

# INTERNATIONAL CONFERENCE



The Second International Conference on  
Engineering and Technology Development

# 2<sup>nd</sup> ICETD 2013

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



**PROCEEDINGS**



In  
Cooperations  
With :



الجامعة الإسلامية العالمية  
INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA  
بوتنيو وسنغافورة  
بوتنيو وسنغافورة



Hosted by :

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

# 2<sup>nd</sup> 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](http://www.ubl.ac.id)

## 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 ( 2<sup>nd</sup> 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  
2<sup>nd</sup> ICETD Chairman

# **PROCEEDINGS**

## **2<sup>nd</sup> ICETD 2013**

The Second International Conference  
On Engineering And Technology Development

**28 -30 January 2013**

### **INTERNATIONAL ADVISORY BOARD**

Y. M Barusman, Indonesia  
Ahmad F. Ismail, Malaysia  
Mustofa Usman, Indonesia  
Moses L. Singgih, Indonesia  
Andreas Dress, Germany  
Faiz A.M Elfaki, Malaysia  
Warsono, Indonesia  
Raihan Othman, Malaysia  
Zeng Bing Zen, China  
Tjin Swee Chuan, Singapore  
Khomsahrial R, Indonesia  
Rony Purba, Indonesia  
Alex Tribuana S, Indonesia  
Hon Wei Leong, Singapore  
Imad Khamis, USA  
Rozlan Alias, Malaysia  
Rudi Irawan, Indonesia  
Gusri Ibrahim, Indonesia  
Jamal I Daoud, Malaysia  
Riza Muhida, Indonesia  
Heri Riyanto, Indonesia  
Agus Wahyudi, Indonesia  
Lilies Widojoko, Indonesia

# **PROCEEDINGS**

## **2<sup>nd</sup> 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

# **PROCEEDINGS**

## **2<sup>nd</sup> 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

#### **Receptionist**

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

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

## Table Of Content

Organizing Committee .....	i
Table Of Content.....	v
Keynote Speaker	
1. Recent Advances in Biofuel Cell and Emerging Hybrid System <b>Abdul Aziz Ahmad and Raihan Othman</b> .....	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 <b>Lilies Widodojoko &amp; Susilawati</b> .....	8
3. Infrastructure Health Monitoring System (SHM) Development, a Necessity for Maintance and Investigation <b>Prof. Dr. Priyo Suprobo, Faimun, Arie Febry</b> .....	17
4. Four Phases Quality Function Deployment (Qfd) By Considering Kano Concept, Time And Manufacturing Cost <b>Prof. Dr. Moses L Singgih, Dyah L. Trenggonowati, Putu D. Karningsih</b> ....	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: Kampung Adat (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 Transpotion 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'1., 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 <b>Marzuki, Maria Shusanti F.</b> .....	207
27. The Developing Of e-Consultations For Effectiveness of Mentoring Academy <b>Ahmad Cucus, Endang K</b> .....	214
28. The Evaluation of information system performance in higher education case study with EUCS model at bandar lampung university <b>Reni Nursyanti, Erlangga.</b> .....	221
29. The Analysis Of History Collection System Based On AndroidSmartphone With Qr Code Using Qr CodeCase Study: Museum Lampung <b>Usman Rizal, Wiwin Susanty, Sutrisno.</b> .....	230
30. Application of Complaint Handling by Approach Model of ISO 10002 : 2004 to Increase Complaint Services <b>Agus Sukoco and Yuthsi Aprilinda.</b> .....	235
31. Towards Indonesian Cloud Campus <b>Taqwan Thamrin, Iing Lukman, Dina Ika Wahyuningsih</b> .....	252
32. Bridging Router to ADSL Modem for Stability Network Connection <b>Arnes Yuli Vandika and Ruri Koesliandana.</b> .....	257
33. The Effect of Use Styrofoam for Flexural Characteristics of Reinforced Concrete Beams <b>Yasser , Herman Parung, M. Wihardi Tjaronge, Rudy Djamaluddin</b> .....	261
34. The Estimation Of Bioethanol Yield From Some Cassava Variety <b>M.C. Tri Atmodjo</b> .....	273
35. Effect of Superficial Velocity of Pressure Difference on The Separation of Oil And Water by Using The T-Pipe Junctionl <b>Kms. Ridhuan and Indarto.</b> .....	277
36. The use of CRM for Customer Management at Cellular Telecommunications Industry <b>Ayu Kartika Puspa.</b> .....	293
37. Indonesian Puslit (Centre Of IT Solution) Website Analysis Using Webqual For Measuring Website Quality <b>Maria Shusanti Febrianti and Nurhayati.</b> .....	297
38. The E-internal audit iso 9001:2008 based on accreditation form assessment matrix in study program for effectiveness of monitoring accreditation <b>Marzuki, Maria Shusanti F.</b> .....	307

