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Innovations in Civil Engineering & Management
Volume 2 Issue 1, 2023

Comparative Study of Compressive Strength of Timber Blocks Under Various Slenderness Ratio-A Viable Case

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ABSTRACT

The title of paper is indicative for higher slenderness ratio and lower density bearing specimen, keep lower strength, which has been revealed through testing, considering some limitations and assumptions. The study extempore that specimen having size 5cm by 5cm by 10 cm with density 0.576 gm/cc bearing slenderness ratio as 2, has 440 kg/sq.cm strength, while sample having size 5cm by 5cm by 5cm with density 0.64 gm/cc bearing slenderness ratio as 1, has 568 kg/sq.cm strength. So, the lower slenderness ratio bearing members, having good density, extend more compressive strength, which has been revealed through this paper.

Key Words: *Density, Slenderness Ratio, weight, CTM and load.*

INTRODUCTION

Wood used for engineering purpose is said timber which is free from sap, wrapping, fissures, cracks, worms, termite, shakes and rots etc. Engineering timber is used in beam, chaukhats, shutters, truss, sleepers and office furnitures *etc*. Shishum, sal, teak, deodar and chir is used for various engineering purpose. The blocks of timber of various sizes are taken to get know the compressive strength by testing on hand operated Compression Testing Machine. The wooden test blocks of sizes 5cm by 5cm by10cm, 5cm by 5cm by 7.5cm, 5cm by 5cm by 5cm and 2.5cm by 5cm by 10cm were taken and tested by providing compressive force along the wooden fibers up-to the failure.

CONCEPT

The theme to this technical title deserves the strength of wooden blocks depends on the basis of their slenderness ratio and density. Higher the slenderness ratio, lower the compressive strength, due to the buckling in shape while loading. As slenderness ratio is the ratio between the height to the lateral least dimension. Also higher the density, higher the strength occurs.

LIMITATIONS

Following limitations and assumptions were taken to explore the result.

1) Slight eccentricity while loading may possible, however it has been considered as negligible.
2) Manual loading may have some jerks and its effect on failure has been taken as negligible.
3) Loading is along the fibers.
4) Weighing accuracy is limited to 2 grams.
5) CTM differ in calibration is negligible.
6) CTM has loading least count limited to 5kn.
7) Some internal fissures in wooden sample have been assumed as negligible.

PROCEDURE

Since it is clear, that higher the weight of material means small particles are closely packed and creates higher density, which represents the higher strength too. Also, when material specimen is placed to bear the compressive force, then its height to its lateral dimension's ratio affects the strength.

The seasoned wooden blocks of sizes 5cm by 5cm by10cm, 5cm by 5cm by 7.5cm, 5cm by 5cm by 5cm and 2.5cm by 5cm by 10cm were taken and weighted individually, after calculating individual's volume, to get know the density. Then individual block was tested by providing axial compressive force up-to its failure in crushing. Following table will demonstrate the theme of title.

S.No	Size	Weight In gm	Volume in cc	Density in gm/cc	SLR l/b	Load In kg	Area In sq.cm	Strength In kg/sq.cm	Remark
1	5by5by10 cm	134	250	0.536	2	10500	25	420	Good
2	5by5by10 cm	144	250	0.576	2	11000	25	440	Better
3	5by5by7.5 cm	110	187.5	0.587	1.5	13500	25	540	Best
4	5by5by7.5cm	112	187.5	0.597	1.5	13500	25	540	Best
5	5by5by5cm	72	125	0.576	1	14000	25	560	Good
6	5by5by5 cm	80	125	0.64	1	14500	25	580	Best
7	2.5by5by10 cm	74	125	0.592	4	5500	12.5	440	Better
8	2.5by5by10 cm	72	125	0.576	4	5000	12.5	400	Good

Figures

See figures of sample during failure in crushing.


5cmby5cm by 7.5cm


5cmby5cm by 10cm


5cmby5cm by 5cm


2.5cmby5cmby10cm


CTM

RESULT

The result during testing revealed that wooden pieces of small sizes have better strength, which indicates the lower slenderness ratio specimen has better strength.

