ISSN : 2301-5690

mahen

INTERNATIONAL CONFERENCE

ENGINEERING & TECHNOLOGY DEVELOPMENT
UBL ICETD
2013

The Second International Conference on Engineering and Technology Development

2nd ICETD 2013

27, 28, 29 August 2013, Bandar Lampung, Indonesia

PROCEEDINGS

In Cooperations With :

APTIKOM

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

SURYA INSTITUTE

Hosted by :
Faculty of Engineering and Faculty of Computer Science,
Bandar Lampung University (UBL), Indonesia

2nd ICETD 2013

THE SECOND INTERNATIONAL CONFERENCE
ON ENGINEERING AND TECHNOLOGY DEVELOPMENT

28 -30 January 2013
Bandar Lampung University (UBL)
Lampung, Indonesia

PROCEEDINGS

Organized by:

Faculty of Computer Science and Faculty of Engineering
Bandar Lampung University (UBL)
Jl. Zainal Abidin Pagar Alam No.89 Labuhan Ratu, Bandar Lampung, Indonesia
Phone: +62 721 36 666 25, Fax: +62 721 701 467
website :www.ubl.ac.id

ISSN 2301-6590

PREFACE

The Activities of the International Conference is in line and very appropriate with the vision and mission of Bandar Lampung University (UBL) to promote training and education as well as research in these areas.

On behalf of the Second International Conference on Engineering and Technology Development (2nd ICETD 2013) organizing committee, we are very pleased with the very good response especially from the keynote speaker and from the participans. It is noteworthy to point out that about 80 technical papers were received for this conference.

The participants of the conference come from many well known universities, among others : University Kebangsaan Malaysia – Malaysia, APTIKOM – Indonesia, Institut Teknologi sepuluh November – Indonesia, Surya Institute – Indonesia, International Islamic University – Malaysia, STMIK Mitra Lampung – lampung, Bandung Institut of Technology – Bandung, Lecture of The Malahayati University, B2TP – BPPT Researcher – lampung, Starch Technology Center – Lampung, Universitas Islam Indonesia – Indonesia, Politeknik Negeri Malang – Malang,University of Kitakyushu – Japan, Gadjah Mada University – Indonesia, Universitas Malahayati – Lampung, Lampung University – lampung, Starch Technology Center – Lampung, Universitas Riau – Riau, Hasanuddin University – Indonesia, Diponegoro University – Indonesia, King Abdulaziz University – Saudi Arabia, Parahyangan Catholic University – Indonesia , National Taiwan University– Taiwan, Surakarta Christian University – Indonesia, Sugijapranata Catholic University – Indonesia, Semarang University – Indonesia, University of Brawijaya – Indonesia, PPKIA Tarakanita Rahmawati – Indonesia, Kyushu University, Fukuoka – Japan, Science and Technology Beijing – China, Institut Teknologi Sepuluh Nopember – Surabaya, Researcher of Starch Technology Center, Universitas Muhammadiyah Metro – Metro, National University of Malaysia – Malaysia.

I would like to express my deepest gratitude to the International Advisory Board members, sponsor and also to all keynote speakers and all participants. I am also gratefull to all organizing committee and all of the reviewers who contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector of Bandar Lampung University (UBL) who give us endless support to these activities, so that the conference can be administrated on time

Bandar Lampung, 29 August 2013-08-26

Mustofa Usman, Ph.D
2nd ICETD Chairman

ISSN 2301-6590

PROCEEDINGS

2nd ICETD 2013

The Second International Conference
On Engineering And Technology Development

28 -30 January 2013

INTERNATIONAL ADVISORY BOARD

ISSN 2301-6590

PROCEEDINGS

2nd ICETD 2013

The Second International Conference
On Engineering And Technology Development

28 -30 January 2013

STEERING COMMITTEE

Executive Advisors
Dr. M. Yusuf S. Barusman
Andala R. P. Barusman, MA.Ec

Chairman
Mustofa Usman, Ph.D

Co-Chairman
Dr. Ir. Hery Riyanto, MT
Ahmad Cucus, S.Kom., M.Kom

Secretary
Marzuki, S.Kom., M.Kom
Maria Shusanti Febrianti, S.Kom., M.Kom

Technical Committee
Indyah Kumoro, ST. IAI
Ardiansyah, ST., MT
Sofiah Islamiah, ST. MT
Taqwan Thamrin, ST., MSc
Dina Ika Wahyuningsih, S.Kom
Agus Sukoco, M.Kom
Hj. Susilowati, ST. MT
Haris Murwadi, ST, MT
Robby Yuli Endra, S.Kom., M.Kom
Fenty Ariani, S.Kom., M.Kom

Treasure
Samsul Bahri, SE
Dian Agustina, SE

ISSN 2301-6590

PROCEEDINGS

2nd ICETD 2013

The Second International Conference
On Engineering And Technology Development

28 -30 January 2013

ORGANIZING COMMITTEE

Chair Person
Dr. Ir. Hery Riyanto, MT

Vice Chair Person
Yuthsi Aprilinda, S.Kom., M.Kom

Treasure
Dian Agustina, S.E

Secretary
Aprizal, ST. MT
Ir. Tjejeng Sofyan, MM
Ir. Muhammad Zein, MT
Ir. Bambang Pratowo, MT

