

A Study on Lighthouse

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Abstract: The project report is about its history, technology, construction, maintenance, preservation. A light house is a tower structure consisting of lamp which is used for navigation of sailors, people at the banks of river .The light house warns sailors before the ships hit at the banks of river.



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I.INTRODUCTION

A lighthouse is a high tower equipped with a brilliant light and lens that help guide ships to port at night and alert sailors about sandbars, reefs, rocky coast lines. Lighthouses are built to resist the impact of powerful swells, tides, and hurricane-force winds. They are generally erected slightly above sea level and near the shoreline. Modern lighthouses use automated, high-intensity lights that emit brief and unidirectional flashes and coded aids to navigation (color, period, and phase). Lighthouses offer 360-degree views of the surrounding area, allowing visitors to spot long-distance landmarks or neighbor villages, towns, and cities.

1.1 HISTORY:

According to historians, the world's first lighthouse was built between 284-246 BC in Egypt and finished by the pharaoh of Ptolemaic Egypt, Ptolemy II Philadelphus. The Lighthouse of Alexandria, also known as the Pharos of Alexandria, was 330-foot tall and featured an inscription dedicated to Zeus, the god of the sky and thunder, on the seaward-facing side. The Pharos of Alexandria suffered several damages after the earthquakes of 796, 951, 956, 1303, and 1323.



Fig; lighthouse of Alexandria

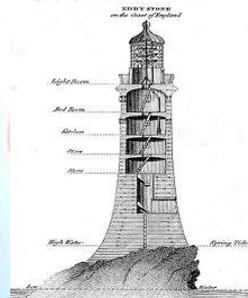
It was one of the Seven Wonders of the Ancient World for a long time, but by the end of the 14th century, it was already destroyed. Before the construction of the Lighthouse of Alexandria, people used to light bonfires to alert approaching ships of hazardous coastlines. Later, men and women started erecting small-sized stone towers on top of which they would light a fire. In some cases, they installed a bell that would ring with the flow of the wind.

First lighthouse built there was an octagonal wooden structure, anchored by 12 iron stanchions secured in the rock, and was built by Henry Winstanley from 1696 to 1698. His lighthouse was the first tower in world to have been fully exposed to the open sea.



Fig; Henry Winstanleys light house

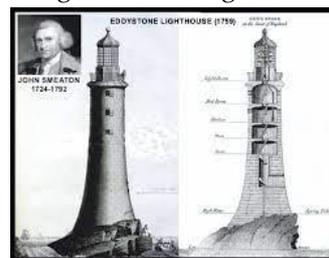
The civil engineer, John Smeaton, rebuilt the lighthouse from 1756–59. His tower marked a major step forward in the design of lighthouses and remained in use until 1877. He modeled the shape of his lighthouse on that of an oak tree, using granite blocks. He rediscovered and used "hydraulic lime", a form of concrete that will set under water used by the Romans, and developed a technique of securing the granite blocks together using dovetail joints and marble dowels.



Fig; john smeatons light house

The dovetailing feature served to improve the structural stability, although Smeaton also had to taper the thickness of the tower towards the top, for which he curved the tower inwards on a gentle gradient. This profile had the added advantage of allowing some of the energy of the waves to dissipate on impact with the walls. His lighthouse was the prototype for the modern lighthouse and influenced all subsequent engineers.

John Smeaton's rebuilt version of the Eddystone Lighthouse, 1759. This represented a great step forward in lighthouse design. One such influence was Robert Stevenson, himself a seminal figure in the development of lighthouse design and construction.



Fig; john smeatons rebuilt version of eddy stone

His greatest achievement was the construction of the Bell Rock Lighthouse in 1810, one of the most impressive feats of engineering of the age. This structure was based upon Smeaton's design, but with several improved features, such as the incorporation of rotating lights, alternating between red and white.

It worked for the Northern Lighthouse Board for nearly fifty years during which time he designed and oversaw the construction and later improvement of numerous lighthouses. He innovated in the choice of light sources, mountings, reflector design, the use of Fresnel lenses, and in rotation and shuttering systems providing lighthouses with individual signatures allowing them to be identified by seafarers. He also invented the movable jib and the balance-crane as a necessary part for lighthouse construction.

