

# Analysis And Design Of Rotating Bridge To Provide Easy Access For Roadway and Water Way

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**Abstract** - The available solutions are taking the overhead passenger bridge, walking to the end of the platform, crossing the railway track. The above-mentioned cases might be challenging to the elderly persons, people with disabilities and when the passenger is carrying heavy luggage. The present work deals with the study of platforms of Indian railways, identifying opportunities for facilities re-design for improved crowd management, passenger movement and comfort. A swing bridge mechanism is designed and developed using CAD modelling followed by a small scale working model, with a facility to provide temporary access to the platforms when there is no train available on the track. Our project aims at helping the railway administration to modify their facilities for better and easy flow of passenger.

**Key Words:** bridge, elderly persons, railways, administration crowd management

## 1. INTRODUCTION

Rotating bridge is a movable bridge that has as its primary structural support a vertical locating pin and support ring, usually at or near to its center of gravity, about which the turning span can then pivot horizontally as shown in the animated illustration to the right. Small swing bridges as found over canals may be pivoted only at one end, opening as would a gate.

In its closed position, a swing bridge carrying a road or railway over a river or canal, for example, allows traffic to cross. When a water vessel needs to pass the bridge, road traffic is stopped (usually by traffic signals and barriers), and then motors rotate the bridge horizontally about its pivot point. The typical swing bridge will rotate approximately 90 degrees, or one-quarter turn; however, a bridge which intersects the navigation channel at an oblique angle may be built to rotate only 45 degrees, or one-eighth turn, in order to clear the channel.

## 2. OBJECTIVE

1. To Study Design & Working Of Rotating Bridge.
2. To Study Rotating Bridge Types.
3. To Study The Material Used For Rotating Bridge.
4. To Determine The Tests Are Conducted On Material Which Are used For Construction Of Rotating Bridge.
5. To Study Analysis and design of rotating bridge to provide easy access for roadway and Water Way

## 3. LITERATURE REVIEW

(Roberts, C. L., Breen, J. E., & Kreger, M. E., 1993). Since then, the vertical construction method has begun to be recognized. Germany has built a bridge spanning 150 m. In 2011, the concrete arch bridge in Kambara Valley, Japan, was built with a span of 135 m.

(Liu, J. P., Tsunornoto, M., & Kunihiioo, N., 2003). The cable-stayed bridge of the Danube Canal Bridge (55.7+119+55.7)m is located in Vienna Airport, Austria.

Sun, Q. S., Guo, X. G., Zhang, D. P., Guan, X. K., & Zheng, Y., 2011). (It was built in 1976 and is the first application of the horizontal rotation construction method of the bridge.

(Berger, I., Healy, D., & Tilley, M., 2013). The weight of the rotating body is about 4000 tons. After decades of development, the horizontal rotation construction technology has gradually matured, and the scope of application of the horizontal rotation construction method has not only increased, it has achieved some remarkable achievements. The bridge of the rotation construction method is only applicable to the arch bridge vertical

rotation. With the development of construction materials, construction level, and construction technology, the horizontal rotation construction method can be applied to the rigid frame bridge, the steel plate girder bridge, and the cable-stayed bridge. The famous bridge built here has a total weight of 19,500 tons and a main span of 168 m. The Ben Ain cable-stayed bridge was built in Belgium in 1991.

## 4.METHDOLOGY

### Rotating Pillar Section Design

This structure consists of a hollow cylindrical pillar which is connected with a gear motor . At the top of the pillar a cuboid is attached. The pillar and the gear have a common hole through which a rod passes about which the entire structure shall rotate. The rod is connected to a cuboidal base on which the entire structure rests.

