

The Kattwyk Bridge



Motivation

The motivation behind the project is the KATTWYK BRIDGE, HAMSBERG, GERMANY. The bridge was built in 1972. The bridge has a unique feature that it based on the “Vertical Lift Mechanism”, its middle (movable) part lifts to give way to the ship passing by thus maintaining waterways transport. Till now no bridge such has been built in India.

Description

This project is a model and a simplified version of Kattwyk Bridge and has been made under the constraints of space, time and resources available in the lab.

The Bridge mechanism has been divided in three sections. The central section lifts above, while the two side parts remain intact with the supporting angles. The lift mechanism used for the bridge is based on the pulley system involving three pulleys. A string is passed through the two pulleys on either side of middle section and the pulley at the centre synchronizes the motion of two pulleys and makes the motion centralized.

The angles are used to restrict the motion of central section allowing only the motion in vertical direction to occur and provide the stability to the bridge structure. A chain is also used to stop the central section at any desired height depending on the height of ship assuming a real case situation thus saving the power.

The mechanism used to lift the central section is due to the constraint of not using any electric motor or gears. In real case situation, the power can be given by electric motors and cables can be used.

The four bridge supporting angles that connect the three sections of the bridge will actually go till the bottom surface of the river.

Bill of Materials Used

S.No.	Part Name	Material Used	Quantity	Manufacturing Process	Cost per unit (in Rs.)
1	Angle	Mild Steel Angles	4	Cutting, Filing	94
2	Pulley	Mild Steel Rods	3	Cutting, Grinding	4
3	Base	Mild Steel Sheets	3	Metal Forming	2
4	Rods	Mild Steel Rods 8 mm and 4mm (1.4 Kg approx)	N.A.	Cutting, Filing	39

Estimated Cost of the Project

Labor charges: Unskilled: 800 Rs. Skilled: 40 Rs.

Electricity charges: 76 Rs. (for 1 Hr.)

Total cost of materials used: 433 Rs.

Overhead cost: 135 Rs.

Overall cost of the project: 1484 Rs.

Difficulties and Remedies

The difficulties faced are:

1. SETTING THE CENTRAL LIFT PART IN POSITION :
To set the exact clearance for the middle section to give it smooth movement in vertical direction.
2. ALIGNING THE RODS: Problems while aligning the small parts for welding.
3. Weight lifting mechanism and stopping the central part at any desired height.
4. MACHINING PROBLEM: Filing and Machining all the parts welded was difficult.

The Remedies and changes made to overcome the difficulties:

1. Brazing was used wherever it was not possible to do welding.
2. Initially the mechanism for lifting the central part involved the use of weights but it was not an efficient mechanism and it was not possible to stop the bridge at any desired height so it was decided to use pulleys and move the central pulley manually using handle.
3. Whole construction process was divided in separate sections such as movable and two side sections of bridge, pulley making, filing and machining parts separately and finally all parts were assembled.
4. We tried our best in getting the exact measurement and maintain the symmetry with patience, coordination and team spirit.

THANK YOU