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THE 3rd INTERNATIONAL CONFERENCE OF EUROPEAN ASIAN CIVIL ENGINEERING FORUM (EACEF) 2011, GERMAN ALUMNI NIGHT, and Half Day Seminar of German Professors

Theme: Designing and Constructing in Sustainability

Organized by:

Universität Stuttgart Germany | UPH Universitas Pelita Harapan | Universitas Atma Jaya Yogyakarta | Universität Kassel

Supported by:

DAAD Deutscher Akademischer Austausch Dienst German Academic Exchange Service

Yogyakarta, 20 - 22 September 2011

Introduction:

This report is consisted of three activities, joint cooperation between Universitas Atma Jaya Yogyakarta (UAJY), Universitas Pe Harapan (UPH), University of Stuttgart, University of Kassel, supported by DAAD through Grant for Alumni Events.

The committee has been also supported by The Ministry of Public Works of Republic of Indonesia and The Embassy of Fed Republic of Germany.

1. THE 3rd INTERNATIONAL CONFERENCE OF EACEF 2011

In September 2010, Prof. Dr.-Ing. Harianto Hardjasaputra set up the International Scientific committee, chaired by Prof. Dr.- Michael Schmidt (University of Kassel).

INTERNATIONAL SCIENTIFIC COMMITTEE

Chairman: Prof. Dr.-Ing. Michael Schmidt (University of Kassel, Germany)

Structural and Construction Engineering

Prof. Dr.-Ing. Dr.-Ing. E.H. Werner Sobek (University of Stuttgart, Germany)
Prof. Dr.-Ing. Harianto Hardjasaputra (Universitas Pelita Harapan, Indonesia)
Prof. Yoyong Arfiadi, Ph.D. (Universitas Atma Jaya Yogyakarta, Indonesia)
Prof. Ir. Dr. Mahmood Md. Tahir, B.Sc. (Universiti Teknologi Malaysia, Malaysia)
Prof. Dr.-Ing. Johannes Tarigan (Universitas Sumatera Utara, Indonesia)
Prof. Dr.-Ing. Karl-Heinz Reineck (University of Stuttgart, Germany)
Prof. Ir. Iswandi Imran, Ph.D (Institut Teknologi Bandung, Indonesia)
Prof. Kuo-Chun Chang (National Taiwan University, Taiwan)
Prof. Andy Chit Tan, Ph.D. (Queensland University of Technology, Australia)

Construction Management and Project Management

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Prof. Weng Tat Chan (National University of Singapore, Singapore)
Prof. Dr.-Ing. Michael Korn (University of Karlsruhe, Germany)
Prof. Khrisna Mochtar, Ph.D. (Institut Teknologi Indonesia, Indonesia)
Prof. Dr.-Ing. Hans Wilhelm Alfen (Bauhaus-University of Weimar, Germany)
Prof. I-Tung Yang Ph.D (National Taiwan University of Science and Technology)

Infrastructure (environmental, coastal, transportation, water) Engineering
Prof. Nur Yuwono, Ph.D. (Universitas Gadjah Mada, Indonesia)
Prof. Dr.-Ing. Jürgen Hothan (Leibniz-University of Hannover, Germany)
Prof. Tawatchai Tingsanchali (Asian Institute of Technology, Thailand)
Prof. Shunji Kusayanagi (Kochi University of Technology, Japan)

Geotechnical Engineering
Prof. Ir. Masyhur Irsyam, PhD (Institut Teknologi Bandung, Indonesia)
Prof. Chang-Yu Ou, Ph.D (National Taiwan University of Science and Technology, Taiwan)
Prof. Jianye Ching, Ph.D (National Taiwan University, Taiwan)
Prof. Horn-Da Lin, Ph.D (National Taiwan University of Science and Technology, Taiwan)

Building Materials Engineering and Nanotechnology
Prof. Dr.-Ing. Michael Schmidt (University of Kassel, Germany)
Prof. Yin-Wen Chan, Ph.D (National Taiwan University, Taiwan)
Prof. Dr. Ir. Irwan Katili (Universitas Indonesia, Indonesia)
Prof. Hilmi Bin Mahmud, Ph.D (Universiti Malaya, Malaysia)
Prof. Dr.-Ing. Ludger Lohaus (Leibniz University of Hannover, Germany)

The member of ISC comes from the international universities in Europe, Asia, and Indonesia. They were assigned based on their expertise each to review the submitted abstracts & papers.

The civil engineering department of Universitas Atma Jaya Yogyakarta was the host of this conference. They set up the organizing committee, chaired by Ms. Ir. Anastasia Yunika M.Eng. The lecturers from both universities were involved in this committee.