39. Enhancing Quality Software Through CMMI-ISO 9001:2008 and ISO 9126 <b>Agus Sukoco</b> .....	320
40. Value Analysis Of Passenger Car Equivalent Motorcycle (Case Study Kartini Road Bandar Lampung) <b>Juniardi, Aflah Efendi</b> .....	337
41. Alternative Analysis Of Flood Control Downstream Of Way Sekampung River <b>Sugito, Maulana Febramsyah.</b> .....	347
42. Analysis Of Fitness Facilities And Effective Use Of Crossing Road <b>Juniardi, Edi Haryanto.</b> .....	353
43. Study On Regional Development Work Environment Panjang Port Lands In Support Bandar Lampung City As A Service And Trade <b>Ir. A. Karim Iksan, MT, Yohn Ferry.</b> .....	359
44. Analytical And Experimental Study Bamboo Beam Concrete <b>Hery Riyanto, Sugito, Juli</b> .....	370
45. Comparative Analysis Of Load Factor Method Static And Dynamic Method (Case Study Akdp Bus Route Rajabasa - Bakauheni) <b>A. Ikhsan Karim, MT., Ahmad Zulkily.</b> .....	378
46. Optimization Utilization Of Water Resources dam Batutegei Using Method Of Linear Program <b>Aprizal, Hery Fitriyansyah</b> .....	386
47. Characteristics Generation Traffic Patterns And Movement In Residential Area (Case Study Way Kandis Residential Bandar Lampung) <b>Fery Hendi Jaya, Juniardi,</b> .....	392
48. Use Study On Slight Beam Reinforced Concrete Floor Plate in Lieu Of Secondary Beam <b>Hery Riyanto, Sugito, Lilies Widodjoko, Sjamsu Iskandar</b> .....	399
49. Observation Of The Effect Of Static Magnetic Field 0.1 Mt On A-Amylase Activity In Legume Germination <b>Rochmah Agustrina, Tundjung T. Handayani, and Sumardi.</b> .....	405
50. Effectiveness Analysis Of Applications Netsupport School 10 Based Iso / Iec 9126-4 Metrics Effectiveness <b>Ahmad Cucus, Nelcy Novelia</b> .....	413
51. Comparative Performance Analysis Of Banking For Implementing Internet Banking <b>Reza Kurniawan</b> .....	418

## **USE STUDY ON SLIGHT BEAM REINFORCED CONCRETE FLOOR PLATE IN LIEU OF SCONDARY BEAM**

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

**Abstract-***Use of false beams on reinforced concrete slab instead of the joist is an innovation in the construction of reinforced concrete slab. Where the study was made by using 4 samples of precast concrete slab specimens (PBP). Ie: P1 type - plate only, type P2 - plate with joists, type P3 - small plates with slight beams, type P4 - plate with big apparent beam. The fourth specimen samples made using the Batu Raja cement, sand from Gunung Sugih, and local split Bandar Lampung in the Civil Engineering Laboratory of UBL. The fourth test specimen samples was conducted at the Laboratory of Civil Engineering Unila using method one point load that is placed in the center - the center span in order to get the load and the maximum deflection and crack patterns. The data obtained are used to verify the theoretical calculations. Conclusions will be given at the end of writing.*

