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CONCRETE CANOE USING LIGHT WEIGHT AGGREGATE

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Abstract

As engineers, we have an obligation confront challenges group by innovating and implementing creative solution to current issues. As matter of curiosity, the idea of ships and boats made of concrete is in close connection with the invention of reinforced concrete .we decided to construct the concrete canoe and identified the environmental impact of concrete construction as major contemporary concern, and therefore set out to develop the most suitable concrete canoe with low cost. In kerala now rivers are main source for waste deposition ,Rivers mainly used for drinking and water transportation .But the governments mainly supports the land transportation .Then the public turn their transportation mode to land transportation ,it has more reasons.so the people use the rivers and streams for waste deposition. If it is used for water transportation the waste deposition may get down. But the construction of wooden / fiberglass canoe cost almost 30000-65000/-. But it can do with concrete canoe almost 2500-3500/- rupees. It can achieve all the properties of wooden & fiber canoe. And also have some extra properties like long life ,strength ,impact strength. And we can some waste material its construction Like crushed glasses has light weight aggregate.

Keywords: - *Canoe, Light Weight Aggregate Etc…*

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1. INTRODUCTION

Commonly canoe and boats are made by fiber glass and wood with high cost .due to higher cost, we are develop the low cost canoe replacing the construction material by concrete. In the advanced concrete technology, we discovered light weigh concrete canoe using light weigh aggregate and other admixtures.

It is rather easy to build a concrete canoe. However, to get an excellent and performing concrete canoe is not an easy task. Optimizing a concrete canoe requires a lot of thinking and knowledge, and specially a good working plan or optimization sequence. This represents a method to optimize a canoe from structural and material point of view.

In the world of concrete canoeing, several criteria such as mechanical properties and specific gravity do not vary in the same way.in fact, most criteria are antagonists. The main objective of an optimization process to provide the best combination of structural and composite design in regard to the design criteria and rules that guide the project, this means having the lightest structure that will resist the stresses encountered during the races and transportation.

This represent the major design criteria, explains the steps that lead to an optimized canoe and some helpful hints for designing a concrete canoe.

1.1 Materials

- Cement
- Fiberglass Mesh
- Chicken Mesh
- Perlite
- Glass powder

1.2 Methodology

In line with elaborating the mix, the designing process of the body of canoe started. As first step, deciding the method of construction technology was required. During preliminary survey, the authors reviewed possibilities, which helped choosing the best option. The technology and method of creating the body is a crucial factor which influenced most of the following work, including the consistency of mixture.

Then the next step was to test material. For cement the test conducted was fineness and we get the percentage of weight of residue is 6. Then the next step was the workability test of concrete. The slump cone test was conducted for 1.5:3 mix ratio and get the slump value is 40 mm. The concrete cubes were casted using the mix proportion of 1.5:3 concrete .The cubes were placed for curing for 3 days, 7 days and 14 days. Then the compressive strength of cubes after 3 days, 7 days and 14 days was found out. Finally, the results were analyzed.

Without any previous experience of concrete floating objects, the team decided to put safety forward while designing the body. Two different methods were possible for design: borrowing an actual plastic canoe and use it as a formwork board, or creating the form as an individual

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design. The latter was chosen, and by three dimensional virtual modeling the ideal form was designed from which the required parts of formwork were easily shaped as shown in fig 1.2.

On the source of previous surveys two different methods of molding could be chosen: male mold and female mold. we chose an female formwork mold on which later built and stacked the layers of concrete by hand. After building the formwork was set together. These parts were previously cut and shaped based on the virtual 3D design of the body. Joint gaps were filled with epoxy glue and the edges were shaped. After completion of mold preparation, we cast the concrete canoe.

Fig.1: Male mold and Casted canoe

2. CANOE DESIGN

For the concrete canoe, we choose the flat shape bottom wetted surface to decrease tipping motion and enhance stability. And decide the dimensions of canoe. It is unsymmetrical canoe there are different 12 dimensions. We conclude that size of canoe is 4.5m length with 12 sizes of width. They are 0.58m, 0.83m,1m, 1.16m, 1.25m, 1.31m, 1.43m, 1.47m, 1.46m, 1.37m, 1.1 and 0.75m.The figure 4.1 shows the dimensions of canoe.