Organizing Committee (OC):

STEERING COMMITTEE	:	Dean of Faculty of Engineering of UAJY
		Dean of Faculty of Design and Planning of UPH
		Director of Executive of EACEF
		Prof. Dr.-Ing. Harianto Hardjasaputra (Alumni)
ORGANIZING COMMITTEE		
Chairwoman	:	**Anastasia Yunika, S.T., M.Eng.** (anasyunika@yahoo.com)
Treasurer	:	Sumiyati Gunawan, S.T., M.T.
Vice Chairman 1	:	Cilcia Kusumastuti, S.T., M.Eng.
Sponsorship & Promotion/ Exhitibition	:	Ir. Hendra Suryadharma, M.T.
		Ir. Y. Lulie, M.T.
		Joey Tirtawijaya S.T., M.T.
Registration	:	Cilcia Kusumastuti, S.T., M.Eng.
		Maya Nainggolan
Proceeding & Paper	:	Ferianto Raharjo, S.T., M.T.
		Siswadi, S.T., M.T.
		Dr. Ir. Wiryanto Dewobroto, M.T.
		Merry Natalia, ST, M.Eng
Publication	:	Lukas Widya
		Agung Pradjaka
Venue and equipment	:	Ir. Wiryawan Sarjono, M.T.
		Januar Sudjati, S.T., M.T.
Vice Chairman 2	:	Ir. Junaedi Utomo, M.Eng.
Plenary & Technical Session	:	Ir. Junaedi Utomo, M.Eng.
		Dr.-Ing. Jack Widjajakusuma
Program/ Master of Ceremony	:	Prof. Dr. Manlian Ronald A. Simanjuntak, S.T., M.T., D.Min.

Logistic/consumption/	:	Eva Lianasari, S.T., M.T.
banner/conference Kit		Etik Rukmini
		Supiyati
Transportation	:	Ir. Arief Sudibyo
		Sribowo
Accomodation of speakers	:	Anastasia Yunika, S.T., M.Eng.
		Vincent, ST
Documentation	:	Wiko Retnanto
Technical visit & Farewell Dinner	:	Ir. Harijanto Setiawan, M.Eng.
		Ir. Eko Setyanto, MCM
Website Administrator	:	Hendy Wijaya, S.Kom

Program Schedule of Conference

Conference preparation

In December 2009 the OC announced the coming conference through flyer and website for **call for papers.**

We launch the conference website www.eacef.com, equipped with on line registration, to ease the authors in registration and submission their scientific paper.

The participants were welcomed to contribute the paper on the conference with following key dates:

1. Submission of a brief one-page abstract : 28 February 2011
2. Acceptance of the abstract : 31 January – 28 February 2011
3. Submission of the complete manuscripts : 1 July 2011
4. Review of the manuscripts : 15 June 2011 - 30 June 2011
5. Final submission of the Complete manuscripts : 1 July 2011

Conference date and venue:

Date : 20 – 22 September 2011

Venue :

September 20 ,2011

- Grand Quality Hotel, Yogyakarta

September 21 ,2011

- St. Thomas Aquinas Auditorium, Universitas Atma Jaya Yogyakarta

September 22 ,2011

- Technical Visit – Borobudur Temple & Prambanan Temple

The main theme of the conference is:

Designing and Constructing in Sustainability

The Scientific Committee has accepted 131 scientific papers from 20 countries. 91 papers were presented in 4 Plenary Sessions and 8 parallel technical sessions. They were divided into five groups, as such:

1. Structural and Construction Engineering
2. Construction Management and Project Management
3. Infrastructure (environmental, coastal, transportation, water) Engineering
4. Geotechnical Engineering
5. Building Materials Engineering (Nanotechnology)

Promotion

To promote the conference, the Organizing Committee has made one flyer and conference website: www.eacef.com

The Organizing Committee published the accepted scientific papers in the form of **Digital Proceeding** and **Printed Proceed** and also **Program Book/Abstract**.

Keynote Speakers

- Ir. Agus Widjanarko, MIP (German Alumni- University of Stuttgart), Secretary General of Public Works Ministry of Republic of Indonesia
- Dr. Norbert Baas, **His Excellency, the Ambassador of Republic Federal of Germany**

Invited Speakers

8 Invited Speakers from world class universities were invited to present their state of the art of research:

1. Dr.-Ing. Alexander Wetzel on behalf of Prof. Dr.-Ing. habil. Michael Schmidt (University of Kassel, GERMANY)
2. Dipl.-Ing. Linus Klein on behalf of Prof. Dr.-Ing. habil. Christian Moormann (University of Stuttgart, GERMANY)
3. Prof. Jong Sung Sim (University of Han Yang - KOREA)
4. Klaus Thorsten, M.Sc. on behalf of Prof. Dr.-Ing. habil. Werner Sobek (University of Stuttgart, GERMANY)
5. Dr. Keiji Ando (The Japan Iron and Steel Federation, JAPAN)
6. Prof. Shunji Kusayanagi (Kochi University of Technology, JAPAN)
7. Prof. Chan Weng Tat (National University of Singapore, SINGAPORE)

Conducting a two-day Conference

1st Day, September 20, 2011

Time: 8.00 – 17.00

Program: Plenary & Technical session

Welcoming and opening Speeches of the conference was delivered by:

1. Prof. Dr.-Ing. Harianto Hardjasaputra (UPH-Indonesia), Chairman of European Asian Civil Engineering Forum (EACEF)
2. Ms. Ir. Anastasia Yunika, M.Eng (UAJY-Indonesia), Chairwoman of Organizing Committee
3. Dr. Nils Wagenknecht, on behalf of Director of DAAD Jakarta Office
4. Dr. Rogatianus Maryatmo, Ph.D (Rector of UAJY-Indonesia)
5. Ir. Agus Widjanarko, MIP (German Alumni- University of Stuttgart), Secretary General of Public Works Ministry of Republic of Indonesia

Prof. Dr.-Ing. Harianto Hardjasaputra (Director of LPPM Universitas Pelita Harapan), Chairman of European Asian Civil Engineer Forum (EACEF)

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EACEF

The 3rd International Conference of European Asian Civil Engineering Forum

Yogyakarta, INDONESIA, 20 - 22 September 2011

Designing and Constructing in Sustainability

Keynote Speakers

- Ir. Agus Widjanarko, MIP (German Alumni- University of Stuttgart), Secretary General of Public Works Ministry the Republic of Indonesia
- Dr. Norbert Baas, His Excellency, the Ambassador of Republic Federal of Germany

Invited Speakers

The Development of Nanotechnology for Construction Materials

Prof. Dr.-Ing. habil. Michael Schmidt (University of Kassel)

Real-Time Rainfall and Flood Forecasting in Ta Tapao River Basin, Thailand

Prof. Tawatchai Tingsanchali, D.Eng. (Nakhon Pathom Rajabhat University)

Designing the Future

Klaus Thorsten, M.Sc. on behalf of Prof. Dr.-Ing. habil. Werner Sobek (University of Stuttgart, GERMANY)

New Structural Systems Employing Innovative Structural Materials

Keiji Ando (The Japan Iron and Steel Foundation, Japan)

Optimisation of Sustainable Geotechnical Structures in Urban Civil Engineering

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Prof. Dr.-Ing. habil. Christian Moormann (University of Stuttgart)

The Development of Construction Safety Management Systems

Prof. Chan Weng Tat (National University of Singapore)

Construction Management Research and Education Activities Moving Up Asian Universities Collaboration

Prof. Shunji Kusayanagi (Kochi University of Technology, Thailand))

BM - Building Materials Engineering (Nanotechnology)

The Use of Local Materials in the Flexible Pavement Structure Towards the Sustainable Pavement Materials in Indonesia

Bambang S. Subagio

Multiphases Hydration of the Activated Binary Blend Portland Cement – Trass

Vera Indrawati Judarta

Utilisation of Soft Drink Can as Fibre Reinforcement in Concrete

A.S.M. Abdul Awal, Dianah Mazlan, and Md Latif Mansur

Another Looks: Application of Stick Scanner in RC Structures Assessment

Achfas Zacoeb, Yukihiro Ito, and Koji Ishibashi

The Comparison of Microscopic and Macroscopic Characteristics between Low Calcium Fly Ash Geopolymer Binder and High Calcium Fly Ash Geopolymer Binder Using Indonesian Fly Ash

Simatupang, P.H., Pane, I., Sunendar, B., and Imran, I.

Mechanical Properties of Concrete Using Rubber Tire Chips as Partial Coarse Aggregate Replacement

Ezahtul Shahreen A.W., Nor Ashikin M.K., and Roslina O.

Material Development of Nanosilica Based on Indonesia Silica Sand for Concrete Mix

Jonbi, Harianja, B., Imran, I., and Pane, I.

The Characteristic of Durability in High Performance Concrete

Chao-Lung Hwang, Chun-Tsun Chen, Fransiscus Mintar Ferry Sihotang, and Tuan Le Anh Bui

Self-Compacting Concrete in Its Durability Performance

Chao-Lung Hwang, Chun-Tsun Chen, Fransiscus Mintar Ferry Sihotang, and Tuan Le Anh Bui

The Utilization of Tailing Sand Ex Bangka Island for Rehabilitation Materials of Rigid Pavements

A. Setyawan, K.A. Sambowo, and Z. Senaring

Evaluation of Current Models for Estimating Long-Term Shrinkage of Lightweight Aggregate Concrete

S.A. Kristiawan

Multi Criteria Decision of Type and Building Material for Simple House Construction

Wahyu Wuryanti

Properties of Building Block Incorporating Waste Aggregates Bound With Alternative Binders

I Nyoman Arya Thanaya

Behavior of Baggage Ash – Cement Stabilized Soil with Fiber Inclusion

John T. Hatmoko and Yohanes Lulie

Analysis of the Use of Brackish Sand for Making Mortar in Mutun Beach, South Lampung Regency

Lilies Widojoko

The Effect of Carbon Black and Natural Rubber Latex on Rheological Characteristics of Bitumen

Ismail bin Yusof, Madi Hermadi, Saad, and Abdulqader Ali Joda

Strength and Sulphate Attack Resistance of Roller Compacted Concrete with Circulating Fluidized Bed Combustion Ash

Mao Chieh Chi and Run Huang

Reaction between Alkaline Metal Ions and ASR Reactive Aggregate and Behavior of Na+ and K+ in Cement Paste Replaced by