Special Events
Ir. Juniardi, MT
Ir. Indra Surya, MT
Ir. Sugito, MT
DR. Baginda Simaibang, M.Ed
Berry Salatar, S.Pd
Yanuar Dwi Prasetyo, S.Pd.I., M.A

Receiptionist
Ir. Najamudin, MT
Kunarto, ST. MT
IB. Ilham Malik, ST. MT
Ir.A Ikhsan Karim, MT
Ir. Asikin, MT
Usman Rizal, ST., M.MSi

Transportation and Acomodation
Irawati, SE
Desi Puspita Sari, S.E
Tanto Lailam, S.H

ISSN 2301-6590

Ilyas Sadad, S.T., M.T

Publication and Documentation
Ir. Indriati Agustina Gultom, M.M
Noning Verawati, S.Sos
Hesti, S.H
Rifandi Ritonga, SH
Violita, S.I.Kom

Cosumption
Dra. Yulfriwini, M.T
Wiwin Susanty, S.Kom., M.Kom
Fenty Ariani, S.Kom., M.Kom
Reni Nursyanti, S.Kom., M.Kom
Erlangga, S.Kom
Arnes Yuli Vandika, S.Kom

Facility and Decoration
Siti Rahma Wati,SE
Dina Ika Wahyuningsih, S.Kom
Zainal Abidin, SE
Ahyar Saleh, SE
Eko Suhardiyanto
Wagino
Sugimin

ISSN 2301-6590

Table Of Content

Organizing Committee i
Table Of Content v

Keynote Speaker

1. Recent Advances in Biofuel Cell and Emerging Hybrid System
   Abdul Aziz Ahmad and Raihan Othman 1

2. Waste Utilization Study Tailing Gold Mine in Way Linggo-Lampung, as Fine Aggregate Materials for Producing Mortar Materials based on concept of Green Technology
   Lilies Widojoko & Susilawati 8

3. Infrastructure Health Monitoring System (SHM) Development, a Necessity for Maintance and Investigation
   Prof. Dr. Priyo Suprobo, Faimun, Arie Febry 17

4. Four Phases Quality Function Deployment (Qfd) By Considering Kano Concept, Time And Manufacturing Cost
   Prof. Dr. Moses L Singgih, Dyah L. Trenggonowati, Putu D. Karningsih 22

Speaker

1. Comparative Analysis for The Multi Period Degree Minimum Spanning Tree Problem
Wamiliana, Amanto, and Mustofa Usman 39

2. Choosing The Right Software In Supporting The Successful of Enterprise ERP Implementation
Yodhie Yuniarthe, Idris Asmuni 44

3. Climate Adaptive Technology In Maintaining Vernacularism Of Urban Kampong Case study: KampungAdat (Indiginous) Mahmud, Bandung District,West Java
Marcus Gartiwa 50

4. The Prospect Of Diesohol In Facing Fossil Fuel Crissis
M.C. Tri Atmodjo 63

5. The Potential Of Agriculture And Forestry Biomass Wastes As Source Of Bioenergy
Hardoyo 66

6. The Importance of Education Facility as Sustainable Urban Generation Tool
Fritz Akhmad Nuzir, Haris Murwadi and Bart Julien Dewancker 71

7. The implementation of Secton Method for Solving Systems of Non Linear Equations
Nur Rokhman 80

8. Quality Control Analysis Into Decrease The Level Defects On Coffee Product
Heri Wibowo, Sulastri and Emy Khikmawati 85

9. Public Transportion Crisis In Bandar Lampung
Ida Bagus Ilham Malik 89

10. Geospatial Analysis of Land Use Change in Way Kuripan Watershed, Bandar Lampung City
Candra Hakim Van Rafi'i1., Dyah Indriana Kusumastuti2., Dwi Jokowinarno 99

11. Material Utilization Technology Of Agriculture And Forestry Waste
Hardoyo 105

12. The Supply Chain System Of Cassava On The Tapioca Industry
Hardoyo 108

13. Glass Technology In Natural Light Glasses On Aperture Element In The Architecture World
Muhammad Rija & MT Pedia Aldy 113

14. An Eksperimental Permeable Asphalt Pavement Using Local Material Domato Stone On Quality Of Porous Asphalt
Firdaus Chairuddin, Wihardi Tjaronge, Muhammad Ramli, Johannes Patanduk 117

15. Coordination Of Architectural Concepts And Construction Systems
Eddy Hermanto. 129

16. Seismic Assessment of RC Building Using Pushover Analysis
Riza Ainul Hakim 136

17. Viscosity and Liquidity Index Relation for Elucidating Mudflow Behavior
Budijanto Widjaja and Shannon Hsien-Heng Lee 143

18. The Use of Pozzolanic Material for Improving Quality of Strontium Liquid Waste Cementation in Saline Environment during Nuclear Waste Immobilization Process
Muhammad Yusuf, HayuTyasUtami, Tri SulistiyoHariNugroho, SusetyoHarioPutero 148

