

WESTERN ARCHEOLOGICAL AND CONSERVATION CENTER

Museum Collections Repository, Conservation Laboratory
1415 N. 6th Ave., Tucson, AZ 85705

Conservation Examination Report and Treatment Proposal

Point Pinos Fresnel Lens

Type:	3 rd Order Fixed Lens
Manufacturer:	M.M. Henry Lepaute Co.
Date of Manufacture:	Pre-1854
Date of Installation:	Lit February 1, 1855
Place of Manufacture:	Rue L'Monore, N247, A. Paris
Dimensions:	Inner diameter: 1 meter Height of Glass: 1.56 meters Height of Frame: 2.18 meters DIAM: 1.07 meters
Number of Prisms:	96 (originally)
Number of Panels:	8 (4 dioptric, 4 upper catadioptric)
Light Source:	1000W mogul bi-post lamps on CG2P lampchanger
Date of Inspection:	August 24-25, 2001
Inspected By:	Nicholus Johnston, Lampist, USCG Active Gretchen Voeks, Conservator, NPS-WACC

Description:

The Point Pinos lighthouse was completed in 1854. However, it was not lit until February 1, 1855 when the 3rd Order Lepaute lens originally intended for the Fort Point lighthouse was installed.

This 3rd Order Fresnel lens is constructed of eight bronze panels mounted in a steel and bronze frame. Four lower dioptric panels hold 13 prisms each. Four upper catadioptric panels hold 11 prisms each. The lens was constructed to hold a total of 96 prisms.

The four lower panels are numbered in a typical pattern for Fresnel lenses of this period and manufacture. The four upper panels are un-numbered. This is highly unusual. It is possible that the upper panels are not original. The panels may be original and simply not marked but this is unlikely.

No doors were fitted for this lens.

The lens is mounted on a cast iron pedestal.

The original lighting was an Argand-style two-wick lamp. The lighting equipment has undergone changes over the years and is now a General Electric/Sylvania 1000W Mogul bi-post lamp mounted on a CG2P lampchanger. The lampchanger is mounted on an aluminum post that is bolted to the pedestal.

Condition:

On April 18th, 1906 the lens was shaken and severely damaged by a violent earthquake. The lens was removed and sent back to France for repairs. French repairmen may have determined that the upper panels were too severely damaged to be replaced, and used panels from another lens. It is also possible that the upper panels are numbered under their bases and that these numbers are not visible when the lens frame is assembled. The lens was returned to Pt. Pinos and back in operation on August 18, 1906. No record of the exact damage or type of repairs was examined during this inspection.

The lens was again removed from the lantern room in 1994 for extensive cleaning. USCG CWO Craig D. Bitler removed the lens, with the assistance of Pt. Pinos docents and volunteers. Records of the treatment methodology are not on file.

The overall condition of the lens is stable. It has not been assembled correctly. The lamp is not focused because it sits too low in the lens.

Bronze: The frame is warped. Warping probably occurred during the 1906 earthquake. Two lower panels have been assembled incorrectly and may be better aligned if re-assembled in their proper order. The numbering system on the base of these panels indicates order.

The surface of the bronze is painted with a bronze paint, which is slightly soluble in acetone. There are indications that the surface was mechanically stripped of corrosion using wire brushes, wire wheels or similar tools before paint was applied. No corrosion is currently visible.

The brass identification or nameplate has been polished. Some wear is visible on the plate. Routine polishing can slowly wear the surface of the brass down and make the inscription unreadable.

Prisms: Many prisms are chipped and some are broken. Prism number 6 from the un-numbered panel above panel 1-2 is missing. Some of this damage has been caused by seismic activity. In particular the dioptric panels exhibit these patterns. The upper catadioptric prisms do not exhibit this type of damage, which lends further evidence to the theory that the upper panels were replaced after the 1906 earthquake.

Prisms in the upper panels exhibit patterns consistent with tool damage. This occurs when metallic objects are dropped or inadvertently graze the edges of the glass. Tools, exposed jewelry or belt buckles may cause this type of damage. It should be noted that the glass used to form these prisms is extremely fragile and brittle, and will chip and shatter easily.

Damage from a .22 caliber bullet or smaller is visible on the interior of the lens panels. Small round chips with tiny cracks radiating from them appear to have lead residues remaining in the cracks. Prisms in panels number 4-5 and the panel above 1-2 both exhibit this damage. It is likely that the lens was disassembled after the vandalism occurred. These two panels should be in alignment.

No original litharge remains in the joins between prisms and the frame in panel 2-3. Most prism joins have a combination of original litharge, an unevenly applied white glazing putty, which is possibly DAP 33, and several other minor areas of an unknown adhesive repair. Panel 2-3 has no original litharge, some areas of the DAP 33-like material and some minor areas of an unknown dark clear adhesive. It is likely that this panel has been completely disassembled with prisms removed at some time.

Repairs have been made to broken and cracked prisms using a clear adhesive that is slowly yellowing and embrittling. This is particularly obvious on prism 1, panel 3-4, and three broken prisms on panel 2-3. The adhesive type is unknown but it is soluble in acetone, which may indicate a cellulose nitrate formula, similar to DUCCO adhesives. Eventually this adhesive will turn a dark yellow, and some of it may spall from the surface but it will not affect the stability or effectiveness of the lens.