Wei-Chien Wang, Chih-Chien Liu, and Chau Lee

Mechanical Properties of Concrete Containing Recycled Steel Fibres (RSF)

Noralwani Modtrifi and Izni Syahrizal Ibrahim

Enhancement on Strength Properties of Steel Fibre Reinforced Concrete

Noor Nabilah Sarbini and Izni Syahrizal Ibrahim

The Compressive Strength of Baggase Ash-Based Geopolymer Concrete

Ade Lisantono and John Tri Hatmoko

Comparison of Infrastructure Designs for Quay Wall and Small Bridges in Concrete, Steel, Wood and Composites with Regard to the CO2-Emission and the Life Cycle Analysis

David Dudok van Heel, Trude MAAS, Jarit de Gijt, and Mozafar Said

Maturity Function to Predict Strength of Mortars Containing Ground Granulated Blast Furnace-Slag Cured at Different Curing Temperatures

Gidion Turuallo and M.N. Soutsos

Rutting and Fatigue Behavior of Nanoclay Modified Bitumen

Saeed Ghaffarpour Jahromi

The Effect of Cold Lava Aggrate as a Filler Material of Concrete

Ika Bali and Oskar Sitorus

Experimental Study to the Load-Displacement Response of The Interfacial Transition Zone in Concrete

Han Ay Lie and Parang Sabdono

The Influence of Compaction Methods on the Properties of Hollow Concrete BricksUtilizing Fly Ash and Bottom Ash

Djwantoro Hardjito and Antoni

The Use of Spent Catalyst RCC-15 as Powder on Environmental-Friendly High-Performance Self-Compacting Concrete

Bernardinus Herbudiman and Ayu Setyaning Pijar Kemala

Influence of Curing Method on High Strength Self Compacting Concrete

Bernardinus Herbudiman and Ruli Adi Prasetia

Flexural Performance of High Strength Concrete Containing Steel Fibres

Sholihin As'ad and Andreas Saxer

Shear-Friction Strength of Recycled Aggregate Concrete

Khaldoun Rahal, Abdul Lateef Al-Khaleefi

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Harianto Hardjasaputra, Joey Tirtawijaya, and Giovano Tandaju

CM - Construction Management and Project Management

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Sentosa Limanto, Jonathan HK, Stephen H.S, and Hendri W

Best Practice for Safer Construction from Designers' Perspective

Abdul Rahim Abdul Hamid, Bachan Singh and Tan Kin Liang

Best Practice for Safer Construction from Contractors' Perspective

Abdul Rahim Bin Abdul Hamid,Bachan Singh and Mazni Binti Mat Zin

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Project Financing and Risk Management in Transportation Projects: A Public Private Partnerships Framework

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Fault Tree Analysis of Work Accident Cause Factors in Mud Volcano Sidoarjo Disaster Management

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Productivity Problems Encounted by Indonesian Construction Foremen

Peter F. Kaming

Relationship Between Implementation of Safety Policy and Craftsmen's Productivity

Peter F. Kaming and Martino Ardianto

Risks Analysis in Public Private Partnership (Case Study: Traditional Market Development Projects in Surabaya)

Farida Rahmawati and Carla Widha Permatasari

The Implementation Effect of Aspects Relating to the Issues of Occupational Safety and Health Against Productivity in Constructi

Anton Soekiman and Syamsuduha

Cost of Quay Walls

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Mochamad Agung Wibowo and Rudi Waluyo

Exploring Contractors' View on Green Construction

Jati Utomo Dwi Hatmoko, Ferry Hermawan, And Tia Putriani Styianingsih

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Peak Base Acceleration of Semarang City with Three Dimensional Seismic Source Model

Abdul Rochim

Dimension Effects of Upstream Filter of Rockfill Dam Against Hydraulic Fracturing

D. Djarwadi, K.B. Suryolelono, B. Suhendro, and H.C. Hardiyatmo

Improvement of the Load Carrying Capacity of UTHM Soft Clay Soil by Electro Osmotic Consolidation

Khairul Nizar Mohd Yusof and Abdul Kaharudin Arsyad

Analysis of Basal Heave Stability for Excavations in Soft Clay Using the Finite Element Method

Aswin Lim, And Chang- Yu Ou

Squeezing Potential Evaluation of Tunnel in Tropical Area

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Validating the Juang Method in Order to Assess Liquefaction Potential of Soils in the Northern Moroccan Region of Tangier

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Influence of Construction Stages on Surface Settlement in NATM Tunnelling

H. Sohaei, M. Hajihassani, A. Marto, And M Karimi Shahrbabaki

IS - Infrastructure (environmental, coastal, transportation, water) Engineering

Exploring the Passenger Loyalty: An Integrated Framework for Service Quality, Satisfaction and Loyalty for Informal Public Transportation

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Financial Innovation for Toll Road Infrastructure Development

Lukas B. Sihombing, Ismeth S. Abidin, and Yusuf Latief

The Influence of Land Use in Transportation Planning

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Modeling Freight Transportation for Crude Palm Oil (CPO) in Central Kalimantan

Noor Mahmudah, Danang Parikesit, Siti Malkhamah, Sigit Priyanto, and Mark Zuidgeest

History, Conservation, and Development of Rail Transport in Indonesia

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Transportation Performance Indicator Survey on Transportation Agencies at Nanggroe Aceh Darussalam Province

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The Comparison of V/C and Travel Time Reliability Factor Affecting Daily RouteChoice Behavior at Medan City

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Considerations of Composite Signalised Intersection Control System

Ben-Edigbe J. and Mashros N.