**Keywords:** *artificial beam, maximum load, maximum deflection, crack patterns.*

## INTRODUCTION

In the modern era many young architects to design buildings with a minimalist style that minimal design but most notably on the function of the lower level floor (split level). In this case the Civil Engineer must be able to tolerate the design of the architect, of course, within limits - limits the rules of civil engineering criteria. The case that the joists should be discarded because they interfere with the aesthetic design of the ceiling. To anticipate that it is made apparent as the study of beam replacement joist with experimental methods carried out in the laboratory of civil engineering. As for making false beams can also be beneficial in terms of economics, time, construction of buildings (building height may be lower due to the lower floor level). The purpose of this paper to obtain data on the extent to which the apparent beam reinforced concrete construction can be used.

## LITERATURE REVIEW

### 1. Formula Speciment Planning Analysis

In planning specimen authors use the basic formula calculation of reinforced concrete beams without taking into account the conversion factors Whitney voltage block as shown in Figure 1

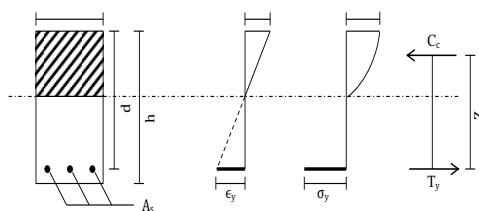


Figure 1: The diagram of distribution of strain and stress

Balance equation the horizontal force and moments:

1. The resultant compression force concrete the magnitude must be equal

to the resultant force on the tensile steel.

$$\sum H = 0$$

$$C_c = T_y \quad \text{where } T_y = A_s \sigma_y$$

Calculation applies to the calculation of the collapse of state planning balanced, then apply  $T_y = A_s f_y$

2. External moments must be equal to the moment internal.

$$M_{\text{ext}} = M_{\text{int}} = M_{\text{ultimat}}$$

$$M_u = A_s f_y Z \quad \text{where } Z = (0,8 - 0,9) d$$

$$A_s = \frac{M_u}{f_y Z}$$

$$\rho = \frac{A_s}{b d}$$

Requirement :  $\rho_{\text{min}} < \rho < \rho_{\text{max}}$

### 2. Testing the formula

In this experiment the specimen is placed on two simple placement following the 1.20 m long with a center to center distance of 1 m pedestal, then given the gradual loading (incremental load) through the actuator load to the crack that is placed on the center span as shown in the Figure 2.

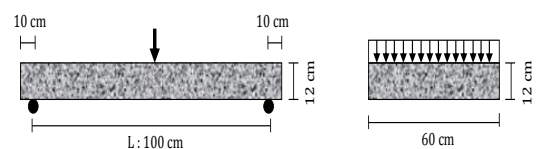


Figure 2. schematic of loading

Based on Figure 2, the load line can be considered as a concentrated load as the specimen just riveted on the two sides so that it can be considered as engineering

mechanics calculations beam.  
Engineering mechanics calculations:  
(See figure 3)



Figure 3: Moment diagram

$$-M_{LL} = \frac{1}{4} P L$$

$$-M_{DL} = \frac{1}{8} Q L^2$$

$$\text{So } M_u = M_{LL} + M_{DL} = \frac{1}{4} P L + \frac{1}{8} Q L^2$$

### 3. Studi Eksperimen Modul Benda Uji

Specimens were made with several types, namely: P1 type - plate only, type P2 - plate with joists, type P3 - plates with small apparent beams, type P4 - plate with big apparent beam. Each - each specimen using plain reinforcement (BJTP) Ø8 mm in diameter and quality of steel fy: 2400 kg/cm<sup>2</sup>, wherein each - each rebars placed 2 cm from the outermost layer of concrete. Module will test object given in table 1.

