaire has a temp rating on the spec sheet, *make sure the label on the fixture matches!!* |
| **Optics**          | *Uniformity* and vertical foot candles are key to good lighting in Industrial spaces. Without optics, you have a glare bomb, and spot lights. | Diffuse and prismatic optics, *distributions to spread the light out*, and protect the LED’s. Glass is ideal in manufacturing to keep out airborne chemicals and contaminants |
| **Controls**        | Embedded Sensors and wireless controls allows you to *save 50% more energy* compared to LED alone, and provides additional functionality. | Bluetooth-Programmable Sensors like Sensor Switch Haleon and app-based wireless controls like *nLight Air*. These are A+ certified and fully interoperability tested |