

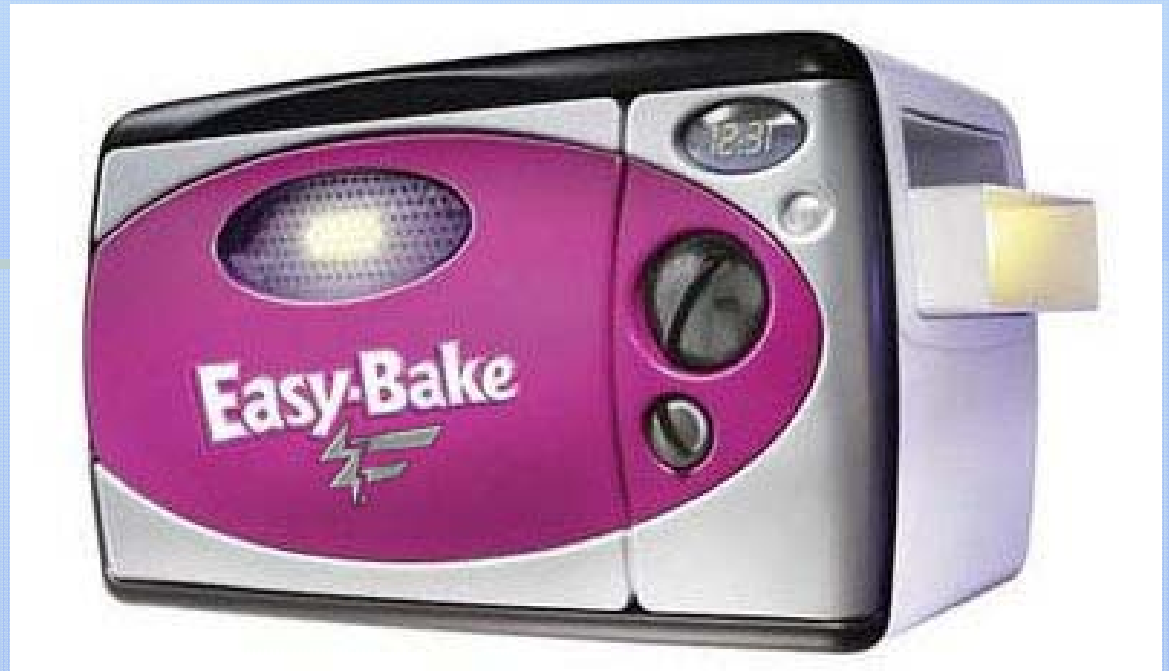
The Death of the Light Bulb



- The light bulb has changed very little over the years.
- Just how old is this bulb? **Any one**
- They are not very energy efficient either
- The higher the wattage more efficient

The Simple Facts

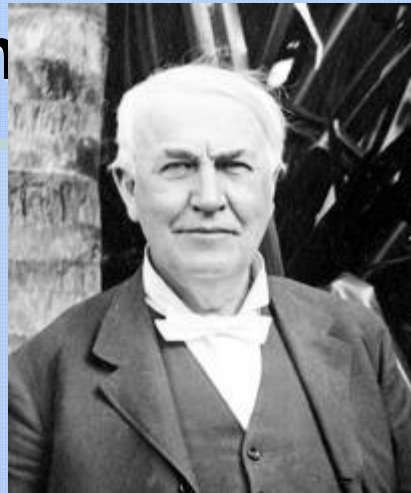
- **These lamps normally put out more heat than light**



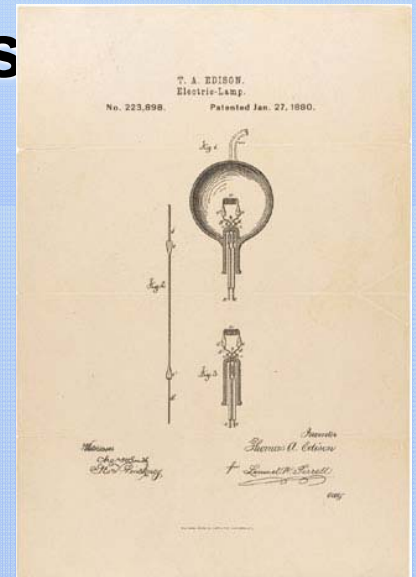
Thomas Edison

- Edison stated

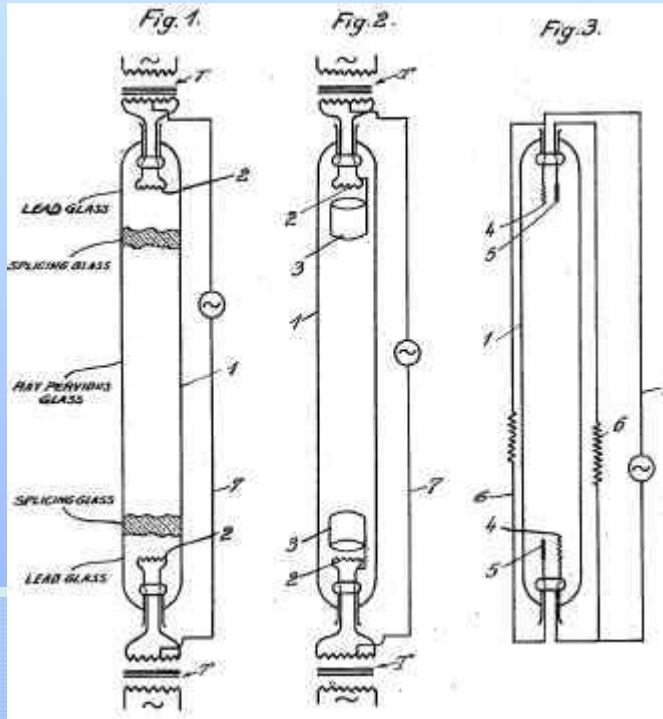
"Genius is one percent inspiration and ninety-nine percent perspiration"



- One of the things I admire most about him is he tested over 6000 different Filaments



Fluorescent



**Any guess as how old
fluorescents are?**

Fluorescent



**Any guess as how old
CFL are?**

Better Lumen Output Per Watt... But...

