



# CONSIDER THE TOTAL COST OF OWNERSHIP WHEN CHOOSING AIRCRAFT LIGHTING

Keeping a close watch on expenses continues to be an important driver for the aviation industry. In our current economic environment, aircraft maintenance is moving to the forefront as operators look to reduce costs across the board and ensure the maximum return on every investment.

When it comes to aircraft lighting, beyond the initial price of any aircraft lamp, an important consideration in evaluating its value is the total cost of ownership over the lamp's useful lifetime. This includes not only the initial price of the lamp itself, but also the cost of maintenance labor hours when it needs to be replaced, as well as the lost revenue from flight delays or the plane's downtime. This can vary from a couple of hours to days, depending on the type of plane and the type of lamp and creates a huge expense just to change out a light. Because lamps that fail more frequently can run up these unexpected expenses, it makes economic sense to look for lamps that deliver the most in terms of performance and longevity.

## Four Types of Lamps Commonly Used for External Aircraft Lighting

- 1. Incandescent lamps** contain a tungsten filament enclosed within an evacuated glass bulb, and are used for landing, taxi and identification lighting. While incandescent lamps may still be used by private pilots or in military aircraft, they don't offer the longevity that halogen or LED lights offer and do not maintain optimum candela or light output as well as the other types. The low cost of these lamps (while attractive) needs to be balanced against the need for more frequent lamp changes and the cost involved in doing so. The labor cost to change one lamp could run up to \$100 an hour, not to mention the cost of a plane's downtime with pilots, crew and potential delays figured in.
- 2. Halogen lamps** can be used for almost all of an aircraft's exterior lighting, including landing lights, taxi lights, tail lights and logo lights. These lamps consist of a tungsten filament sealed into a compact, transparent envelope filled with a mixture of an inert gas and a small amount of a halogen, such as iodine or bromine. Halogens currently are the most widely used lamps for commercial aircraft, as well as for business and general aviation, because of their proven cost-effectiveness, durability and reliability in terms of candela output and their long life. Halogen lamps can deliver up to, if not more than, 100 hours of lamp life, which reduces operating costs overall. Fewer lamp changes mean more flight hours and a large cost savings. Another advantage is that most of these lamps include all necessary FAA approvals, are listed in the aircraft illustrated parts catalog (IPC), and are readily available from the original equipment manufacturer (OEM).

- 3. Xenon flashlamps**, a standard in the market, are used primarily for wing tip and other identification lighting and may be the strobes or flashing lights on aircraft wing tips and tails. They produce light by passing electricity through ionized xenon gas at high pressure and are used on both older and newer types of aircraft. The life of the xenon lamp depends on the number of flashes emitted. They typically last for between five and ten million flashes, depending on the usage of the plane. Their costs are in range with halogen lamps, and xenon flashlamps also are available through OEM parts catalogs. However, not all xenon flashlamps are manufactured the same way. Be sure to check that the manufacturing process of the lamp is strictly controlled to ensure there is no exposure to moisture and foreign elements and that they are produced in clean room-like environments.
- 4. LED lamps** are light emitting diodes, a solid-state light source that emits light when an electric current passes through them. Leading aircraft manufacturers, including Boeing and Airbus, are integrating these types of lamps into their new designs for all internal and external aircraft lighting because they last virtually forever.

## Important Considerations: Choosing the Appropriate Lamp

Of course, in choosing lamps for any type of aircraft, all products should meet or exceed the standards set by the American National Standards Institute (ANSI), the FAA and/or are manufactured by an OEM and are approved for use by those organizations. Using other, possibly substandard lamps, can be dangerous because it may limit the pilot's visibility on the ground and the plane's visibility in the air, which can result in huge legal and other liabilities. Lamps from qualified manufacturers are carefully tested in a range of environments and in all aircraft applications to ensure their performance, durability and longevity. Choosing the appropriate type of lamp for external lighting not only contributes to reducing maintenance costs and ensuring the maximum return on your investment, more importantly, it can ensure the safety of the pilot, crew and passengers.

