

Fresnel Lens Installed in Lighthouse Museum

A new Fresnel lens exhibit has been installed in the Keeper's House Museum at the Cape St. George Light.



The lens displayed in the Lighthouse Museum is a replica of the Third Order Fixed White Fresnel Lens that lighted the Cape St. George Light from 1857 to 1949.

The Fresnel lens was developed by French physicist Augustin-Jean Fresnel in 1822, and revolutionized the technique for transmitting light over long distances. The lens uses an assembly of prisms supported by a brass frame to reflect and refract (or bend) the light coming from a single lamp, and concentrates the light into parallel horizontal beams.

“Third Order” refers to the size of the lens, which determines the distance over which its beam is visible. First order lenses are the largest at more than eight feet tall, and are generally used in seacoast lighthouses, like St. Augustine or Cape Hatteras. Usually considered the smallest, the sixth order lens is only about 17 inches tall and is used in river or harbor lighthouses. Our third order lens sent out a beam visible for about 14 nautical miles, which is 16 statute miles.

“Fixed White” is the light characteristic of the lens. A fixed white lens emits a steady white light, and does not flash. When the

Fresnel lens at Cape St. George was removed in 1949, the light characteristic was changed from fixed to flashing. The current Vega LED optic maintains the latter characteristic, and emits a one-second flash every six seconds.

The 1833 lighthouse, built by sea-captain-turned-lighthouse-contractor Winslow Lewis, was most likely lighted by a candelabra arrangement of 13 or more whale oil Lewis Lamps, which Winslow Lewis patented in 1810. Because

Lewis had a contract with the U.S. government to supply lamps for all U.S. lighthouses, the superior Fresnel lens technology was slow to be adopted in this country. Although a Fresnel lens was a large initial investment, the cost savings for fueling a single lamp instead of 13 was significant.

The replica Fresnel lens displayed in the museum contains 149 individual prisms set into the brass framework. The prisms are made of acrylic rather than glass, because acrylic has a better light transmission percentage than glass, and is lighter in weight and much less expensive than glass. The prisms are tinted green to match those in historic Fresnel lenses.

Dan Spinella of Artworks Florida in Celebration, Florida built the lens using CAD drawings and computer models based on Augustin Fresnel's original formulas. The brass frames are waterjet cut, then sanded and polished. The prisms are individually set and glazed into the framework.

The lamp displayed in the Lens Exhibit is a reproduction Moderator Lamp, which would have been used starting around 1860. This specific lamp design was developed in 1883 by Joseph Funck, who worked for the Lighthouse Service. Lampists were always seeking to invent a brighter and cleaner light to use with Fresnel lenses, so that lighthouse keepers could spend less time cleaning soot off the prisms. The replica lamp in the exhibit was handcrafted by Kurt Fosburg of Superior Lighthouse Restoration, LLC in Michigan.

Posted by Kemp Terry - Thursday, 04/14/16, 10:46 AM