Travel Expenditure of Urban Transportation in Yogyakarta

Imam Basuki, Siti Malkhamah, Ahmad Munawar, and Danang Parikesit

Land Value and Transportation Provision Modeling (Case Study: Yogyakarta City)

Muiz Thohir and Ofyar Z. Tamin

Binder Type Selection for Foamed Cold Mix Asphalt

Sri Sunarjono

Trend of Rainfall Pattern and Extreme Rainfall in Jakarta

Cilcia Kusumastuti and Sutat Weesakul

Formulating Model to Separate Liquid Terminal Operation

Anwarudin and Ofyar Z. Tamin

Informal Settlement Mapping and Urban Riverside Poverty Analysis Case: Kahayan Urban Riverside Area

Noor Hamidah

Probabilistic Roughness Progression as a Measure of Road Network Pavement Maintenance Effectiveness

I Putu Mandiartha, Colin F. Duffield, Russell G. Thompson

Properties of Porous Asphalt Mixed Subjected to Laboratory Ageing

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Using Geographic Information System for Flood Reduction in Bekasi City, Indonesia

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High Rate Water Treatment Plant System: Successful Implementation and Financial Prospect

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Potential Application of Biomembrane System for Wastewater Reuse in Urban Housing Area

Elis Hastuti and Haryo Budi

Modeling Groundwater Flow and Salinity Intrusion by Advective Transport in the Regional Unconfined Aquifer of Southwest Bangladesh

Sajal Kumar Adhikary, Ashim Das Gupta, and Mukand S. Babel

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Performance Analysis of Hydrology and Water Management for Flood Control System (A Case Study of Solo)

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SC - Structural and Construction Engineering

Partial Capacity Design, an Alternative to the Capacity Design Method

Benjamin Lumantarna and Ima Muljati

Finite Element Modeling for Reinforcing Steel Subjected to Reversed Cyclic Loading with Moderate Compressive Stress and Stra Demands

Data Iranata

The Effect of Structural Modelling on the Analysis of P-Delta Effect Case Study: Second-Order Analysis by a Commercial Compu Program, SAP2000

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Seismic Reinforcement Against Shear Failure by “Post-Installed Rebar” on Walls of Existing Underground Structures

Kensuke Yamamura and Osamu Kiyomiya

Lateral Torsional Buckling of Web Tappered I Beam

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Numerical Analysis of Circular Concrete Columns Confined with FRP Sheets Under Concentric Axial Load

Nico Nirwanto Laban and Andreas Triwiyono

Shear Strengthening Effect of RC Beams Retrofitted by Steel Reinforcement and PCM Shotcrete

A. Arwin Amiruddin

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Sri Tudjono, Windu Partono, and Joko Purnomo

Seismic Performance of Steel Special Moment Resisting Frame Using Reduced Beam Section

Ima Muljati and Hasan Santoso

Bonding Capacity of Self Compacting Concrete Containing Fly Ash and MIRHA

Agus Kurniawan, Nasir Shafiq,

Steel Fiber Concrete Slab Application as Replacement of Ordinary Roof Tiles

Agus Kurniawan

Analysis of Structural Healthiness Using Hilbert Transform

Jack Widjajakusuma

Seismic Performance of Structure with Vertical Set-Back Designed Using Partial Capacity Design

Pamuda Pudjisuryadi Benjamin Lumantarna, S. Teddy, And H. Wijoyo

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Gambiro and Heru Purnomo

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A Proposal of Tensile Test of Pultruded GFRP Plate

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Performance Based Design Review of 16-Story Twin Tower with Connecting Bridge-Way

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Lesson and Learning from 5 Big Earthquakes in Sumatra 2004 - 2010

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The Flexural Strength And Rigidity Of Composite Plywood-Meranti Stress Skin Panel

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Parametric Study of Modified Continuous Bang-Bang Controller

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Reconstruction of Distributed Force Characteristics in Case of Non Punctual Objects Impacting Elastic Beams

A. Elbakari, F. El Khannoussi, A. Khamlichi, R. Dkiouak, A. Hajraoui, M. Bezzazi, A. Limam, E. Jacquelin

Bolts Connections in Steel Bridge Structure Theory and Facts

Lanny Hidayat and Demson Sihaloho

Composite Columns in Low-to-Medium-Rise SCBFS with Braces in the Two-Story X-Configuration

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Empirical Modeling of Storm Processes

B.M. Nguyen, J. A. Roelvink, and P. H. A. J. M. van Gelder

A Fundamental Consideration of Defect Evaluation of Concrete Structures Using Infrared Thermography