19. Geospatial Analysis Of Land Use And Land Cover Changes For Discharge At Way Kualagaruntang Watershed In Bandar Lampung
Fieni Yuniarti, Dyah Indriana K, Dwi Joko Winarno 153

20. Wifi Network Design For High Performance
Heru Nurwarsito, , KasyfulAmron,BektiWidyaningsih 161

21. Studi on The Efficiency Using Nature Materials in The Structural Elements of Reinforced Concrete Beam
Yasser , Herman Parung , M. Wihardi Tjaronge, Rudy Djamaluddin 167

22. The Research Of Slow Release Nitrogen Fertilizer Applied In Sugarcane (Saccharum Officinarum) For Green Energy Bioethanol
M.C. Tri Atmodjo, Agus Eko T. Nurul Rusdi, Sigit Setiadi, and Rina 179

23. Energy Utilization Technology Of Agriculture And Forestry Waste
Hardoyo 185

24. Implementation Of Fuzzy Inference System With Tsukamoto Method For Study Programme Selection
Fenty Ariani and Robby Yuli Endra 189

25. The Analysis of Video Conference With ITU Standarization (International Telecommunication Union) That Joining in Inherent At Bandar Lampung University
Maria Shusanti F, Happy Reksa 201

26. The E-internal audit iso 9001:2008 based on accreditation form assessment matrix in study program for effectiveness of monitoring accreditation
Marzuki, Maria Shusanti F 207

27. The Developing Of e-Consultations For Effectiveness of Mentoring Academy
Ahmad Cucus, Endang K 214

28. The Evaluation of information system performance in higher education case study with EUCS model at bandar lampung university
Reni Nursyanti, Erlangga 221

29. The Analysis Of History Collection System Based On AndroidSmartphone With Qr Code Using Qr CodeCase Study: Museum Lampung
Usman Rizal, Wiwin Susanty, Sutrisno 230

30. Application of Complaint Handling by Approach Model of ISO 10002 : 2004 to Increase Complaint Services
Agus Sukoco and Yuthsi Aprilinda 235

31. Towards Indonesian Cloud Campus
Taqwan Thamrin, Iing Lukman, Dina Ika Wahyuningsih 252

32. Bridging Router to ADSL Modem for Stability Network Connection
Arnes Yuli Vandika and Ruri Koesliandana 257

33. The Effect of Use Styrofoam for Flexural Characteristics of Reinforced Concrete Beams
Yasser , Herman Parung, M. Wihardi Tjaronge, Rudy Djamaluddin 261

34. The Estimation Of Bioethanol Yield From Some Cassava Variety
M.C. Tri Atmodjo 273

35. Effect of Superficial Velocity of Pressure Difference on The Separation of Oil And Water by Using The T-Pipe Junctionl
Kms. Ridhuan and Indarto 277

36. The use of CRM for Customer Management at Cellular Telecommunications Industry
Ayu Kartika Puspa 293

37. Indonesian Puslit (Centre Of IT Solution) Website Analysis Using Webqual For Measuring Website Quality
Maria Shusanti Febrianti and Nurhayati 297

38. The E-internal audit iso 9001:2008 based on accreditation form assessment matrix in study program for effectiveness of monitoring accreditation
Marzuki, Maria Shusanti F 307

39. Enhancing Quality Software Through CMMI-ISO 9001:2008and ISO 9126
Agus Sukoco 320

40. Value Analysis Of Passenger Car Equivalent Motorcycle (Case Study Kartini Road Bandar Lampung)
Juniardi, Aflah Efendi 337

41. Alternative Analysis Of Flood Control Downstream Of Way Sekampung River
Sugito, Maulana Febramsyah 347

42. Analysis Of Fitness Facilities And Effective Use Of Crossing Road
Juniardi, Edi Haryanto 353

43. Study On Regional Development Work Environment Panjang Port Lands In Support Bandar Lampung City As A Service And Trade
Ir. A. Karim Iksan, MT, Yohn Ferry 359

44. Analytical And Experimental Study Bamboo Beam Concrete
Hery Riyanto, Sugito, Juli 370

45. Comparative Analysis Of Load Factor Method Static And Dynamic Method (Case Study Akdp Bus Route Rajabasa - Bakauheni)
A. Ikhsan Karim, MT., Ahmad Zulkily 378

46. Optimization Utilization Of Water Resourcesdam Batutegi Using Method Of Linear Program
Aprizal,HeryFitriyansyah 386

47. Characteristics Generation Traffic Patterns And Movement In Residential Area (Case Study Way Kandis Residential Bandar Lampung)
Fery Hendi Jaya, Juniardi, ... 392

48. Use Study On Slight Beam Reinforced Concrete Floor Platein Lieu Of Scondary Beam
Hery Riyanto, Sugito, Lilies Widodjoko, Sjamsu Iskandar 399

49. Observation Of The Effect Of Static Magnetic Field 0.1 Mt On A-Amylase Activity In Legume Germination
Rochmah Agustrina, Tundjung T. Handayani, and Sumardi 405

