

Solid State Lighting

At a Glance

What is it?

Solid-state lighting (SSL) refers to a type of illumination that uses light-emitting diodes as sources of illumination rather than electrical filaments, plasma, or gas.

How does it work?

LEDs emit visible light when at DC current is passed through them. Luminaires are designed to use numerous small, point-source LEDs in place of incandescent and fluorescent lamps to illuminate an area. Integral to the luminaire is a driver circuit which converts the AC power to a constant DC current .

What will it accomplish?

LED-based luminaires will provide considerable energy savings, especially when replacing incandescent fixtures or in colored lighting applications. Also, SSL luminaires will have an increased lifetime over an equivalent incandescent or fluorescent fixture, reducing maintenance.

Metrics

- Potential Fuel Savings: 500 bbls/Yr/DDG

Applications

- Surface Combatants
- Amphibious
- Auxiliary
- Submarines
- Carriers

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Description:

Solid state lighting is proving to be the successor to the fluorescent and incandescent based light fixtures currently used on US Navy vessels. Luminaires designed with Light Emitting Diodes have many advantages over traditional light sources.

Chief among the advantages is the promise of increased energy efficiency. Incandescent fixtures make up ~20% of the fixtures used on a vessel and commonly use 100W per fixture. Replacement fixtures using SSL technology have cut that power consumption down to under 25W. Greater power savings are seen in colored light applications, where traditional fixtures use lossy filter material.

Another advantage is an increased time between failures of an LED-based fixtures. LEDs are currently rated to achieve over 50,000 hours of life before needing to be replaced, compared to the 9,000 hours or fewer with fluorescent and incandescent fixtures.

The government is evaluating numerous at sea installations of prototype SSL fixtures to assess their effectiveness and determine any areas in their design that requires special attention. Lessons learned are being shared with industry leaders to develop better specifications and design practices to provide the fleet with the most energy efficient and cost effective solid state lighting solutions.

Research Challengers and Opportunities:

- Fouling release coating manufacturers recommend this type of coating be used on ships with higher operational tempos.
- Coating damage such as scratching or gouging reduces overall coating efficacy, especially the ability of the coating to release biofouling.
- Understanding triggers for hull maintenance of this coating type.