Concrete Canoe Competition

INTRODUCTION AND OBJECTIVES

Snapshot from canoe competition in USA

During the World War II, concrete was used in making warships. After this, countries like the USA, Australia, Brazil, Canada, France, Germany, Hungary, Iran, Israel, Japan, Mexico, Netherlands, Singapore, South Africa, Sweden and UAE started making concrete canoes. The American Society of Civil Engineers (ASCE) conducts National Concrete Canoe Competition every year (http://www.asce.org/concretecanoe/). This is a highly successful program and students from various universities make their own concrete canoe and participate in this competition. The science and technology behind the making of concrete canoe has developed significantly in the past several years. For example, advanced software programs are used to perform the structural design and stability analysis. Also, advanced materials (carbon fibers, glass fibres, polystyrene, rubber, admixtures, glass microspheres, etc.) are used to build light-weight and high-strength concrete. The construction procedure also plays a vital role in achieving the desired structural/material properties and stability/safety of the canoe.

One of the well known festivals in India, Kerala Boat Festival brings out the rich tradition and diverse culture of the state of Kerala. It is one of the biggest festivals in Kerala and is held every year. Kerala Boat Festival is celebrated by the people of Kerala with great zeal irrespective of any caste and religion.

The backwaters of Kerala offer a wonderful setting for various types of festival and boat races in Kerala. The Kerala boat festival is an event which showcases the culture of the state and brings out the excellent team spirit, integration and good relations of the people. So we are here to conduct concrete canoe competition. to showcase the culture of kerala state.

It is really a thrilling experience to design and build concrete canoe and finally row it in water, which a layman would find very hard to believe. Taking the experiences from

abroad, PEC University of Technology also organised Concrete Canoes competition on a small scale in the recent past.

Now, PEC University of Technology, Chandigarh is proudly presenting Concrete Canoe Competition 2018, a major attraction of PECFest 2018

GENERAL RULES

1. Each team shall have a maximum of 6 persons (with minimum 2 boys and minimum 1 girl)
2. The canoe must be designed by a team of bonafide students pursuing Civil/Architecture/Ocean Engineering program at any AICTE approved University/Engineering College in India.
3. The mould for casting the canoe cannot be prepared by professionals other than the team members. All works (design, construction, testing, etc.) must be performed by the team members.
4. The length, width, and height of your canoe must be less than or equal to 1.5m, 0.3m, and 0.25 m, respectively.
5. The teams can either bring their furnished boats at the time of testing or they can come to the PEC University campus on 13 and 14 october and construct their boats on the spot.
6. Concrete will be allowed to set for atleast 15 days and testing would be done on event day only.
7. The teams will be provided all the basic raw materials including cement, aggregate, thermocol and other basic material free of cost on the spot only. No admixtures and other additives will be provided, participants can bring their own material (if they require).

RESTRICTIONS ON MATERIAL USED

CONCRETE MATERIALS

- Commercially available pre-packaged or pre-mixed concrete, mortar, or grout cannot be used.
- The minimum amount of ordinary Portland cement should be 30% (by weight) of the total weight of the cementitious/binder materials.
- Fly ash, slag, silica fume, metakaolin, and other commercially available supplementary cementitious materials (SCMs) can be used as mineral admixtures.
- Commercially available chemical admixtures (superplasticizers, retarders, etc.) can be used.

- The volume of fine aggregates must be more than 25% of the total volume of the concrete. Natural and/or artificial materials can be used as fine aggregates to attain certain desired properties.

PAINTING

- Canoe can be painted in color for enhancing the aesthetic appearance. However, the bottom surface of the canoe (the surface in contact with the water) should not be painted.

DIMENSIONAL CONSTRAINTS

1. Length

The length of the canoe, defined as the maximum end-to-end (bow to stern) measurement taking into account the outermost longitudinal dimension of the hull, is restricted to 1.5 metres. The lower limit of length is 1 metre.

2. Beam Width

The maximum width of the canoe, defined as the outermost lateral dimension of the hull, is restricted to 0.3 metres. The location of the maximum width is at the discretion of the team.

3. Hull Depth

The dimensions of the hull depth are limited to 0.25 metre; depth location is at the sole discretion of the team.

4. Other Dimensions

The dimensions for other canoe parameters such as, but not limited to, hull thickness, radii of chines and rocker, are not regulated and their values are at the sole discretion of the team.

5. Use of Standardized Hull Design

Teams may use, and are permitted to modify, the hull design that had been developed by the CNCCC and used in the 2009-2011 ASCE National Concrete Canoe Competitions™ in USA. The specifications and drawings can be located at http://www.asce.org/concretecanoe.

6. Gunwale width of the canoe should be in range of 10 cm – 15 cm.

JUDGEMENT CRITERIA

1. Floatation test

The canoe shall pass a flotation test whereby the canoe floats horizontally, with both ends breaking water's surface, within two (2) minutes of being completely filled with water. A canoe shall be deemed as successfully passing the flotation test if it floats level and breaks the surface of the water without sinking once completely submerged. The canoe shall be certified as safe before entering any race, to the satisfaction of the judges

2. Loading

Load will be placed in the canoe till it starts sinking completely in water. More the load taken, more points will be awarded.

The boat will also be tested for concentrated load at the centre to check the flexural strength of the boat.

3. Design of canoe

Points will be awarded on the basis of the design of the hull, estimation showing the stability of the canoe in tide-less water, reasoning for design choices. Measurement of the dimensions of the canoe.

4. Load weight ratio

Weight of the canoe will be measured and ratio of load taken and weight of canoe will be calculated more points will be given for greater load weight ratio.

5. Concrete mix design

Materials selection (reasoning for the choice of material), understanding of the relationship among the mix component properties and proportions and achieving the design goal based on the structural analysis, Mixture Proportion Data sheet (compliance and correct math)

6. Material wastage will also be checked by calculating the theoretical material that has to be used