50. Effectiveness Analysis Of Applications Netsupport School 10 Based Iso / Iec 9126-4 Metrics Effectiveness
Ahmad Cucus, Nelcy Novelia 413

51. Omparative Performance Analysis Of Banking For Implementing Internet Banking
Reza Kurniawan 418

ISSN 2301-6590

ANALYTICAL AND EXPERIMENTAL STUDY BAMBOO BEAM CONCRETE

Hery Riyanto, Sugito, Juli
Master of Civil Engineering, Graduate School, University of Bandar Lampung, Jl. Zaenal Abidin Pagar Alam 26 Bandar Lampung, 35142, Indonesia

Abstract-*This study is known as the Bamboo Concrete Beams (B3) with bamboo casing as an alternative reinforcement, conducted through experimental methods. The test results were then verified through analytical calculations. Behaviors examined included mechanical properties of bending, beam flexural strength and fracture patterns are burdened by the quasi-static load. Researchers used 16 pieces of the test specimen. Bamboo specimens used in this study is a type of Petung Bamboo (Dendrocalamus Asper), with a long piece of bamboo varies from 2860 mm to 3910 mm, outer diameter of the bottom of the 105 mm to 155 mm and the outer diameter of the upper section of 95 mm to 135 mm, which are grouped into 5 kinds of testing that is,*

1. *Bamboo intact, the inner segments remain, with BA code (2 pieces of the specimen)*
2. *Bamboo intact, the inner segments removed, the code BP (2 pieces of the specimen)*
3. *Bamboo shoots in a section removed (like bamboo pipes) and not given a bamboo rod stud, with code BTS (4 pieces of the test specimen).*
4. *Bamboo shoots in a section removed (like bamboo pipes) and given a bamboo rod stud on the inside along ½ bamboo inner diameter, with code BAS (4 pieces of the test specimen).*
5. *One side of the split bamboo rod sections with a thickness of 75 mm, inner bamboo segments remain (such as drums) and given a bamboo rod stud on the inside, with code KTGN (4 pieces of the test specimen). Value of the maximum load Pmax, the maximum moment Mmax and □ max deflection for each specimen according to the results of observation and calculation is as follows:*

BA 1,	P_{max}	=	838	kg,	M_{max}	=	2.933,00	kNmm dan □$_{max}$	= 50,11 mm.
BA 2,	P_{max}	=	1.044	kg,	M_{max}	=	3.654,00	kNmm dan □$_{max}$	= 23,31 mm.
BP 1,	P_{max}	=	907	kg,	M_{max}	=	3.174,50	kNmm dan □$_{max}$	= 42,90 mm.
BP 2,	P_{max}	=	838	kg,	M_{max}	=	2.933,00	kNmm dan □$_{max}$	= 38,25 mm.
BTS 1,	P_{max}	=	1.250	kg,	M_{max}	=	4.062,50	kNmm dan □$_{max}$	= 69,90 mm.
BTS 2,	P_{max}	=	3.032	kg,	M_{max}	=	10.612,00	kNmm dan □$_{max}$	= 63,64 mm.
BTS 3,	P_{max}	=	838	kg,	M_{max}	=	3.037,75	kNmm dan □$_{max}$	= 37,30 mm.
BTS 4,	P_{max}	=	1.798	kg,	M_{max}	=	8.091,00	kNmm dan □$_{max}$	= 61,20 mm.
BAS 1,	P_{max}	=	1.387	kg,	M_{max}	=	4.507,75	kNmm dan □$_{max}$	= 50,80 mm.
BAS 2,	P_{max}	=	838	kg,	M_{max}	=	2.723,50	kNmm dan □$_{max}$	= 46,05 mm.
BAS 3,	P_{max}	=	1.044	kg,	M_{max}	=	3.393,00	kNmm dan □$_{max}$	= 44,45 mm.
BAS 4,	P_{max}	=	1.044	kg,	M_{max}	=	3.393,00	kNmm dan □$_{max}$	= 64,79 mm.
KTGN 1,	P_{max}	=	976	kg,	M_{max}	=	3.172,00	kNmm dan □$_{max}$	= 21,00 mm.
KTGN 2,	P_{max}	=	976	kg,	M_{max}	=	3.172,00	kNmm dan □$_{max}$	= 92,32 mm.
KTGN 3,	P_{max}	=	976	kg,	M_{max}	=	4.062,50	kNmm dan □$_{max}$	= 44,67 mm.
KTGN 4,	P_{max}	=	1.387	kg,	M_{max}	=	4.507,75	kNmm dan □$_{max}$	= 70,45 mm.

INTRODUCTION

In the lives of rural communities in Indonesia, bamboo plays a very important. Bamboo material has long been known by the public has good properties to be used, among others, strong stem, resilient, straight, flat, hard, easy to cut, easy to set up and easy to work with and lightweight so it easily transportable. Besides bamboo is also relatively inexpensive compared to other building materials as are found in the surrounding rural settlements. A versatile bamboo plant for rural communities [4].
Bamboo in a round shape used for various constructions such as houses, warehouses, bridges, stairs, plumbing, water spots, as well as household appliances other [1]. In the form of parts can be made of bamboo booths, walls or floors, battens, fencing, crafts, and so forth. Some bamboo lately started being used as industrial raw material such as chopsticks, craft items, kitchen utensils, hats, bags, lampshades, musical instruments, curtains and others. In general, the type of bamboo that is often used by people in Indonesia is Bambu Tali (Gigantochloa Apus), Petung Bamboo (Dendrocalamus Asper), Bamboo Andong (Gigantochloa verticillata) and Black Bamboo (Gigantochloa Nigrocillata).