How they stack up

A compact fluorescent bulb activates phosphor to produce light. A phosphor coating inside the lamp gives off light when it is exposed to ultraviolet radiation. The bulb doesn't use heat to create light, which makes it more energy efficient.

Regular (incandescent) bulbs produce light by heating a filament inside the bulb. Electric current passes through the filament, heating it to the point that it becomes white-hot and emits light. Most of the electric energy incandescent bulbs use is converted into heat.



COMPACT FLUORESCENT
(23 watt)

Average life:
10,000 hours

Cost:
\$11

Comparable lighting:
1,500 lumens

THREE-YEAR COST COMPARISON

Electricity cost*: \$8.06

Bulb cost: \$11
(1 bulb for 6.8 years)

Total cost: \$19.06

INCANDESCENT
(100 watt)

750 hours

75 cents

1,690 lumens

\$35.04

\$4.50
(6 bulbs for three years)

\$39.54



*At 8 cents/kilowatt-hour, four hours burned per day



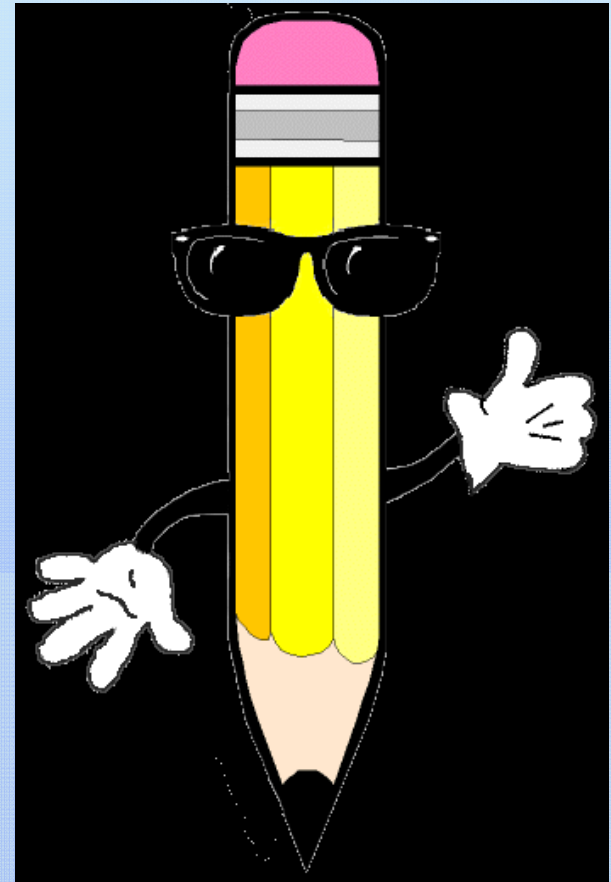
LED

- **CPP was first introduced to LED back in 2006**



Case Study #1

- **Central Pacific Plaza down town**
- **Hallway Lighting Project**
- **Does it Pencil?**
- **Green points**



Does it Pencil

- **Over 300 fixture**
- **2 X 26 Watt (*BIAX*)**
- ***52 X 300 = 15,600***
- ***Per hour***
- ***X .29KWH = \$45.24***
- ***15 hours a day***
- ***\$678.60 per day***
- ***For hallway lighting***



The LED Replacement

- LED is only 15 Watts
- $15 \times 300 = 4,500$
- *Per hour*
- $\times .29\text{KWH} = \$13.05$
- *15 hours a day*
- $\$195.75$ per day
- 2 X 26 Watt (*BIAX*)
- $52 \times 300 = 15,600$
- *Per hour*
- $\times .29\text{KWH} = \$45.24$
- *15 hours a day*
- $\$678.60$ per day
- *Less the \$195.75*
- *Savings of \$482.85 per day*

2006

- CPP introduced to LED
- Year KWH Saved
- 2004 **498,800 KWhrs** (chiller plant)
- 2005 **421,200 KWhrs** (AHU upgrade)
- 2006 **580,000 KWhrs** LED Lighting
- 2007 **577,600 KWhrs** LED Lighting and exit lights
- 2008 **926,200 KWhrs** Super T8s LED Xmas lights
- 2009 **1,204,000 KWhrs** Super T8s & LED upgrades
- 2010 **1,397,600 KWhrs** Roof coating tinting lighting

LED Exit Signs



- **Led Exit Signs**
- **50,000 hrs.**
- **Low wattage**
- **Little or no maintenance**

Linear T8s

- Early problems
- Lamp Costs were high
- “Driver” problems
- We continue to use & bench test many linear LED products

Linear Lamps



Screw Ins

- Large variety now available
- Sometimes confusing
- Many applications
- New products/applications nearly weekly

Brings me back to 1965



Its an Exciting Time in Lighting

- **Historic advances in lighting**
- **New milestones everyday**
- **More lumen output-less wattage**
- **Look forward to new and exciting growth in the industry**

Lumens Per Watt

- **2002** **18-22** **Lumileds**
- **2003** **65** **CREE**
- **2006** **131** **CREE**
- **2007** **135** **Seoul Semiconductor**
- **2008** **145** **Seoul Semiconductor**
- **2009** **150** **Nichia**
- **2010** **208** **CREE**

OLED



Not all LED are the same



- **LED lamps are not always identical**
- **Know your supplier**
- **Ask about a warranty**
- **Do the Math!**
- **Ask Questions!**