Table 1: Module test specimens

Type	Jenis	Ukuran Pelat ( cm )	Ukuran Balok
P1	pelat saja	120×60×12	-
P2	pelat dengan balok anak	120×60×12	12×17
P3	pelat dengan balok semu kecil	120×60×12	12×12
P4	pelat dengan balok semu besar	120×60×12	21,5×12

Figure 4 shows the images - photos of the four types of the test specimens (formwork and reinforcement).



Figure 4. formwork and reinforcement

specimen

Tanggal Pengcoran	Tanggal Pengujian	Berat Jenis ( kg/m <sup>3</sup> )	Kuat Tekan ( kg/cm <sup>2</sup> )
11/11/2008	10/12/2008	2321,302	181,17
11/11/2008	15/12/2008	2192,593	177,78
11/11/2008	15/12/2008	2283,557	220,81
11/11/2008	15/12/2008	2251,852	182,22

### 4. Concrete Process

Manufacture of concrete for test specimens conducted at the Laboratory of Civil Engineering UBL according to Procedure of Making Plans Mixed Concrete Normal accordance with SNI 03-2834 -2000. The use of cement in making concrete the King Stone, Sand Gunung Sugih, and local split Bandar Lampung. Manufacture of fresh concrete mixtures with compressive strength fc plan: 225 kg/cm<sup>2</sup> for 1 m<sup>3</sup> of fresh concrete required:

- Cement = 323 kg
- Sand ( keadaan SSD ) = 811,14 kg
- Split = 982 kg
- Watter = 153,86 ltr

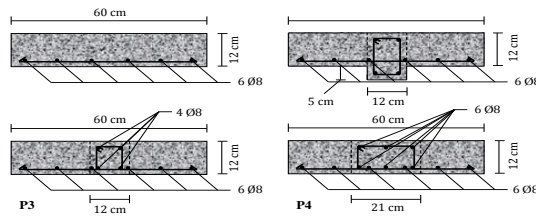
### 5. Concrete Compressive Strength Test Results

Compressive strength testing of concrete cubes for the four specimens held after the age of concrete at 28 days. Tests carried out at LTS - UBL and data testing results are shown in Table 2.