Traditional bamboo preservation efforts already identified by rural communities. Curing is done by submerging it in water, stagnant water, mud or sea water and fumigation. Moreover, we often found a way preservation by investing lime and cow dung on the walls of bamboo and bamboo room[6]. Bamboo preservation has the purpose to prevent fungal attack (dye and pelapuk) or insects (dry powder, dry wood termites and soil creep). Some bamboo furniture craftsmen undertook preservation using borax, camphor mixture of kerosene, or fumigation with sulfur. But effectiveness is not yet known how the chemicals used and the method of preservation is implemented [2].

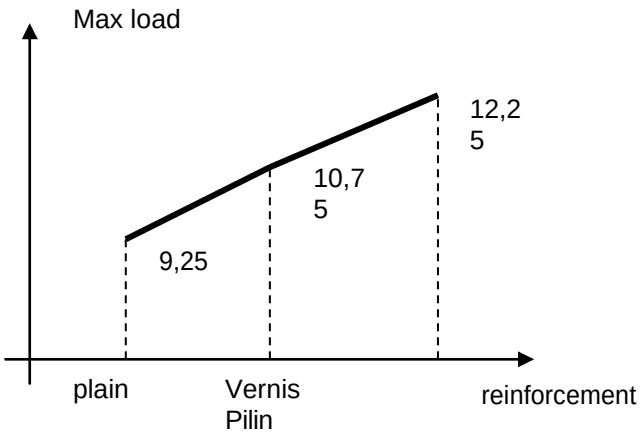
Use of bamboo is also grown towards replacing steel reinforcement (as an alternative reinforcement) in reinforced concrete. It is based on the strength of bamboo is relatively good in resist gravity. Several studies on the bamboo as an alternative material reinforcing steel has been carried out, including:
a. Pathurahman, Jauhar Fajrin and Anggraini Dwi Kusuma (2003) states that the bamboo has the opportunity to be used as reinforcement, especially for simple concrete structures [10].
b. Purba (2007) states that Bamboo Wall Precast (DBP) with bamboo as reinforcement in the form of woven sasak effectively used as an alternative reinforcement [7].

LITERATURE REVIEW

1. Maximum Load

Comparison of average maximum load that caused the collapse of the beam test specimen for plain bamboo reinforcement, the maximum load that can be supported beam test increased to 16.21% after the varnish coated bamboo reinforcement , and increased 32.43% after twisted bamboo reinforcement.
These results suggest that there is a strong improvement-Adhesion reinforcement (bond strength bar), which is quite significant when bamboo was treated divernis especially nominal [3].
Those results also prove that the result divernis, bamboo water rate be maintained at a constant value of specific and preventable decline until frictional forces between the reinforcement to the concrete surface is maintained at its initial value [9].
With nominal, depressions formed between strand-groove bamboo reinforcement spesi filled by concrete when casting is done. Despite the decline occurred, but darispesi depressions that have hardened concrete is able to prevent slips (slips) of bamboo with concrete reinforcement around [5].

ISSN 2301-6590



Figur. 1.
Comparison of the maximum load beam test
plain bamboo reinforcement, and varnish finishes in spiral

RESEARCH METHODOLOGY

1. Dimensional Objects Test

Researchers used 16 pieces of the test specimen. Bamboo specimens used in this study is a type of Petung Bamboo (Dendrocalamus asper), with a long piece of bamboo varies from 2860 mm to 3910 mm, outer diameter of the bottom of the 105 mm to 155 mm and the outer diameter of the upper section of 95 mm to 135 mm.

As a base line of this research will be tested against the bamboo, namely:

a. Bamboo intact, the inner segments remain,
   with BA code (2 pieces of the specimen)
b. Bamboo intact, the inner segment eliminated, with the BP code (2 pieces specimen)

Furthermore there are 3 categories of things Bamboo composite test-Concrete (concrete as fill material) which will be done in this study, namely:

a. Bamboo inner segments removed (like bamboo pipes) and bamboo not given stud, with BTS code (4 pieces of the specimen).
b. Bamboo inner segments removed (like bamboo pipes) and bamboo given all the studs on the inside of the bamboo inner diameter, with code BAS (4 pieces of the specimen).
c. One side of on the shaft of bamboo cleaved with a thickness of 75 mm, segments bamboo inner stay there (such as kentongan) and bamboo sticks were stud on the inside, with code KTGN (4 pieces of the specimen).

2. Preparation of Sample

Besides bamboo specimen specimen also needs concrete constituent materials are cement, sand, gravel and water. To get the ight amount of concrete needs to be used, t must be prepared careful calculation that can efficiently use such material.