REFERENCES

1) Disinfected Water –An Easy Approach presented in AGM of IEI UP State Centre Lucknow on 28/10/2007 and published in Jawaharlal Nehru Technological University-Hyderabad 02-06/Feb-2010, National Institute of Technical Teachers Training and Research Chandigarh-04-05/March-2010 and 22nd Indian Engineering Congress of The Institution of Engineers India Udaipur14-16 DEC-2007. (page no.-308-310)
2) Perspective of Informal Education in Engineering India published in 20th Indian Engineering Congress of the Institution of Engineers (India) Kolkata on 15-18/DEC-2005, (page no.350).
3) Perspective of Professional Engineering Membership-published in 19th Indian Engineering Congress of Institution of Engineers (India)-Mumbai17-19/DEC.2004, (page

no.313-314) Annual General Meeting of IEI UP State Centre Lucknow 13/NOV.-2005.
4) Water Hyacinthan Utmost Approach of Land Treatment published in AGM of IEI Lucknow 11/FEB-2007.
5) Revaluation of Sinking Fund-An Empirical View published in Indian Surveyor of Institution of Surveyors India-New Delhi-July 2009(ISSN-0970-3470),(page no.-54-56), Indian Valuer/Journal of Institution of Valuers India- New Delhi on March-2009, News Letter of Institution of Civil Engineers India-New Delhi on Dec-2008, Anusandhan -2017 ISSN-2322-0708.
6) Re-Assessment of Duty In Irrigation Channel-A Suggestive Approach published in Indian Surveyor Journal (ISSN-0970-3470) of ISOI New Delhi January 2012, (page no.-44-45).
7) Valuation of Volume of Frustumial Bodies-A Mathematical Study published in Journal Indian Valuer June 2009,
8) Optimum Shapial Building Structures-An Economical Estimation published in the Indian Surveyor of ISOI- New Delhi in July 2011. (page no.-46-51).
9) Valuation of Volume of Differential Folding Patterns-A Calculator view published in Indian Surveyor (ISSN-0970-3470) in January-2011 (page no.-50-52).
10) Modern Contruction Viz-A-Viz Primitive Construction-A Case Study for Viable Valuation published in IOV New Delhi in June 2013(page no.674-682) and Indian Surveyor ISSN-0970-3470 of Institution of Surveyor India of its July 2012 volume, (page no.-17-22)
11) Valuation of Methods for Designing of RCC Structures-A Case Study with Working Stress v/s Limit State vis-a vis Ultimate Load published in IOV of Dec-2013(page no.-1524-1526) and Abhiyanta Bandhu of IEI U.P. Lucknow in 2015. (page no.-170-173), IOV of September-2013, (page no.-1078-1081).
12) Valuation of Single Room Below Ground Level –An Estimational Study for Spread v/s Quasi Spread Footing Foundation published in IOV in April-2014. (page no.-402-407).
13) Valuation Of Strength of Structrual Steel Angles- A Case Study with EQUAL vis-à-vis Unequal Angles under I.S. CODE: 800-1984 published in IOV New Delhi in 24/MAY-2015 and International Journal of Engineering Research and Application-DEC-2015 ISSN-2248-9622.
14) Mulyankan Ke Naye Aayam published in Vigyan Garima Sindhu (A-Journal under MHRD-GOI) in June-2009.
15) Valuation of Steel Column Base – A Economical Case Study under I.S. CODE: 800-1984 published in journal of Ceramics and Concrete Technology bearing ISSN:2457-0828 in 12/04/2019 under Mantech Publications Pvt. Ltd. Ghaziabad.
16) Re-Assessment of Rivet Size by Empirical Way for Theoretically Calculating Tensile Strength under IS Code: 800-1984 published in Journal of Ceramics and Concrete Technology in 13/05/2019 under Mantech Publication Ghaziabad.
17) Perspective of Diploma in Engineering Courses vis-a-vis Simple Graduation within U.P. Province-A Case Study-2020
18) Journal of ISTE-New Delhi- IJTE bearing ISSN-0971-3034, volume-44, no.-4, oct-dec-2021, page-4-11.
19) Innovations in Multidisciplinary Research-volume -1, Issue-1 of CR Subscription Agency.
20) Diploma in Engineering an Equivalent to Intermediate -The State Level Study published in “ANUSANDHAN” page number 79-80
21) Science Research Journal)-ISSN-2322-0708/EISSN-2350-0123 (year-2021) volume-1, part-9. -Valuation of Design for RCC Balanced Beam Versus Under Reinforced Beam Using I.S.Code-456-2000 published in Innovations in Civil Engineering and Management

journal (volume-1,issue-1) under CR Subscription Agency Ghaziabad in Jan-June 2021 page no.44/47

22) Working Stress Versus Limit State Method-A Gistical View for Designing of RCC Structures- published in Innovations in Civil Engineering and Management journal (volume-1, issue-1) under CR Subscription Agency Ghaziabad in July-Dec.2021 page no.20/31 IIMT-Greater Noida -National Conference paper presented on 24-12-2021
23) Equivalency of Diploma in Engineering-A Case Study – Journal of ISTE-New Delhi-JITE bearing ISSN-0971-3034, volume-45, no.-1, JAN-MARCH-2022, page-4-11.