Tatsuro Watanabe and Yoshimi Sonoda

Dynamic Behaviour of Footbridges Subjected to Human-Induced Dynamic Loads; A Case Study of Footbridges in Surabaya

Endah Wahyuni, asdamnu, Ananta S.Sidharta and Dicky Ardhian Prasetya

Mechanical Behavior of GFRP Rock Bolt for Permanent Support of Tunnel

Jongsung Sim and Hyunjoong Kim

The Development of Green Structural Concrete In Indonesia

Hadi Rusjanto Tanuwidjaja

A Discussion on Durability of High Strength Concrete (HSC) in View Point of Micro Pore Structure

Rita Irmawaty, Hidenori Hamada, Yasutaka Sagawa and Sho Yamatoki

The Aerodynamic Derivatives of Suramadu Cable Stayed Bridge

Sukamta

Shear Capacity of the Composite Styrofoam Filled Reinforced Concrete Beams

Rudy Djamaluddin

The Flexural Strength of African Wood Flange–Plywood Web I-Joist

Johannes Adhijoso Tjondro and Michael Pio

Ductility Performance of Precast Concrete Beam Confined by Nylon Mesh

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BEHAVIOR OF BAGGAGE ASH – CEMENT STABILIZED SOIL WITH FIBER INCLUSION

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ABSTRACT

Baggage ash is a fine residue collected from the burning of baggage in sugar factory. The production of baggage ash is growing according to production of sugar. Research about using of baggage ash is continually in progress. Baggage ash is a non cohesive material having small specific gravity that is relatively smaller than that of normal soil. When burned at 600^{O} C, baggage ash is pozzolanic material (Wibowo, and Hatmoko, 2003), and therefore its engineering behavior can be improved by addition of cement. Some experimental studies on chemical stabilization of baggage ash has been done. Wibowo and Hatmoko (2001) carried out a research of additional baggage ash to concrete. The research indicated that additional of baggage ash improved the strength of concrete with significant values. Wibowo and Hatmoko (2003, 2004) made an equipment to burn the baggage ash to get the optimum temperature to be the best pozzolanic material. Hatmoko (2003) observed the additional of baggage ash to expansive clay. In this paper, an experimental study was undertaken to study the individual and combined effects of randomly oriented fiber inclusions and baggage ash-cement stabilized soil. Baggage ash was taken from Madukismo Yogyakarta sugar factory, and it was mixed with clay with different proportions. The geotechnical characteristic of baggage ash-soil specimen, and baggage ash-soil specimen containing 0.8 to 1% randomly oriented fiber inclusions was investigated. A set of unconfined compression tests were carried out on baggage – ash soil specimen prepared with 4% cement alone and also with 4% cement and 1% fiber with 7 days of curing time. The study indicates that cement stabilization increases the strength of baggage ash – soil specimens as well as the strength of baggage ash – cement soil specimen with fiber inclusions

Keywords: Baggage ash, cement, fiber, soil, unconfined compression.

1. INTRODUCTION

Baggage ash is a fine residue collected from the burning of baggage in sugar factory. The production of baggage ash is growing according to production of sugar. Research about using of baggage ash is continually in progress. Baggage ash is a non cohesive material having small specific gravity that is relatively smaller than that of normal soil. When burned at 600^{O} C, baggage ash is pozzolanic material (Wibowo, and Hatmoko, 2003), and therefore its engineering behavior can be improved by addition of cement. Some experimental studies on chemical stabilization of baggage ash has been done. Wibowo and Hatmoko (2001) carried out a research of additional baggage ash to concrete. The research indicated that additional of baggage ash improved the strength of concrete with significant values. Wibowo and Hatmoko (2003, 2004) made an equipment to burn the baggage ash to get the optimum temperature to be the best pozzolanic material. Hatmoko (2003) observed the additional of baggage ash to expansive clay.

Chemical stabilization by cement is proven technique to improve soil performance. Hatmoko, et.al (2004) carried out the research on un drained compression triaxial test to study the effect of cement and baggage ash on shear strength of expansive clay. Hatmoko (2000) observed the additional of baggage ash alone to expansive clay, the result indicated that both compressive and shear strength of expansive clay increased. Consoli (1998) performed the research on drained triaxial compression tests to study combined effects of cement stabilization and randomly oriented fiber inclusion on the behavior of silty sand.

The authors, so far, have not found yet any study about the combined influence on the behavior of fiber reinforcement and cement- baggage ash stabilized soil. An experimental program was then undertaken to investigate the individual and combined effects of randomly oriented fiber inclusions and baggage ash-cement stabilized soil. Baggage ash was taken from Madukismo Yogyakarta sugar factory, and it was mixed with clay and sand with different proportions.The geotechnical characteristic of baggage ash-soil specimen, and baggage ash-soil specimen containing 0.8 to 1% randomly oriented fiber inclusions was investigated. A set of unconfined compression tests were carried out on baggage – ash soil specimen prepared with 4% cement alone and also with 4% cement and 1% fiber with different period of curing.

