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Light Insight

By John Fogel

Leading aircraft manufacturers like Boeing are building LED lamps into their new designs for all external aircraft lighting because they last virtually forever.

This industry insider advises operators to consider the whole cost of ownership when choosing aircraft lighting.

MOST commercial airlines have seen an uptick in bookings over the 2020 holiday season but remain cautiously optimistic about rebounding to the full flights and revenues they reported prior to the COVID-19 pandemic. Keeping a close watch on expenses is key to maximizing operating efficiencies and continues to be an important driver for the 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 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 labour 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

Above: LED cabin lights, which can be programmed to shift in brightness, warmth, and colour throughout the flight, have become common on new planes.

At right: 1. A light-emitting diode(LED) is a semiconductor light source that emits light when current flows through it.

2. Halogen lamps produce a continuous spectrum of light, from near ultraviolet too deep into the infrared.

3. Incandescent bulbs are manufactured in a wide range of sizes, light output, and voltage ratings, from 1.5 volts to about 300 volts.

creates a huge expense just to change out a light. Because lamps that fail more frequently can run up these unexpected expenses (even though they may be offered at discount prices), it makes economic sense to look for lamps that deliver the most in terms of performance and longevity.

There are four types of lamps commonly used for external aircraft lighting—and for different reasons. Here is what to consider when evaluating which lamp is best for your operation:

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—due primarily to restrictive rules and regulations—they are rarely used in commercial fleets today, and for good reason. Incandescent lamps don't offer the longevity that halogen or LED lights offer and do not maintain

With powerful lamps in the forward landing gear and wing roots lighting the way, an Airbus 350 accelerates for takeoff.

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 labour cost to change one lamp could run up to $140 an hour, not to mention the cost of a plane's downtime with pilots, crew and fuel figured in.

2. HALOGEN LAMPS can be used for almost all of an aircraft's exterior lighting, including landing lights, taxi lights, taillights 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. Another advantage is that they have won all necessary regulatory approvals and are readily available from OEM (original equipment manufacturer) parts catalogues.

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 though ionized xenon gas at high pressure and are used on both

Xenon flashlamps are used primarily for wing tip and other identification lighting and may be the strobes or flashing lights on aircraft wing tips and tails.

The bright red light signals to all around that this is the left or port side.

Zenon circular flasthtube is an electric arc lamp that produces extremely intense, full spectrum white light with bands of UV-Visible-IR transmissions.

older and newer types of aircraft. The life of the xenon lamp depends on the number of flashes emitted. They typically last 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 catalogues. However, not all xenon flashlamps are manufactured the same. 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 semiconductor light source that emits light when an electric current passes through them. Leading aircraft manufacturers, including Boeing and Airbus, are building these types of lamps into their new designs for all external aircraft lighting because they last virtually forever. However, they may or may not fit into the lighting fixtures and housings of older aircraft. Often, they emit too much brightness on these planes, affecting visibility. For this reason and more, it's not likely many operators will retrofit their existing fleets with LED lighting, but they will be a big part of the future.

Of course, in choosing lamps for any type of aircraft, all products should meet or exceed the standards set by ANSI (American National Standards Institute), the FAA (Federal Aviation Administration) and/or are manufactured by an OEM and are approved for use by those organizations. Using other, possibly substandard lamps, can be dangerous by limiting 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. ■

(John Fogel, Halogen Product Manager at Amglo, has worked with the company for more than 10 years in product development, qualifying products with the FAA and building partnerships. For more information, visit **www.amglo.com**.*)*