DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY, MADRAS
CHENNAI-600 036.

Name of the Project : **REPORT ON TESTING OF TIMBER BEAM (H-20)**

Client : **M/s. Eximcorp India Pvt. Ltd.,**
X-11, Anna Nagar, Park Towers,
Chennai – 600 040.

Ref No. : *Email dated 06.10.2021*

Consultant : **Dr. G. APPA RAO**
Professor
Department of Civil Engineering
Indian Institute of Technology Madras
Chennai - 600 036.

The report deals with the ***"Testing of Timber Beam (H-20)"*** submitted by M/s. Eximcorp India Pvt Ltd, Chennai. This report contains **Seven** pages.

Date: 13.10.2021

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13/10/2021

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LABORATORY TEST REPORT
STRUCTURAL ENGINEERING LABORATORY
DEPARTMENT OF CIVIL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGYMADRAS, CHENNAI- 600 036

Title : Report on Bending and Shear Test of H20 Timber Beam

Client: M/s. Eximcorp India Pvt Ltd

INTRODUCTION

M/s. Eximcorp Pvt Ltd., Chennai, through email dated 06.10.2021, approached the Indian Institute of Technology Madras to carry out bending and shear tests on timber beam H-20. The Indian Institute of Technology Madras, represented by Dr. G. Appa Rao, Professor (Structural Engineering Laboratory), agreed to take up the above work and test was carried out. This report deals with details of the test, observations made, and results obtained from the tests.

TEST SPECIMENS: H-20 Timber Beam – 2.45m Length

The test specimens (H-shaped, 200 mm height and 24 mm web thickness) were made of strength graded timber wood and plywood. Dimensional properties of the specimens are detailed in Fig 1. Top and bottom flanges were made of Fir or Spruce wood joined together and glued properly using Melamine. The web was made of Structural plywood.

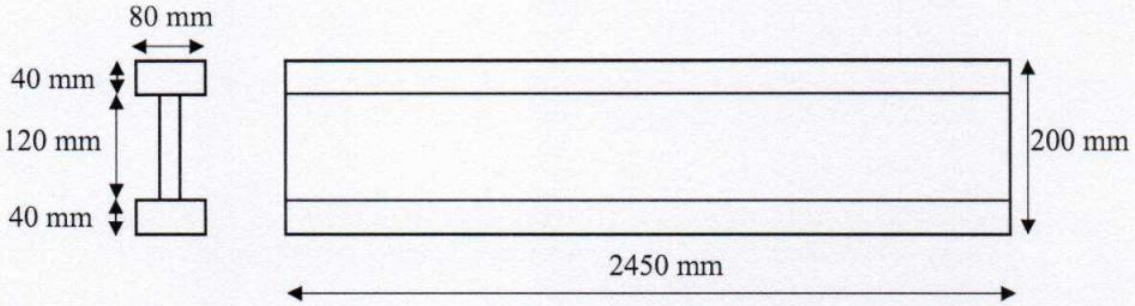

Fig. 1 – Dimension details of H-20 timber beam

TEST PROCEDURE

a) Bending Test

Three specimens with same cross-sectional dimensions were tested. Two-point loads were gradually applied using Flexural Testing Machine. Deflections of the specimen under loading were observed at the mid span point.

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b) Shear Test

Three specimens with same cross-sectional dimensions were tested for shear Two-point loads were gradually applied using Flexural Testing Machine. The ultimate load was found out for each specimen.

