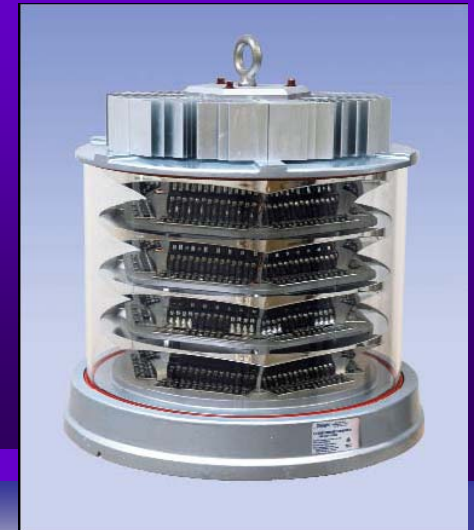
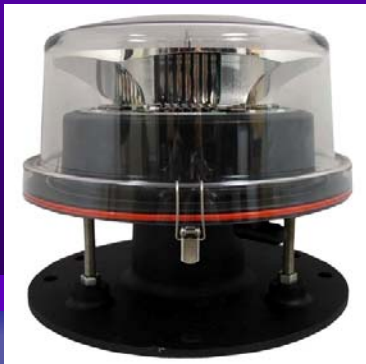


Dialight Corporation

9/20/08

LED's and Tower Lighting;

How is the industry accepting them?



LED

Dialight

Your speaker....Thad Fink

- Central Ohio native (U.S.) active in high school & collegiate sports
- Graduated from Capital University, Columbus, OH in 1994 with a degree in public relations
- Started in lighting industry with Siemens Airfield Solutions as floor assembly tech in '95
- Wanted to go into sales and finagled my way into the sales department
- Recruited by Honeywell in '98 to work in airfield / obstruction lines
- Moved onto Dialight in '05, Focus on LED OB lighting & channel management
- Married H.S. sweetheart, father of 4 (daughter 9, son 7, daughter 3, daughter 2) reside in Tampa, FL
- Very active in local community & charity work, enjoy sports & fitness and currently publishing a series of children's books

Contact Info

- Office : 813-643-6791 Mobile : 813-943-4322 tfink@dialight.com



Overview of presentation

- Information about your speaker
- Dialight Corporate Overview
- Obstruction Lighting History & Regulations
- Lighting Technologies & Evaluation
- LED Technology, Overview & Performance
- LED “Challenges and Concerns”
- Manufacturer responsibility
- LED’s and the state of the market
- Question and answers

Dialight Corporation

“Making L.E.D’s Usable”

**Headquarters:
Farmingdale, New Jersey, USA**

- **An “L.E.D. Application Company”**
- **Founded 1938**
- **Multinational workforce of 919 employees**

The logo for Dialight Corporation, featuring the word "Dialight" in a blue sans-serif font. To the left of the text is a horizontal row of 15 small circles in various colors (orange, yellow, green, blue, purple).

About our business

Dialight has three major divisions

– Components:

- relatively mature market low brightness LEDs

– Signals:

- Using high brightness LEDs.
 - A “focus” on retro-fit solutions to existing infrastructures

– General illumination & Color mixing:

- Using high brightness LED's with computer controlled aspects



Dialight World-Wide Operations

- ISO 9001-2000 Registered
- Design and Development
 - Farmingdale USA
 - Wang Germany
 - Newmarket and Knaresborough England
- Manufacturing
 - Roxboro USA
 - Ensenada Mexico,
 - Newmarket and Knaresborough England



Dialight - Signals Division

• Obstruction

- Broadcast – Cellular/PCS
- Wind Energy – Utilities
- Buildings & Roadways
- Airports & Heliports