Marjaniemi Lighthouse, the 19th-century lighthouse in the Hailuoto Island, neighboring municipality of Oulu, Finland

Alexander Mitchell designed the first screw-pile lighthouse – his lighthouse was built on piles that were screwed into the sandy or muddy seabed. Construction of his design began in 1838 at the mouth of the Thames and was known as the Maplin Sands lighthouse, and first lit in 1841. Its construction began later, the Wyre Light in Fleetwood, Lancashire, was the first to be lit (in 1840).

1.2 TECHNOLOGY:

Where as in early centuries lamps and lenses are working as a source of light which requires petroleum, diesel, whale oil, colza, olive oil. Electricity and carbide (acetylene gas) began replacing kerosene around the turn of the 20th century. It was promoted by the Dalen light which automatically lit the lamp at nightfall and extinguished it at dawn. Some modern lighthouses have 1 million candle powers; a standard 100 Watt incandescent bulb has approximately 100.

In modern automated lighthouses, the system of rotating lenses is often replaced by a high intensity light that emits brief Omni directional flashes, concentrating the light in time rather than direction. These lights are similar to obstruction lights used to warn aircraft of tall structures. Later innovations were "Vega Lights", and experiments with light-emitting diode (LED) panels. Lifetime of the LED light source is 50,000 to 100,000 hours, compared to about 1,000 hours for a filament source.



Fig; An actual candle from the Eddystone lighthouse. (1759)



Fig; First kerosene lamp



Fig; Fresnel lens

II. COMPONENT

While lighthouse buildings differ depending on the location and purpose, they tend to have common components. A light station comprises the lighthouse tower and all outbuildings, such as the keeper's living quarters, fuel house, boathouse, and fog-signaling building. The Lighthouse itself consists of a tower structure supporting the lantern room where the light operates. The lantern room is the glassed-in housing at the top of a lighthouse tower containing the lamp and lens.

On a lighthouse tower, an open platform called the gallery is often located outside the watch room (called the Main Gallery) or (Lantern Gallery). The Lighthouse itself consists of a tower structure supporting the lantern room where the light operates.

Lighthouses near to each other that are similar in shape are often painted in a unique pattern so they can easily be recognized during daylight, a marking known as a day mark. The black and white barber pole spiral pattern

III. MAINTENANCE:

The objective of a lighting checklist helps you to improve the lighting in your area, minimize costs, maximize energy saving and improve reliability throughout your business or home. This includes the minimization of future breakdowns by identifying important equipment to add to your checklist.

- Replace Any Burnt Out Lights.
- Check Lighting Cables.
- Ensure That Lights Have the Same Color.
- Redirect Adjustable Lights.
- Heck for Dust.
- Change Batteries Where Appropriate.
- Don't Forget Compatibility.

IV. NAVIGATION

In an era before GPS and other navigational apparatuses, lighthouses served two primary purposes. The first was illuminating waterways made treacherous by shoals, reefs, rocks and other hazards as ships left the open ocean and pulled into port. Most lighthouses also include fog signals such as horns, Bells or cannons, which sound to warn ships of hazards during periods of low visibility.

The second purpose is to serve as a reference to mariners. An individual lighthouse distinguished itself with its day mark -- the color schemes and patterns on the tower -- and its light signature. For example, a lighthouse might emit two flashes every three seconds to distinguish it from a lighthouse that emits four flashes every three seconds. Even today, if the GPS goes on the fritz, crews reference light lists to plot a course -those regional indices of lighthouses and their distinguishing traits.

At points before their automation in the 20th century, lighthouses had to accommodate cumbersome systems as well as a light-keeping staff to keep shining 24 hours a day. In addition to a lighthouse, a complete light station might include a fog signal building, a boathouse, living quarters for the keeper and his family and a separate oil house to cordon off the flammable agents that powered the lamps.

No two lighthouses have been built the same. Early lighthouses used whatever materials were available locally: wood, brick, stone, concrete, reinforced steel and cast iron. Some lighthouses are placed onshore overlooking the water, while some are built offshore on

reefs or patches of rocks. Even the height of the tower changes from one lighthouse to the next depending on the view from the water. A lighthouse overlooking a 100-foot (30.48 meter) cliff, for example, wouldn't need to be built as tall as one positioned closer to sea level.