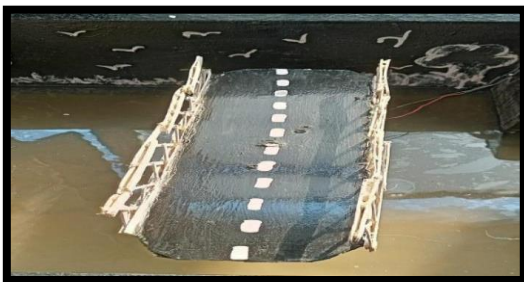


Figure1.rotating Pillar construction design

Figure 2. Span attached with the rotating (circular) pillar

### Construction Of Pillar in Under Water

Bridges are built over water by different methods (depending on the level of water and quality of soil).The most common approach is to sink a pier down into the earth below the water—allowing for shorter bridge spans. If the water is relatively shallow, and the loads not too great,

individual piles or a precast concrete pile group can be driven through the water and into the riverbed.

In cases of large bridges requiring substantial supports much more extensive foundations are needed than a few simple piles. These are inevitably cast-in-place concrete foundations. Up to a certain depth what's called a cofferdam can be built around the planned pier foundation site. A cofferdam is a basically a three or four sided box built in the water that is made nearly watertight. The water is then continuously pumped out of the cofferdam lowering the water level inside the box until the earth is finally reached. This allows men to work on solid (well it's usually a muddy mess) ground. There are several types of columns which are used in different parts of structures. Column is a vertical structural member that carry loads mainly in compression. It might transfer loads from a ceiling, floor slab, roof slab, or from a beam, to a floor or foundations. Commonly, columns also carry bending moments about one or both of the cross-section axes. In this article, different types of columns used. In building construction will be discussed. Columns are classified based on the several conditions which include:

Based on Types of Reinforcement

Based on Types of Loading

Based on Slenderness Ratio

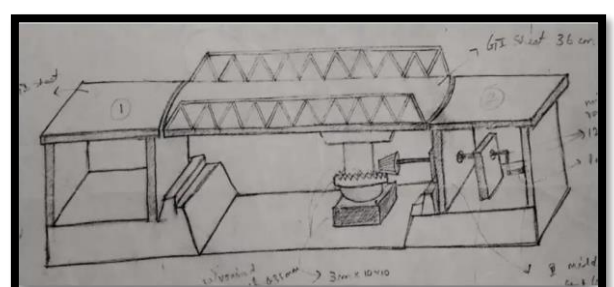
Based on Shape

Based on Construction Material

## 5.ANALYSIS

### Complete Assembly Design

The whole project consists of 4 parts. The gear mechanism, Rotating Pillar, Rotating Bridge section and the



Main base are finally welded together. The entire project is brushed and polished using sand papers and then oiled to prevent further oxidation. The structure is weighed and then analyses for any deformation etc.

## 6. Advantages Of Rotating Bridge

- As this type requires no counterweights, the complete weight is significantly reduced as compared to other moveable bridges.
  - Where the channel is wide enough for separate traffic directions on each side, the likelihood of vessel- to-vessel collisions is reduced.
  - The central support is often mounted upon a berm along the axis of the watercourse, intended to protect the bridge from watercraft collisions when it is opened. This artificial island forms an excellent construction area for building the moveable span, as the construction will not impede traffic.
  - Compared to other types of movable bridges, wind load on rotating Bridge is minimum.
  - Since swing span moves horizontally during the opening of the bridge, the moment generated by wind force is smaller compared with other movable bridge types.
  - Two movable spans in one moving structure can be achieved in symmetrical rotating bridge. This would be greatly advantageous to manage busy waterway properly
- The improvement of the slide-way form reduces the amounts of temporary structures, simplifies the construction process, improves the operating platform, and ensures the safety of workers.
  - The down-slide-way rotating construction method avoids the impact on the existing highway and railway tracks during the construction of large-span cast-in-place beams and reduces the project safety risk.

## 8. REFERENCES

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## 7. CONCLUSION

- Through the improvements of the Up-slide-way rotation method in this project, the following conclusions can be reached:
- Through the guide system, the down-slide-way method changed the rotation type and achieved continuous tangent traction. Increased rotation process efficiency and safety.