2. MATERIALS AND METHODS

2.1. Materials

The baggage ash was taken from Madukismo Sugar Factory. It was burned up to 600^{O} C, than blended into the fine residue. The soil was that is local soiltaken from Wates Daerah Istimewa Yogyakarta used in the baggage ash-soil mixtures. Tabel 1 and 2 show characteristics of fly ash and the polyester fibers used as reinforcement.

Tabel 1. Chemical composition of baggage ash compared to Australian and Bukitasam fly ashes

Chemical composition	% by weight		
	Baggage ash Madukismo @	Bukitasam fly ash (%)©	Australian fly ash (%)©
Silika (SiO_2)	47,60	56,20	62,45
Alumina (Al_2O_3)	6,19	29,42	31,75
Iron (Fe_2O_3)	10,21	4,32	1,48
Calsium (CaO)	1,56	1,36	0,37
Magnesium (MgO)	----	0,61	0,34
Titanum (TiO_2)	----	0,93	1,85
Sodium(Na_2O)	----	0,36	0,35
Potasium (K_2O)	----	0,43	0,07
Phospor (P_2O_5)	----	0,34	0,31
Manganese(Mn_2O	----	----	0,05
Sulphur(SO_3)	0,21	0,56	0,02
HD	18,50	5,47	0,96

@ : research © : references

Tabel 2. Polyester fiber characteristics

	Diameter (mm)	Ratio aspect	Spec gravity	Tensile str (Mpa)	Tensile mod (Mpa)
Polyester	0,0800	281	1,4	135	2050

2.2. Methods of Baggage Ash soil Mixture Preparation

The following are the preparation of all types of specimens. The first, the required amounts of baggage ash and soil were measured and mixed together in the dry condition. If there were no cement and fiber were used, the dry baggage ash-soil mixture was mixed with the required amount of water that relies on optimum water content of baggage ash – soil mixture. If cement alone was used for stabilization, the dry baggage ash-soil mixture was first mixed with cement then baggage ash cement –soil mixture was mixed with water. It was found that the fibers could be mixed with the baggage ash soil mixture more efficiently in the moist condition compared to on the dry state. Therefore, if fiber reinforcement alone was used, the dry baggage ash-soil mixture was first mixed with water and then put the fiber. If both cement and fiber were used for stabilization, a moist baggage ash – cement soil mixture was prepared similar as that of the previous one, than mixed with fiber.

3. BAGGAGE ASH-SOIL MIXTURES

Soil (clay) mixed with baggage ash is indicated on table 3. The abbreviation used in this paper is as follow : L = soil (clay); T = baggage ash. This baggage ash –soil mixtures were than mixed with 4% Cement and 1% fiber. Light compaction or standard Proctor Test were carried out on the baggage ash – soil mixture. Specimens at standard Proctor were prepared by static compaction. Direct shear test and unconfined compression test were carried out.

Tabel 3. Baggage Ash – Soil mixtures

Symbol	Notes
L	100% clay
L_3T_1	75% clay-25% Ash
L_1T_1	50% clay-50% Ash
L_1T_3	25% clay-75% Ash
T	100% Ash

4. FIBER REINFORCED BAGGAGE ASH – SOIL MIXTURE

The effects of fibers on the geotechnical characteristics of baggage ash – soil mixtures blended by 1% of fibers was investigated by conducting Standard Proctor test, direct shear test and unconfined compression test. The tests were performed according to the ASTM standard as follow: compaction test (ASTM D 698); direct shear test (ASTM D 3080), and unconfined compression test (ASTM 2166).

4.1. Compaction Test

Table 4 shows the compaction test results of baggage ash – soil mixture with and without fiber reinforcement. The values of MDD and OMC of baggage ash soil mixture do not significantly due to the fiber reinforcement. Table 5 indicates the results of baggage ash- soil – cement mixture. The MDD and OMC of baggage ash –soil-cement mixture do not increase significantly because of increasing cement content. This test was done with 7 days curing time. The increase of MDD is about 8% for 3% cement content, and around 10% for 6% cement content. The increases did not reach the maximum value because the pozolanic reaction between $Ca(OH)_2$, CaO,Al_2O_3, and SiO_2 did not maximally go on. If the curing time increases, 14 days for example, it suppose to be more increase in MDD. The optimum moisture content did not increase due to the present of cement, because cement does not the high rate of absorption to the water.

Tabel 4. The result of compaction test of baggage ash-soil mixture with and without reinforcement

Sample	OMC(%)			MDD (kN/m^3)		
	Without fiber	With fiber	% increase	Without fiber	With fiber	% increese
L	32,4	34,50	6,5	13,06	13,56	3,8
L_3T_1	24,80	25,90	4,4	14,32	15,05	5,1
L_1T_1	23,50	24,80	5,5	14,95	16,21	8,4
L_1T_3	22,60	24,20	5,3	15,22	16,14	6,0

Tabel 5. The result of compaction test baggage ash – soil – cement mixture

Sample	Optimum moisture content (%)			Maximum Density (kN/m^3)		
	Without cement	3% cement	6% cement	Without cement	3% cement	6% cement
L	32,4	32,6	32,32	13,06	14,10	14,36
L_3T_1	24,80	24,90	24,78	14,32	15,24	15,78
L_1T_1	23,50	23,35	23,50	14,95	16,34	16,52
L_1T_3	22,60	22,56	22,48	15,22	16, 54	16,87

The fiber inclusion on baggage ash – soil mixture did not significantly increase the MDD. It was noted that the influence of fiber reinforcement was not significant, therefore it is required the advanced investigation about contribution of fiber to the strength of soil mixture, for example the direct shear tests or unconfined compression tests to study the shear strength of soil.