• Vehicle

- Commercial
- Personal
- Tactical (Military)
- Aircraft
- Locomotion / Rail Car



• Traffic/Rail

- Intersections
- Pedestrian walk
- Railroad



• Hazardous Location

- Refineries
- Petro-Chemical
- Mines
- Offshore platforms



History

The Evolution of Tower Lighting

- Red Code Beacon (300mm) and sidelights
- White Strobe, High Intensity
- White Strobe, Medium Intensity
- Red/White Dual Strobe, Medium Intensity
- Red LED Sidelight
- Red LED Beacon
- Medium Intensity Dual LED

Lighting Regulations / Certifications

- FAA Advisory Circular 70/7460-1
 “Obstruction Marking and Lighting”
- FAA Advisory Circular 150/5345-43 “Specification for
 “Obstruction Lighting Equipment”
- FAA Engineering Brief 67
- FCC Part 17
- ICAO Annex 14
- VAP Draft Specification
- Transport Canada CAR 621.19 (*formerly TP-382E*)
- Secretary Communications-Mexico
- IEC Draft

Existing Technology for Light Sources

- What are the options & what's the best?
 - Incandescent??
 - Strobe??
 - LED??

Incandescent Light Sources

Advantages :

- Lowest “up front cost”
- Numerous distribution sources
- Fairly resilient to lightning
- Plug and play to most broadcast towers

Disadvantage :

- Short lamp life, high “reoccurring costs”
- Frequent maintenance
- Susceptible to vibration damage
- Extremely inefficient, Consumes lots of power
- Light Pollution, ground effects!

Strobe / Xenon gas Light Sources

Advantages :
-Longer life technology than incandescent.
-Efficient power consumption
-Numerous distribution sources

Disadvantage :
-Large “upfront” costs
-Proprietary replacement technology
-New electrical infrastructure
-Limited lamp life, depending on design
-EMI / RF issues and ozone release
-Expensive High Voltage replacement components
-Expensive maintenance costs
- Light Pollution, ground effects

Light Emitting Diodes

Advantages

- **Lowest cost of ownership**
- Plug and play with existing 120V / red light infrastructure
- Solid State, extremely robust and reliable, impervious to shock/vibration.
- Extremely energy efficient. “48 Watt L-864”
- Precision optics. Quiet that grumpy neighbor !
- Little EMI / RFI issues
- Very Robust against damage from surge/lighting – See test data
- Eliminates high voltage issues and service danger

