

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Innovation of Lift Bridge by Hydraulic action

Prof. P. V. Kapure, Allan Pereira, Pratik Chikane, Akshay Malkar , Pankaj Galande, Ragho Mhaddalkar

Department of Civil Engineering, AISSMS Polytechnic Pune, India

Diploma Student, AISSMS Polytechnic Pune, India

Diploma Student, AISSMS Polytechnic Pune, India

Diploma Student, AISSMS Polytechnic Pune, India

Diploma Student, AISSMS Polytechnic Pune, India

Diploma Student, AISSMS Polytechnic Pune, India

ABSTRACT: Bridges are the main connections provided between two access provided for transport in such way The bridges are provided and hence are an obstacle of money transportation .there are many movable bridges introduced like bascule bridge vertical lift bridge ,swing bridge we have proposed such a technique where the bridge can be lifted by the hydraulic action it works similarly like a table bridge. By this technical there well be a passage for transportation of marine as well as road or railway

KEYWORDS: Movable Bridge, Vertically lifted bridge ,Hydraulic action, Pamban bridge

I. INTRODUCTION

Movable bridges are commonly used over the waterway especially in flat terrain. These bridges also present significant drawbacks and problems associated with the operation and performance. Movable bridge rehabilitation and maintenance costs are considerably higher than that of a fixed bridge. Deterioration is a concern since they are located over waterways, and often close to the coast, which constitute conditions suitable for corrosion, causing section losses. Deterioration and damage is also observed due to moving parts, friction and wear and tear of the structural and mechanical components. Fatigue can be a problem due to the reversal or the fluctuation of stresses as the spans open and close. If there are breakdowns, these cause problems for both, land and maritime traffic. Maintenance costs associated with the operation system and mechanical parts require special expertise, and may cause extensive repair work. Finally, difficulty in repair works is an issue for movable bridges. A minor or major malfunction of any component can cause an unexpected failure of bridge operation. Electrical and mechanical problems may require experts and may be difficult and time consuming to fix.

The only cheapest mode of transportation is the marine time transport most of the international goods are transported through waterways, but due to rise of industrialization and globalization, goods in India are transported by roadway or railways, in this case various obstacles such as ponds, lakes and rivers this routes are diverted . Due to permanent bridges water transport is not possible. In India, we must promote marine transportation in some capitalized cities and highly populated states where people can travel through roadways and railways and the goods can be transported by waterways. i.e. ships or boats.The next problem arises of obstacles which we discussed above. Transportation by either bridge or waterway is only possible. But no, this is not the final situation. We can use or provide movable span at some span of the bridge where both road or railways and waterways can be used for transportation movable bridges are provided at places with restricted space.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

II. LITERATURE REVIEW

Zhendong Qian et al. [1], proposed the usage of a lightweight epoxy asphalt mixture (LEAM) for pavement on bascule bridges. Test results demonstrated that the LEAM had a decent imperviousness to dampness harm, lasting twisting, and low-temperature splitting. The LEAM with a 70% lightweight total substitution rate was found to have the best impact on deadweight lessening and additionally the other execution measures. In addition, the explanatory outcome demonstrated that LEAM could decrease asphalt stretch altogether when contrasted with an epoxy asphalt mixture, which shows that the LEAM has a decent structural performance. Significant reductions in density at the higher lightweight aggregate percentages and overall better performance of the rounded lightweight mixtures was found to have been achieved by using 70% of the lightweight aggregate in the mixtures which would be vital for the optimal performance for the bridge deck paving. The study further provides a basis and motivation for the design and use of lightweight epoxy asphalt mixtures for bridge deck paving.