Total demand for fresh concrete specimen category I, is 0.0988 m3. Total demand for fresh concrete specimen category II, is 0.0795 m3. Total demand for fresh concrete specimen category III, is 0.0705 m3.

While concrete mixer molen capacity available in the Civil Engineering Laboratory of the University of Bandar Lampung is 0:04 m3. Thus, making 12 pieces of the test object is planned to be done in 12 times the foundry (1 piece specimen 3.14 x r2 x length + bamboo specimen concrete cube 15 cm x 15 cm x 15 cm).

Twelfth casting specimens will be performed in one or two days of work, researchers therefore set up 12 bamboo petung directly to the test.

RESEARCH AND DATA ANALYSIS RESULTS

1. Testing Analysis Bamboo Concrete Beam

To obtain a thorough understanding of the behavior of B3, data verification testing of analytical calculations (theoretical) need to be done. Pattern approach is to compare the magnitude of the moment / experimental and theoretical load for each specimen group. Data deflection and crack patterns complement the data verification test [8].

½

2. Group Sample Test Beams Bamboo Base Line BA

Based on the results of the testing and analysis of test objects that group Line Timber Bamboo Base BA are as follows:

- BA 1 mm distance between the foundation in 2800, the largest maximum load that can be carried on the test specimen reaches Pmax = 838 kg, maximum moment Mmax = 2,933 kNmm and deflection occurs = 50.11 mm.
- BA 2 mm distance between the foundation in 2800, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,044 kg, maximum moment Mmax = 3,654 kNmm and deflection occurring = 23.31 mm.

3. Group Objects Test Beams Bamboo Base Line BP

Based on the results of the testing and analysis of sample test that group Line Timber Bamboo Base BP is as follows:

- BP 1 mm distance between the pedestal in 2800, the largest maximum load that can be carried on the test specimen reaches Pmax = 907 kg, maximum moment Mmax = 3174.5 kNmm and deflection occurring = 42.90 mm
- BP 2 mm distance between the pedestal in 2800, the largest maximum load that can be carried on the test specimen reaches Pmax = 838 kg, maximum moment Mmax = 2,933 kNmm and deflection occurring = 38.25 mm.

4. Group Sample Bamboo Concrete Beams Test BTS

Based on the results of testing and analysis that groups of specimens Bamboo Concrete Beams BTS is as follows:

- BTS 1 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,250 kg, maximum moment Mmax = 4062.5 kNmm and deflection occurring = 69.90 mm.
- BTS 2 mm distance between the pedestal in 2800, the largest maximum load that can be carried on the test specimen reaches Pmax = 3,032 kg, maximum moment Mmax = 10,612 kNmm and deflection occurring = 63.64 mm.
- BTS 3 mm distance between the pedestal in 2900, the largest maximum load that can be carried on the test specimen reaches Pmax = 838 kg, maximum moment Mmax = 3037.75 kNmm and deflection occurring = 37.30 mm.
- BTS 4 mm distance between the pedestal 3600, the maximum load that can be carried biggest specimen reaches Pmax = 1,798 kg, maximum moment Mmax = 8,091 kNmm and deflection occurring = 61.20 mm.

5. Group Sample Bamboo Concrete Beams BAS

Based on the results of testing and analysis that groups of specimens Bamboo Concrete Beams BAS is as follows:

- BAS 1 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,387 kg, maximum moment Mmax = 4507.75 kNmm and deflection occu rring = 50.80 mm.
- BAS 2 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 838 kg, maximum moment Mmax = 2723.5 kNmm and deflection occurring = 46.05 mm.
- BAS 3 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,044 kg, maximum moment Mmax = 3.393 kNmm and deflection occurring = 44.45 mm.
- BAS 4 mm distance between the pedestal in 2600, the largest maximum load that can be carried on

the test specimen reaches Pmax = 1,044 kg, maximum moment Mmax = 3393 kNmm and deflection occurring = 64.79 mm.

6. Group Sample Bamboo Concrete Beams KTGN

Based on the results of testing and analysis that groups Bamboo Concrete Beams specimens are as follows KTGN:

- KTGN 1 mm distance between the pedestal 2600, the maximum load that can be carried biggest specimen reaches Pmax = 976 kg, maximum moment Mmax = 3.172 kNmm and deflection occurring = 21.00 mm.
- KTGN 2 2600 mm distance between the pedestal, the largest maximum load that can be carried on the test specimen reaches Pmax = 976 kg, maximum moment Mmax = 3.72 kNmm and 91.80 mm deflection occurs
- KTGN 3 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,250 kg, maximum moment Mmax = 4062.5 kNmm and deflection occurring = 44.675 mm.
- KTGN 4 mm distance between the pedestal in 2600, the largest maximum load that can be carried on the test specimen reaches Pmax = 1,387 kg, maximum moment Mmax = 4507.75 kNmm and deflection occurring = 70.45 mm.