Disadvantages

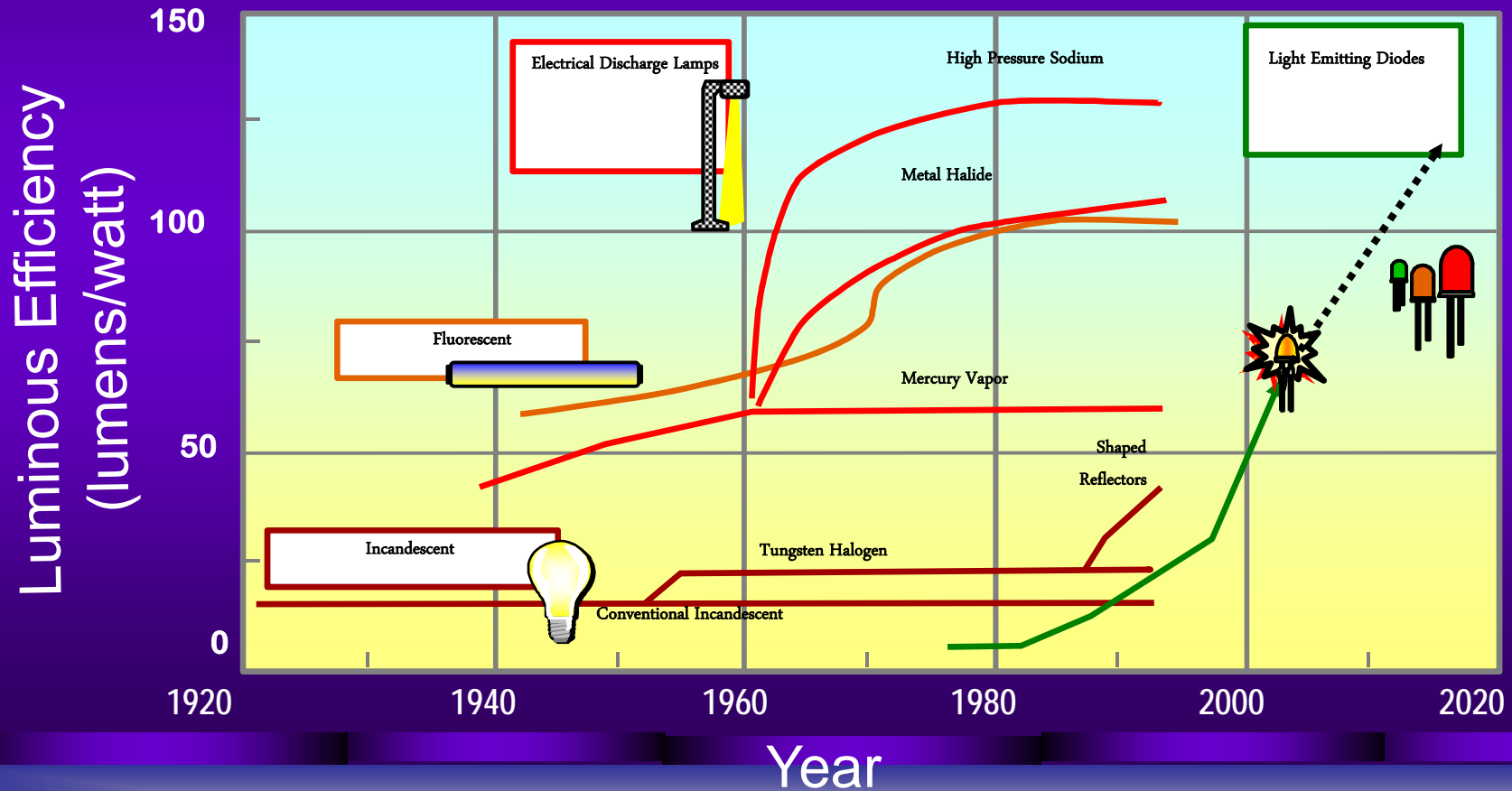
- Initially higher cost
- Self contained Flash Head (dual only)
- No high Intensity..... **YET!!!**