G. Besterfield et al., proposed a procedure for the assembly of trunnion-hub-girder (THG) in bascule bridges which could help in avoiding failures. The study was conducted to understand the failures due to the general assembly procedure followed and the results were used to develop specifications and recommendations for assembly. The causes of failures include the development of high stresses at low temperatures during assembly, while noting that fracture toughness of THG materials decreases with temperature. Recommended specifications included following an alternative assembly procedure that nearly doubles allowable crack length, and that lowers cooling temperatures to avoid trunnion sticking in the hub. Based on the results of the study, various recommendations were made for the THG assembly procedure. Few of them included developing inspection specifications to determine if voids or cracks were bigger than an allowable value, to specify tight machining tolerances for the inner diameter of the hub, to consider heating the outer component as opposed to cooling the inner component as heating is a slow process and hence would not create large transient thermal stress. The maximum Von-Mises stress was found to occur when the whole assembly reaches steady state. The maximum hoop stress on the other hand was found to occur due to thermal shock when the hub was cooled down by immersion in liquid Nitrogen.

J W Smith et al., proposed a method for calculating cycles of stress in steel bridge decks under heavy traffic. This was achieved by using influence surfaces, derived by finite element analysis, and simulating the passage of heavy vehicles by a Monte-Carlo technique. The predicted stress cycle counts compared favourably with experimental observations on a real bridge using an electronic continuous monitoring system. A simplified method for the calculation of the cycles of stress in steel decks under heavy vehicles was developed by Smith and Wastling. They made use of an average bridge temperature and treated wheel loads separately. Their results were conservative when compared with observations on a full scale bridge. An advanced method of analysis was presented in their paper. The paper made it evident that the theoretical method of calculation overestimates damage at high temperatures and underestimates the damage at low temperatures.

F. Necati Catbas et al., proposed a machine learning algorithm for processing of massive data collected from the mechanical components of movable bridges. The proposed approach consisted of training and monitoring statistical features and conducting cross correlation analysis (CCA) and robust regression analysis (RRA). The monitoring phase included tracking of errors associate. The main goal was to analyze the efficiency of the developed system for health monitoring of the bridge mechanical components such as gearbox, motor and rack and pinion. Data was collected from Sunrise Movable Bridge, Florida, USA, for 4 years through sens and was used to assess the performance of the algorithm under baseline and different common damage scenarios. Based on the results, the proposed health monitoring system had a satisfactory performance for the detection of the damage scenarios caused b of sufficient oil in gearbox, as well as bolt removal from rack and pinion. be regarded as a valuable tool for the management and interpretation of the massive (big) data collected for structural health.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

Bridge is a structure which provides a connection or passage over a gap without blocking the passage way beneath the structure. They are constructed over streams, canals or rivers. Bridge building is not a new science. In olden days big trees with broad trunks were placed horizontally on the two edges of land and people used to travel above it.

Types of movable bridges.

1. Bascule Bridge
2. Vertical Lift
3. Table Bridge

1. Bascule Bridge

These bridge have double or single flaps without limiting clearance. The connection between the ends of flats may transmit shear force only or shear force bending moment. A counter weight is attached at the other end of the bridge.

2. Vertical Lift Bridge

A lift bridge has free span between 30m to 50m and clearance above water level of about 13m to 15m in service and 25m to 40m respectively when opened. The lifting height is 10m. A vertical lift bridge is a type of movable bridge in which span rises vertically while remaining parallel with the deck.

3. Table Bridge

It is a movable ridge in which deck moves along the vertical axis. Hydraulic pills are under the bridge rises the bridge deck to allow barge traffic to pass beneath it. In contrast to lift bridge.

Advantages Of Bascule Bridge

1. It opens span for ships and vessels with considerable speed and at permits the passage of small size boat to pass through even if the passage is not open completely.
2. It is safer than vertically opening bridge especially it bascule bridge is double leaf.