Tabel 2 : concrete compressive strength test results

## RESULTS AND DISCUSSION

### 1. Analysis of Specimens



**Figure 5: section of the test specimen**

### Calculations for the plate only

$$M_u = n \pi r^2 f_y 0,9d$$

$$= 6 \times 3,14 \times 0,4^2$$

$$\times 2400 \times 0,9(9,6)$$

$$M_u = 62506,60 \text{ kgcm}$$

$$M_{DL} = \frac{1}{8} Q l^2 = \frac{1}{8} \times 1,73 \times 100^2$$

$$= 2162,50 \text{ kgcm}$$

$$M_{LL} = M_u - M_{DL}$$

$$= 62506,60 - 2162,50$$

$$= 60344,10 \text{ kgcm}$$

$$\rightarrow P_{LL} = \frac{4 M_{LL}}{l} = \frac{4 \times 60344,10}{100}$$

$$= 2413,76 \text{ kg}$$

### Calculation plate with scodary beam

$$M_u = M_{u1} + M_{u2}$$

$$= (n_1 \pi r^2 f_y 0,9d_1)$$

$$+ (n_2 \pi r^2 f_y 0,9d_2)$$

$$M_u = (6 \times 3,14 \times 0,4^2 \times 2400$$

$$\times 0,9(9,6))$$

$$+ (2 \times 3,14 \times 0,4^2$$

$$\times 2400 \times 0,9(14,6))$$

$$M_u = 94193,97 \text{ kgcm}$$

$$M_{DL} = \frac{1}{8} Q l^2 = \frac{1}{8} (1,73 + 0,144) 100^2$$

$$= 2342,50 \text{ kgcm}$$

$$M_{LL} = M_u - M_{DL}$$

$$= 94193,97 - 2342,50$$

$$= 91851,47 \text{ kgcm}$$

$$\rightarrow P_{LL} = \frac{4 M_{LL}}{l} = \frac{4 \times 91851,47}{100}$$

$$= 3674,05 \text{ kg}$$

### Calculation plate with small apparent beam

$$M_u = n \pi r^2 f_y 0,9d$$

$$= 8 \times 3,14 \times 0,4^2$$

$$\times 2400 \times 0,9(9,6)$$

$$M_u = 83342,13 \text{ kgcm}$$

$$M_{DL} = \frac{1}{8} Q l^2 = \frac{1}{8} \times 1,73 \times 100^2$$

$$= 2162,50 \text{ kgcm}$$

$$M_{LL} = M_u - M_{DL}$$

$$= 83342,13 - 2162,50$$

$$= 81179,63 \text{ kgcm}$$

$$\rightarrow P_{LL} = \frac{4 M_{LL}}{l} = \frac{4 \times 81179,63}{100}$$

$$= 3247,18 \text{ kg}$$

### Calculation of the plate with large apparent beams

$$M_u = n \pi r^2 f_y 0,9d$$

$$= 10 \times 3,14 \times 0,4^2$$

$$\times 2400 \times 0,9(9,6)$$

$$M_u = 104177,66 \text{ kgcm}$$

$$M_{DL} = \frac{1}{8} Q l^2 = \frac{1}{8} \times 1,73 \times 100^2$$

$$= 2162,50 \text{ kgcm}$$

$$M_{LL} = M_u - M_{DL}$$

$$= 104177,66 - 2162,50$$

$$= 102015,16 \text{ kgcm}$$

$$\rightarrow P_{LL} = \frac{4 M_{LL}}{l} = \frac{4 \times 102015,16}{100}$$

$$= 4080,60 \text{ kg}$$

## 2 Testing Analysis Test Specimen



Specimens were concentrated on two simple pedestal pressure gradually until the cracks with hydraulic jack in tengah2 span steel through solid concrete slab width of a rigid specimens. Any increase in the burden of proving ring reading on mounted on hydraulic jacks and any deflection that occurs is read on the dial gauge mounted in the bottom center specimens. Load and deflection results are shown in Figure 6.

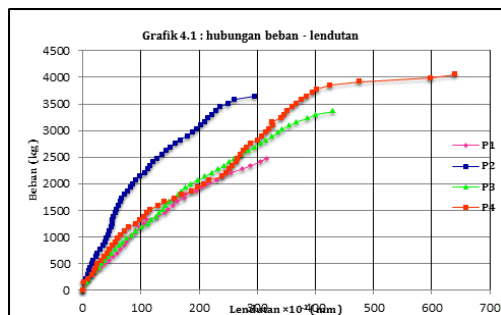


Figure 6. Load vs. deflection graph

Based on the analysis of the load vs. deflection relationship, then substantial rigidity of each specimens can be seen in Figure 7. Stiffness = load is achieved when specimens divided by the crack deflection occurs.

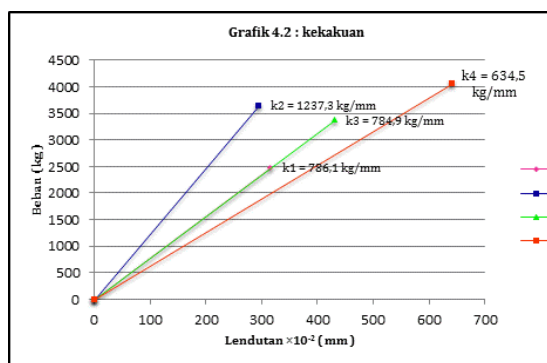


Figure 7 Graph shows the stiffness of each specimen.

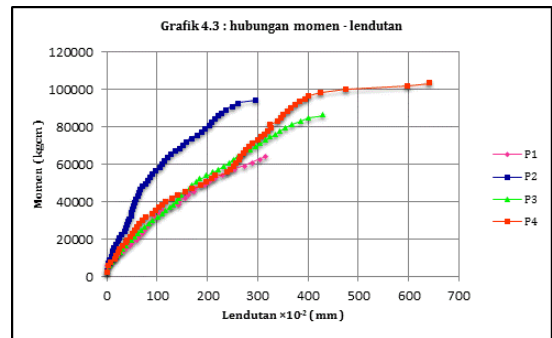


Figure 8. Graph shows the moment vs. deflection relationship of each specimen

Cracking pattern of each specimen is shown in Figure 9.