CONCLUSION

The value of the maximum load, maximum moment and lendutannya appropriate observations and calculations of the test object is as follows:

1. The maximum load that can be carried biggest specimen BA 1 reaches Pmax = 838 kg, maximum moment Mmax = 2933.00 kNmm and 50.11 mm deflection occurs.
2. The maximum load that can be carried biggest specimen 2 BA reaches Pmax = 1,044 kg, maximum moment Mmax = 3654.00 kNmm and 23.31 mm deflection occurs.
3. The maximum load that can be carried biggest specimen BP 1 reaches Pmax = 907 kg, maximum moment Mmax = 3174.50 kNmm and 42.90 mm deflection occurs.
4. The maximum load that can be carried biggest specimen BP 2 reaches Pmax = 838 kg, maximum moment Mmax = 2933.00 kNmm and 38.25 mm deflection occurs.
5. The maximum load that can be carried biggest specimen BTS 1 reaches Pmax = 1,250 kg, maximum moment Mmax = 4062.50 kNmm and 69.90 mm deflection occurs.
6. The maximum load that can be carried biggest specimen BTS 2 reaches Pmax = 3,032 kg, maximum moment Mmax = 10612.00 kNmm and 63.64 mm deflection occurs.
7. The maximum load that can be carried biggest specimen BTS 3 reaches Pmax = 838 kg, maximum moment Mmax = 3037.75 kNmm and 37.30 mm deflection occurs.
8. The maximum load that can be carried biggest specimen BTS 4 reaches Pmax = 1,798 kg, maximum moment Mmax = 8091.00 kNmm and 61.20 mm deflection occurs.
9. The maximum load that can be carried biggest specimen BAS 1 reaches Pmax = 1,387 kg, maximum moment Mmax = 4507.75 kNmm and 50.80 mm deflection occurs.
10. The maximum load that can be carried biggest specimen BAS 2 reaches Pmax = 838 kg, maximum moment Mmax = 2723.50 kNmm and 46.05 mm deflection occurs.
11. The maximum load that can be carried biggest specimen BAS 3 reaches Pmax = 1,044 kg, maximum moment Mmax = 3393.00 kNmm and 44.45 mm deflection occurs.
12. The maximum load that can be carried biggest specimen BAS 4 reaches Pmax = 1,044 kg, maximum moment Mmax = 3393.00 kNmm and 64.79 mm deflection occurs.

ISSN 2301-6590

13. The maximum load that can be carried biggest specimen KTGN 1 reaches Pmax = 976 kg, maximum moment Mmax = 3172.00 kNmm and 21.00 mm deflection occurs.
14. The maximum load that can be carried biggest specimen KTGN 2 reaches Pmax = 976 kg, maximum moment Mmax = 3172.00 kNmm and 92.32 mm deflection occurs.
15. The maximum load that can be carried biggest specimen KTGN 3 reaches Pmax = 976 kg, maximum moment Mmax = 4062.50 kNmm and 44.67 mm deflection occurs.
16. The maximum load that can be carried biggest specimen KTGN 4 reaches Pmax = 1,387 kg, maximum moment Mmax = 4507.75 kNmm and 70.45 mm deflection occurs.

Table 1. Load, Moment and Deflection

No	Code of Speciment	Long of Pedestal (mm)	P_{max} (Kg)	M_{max} (kNmm)	Deflection (mm)
1	BA 1	2800	838	2.933,00	50,11
2	BA 2	2800	1.044	3.654,00	23,31
3	BP 1	2800	907	3.174,50	42,90
4	BP 2	2800	838	2.933,00	38,25
5	BTS 1	2600	1.250	4.062,50	69,90
6	BTS 2	2800	3.032	10.612,00	63,64
7	BTS 3	2900	838	3.037,75	37,30
8	BTS 4	3600	1.798	8.091,00	61,20
9	BAS 1	2600	1.387	4.507,75	50,80
10	BAS 2	2600	838	2.723,50	46,05
11	BAS 3	2600	1.044	3.393,00	44,45
12	BAS 4	2600	1.004	3.393,00	64,79
13	KTGN 1	2600	976	3.172,00	21,00
14	KTGN 2	2600	976	3.172,00	92,32
15	KTGN 3	2600	976	4.062,50	44,67
16	KTGN 4	2600	1.387	4.507,75	70,45

REFERENCES

1. Arce-Villalobos, O., A. (1993), ―Fundamentals of the Design of Bamboo Structures‖ Doctoral Thesis, Eindhoven University, 260 pp. ISBN: 90-6814-524-X

2. Cox and Geymayer (1969) ―Expedient Reinforcement for Concrete for use in South East Asia‖, Monograph.

3. Duff, C., H. (1941) ―Bamboo and Its Structural Use‖, The Engineering Society of China, session 1940- 41, paper # ICE.1. Institution of Civil Engineers of Shanghai, pp. 1-27.

4. International Organization for Standardization (ISO). (2001). ―Laboratory Manual on Testing Methods for Determination of physical and mechanical properties of bamboo‖,

5. Marjono, F., (2006). ―Earthquake Resistant Buildings of Bamboo.‖, Posyanis – Jogja Revives, Leaflet #9, special edition 12 June 2006, page 1 – 4.