Advantages of vertical

Gives easy access for the brra

III. METHODOLOGY

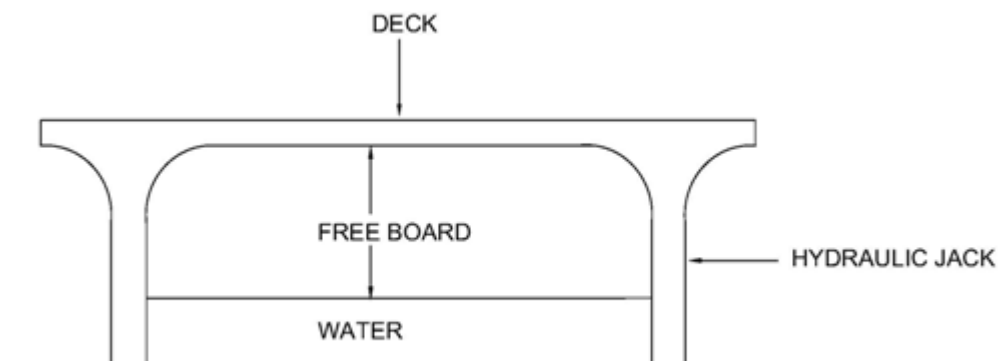


Figure 1 : Span before lifting

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 8, Issue 3, March 2019

The Figure 1 will show the hydraulic jack used in lifting the movable span at rest position hydraulic jacks should be placed at the bottom of the two decks adjoining each other, and the space between them should be between 4 m to 6 m. This is the time when the train can pass over the deck of bridge and the transportation of passengers and goods is possible efficiently

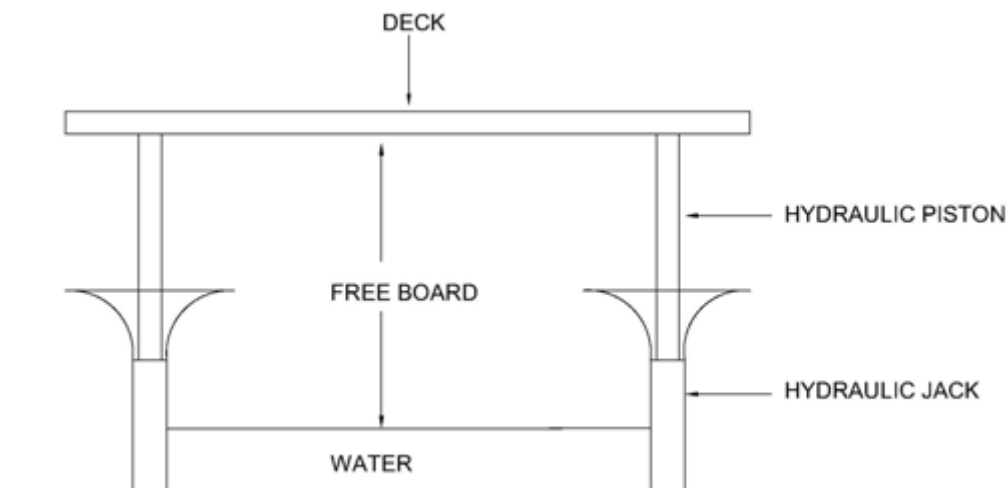


Figure 2 : Span before lifting

Then when the barrages and ships are to be passed across the bridge, the bridge can be lifted by applying external force to hydraulic pistons and this will lift the bridge vertically in the upward direction and create a passage to the Barrages and Ships to cross the bridge.

The figure 2 shows the bridge after lifting with a high Free Board. This method can be used for the reconstruction of Pamban Bridge located in Tamil Nadu state of India. The piers are designed as per Figure 2. Consisting of a hydraulic jack in it

IV. CONCLUSION

Vertical lifted bridge which can be lifted with the hydraulic action is one of the best methods to create a passage for barrages and ships across the bridge due to it there are less possibilities of failure due to other movable actions such as bascule bridge

REFERENCES

- [1] Qian Z, Chen L, Jiang C, Luo S. Performance evaluation of a lightweight epoxy asphalt mixture for bascule bridge pavements. *Construction and Building Materials*. 2011 Jul 1;25(7):3117-22.
- [2] Besterfield G, Nichani S, Kaw AK, Eason T. Full-scale testing of procedures for assembling trunnion-hub-girder in bascule bridges. *Journal of Bridge Engineering*. 2003 Jul;8(4):204-11.
- [3] Ringsberg JW. Life prediction of rolling contact fatigue crack initiation. *International Journal of Fatigue*. 2001 Aug 1;23(7):575-86.
- [4] Catbas FN, Malekzadeh M. A machine learning-based algorithm for processing massive data collected from the mechanical components of movable bridges. *Automation in Construction*. 2016 Dec 1;72:269-78.