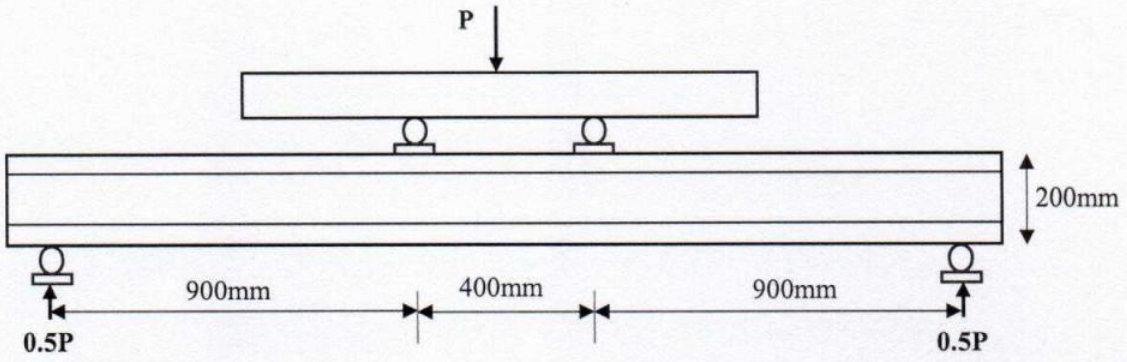

Fig. 2 – Bending test set-up

TEST SET-UP

a) Bending Test

The schematic diagram of the test set-up is shown in Fig. 2. Three specimens with length of 2450 mm were tested using the Flexural Testing Machine of capacity 400 kN. Two-point load was applied on the specimen. The point loads were applied in the plane of the web at 900 mm from each support.

b) Shear test

The schematic diagram of shear test set-up is shown in Fig. 3. Three specimens with 2450 mm length were tested in each depths using the Flexure Testing Machine of capacity 400 kN. Two-point load was applied on the specimen. The point load was applied in the plane of the web at 450 mm away from the supports.

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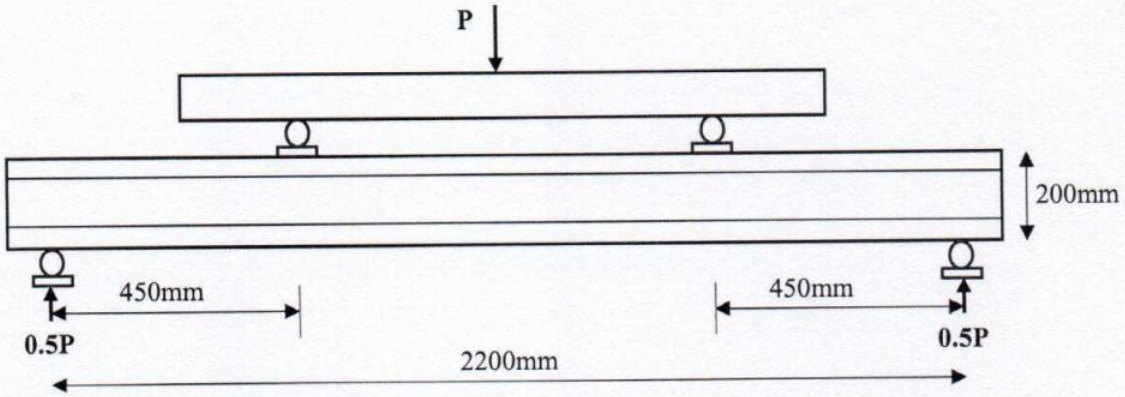

Fig. 3 – Shear Test set-up

TESTING EQUIPMENTS AND MEASURING DEVICES

The bending and shear test was done using Flexural Testing Machine of capacity of 400 kN. The deflection was measured using LVDT. The testing equipment were well calibrated at the time of testing also as per standards.

TEST RESULTS

The bending and shear tests were conducted for the H20 timber beams, and the results are tabulated below.

Bending test

The observations and results of bending test are tabulated in Table -1. The failure pattern of the beams in bending is shown in Fig.4 and 5 respectively.

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Table 1 – Bending test results

S. No	Ultimate Moment Capacity (kN-m)	Observations
1	16.19	Failure of beam occurred at bottom flange under right side loading point.
2	16.79	Failure of beam occurred at bottom flange and extended to web, under right side loading point.
3	19.22	Failure of beam occurred at bottom flange and extended to web, under left side loading point.