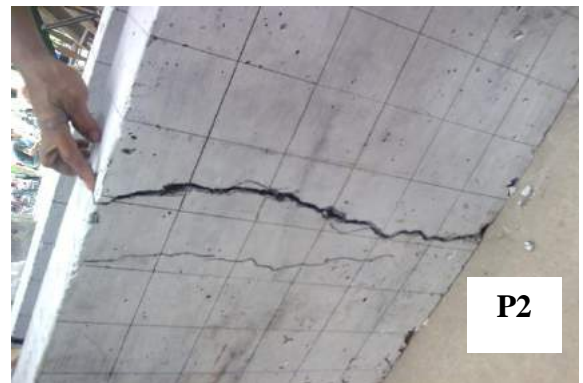
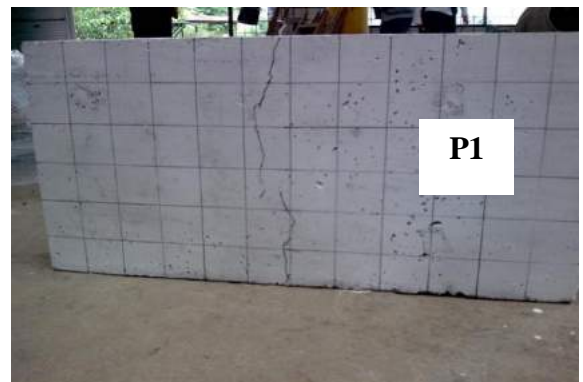




Figure 9: crack pattern test specimens

## CONCLUSION

1. Of the four specimens used in this study, a concrete slab with beams apparent  $21.5 \times 12$  cm (P4) is most effectively used as an alternative in the planning of a concrete slab. Specimen P4 able to bear the load of 4061 kg before the collapse. The maximum moment capacity reached 103,687.5 kgcm, while the nominal moment capacity is only 101 525 kgcm.
2. In the chart 4.2: Relationship load - deflection for specimens P1, P2, P3, P4 on the linear line P2 has seen test specimen stiffness  $k_2 = 1237.3$  kg / mm which means much more rigid than the P4 specimens having rigidity  $k_4 = 634.5$  kg / mm, but specimens P4 is able to bear the greatest burden before developing cracks. So a rigid structure that can not be said to be as strong as the test specimen P2. In other words specimen P4 is more ductile than the specimen so that the specimen P2 P4 stronger withstand impact loads and load creep.

## REFERENCES

1. Department of Public Works (1987) "Guidelines for the Imposition of Planning and Building Houses", the Foundation Board of Public Works Publisher.

2. Kh Sunggono (1984) "Civil Engineering Books", publisher Nova.
3. National Agency for Standardization (2002) "Planning Procedures Concrete Structures for Buildings" National Standardization Agency.
4. National Agency for Standardization (2002) "Calculation Procedure for Concrete Structures for Buildings" National Standardization Agency.
5. Reno Widodo (1993), "Coefficient Tables and Graphs for Planning Plates Concrete Beams", the Foundation Board of Public Works Publisher.
6. Sagel R. and P. Kole and Kusuma Gideon (1994), "Guidelines for Concrete Work", Erlangga.
7. Schodek Daniel (1998), "Structure", Refika Aditama.
8. Vis W.C. and Kusuma Gideon (1993), "Planning Basics Reinforced Concrete", Erlangga.
9. Vis W.C. and Kusuma Gideon (1993), "Graphs and Table Calculation Reinforced Concrete", Erlangga.
10. Vierck Robert (1995) "Vibration Analysis", Eresco.



**universitas  
bandar lampung**

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

copyright © 2013