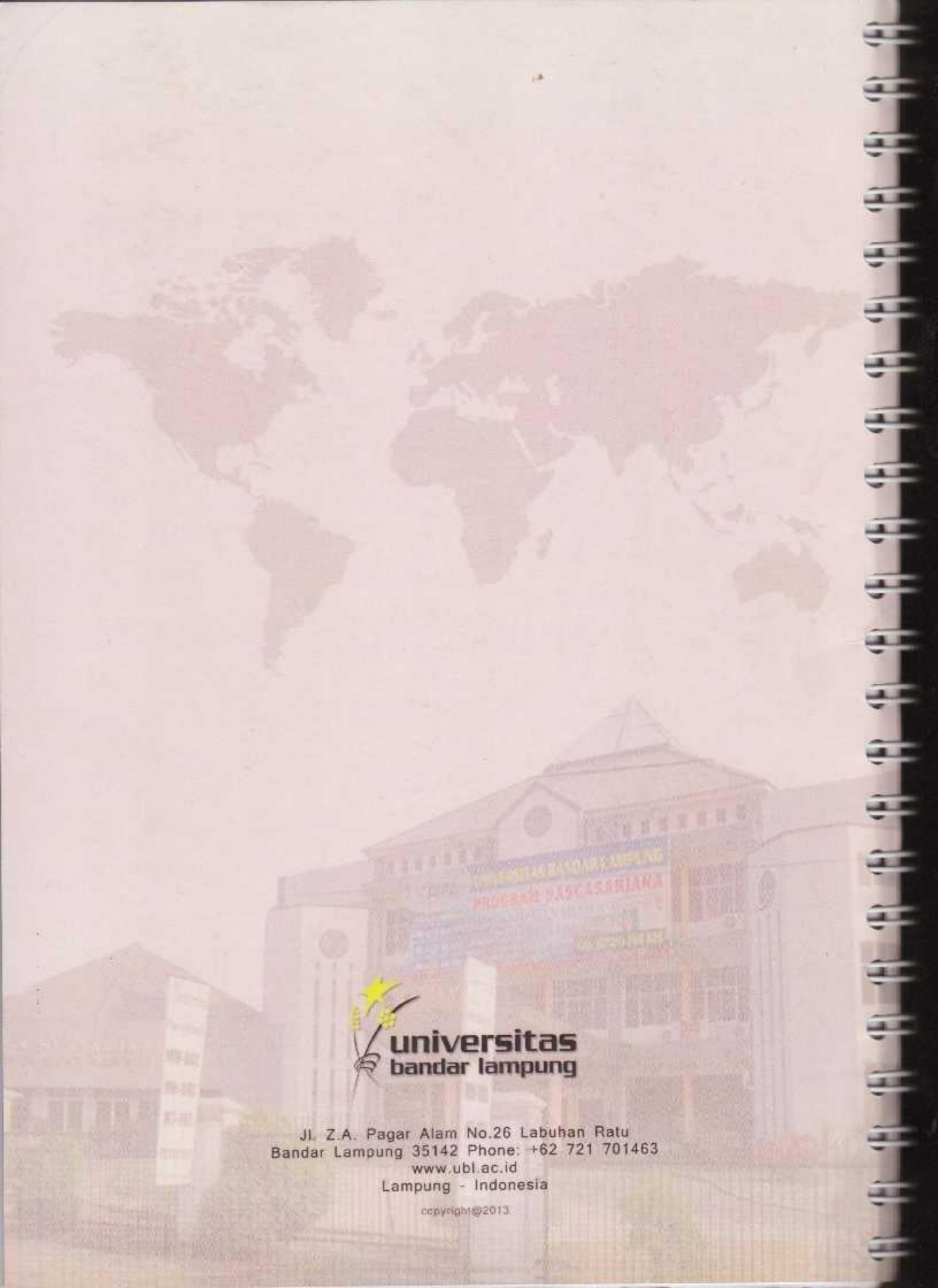
6. Masherni, (2008). ― Study Use of Alternative Bamboo As Reinforcement In Precast Concrete. "Graduate Program, University of Bandar Lampung.

7. Purba, Ronny Hasudungan. (2007) ‖ Precast Concrete Wall Using Bamboo As Reinforcement Alternatives, Final Report of Research Cooperation (Joint Resarch) PT Indo Semen Tunggal Tbk, University of Bandar Lampung, Bandar Lampung

8. Sharma, A. (1990) ‖Bamboo Reinforced Concrete Beams‖, Proceedings of the IABSE Symposium, Brussels, pp. 677-682.

9. Whittaker, A. (2005) ―Confined Reinforced Concrete‖, Module 03, CIE 525 Reinforced Concrete Structures Class Notes, University at Buffalo, New York.

10. Pathurahman, J., F. and Kusuma, D., A. (2003) ―Application Spiral Bamboo as Reinforcement Concrete Beams ", Journal of Civil Engineering Dimension Vol. 5, No. 1, pp. 39-44, Degree in Civil Engineering, Petra Christian University.



universitas
bandar lampung

Jl. Z.A. Pagar Alam No.26 Labuhan Ratu
Bandar Lampung 35142 Phone: +62 721 701463
www.ubl.ac.id
Lampung - Indonesia