LED History

Development timeline

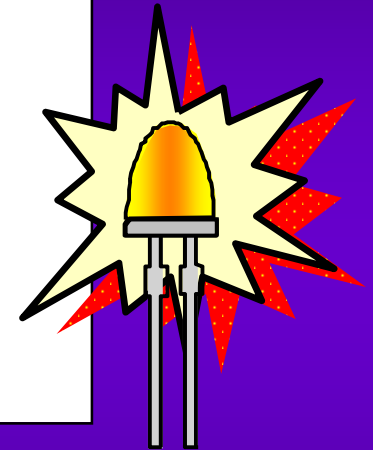
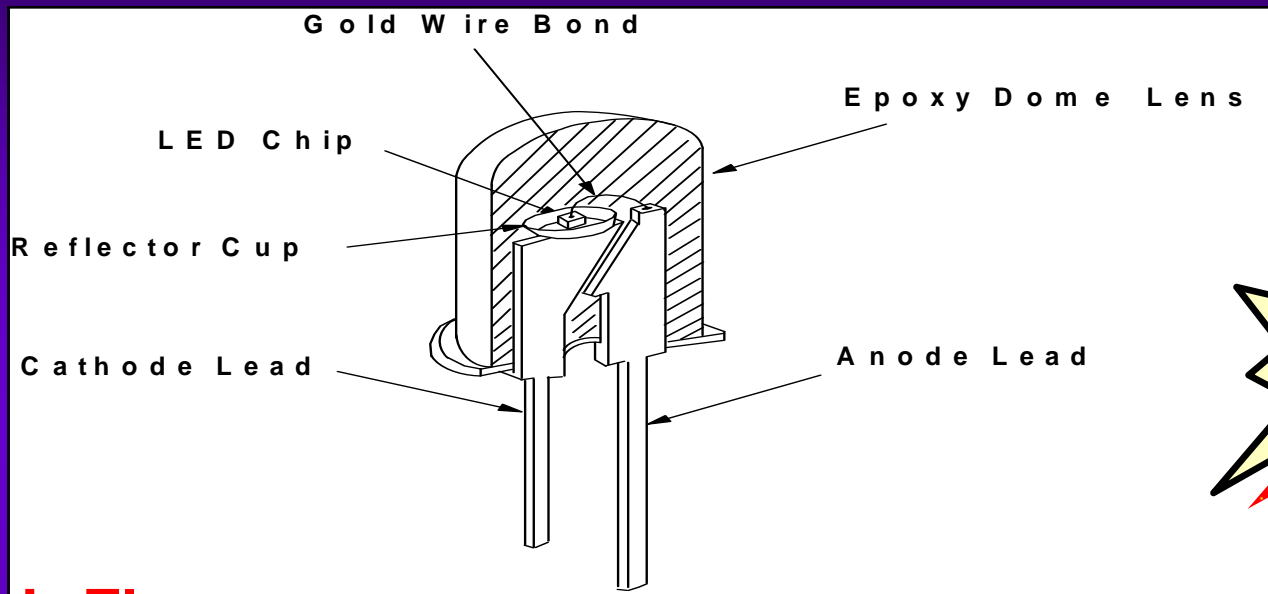
- 60's & 70's calculators and watches
- 80's: Interior uses such as panels, PC's
- 90's: Traffic Intersections & Brake lights
- 2000 Obstruction, railroad, aircraft,
- 2005 - UL, Class 1 Div 2 area white lighting
- Today and beyond: General illumination!