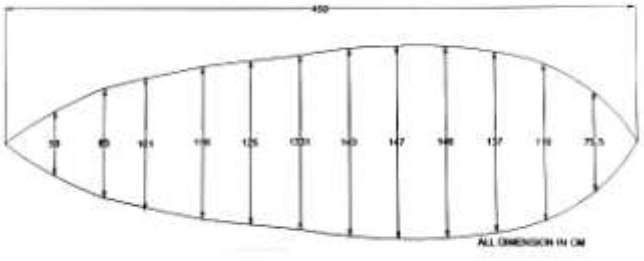

Fig.2: Dimensions of Canoe

2.1 Structural Design

By using STAAD Pro, we analyze the concrete canoe loading conditions and get the maximum bending moments and shear force.

The table 1 shows the maximum bending moment value and maximum shear force value with distance from bow

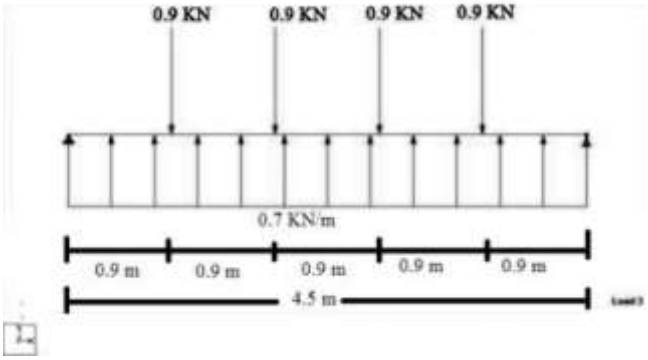

Fig 3: Load details

Fig 4: Bending Moment Diagram

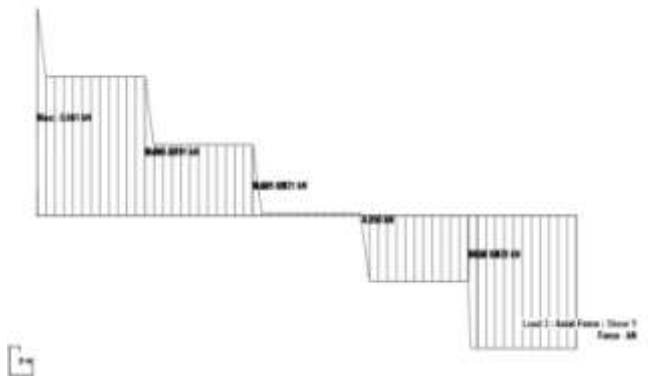

Fig 5: Shear Force Diagram

	VALUE	DISTANCE FROM BOW
Maximum bending moment	8.416	1.7 m
Maximum shear force	9.012 KN	0.9 m

2.2 Determination of Peak Stress

By bending equations for beams

- Maximum Tensile stress =(M/I) x Y_1
- Maximum Compressive stress = (M/I)x Y_2

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To calculate I , Y_1&Y_2 Canoe assumed as C inverted U section

Then peak stresses
Maximum Tensile stress = 5.355 KN/m^2
Maximum Compressive stress = 11.26 KN/m^2

2.3 Laboratory Tests

Table 1: Test result

Property	Benchmark	Result	Remark
Compressive strength	$1.126x10^{-5}$ N/mm^2	0.0148 N/mm^2	With 1:4 ratio
Tensile stress	5.355 N/mm^2	500 N/mm^2	1mm thick chicken mesh
Workability	20mm to 70mm	40mm	With 0.4 w/c ratio

2.4 Casting

Casting done by hand and provide water proofing coat.

3. CONCLUSION

On the basis of the cost, the concrete canoe is economical than fiber and wooden canoe for non-tidal water. Commonly the cost of the fiber and wooden canoe are in between 65000- 8000 rupees. This problem can be overcome by concretecanoe.It is unsymmetrical canoe there are different 12 dimensions. And conclude that size of canoe is 4.5m length with 12 sizes of width. They are 0.58m, 0.83m,1m, 1.16m, 1.25m, 1.31m, 1.43m, 1.47m, 1.46m, 1.37m, 1.1 and 0.75m.The figure 4.1 shows the dimensions of canoe. We cast canoe with 42.2 % of original dimensions. And the maximum bending moment is 8.416 KN/m and shear force is 9.012 KN, calculated along the length of the canoe. By the compressive test, compressive strength is 0.0148 N/mm^2.This can be used exponentially during flood times. The concrete canoe is long lasting and provides any time.The structure altogether is simple and can be easily constructed. The structure can be extended to normal canoe dimension.

ACKNOWLEDGEMENT

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