## Reasons to Consider Halogen Lights: A Long-Lasting Alternative to LEDs

Even in the age of LEDs, halogen landing and taxi lights shine. Although many new aircraft come standard with LEDs, halogen remains more cost-effective for older planes for several reasons. One reason is the enduring popularity of halogen as most existing aircraft were manufactured before the introduction of LEDs. When you consider that the average lifespan of an aircraft is 20 years, it's no surprise that halogen lamps are a fixture on 90% of existing aircraft. In addition, some airlines refurbish aircraft to extend the life of their fleet, making it likely that halogen lamps will be around for years to come.

Here are four reasons why halogen parabolic aluminized reflector (PAR) lamps make an excellent, cost-effective alternative to expensive LED lights:

### 1. Halogen is cost-effective for existing aircraft fleets that continue to dominate the skies

One LED style Q4559 taxi lamp can cost more than 50 times the cost of a halogen bulb. If replacing halogen lamps on a single aircraft is a substantial investment, consider the cost of installing LEDs for an entire fleet. For example, one major airline maintains approximately 1,300 aircraft. About 1,000 of these are Boeings and Airbuses that were manufactured when halogen lamps were the order of the day. Most of these aircraft still require two landing lights and two taxi lights, meaning that the cost of replacing halogen bulbs with LED lights would cost around \$1.2 million. With COVID-19 wreaking havoc on travel plans and federal relief held up by congressional gridlock, few airlines are able or willing to invest this kind of money in lighting.

### 2. Long life means less maintenance needed to change out bulbs, reducing downtime and delays

While halogen bulbs don't have the same longevity as LED lights, a halogen PAR landing light can last 100 to 300 hours, provided it is not damaged during landing or takeoff. A halogen taxi lamp can last even longer—up to 1,000 hours in many cases. An aircraft that locates its lights on the wing, behind a room temperature vulcanized silicone shield that must be unbolted and removed to access the lights, may require a full day to replace lighting, whereas an aircraft that places lights in easier to reach locations can be serviced in as little as an hour. Also keep in mind, that while LEDs should last longer, because of the harsh environment, fluctuating temperatures and constant shock and vibration, LED lamps, too can fail and then is another costly expense to either repair or replace.

### 3. Brightness and durability last throughout the life of the lamp

Well-made halogen lamps will maintain candela output (the measurement of illumination produced by an output beam) that exceeds industry standards. Halogen lamps can withstand countless takeoffs and landings thanks to advancements in the design of filaments and the light weight of lamps. However, it is worth noting not all halogen lamps are created equal. Some lower quality lamps produce less than half the industry-mandated candela output, which can increase the chance of collisions and other accidents. Poor visibility is also a common source of complaints from pilots tasked with providing a smooth flight—and safe landing—for their passengers.

### 4. Halogen is regularly available, and high-quality options are available from different manufacturers

When it comes time to replace the lights on their aircraft, airlines should make sure they purchase high quality halogen lamps from reputable manufacturers, follow instructions in the IPC and change gaskets according to the recommended manufacturer's schedule. To find a reputable manufacturer, airlines should consider the quality of the lab and procedures used for product testing, the quality of the materials used, whether the manufacturer adheres to all IPC requirements, and the availability of robust customer support.

## Summary

Finding a long-lasting, cost-effective lighting solution during lean economic times is vital because replacing lights can be a labor-intensive and time-consuming process. With COVID-19 disrupting travel plans, airlines must find cost-effective options for their taxi and landing lights. For existing aircraft, replacing lights with halogen bulbs provides a durable, economical alternative to LED lighting. In addition to better pricing, high quality halogen bulbs can reduce maintenance costs and lost revenue due to delayed flights. For airlines to thrive during tough times, halogen lamps offer a combination of efficiency, durability and affordability that is worth their continued popularity.

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