A revolution in lighting...LED's

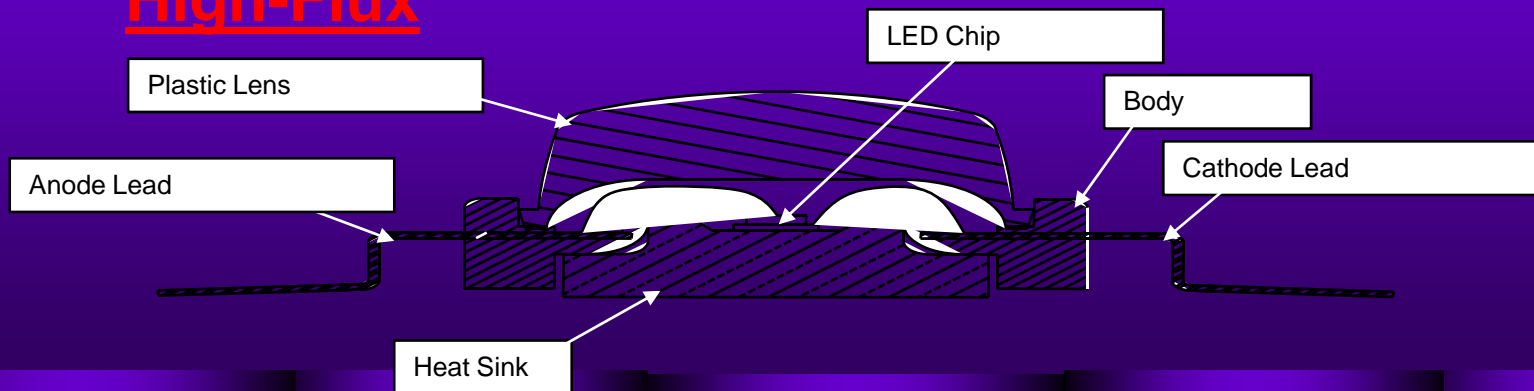


All LEDs are not the Same

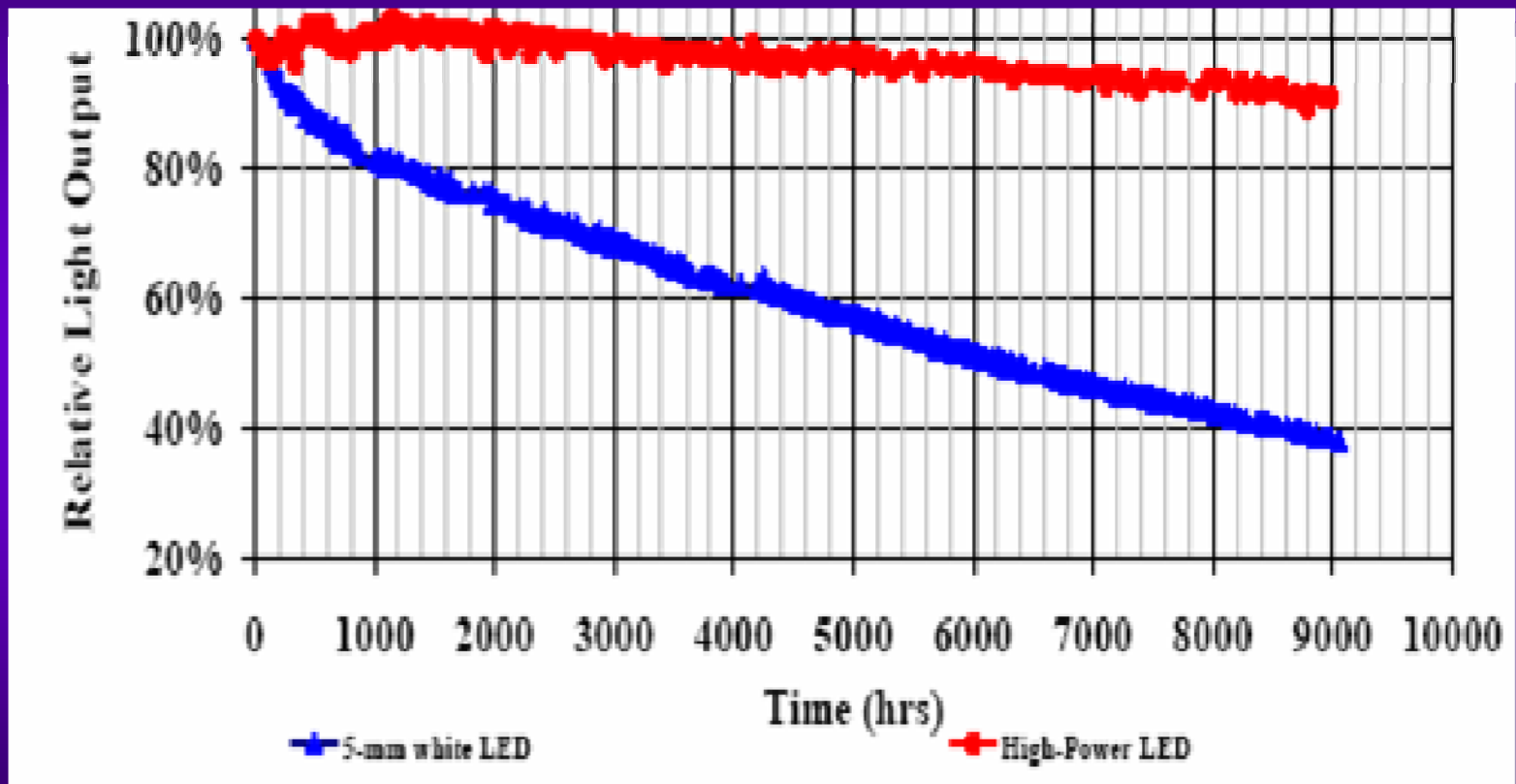
5mm



High-Flux



5mm vs. High Flux performance Comparison

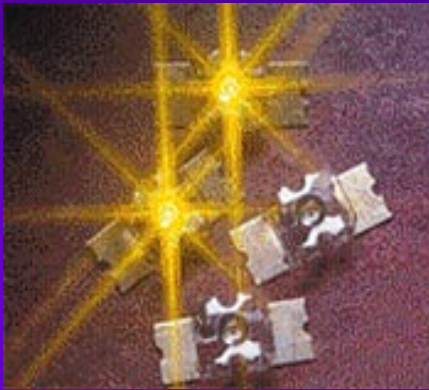


The Wild, Wild West

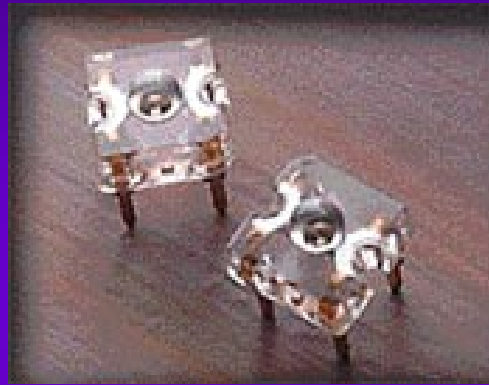
- Be Careful ! Before you purchase an LED you must understand the manufacturer or source
- Currently, LED's of various Bin grades & qualities are available to anyone, and are being designed into products on generalities of information
- Currently, just about anyone with a pole barn and a soldering iron is now classifying themselves as an "LED design house"
- LED Bin grade and quality are essential
- Thermally managing the LED and proper drive currents are paramount
- Verify FAA or other industry or 3rd party testing and certification documentation

Use the Right Technology for the right job!

SnapLED



Through-Hole



Surface Mount



High Flux Surface Mount Technology



Ultimate Solution: Responsible Designs and Manufacturer Warranties

Manufacturers must take the lead to ensure that their products meet the industry minimum operational and intensity requirements at the end of the product's warranty period!



Customers must ensure they receive this in writing.

Minimum Maintenance Procedures

- All technologies
 - Clean exterior optical portions of fixture
 - Inspect and verify controller failure modes by creating a fault
 - Inspect conduit & wiring for degraded connections
- Incandescent
