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**□** ARM X ENG **□** PAP **□** Input

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Agenda item [[2]](#footnote-2) 3.1

Technical Domain / Task Number 2 …………………………………

Author(s) / Submitter(s) Republic of Korea / Korea Institute of Aids to Navigation

Application of modern technology on conventional large beacon

# Summary

KATON(Korea Institute of Aids to Navigation) removed conventional bulbous lamp and retrofitted high luminance LED to improve efficiency of optical lenses used in conventional large beacon(KRB-750) without design change. Visibility of light was secured by applying reflectors to adjust the direction of light emitted from LED with remaining lenses. Heat problem caused by high power LED was solved by independent design applying heat pipes. The separable module design helps manager easily replace the disorder equipment in a few minutes. Furthermore, in the event of an LED failure, improved beacon system detects malfunction by itself, continues its role with alternative light source subsequently.

## Purpose of the document

The committee is invited to note the information.

## Related documents

*G1049 Use of Modern Light Source in Traditional Lighthouses Optics*

# Background

In order to improve the safety and operational efficiency of all vessel sailing near coastal water, Light house must be well managed and kept in good condition accordingly. However, since the bulb lamp type (metal haloid lamp, Life time 1,000Hour) and DC motor has been used as a common design for large beacon, Disorder occurs frequently due to short life span of outdated technology of Lamp source. It prolongs the duration of out of service, subsequently sailor might be in more dangerous condition during the repair progress. A number of authorities has invested time and resource to decrease the malfunction time.

# Discussion

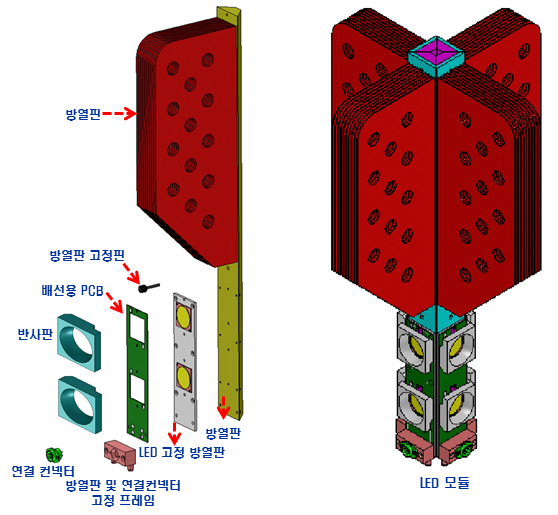
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## The problems of the outdated lamp

1. High energy consumption
2. Unable to control remotely
3. Complex structure that it takes high cost to maintain
4. Long duration of black out in case of out of order
5. Short lifespan on lots of points of conventional beacon including DC motors, electric system, lamp comparing with modern component

## Development contents

### Development of LED Reflectors for Combining High-Power LED Modules (100W Class) and Application of Existing Optical Lens in order to replace conventional bulbous light sources.

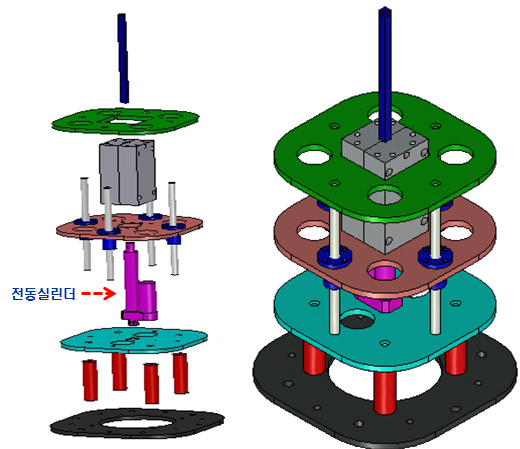


**LED module**

**Heat radiator**

**Light reflector**

Figure 1 Drawing of LED module for Large conventional beacon (KRB-750)



**Elevating cylinder**

Figure 2 Lifting structure of Spare light

### Development of LED light source device structure that automatically switches to spare LED light source through up-and-down motion in the event of main LED light source failure.

### The maximum luminous intensity of the large beacon with LED light source(100W) is approximately 670,000 cd. The vertical and horizontal divergence angle was derived to lengthen the distance of light visibility accordingly.

### Convection Heat emission system was developed and applied by calculating heat discharge capacity.

### Easy module-release design for unskilled person without special tools.

## Application on field

KATON had researched and installed revised large beacon at Odong-Do(An island in south of Korean peninsula) Lighthouse July 2020. Subsequently, investigation has been conducted while actual operation as of august 2020. The visibility of range can reach up to 24 nautical miles.

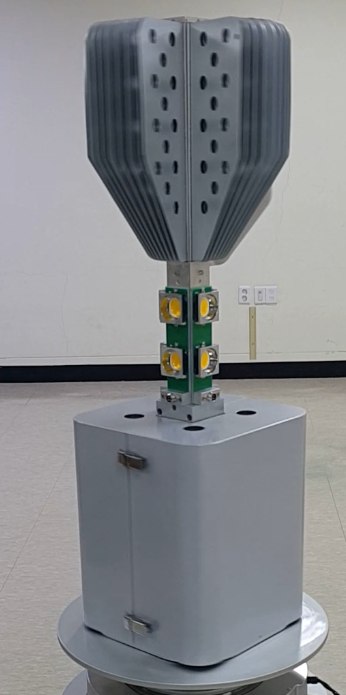


Figure 3 Prototype of Large beacon applying LED module(on duty at Odong-do light house)

# References

1. G1049 Use of Modern Light Sources in Traditional Lighthouses Optics

# Action requested of the Committee

The Committee is requested to note the information and take action as appropriate

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. Leave open if uncertain [↑](#footnote-ref-2)