



Power Tips:

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Heavy Duty Lighting Application

Automotive lighting has a long history starting with coach lamps affixed to the front of the horseless carriages in the late 19th century and then progressing to using Thomas Edison's lightbulb in the early 20's and we've been using them ever since. Coincidentally, in 1920's the light emitting diode was invented. It was immediately forgotten until 1972 when a scientist developed an LED with enough output to be useful.

How do you decide whether to use incandescent or LED and where? There are applications such as 'forward lighting', 'marker lights', 'utility lights', 'safety lighting', 'fog lights', 'stop lights', 'work lights', 'tail lights', 'courtesy lights' and it goes on and on. How important is wattage, lumens(candle power), amps, volts, joules, etc? What are fresnel, trapezoid, flood, reflectorized, and other lenses and why use them? Can you use purple colored lights? What about flashing red or blue?

First how does the incandescent bulb work? Well in plain and simple terms it's a piece of wire that glows white when current is applied. It doesn't 'burn up' because it is in a vacuum. The difference between regular incandescent and halogen is that there is no halogen gas in the bulb and the glass is regular glass. In a regular bulb the tungsten evaporates off of the filament over time causing premature failure. In a halogen bulb the gas causes the tungsten to be 'reapplied' to the filament as it evaporates and condenses through heating and cooling. This process allows for more current to be applied which gives off more heat. Regular glass cannot withstand this heat consequently the halogen 'capsules' use a quartz glass. The downside of the quartz halogen bulb is the amount of heat given off(which is why you should never touch a halogen bulb, the oil in your hands will cause enough of a temperature variance to prematurely kill the bulb)

By virtue of how the LED works it uses less current and doesn't give off any perceptible heat. It is a diode so it is polarity dependent, that is you can't hook it up backwards, it won't work. In addition LED's draw very small current and require resistors to work in a 12 volt system. Generally they must be used in an 'array' to produce enough usable light and meet the photometric(light output and dispersion) requirements of the DOT. The downside of LED's is that they are 'directional' they don't emit light in all directions. This refers to what is known as the 'angularity' of the led. If the LED's are all facing forward there will be no light output to the sides.

This presents a problem for certain applications. In auto tail lights for example quite often the tail light is also the side marker light. If a typical 3157 LED is placed in this application there will be no side marker light due to the 'angularity' of the LEDs.

How do you tell which light to use where? Well, the USDOT uses the Federal Motor Vehicle Safety Standards to determine this, specifically FMVSS108(<http://www.nhtsa.dot.gov/cars/rules/import/FMVSS/>). This details whether you can use purple lights facing forward (you can't) and whether you can shine fog lights backward (you can't). This will tell you when you can use reflectorize tail lights or not (vehicles 80" less in width). What this doesn't tell you is whether to use LED's , incandescent, or halogen.

There are several issues to consider when you choose what kind of lighting to use on a vehicle. Where the light is mounted, how much the initial cost is, what is the service life, how long is the vehicle to be kept in the fleet, how long will they burn, etc. For the foreseeable future forward lighting will continue to be halogen due to the amount of light output. If you have several vehicles in your fleet uniform lighting becomes very attractive because it lowers your operating costs. You know that every tail light in your fleet is going to be the LED40R for example. If you use all LED's for your non-forward lighting you have several advantages including less replacement, less wear and tear on your electrical system, and better fuel mileage(yes that's correct). With LED stop lights you also increase safety due to the fact that they actuate much sooner, giving the following vehicle more notice.

So really as technology improves the rule will be LED lights and the exception incandescent.