4.2. Direct Shear Test

As the compaction test performed that MDD and OMC of the baggage ash – soil were not significantly affected by cement content and fiber reinforcement, the specimens for direct shear test and unconfined compression test were prepared. The specimens prepared were the same condition with that of compression test, thus the effect of fiber and or cement could be seen from the results of direct shear test. The possible effects because of water content and the unit weight are avoided. The direct shear tests were carried out on 63 mm diameter and 25.5 mm height with deformation rate of 20 mm per minute. To get an accurate results, it was used 3(three) specimens for each combination. The confining pressure varies in between 23 kPa (2 kgr load) to 46 kPa (8 kgr load). Shear displacement and volume change are significantly influenced by fiber reinforcement.

L_1T_1 soil without fiber reinforcement reached shear failure at the horizontal displacement in between 1 mm and 2 mm. This result is different from the previous research, the similar soil got the shear failure at the horizontal displacement more than 3 mm at the high value of normal stress. It shows that the fiber reinforcement improves soil ductility. The compacted soil sample indicated the usual tendency for dilatation. However, the vertical displacement was significantly higher in the fiber reinforced samples than in the unreinforced ones. The vertical displacement in unreinforced specimens was less tan 0.25 mm, and decreased with increase in normal stress. The vertical displacement was generally more than 0.50 mm in fiber-reinforced specimens at all stress level, and at normal stress 23 kPa was around 2 mm. The total

stress shear strength parameters obtained from direct shear tests on unreinforced and reinforced baggae ash – soil mixtures are shown in table 6. The change of cohesion (c) and angle of internal friction (φ),

Table 6. Results of Direct Shear test for unreinforced and reinforced 1% fiber- baggage ash soil mixtures

Mix design	Without fiber reinforcement		With 1% fiber reinforcement	
	c (kPa)	Φ (degree)	c (kPa)	Φ (degree)
L	20.12	23	11.2	35.8
L3T1	15.5	31.2	13.3	38.8
L1T1	14.7	36.2	17.5	35.8
L1T3	14.2	37.6	18.7	37.9

due to fiber – reinforcement look not consistent. However, the fiber-reinforcement tends to increase the shear strength of baggage ash-soil mixture. It is shown in table 7.

Table 7. Increase of Shear Strength due to fiber reinforcement

Mix design	Shear Strength (kPa), normal stress 31 kPa		
	Without fiber reinforcement	With 1% fiber reinforcement	% increase
L	33.279	33.558	0.9
L3T1	34.274	38.225	11.5
L1T1	37.389	39.858	0.7
L1T3	38.073	42.833	12.5

It can be noted that the present of fiber in the baggage ash –soil mixture significantly increase the shear strength. The increase is in between 0.7% to 12.5%; however, the patterns of increasing shear strength is inconsistent.

4.3. Unconfined Compression Tests

Unconfined Compression Tests were carried out according to ASTM 2166 standard test. The cylindrical specimens with MDD and OMC as prepared on the compaction test. Three specimens of each combination of variables were tested. The stress-strain behavior of baggage ash – soil mixtures were significantly affected by fiber reinforcement. In specimens without fiber reinforcement, a failure axial stress was reached at the axial strain abut 3%. Whereas in the reinforced specimens, the failure axial stress was on 15% axial strain. Moreover, the unconfined compression strength was also increased due to fiber reinforcement. Table 8 summarizes the unconfined compression strength of the reinforced and unreinforced baggage ash – soil specimens.

Table 8. UCS (kPa) of Unreinforced and Fiber Reinforced Baggage ash – Soil Specimens

Mix design	Unreinforced	1% reinforced with fiber	% increase
T	63.7	142.7	124
L1T1	48.2	298.9	520
L	37.7	409.2	985

In the unreinforced condition, baggage ash has higher unconfined compression strength than clay and baggage ash – soil (clay) mixtures. However, the fiber reinforcement improves markedly the strength of clay and baggage ash-clay mixtures

5. CONCLUSIONS

An experimental program was done to investigate the individual effect, and combined effect of polyester-fiber reinforcement and cement stabilization on geotechnical properties of baggage ash – soil mixtures. The following conclusions can probably be drawn from the study:

1. In compaction tests, the fiber reinforcement does not significantly increase the value MDD, as well as the value of optimum moisture content.
2. The fiber inclusion improves soil ductility.

3. In direct shear test, the changes of cohesion (c) and angle of internal friction(φ) were not consistent due to the fiber reinforcement.
4. The shear strength of baggage ash soil mixture increase due to the reinforcement.
5. The increase of Unconfined Compression Strength (UCS) of reinforced baggage ash soil mixture are very significant.

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