 - Ensure minimum of 120 VAC at lamp
 - Change lamps regularly (at least 12 – 18 mos.)
 - Inspect Gaskets & Seals around Fresnel lenses
- Strobe Tube
 - Inspect high voltage controller capacitors and trigger cards
 - Inspect fixture wiring and terminals for corrosion (Ozone)
 - Re-lamp tubes per manufactures warranty (2-3 years)
- LED
 - Re-lamp and install new gasket and/or power supply every 10-12 years

Making the transition.....

- Going from a light bulb to a “LED Source”
 - Generally, a single LED cannot replace a single light bulb
 - A “Light Engine” is required
 - Multiple LED’s performing as single light source
 - Optics designed for L.E.D. “light engine”
 - Removal of the need for “filters” as L.E.D’s are monochromatic
 - 70% to 90% instant energy savings

LED's and the current industry Status

- To date, Dialight has shipped over 80,000 L-810 sidelights world wide since 1999
- Nearly 10,000 L-864 beacons installed world wide since 2000 (3 generations)
- Nearly 200 medium intensity duals since 2007 (nearly 200 in our back-log for shipment prior to Q2 '09)
- Pricing has rapidly decreased, ROI's are within 36 months and LED's are poised for continuous growth and replacement of older technologies
- Every major tower owner operator in the U.S. is either currently evaluating LED's on their sites at this time or implementing swap out or retro-fit programs



Questions??

Dialight Corp

1501 Route 34 South
Farmingdale, NJ 07727
732 -919-3119
www.dialight.com



Thad Fink

813-643-6791
tfink@dialight.com