Shear test

The results of the shear test are summarized in Table 2. The failure pattern of the beams is shown in Figures 6 and 7 respectively.

Table 2 – Shear test results

S. No	Ultimate Shear Strength (kN)	Observations
1	25.14	Failure of beam occurred at bottom flange in between mid-span and right-side loading point, and failure connection between web and bottom flange also observed
2	28.71	Failure of beam occurred at bottom flange and extended to web, in between mid-span and right-side loading point
3	25.14	Failure of beam occurred at bottom flange and extended to web, in between mid-span and right-side loading point

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CONCLUSION:

Three beams were tested for bending and three beams for shear. The value of ultimate moment capacity varies between 16.19 kN-m to 19.22 kN-m respectively for the beams tested. Shear strength of the specimens is found to vary from 25.14 kN to 28.71 kN. Appropriate factor of safety is to be applied to obtain the safe load.

Prof. G. Appa Rao

Project Co-ordinator

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Fig. 4 – Test set-up for bending test

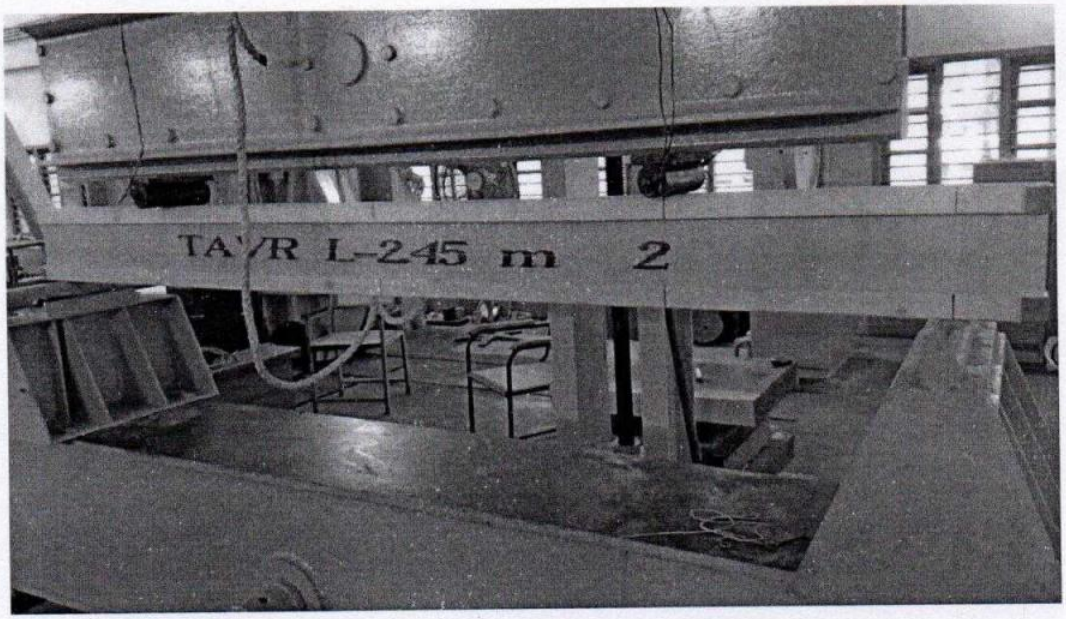

Fig. 5 – Test set-up for shear test

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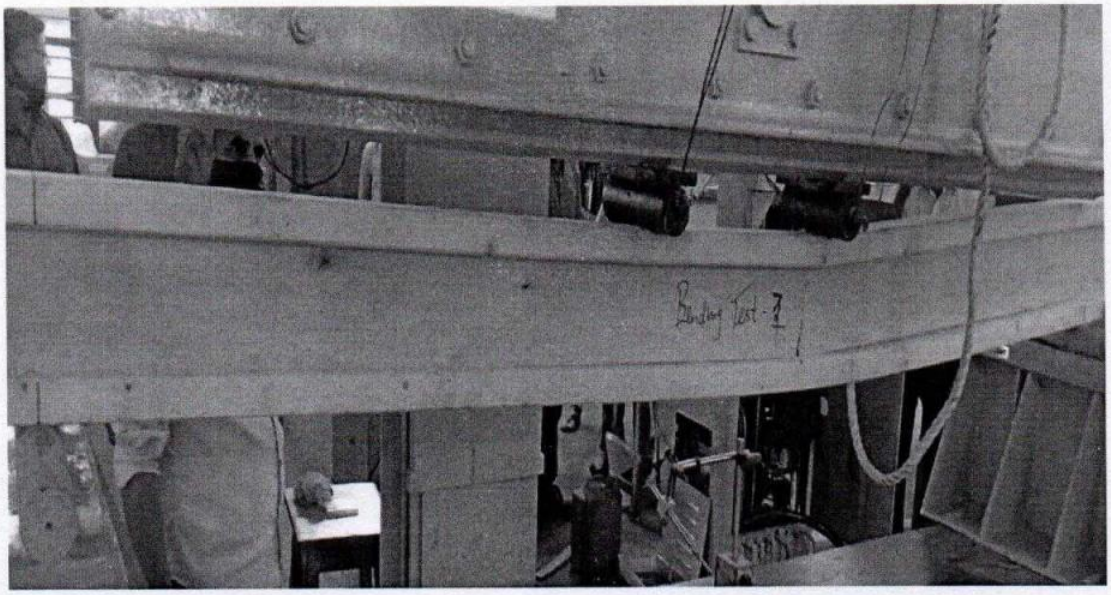

Fig. 6 – Typical failure pattern of beams in bending test

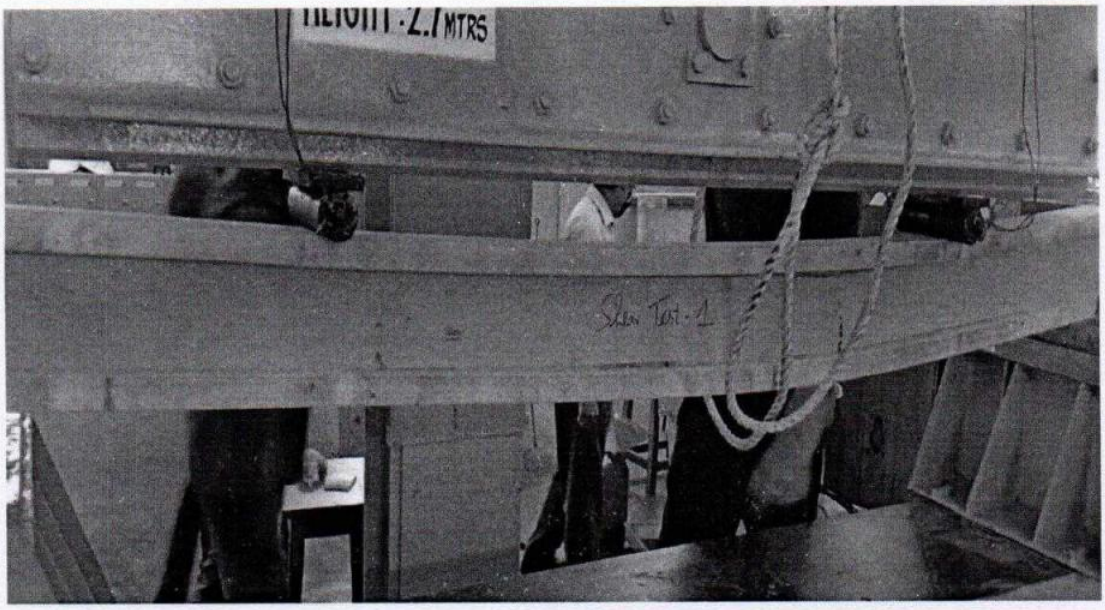

Fig. 7 – Typical failure pattern of beams in shear test.

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