V. WORLD FAMOUS LIGHT HOUSES:

i. Portland Head Light



Fig: Portland Head Light

Looking out over the wild, wet, and windy waters of the Atlantic, Portland Head Light has guided sailors back to safety ever since 1791. The historic lighthouse is set on a craggy cliff top in Cape Elizabeth, just to the south of the busy Portland Harbor. Reaching almost 25 meters in height, its white conical tower stands out delightfully against the desolate and rugged coastline that lies around it.

Although it is now automated, visitors can stop by its adjoining maritime museum to learn all about its captivating past and hear the tragic tales of the many ships that were wrecked along the Maine coastline.

ii. Formentor lighthouse



Fig; Formentor lighthouse

One of the most famous and photographed landmarks in Majorca, Formentor lighthouse lies on the northernmost tip of the Balearic Island. Towering some 210 meters above the sea, the lighthouse is perched on top of a lofty cliff with steep drops below it. Known as Far de Formentor in Spanish, its blinding beacon of light has warned sailors about the dangerous Majorcan coastline ever since 1863.

Due to the outstanding natural beauty around it and fantastic views out over the Mediterranean, Far Formentor lighthouse is not to be missed.

iii. Chania Lighthouse

Lying at the entrance to Chania in Crete's historic harbor, this delightful lighthouse is not only one of the oldest in Greece and the Mediterranean, but in the entire world. First built by the Venetians towards the end of the 16th century, it was subsequently repaired and re-imagined by the Egyptians, Ottomans, and later on, the Greeks.

As such, the lighthouse certainly boasts an illustrious and interesting history as is evidenced by its unique design, which is reminiscent of a mosque's minaret. It is its attractive architecture and splendid setting with the city in the background that makes Chania Lighthouse such a popular attraction.



Fig; Chania Lighthouse

iv. Heceta Head Lighthouse

Set in a prominent and picturesque spot along the Oregon Coast, Heceta Head Lighthouse certainly is a fine sight. Overlooking the Pacific Ocean with dramatic-looking rocks below, its gleaming white tower is backed by verdant forests that tumble down the hillside. First lit in 1894, the lighthouse is named after Bruno Heceta, the Spanish explorer who sailed up and down the Pacific Northwest in the 18th century.

Now a designated state scenic viewpoint, Heceta Head Lighthouse is well worth visiting for its commanding views of the Oregon Coast and the Pacific Ocean.



Fig; Heceta Head Lighthouse

v. Les Eclaireurs lighthouse



Fig : Les Eclaireurs

Les Eclaireurs is located in a breathtaking spot in Tierra del Fuego, right at the southern tip of Argentina. Lying on a small rocky island in the middle of the Beagle Channel, its red and white tower stands out delightfully against the majestic mountains that rise around it.

Having guarded the sea entrance to Ushuaia ever since it was erected in 1920, the lovely lighthouse is now a popular tourist attraction. From the nearby town, lots of people take boat trips to snap photos of it from up close with the mountains behind it.

vi. Galle Lighthouse



Fig: Galle Lighthouse

Located within the ancient walls of Galle Fort, the lighthouse of the same name has protected the surrounding waters ever since it was first elected in 1848. While it is the oldest lighthouse in the whole of Sri Lanka, the current lighthouse's blindingly bright white walls only date to 1939, when it was rebuilt after a devastating fire.

Nestled away on the country's south coast, its magnificent location at the entrance to Galle Harbor with palm trees all around it makes it one of the most picturesque and photographed landmarks in Galle.

vii. Jeddah Lighthouse:

Jeddah Light is an active lighthouse in Jeddah, Saudi Arabia. With a height of about 133 m (436 ft) it "has a credible claim to be the world's tallest light tower". It is located at the end of the outer pier on the north side of the entrance to Jeddah Seaport.



Fig: Jeddah lighthouse

VI. CONCLUSIONS

- In this study I have understood the working procedure and functions, color patterns, flashing patterns, sound waves.
- History of light house and maintenance, preservation.

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