Docents report that Windex was used to wash the lens after birds entered the lantern room and left droppings.

Recommendations:

Because the lens is generally stable despite the damage that has occurred to it, no extensive conservation treatment is required at this time. However, it is important that the lens be dismantled and reassembled in its correct configuration to avoid further warping which could eventually dislodge glass prisms. To ensure that panels are seated properly, and that damaged prisms are kept intact and not dislodged, an experienced lampist should conduct the dismantling and reassembly. During this procedure the lampist will inspect the painted frame to ensure paint thickness is not interfering with the seating of the lens panels. If it is, the frame will need to be stripped and repainted to the appropriate mill specification. After the lens has been re-assembled, the lampist will focus the lens.

The name plate should be left to naturally oxidize brown. It can be included in routine maintenance but should not be polished because this lens is not an exhibit. Polish the name plate one more time to remove all traces of fingerprints and other dirt. Then leave to oxidize. Do not touch the plate after this final polishing operation has been completed because fingerprints will be visible in the oxidation.

The bronze and steel surfaces appear stable beneath the paint layer. The paint on bronze surfaces should not be removed unless a total rehabilitation of the lens is planned. The only reason to do this would be an attempt to improve the appearance of the lens and because the lamp room is not open to visitors the improvements are unnecessary at this time. It is questionable whether or not the appearance would in fact be improved due to previous mechanical cleaning which may have created metal tool marks on the surface of the bronze. If, in the future, a full conservation project is desirable because of visitor accessibility and a need to improve the appearance, a lampist and conservator should be contracted by the museum to ensure appropriate procedures for dismantling and treating the lens. A section of paint must be removed by the conservator to determine the feasibility of improving appearance. It is important that the methodology and materials used in this process do not damage the existing materials and that treatment is reversible in the future if necessary.

The current manufacturer of the 1000W lamps has ceased production and supply is limited. If the City of Pacific Grove does assume full responsibility for the lens they should contact Robert Browning of the USCG Aids to Navigation, Washington, DC, to find out what the intended replacement for these lamps is.

Maintenance

The regular maintenance of the Pt. Pinos lens is important to the long-term preservation of this important bronze and glass structure. Regular, light cleaning will ensure that corrosion and further damage are minimized.

Whenever maintenance procedures are carried out the lamps must be covered with a soft cotton cloth to protect them from bare skin. Oils from the skin will greatly decrease the lamp lifespan and may cause the lamp to explode resulting in severe damage to the lens prisms.

When cleaning windows in the lantern, the cleaning agent should be sprayed onto a cloth before wiping glass surfaces. This will ensure no spray is carried to the surface of the lens. Windex may be used on windows, but never on the lens because it is corrosive to bronze.

Every two to three weeks the lens should be brushed down with a soft natural bristle brush on a long handle, or a piece of white linen, to remove dust and dirt.

This procedure should be carried out on a sunny day after moisture has evaporated from the surface.

The following procedures should be carried out every three months.

1. Remove all metallic jewelry, watches and belt-buckles before cleaning. Avoid metal buttons. Avoid long loose sleeves, which can be snagged on sharp, chipped or broken areas of glass.
2. Mix four drops of Triton x 100 non-ionic detergent into one gallon of distilled water. Use an eyedropper to remove the highly concentrated detergent from the bottle. Use a wooden paint stick to thoroughly mix the detergent and water. Use a clean bucket.
3. Immerse a square of white, high quality painter's rag in the solution, and wring until the cloth is just damp. Gently wipe the cloth over the glass and bronze in sections, to remove dirt, dust and debris. Wet a clean square of painter's rag in distilled water and gently wipe over the area to remove detergent residue. Immediately wipe down with a dry square of clean painter's cloth. This process ensures the lens is cleaned gently, the chemical composition of the detergent will not damage the bronze or glass, water is not left on the surface to attract more dust and pollutants, and streaking is minimized. Never use cleaning agents containing ammonia as these may encourage corrosion of the bronze elements. Never use solvents such as acetone to clean because the painted surface of the bronze is slightly soluble in acetone. Alternative non-ionic detergents may be used but the dilution ratio will differ from that given above.
4. Bird droppings should be removed immediately to avoid corrosive damage to the bronze and the paint. If they cannot be removed using the above solution, the detergent and distilled water ratio can be increased up to 20 drops per gallon. If this is insufficient, rubbing alcohol should be used.
5. If streaking occurs on the glass prisms, this can be removed using a square of white linen or newspaper. Crumple a small section of newspaper and gently rub the surface wherever streaks are visible. Note: Use only black printed newspaper. Colored newsprint may not remove streaks.
6. Inspect the prisms while cleaning to ensure they are not becoming loose. The prisms in the Pt. Pinos lens should not easily become dislodged. However, in time the caulk material may suffer further chemical deterioration and prisms may loosen. Never apply pressure to a prism as it may become dislodged and loose, requiring repair. Damaged prisms may break easily. The glass used in Fresnel lenses is very brittle and easily chipped or broken.

Conduct an annual inspection noting changes in the appearance of the painted surface and any additional damage to the glass prisms. Docents have created thorough and very useful records of the care and treatment of lighthouse objects. Records pertaining to regular maintenance for the lens should be included.