No	Tanggal	Keterangan
1		Penulis korespondensi mengirimkan **naskah publikasi** ke organizing committee.
2	12 November 2020	Penulis menerima Letter of Acceptance.
3		Penulis menerima revisi untuk proses penerbitan prosiding IOP.
4		Penulis mengirimkan naskah revisi.
5	28 Februari 2021	Naskah sudah **terbit** pada prosiding terindeks SCOPUS.

ICAST 2020 Publication ➤

icast@sadaconsultant.id

Sun, Feb 28, 2021, 11:26 AM

to me ▾

Dear author,

I am pleased to inform you that the ICAST 2020 conference proceedings volume is now published and available online:
https://iopscience.iop.org/issue/1757-899X/1071/1

Sincerely,

Dr. Darmawan Napitupulu, ST, M.kom
ICAST Chair

Tuesday, 12 November 2020

Dear Authors ,

On behalf of the committee, we are pleased to inform that your abstract is **ACCEPTED** to be presented at the 1st ICAST 2020, scheduled on 28th November 2020.

Paper ID   :   1st.ICAST.20.049
Title   :   **Elastic Cross-Section Modulus of Jabon (Anthocephalus cadamba Miq.) Bolt-Laminated Timber Beams**
Author(s)   :   Y A Pranata, A Kristianto and A Darmawan

Here are some important things we would like you to do in relation to the abstract's acceptance:

1. Please kindly complete the payment of:
   IDR 2.000.000,- *(due date 16th November 2020)*
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2. Confirm your payment through our email on: icast@sadaconsultant.id by sending the scan of the receipt of payment, your name, and title of the paper,
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3. All accepted papers will be published in **IOP MSE Publishing** and will be submitted to Scopus for further indexing.
4. Please follow the **Templates** from IOP MSE Publisher (sent as another attachment along with email).
5. The paper should use Professional Translation Services (instead of Google Translate), Plagiarism <20%, and using Mendeley software reference manager.
6. Camera Ready (Full) Paper **MUST BE** submitted no more than **12th December 2020.**
7. Since the paper will be selected again by IOP Publisher, the rejected manuscript will be charged 50% of total registration fee.

We thank you a lot for your participation and again congratulate for your achievement.
We are looking forward to seeing you in ICAST 2020 on 28th November 2020.

Sincerely,

Chair of ICAST 2020

Elastic Cross-Section Modulus Ratio of Jabon (*Anthocephalus cadamba Miq.*) Bolt-Laminated Timber Beams

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Abstract. The strength and stiffness of the beam is related to the elastic cross-section modulus of the beam, which is related to the cross-section moment of inertia. The elastic cross-section modulus of mechanically laminated (bolt-laminated) timber beams are not the same as solid timber beam for the beam with the same cross-section, this can be happened due to the inertia moment of cross-section of the bolt-laminated beam is lower than the solid beam due to slip between laminae and the elastic modulus of every lamina are varying. The aim of this research was to study the elastic cross-section modulus of mechanically laminated timber using bolts as a shear connectors. The scope of the study are the beam test object made of Jabon timber (Anthocephalus cadamba Miq.) 60 mm x 160 mm cross-section size, three beam specimens with 1500 mm clear-span length, four lamina layers, lamination system using bolt as a shear connectors to reduce slip between laminae, flexural testing using the four-point loading test method according to the ASTM D198, the flexural behavior reviewed in this research are the flexural strength, the elastic cross-section modulus ratio, and the displacement ductility ratio. The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa. The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria. The test results indicate that the failure of bolt-laminated Jabon timber beams is a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

Keywords: Elastic cross-section modulus, timber, beam, bolt-laminated, Jabon

1. Introduction

Laminate timber, especially mechanically, has been widely applied to bridge structures and agricultural support building structures for a long time in America. The concept of mechanical lamination is that the wooden laminates are connected to a bolt joint, which acts as a shear barrier so that the slip that occurs between the laminates due to working loads can be prevented. The laminate system is one of the engineered wood solutions amidst the limited production of large diameter whole wood from forests. Mechanical laminated wood elements are structural components composed of

horizontal or vertical laminates, which are mechanically joined using nails, pins, or bolts [Kramer and Blass, 2001]. The bonding behavior between the laminae occurs as a result of the horizontal slip between the laminae being prevented and restrained by the sliding linkage device at certain intervals with the mechanical coupling.

1.1 The Aim and Scope of Research
The aim of this research was to study the elastic cross-section modulus of mechanically laminated timber timber using bolts as a connectors. The scope of the study are the beam test object made of Jabon timber (*Anthocephalus cadamba Miq.*) 60 mm x160 mm cross-section size, three beam specimens with 1500 mm clear-span length, four lamina layers, lamination system using bolt diameter 10 mm as a shear-connectors, flexural testing using the four-point loading test method according to the ASTM D198 [ASTM, 2014], the flexural behavior reviewed in this research are the flexural strength, the elastic cross-section modulus ratio, and the displacement ductility ratio.

This study is a continuation of previous research conducted by Pranata et.al. [Pranata et.al., 2012], namely the ratio of the elastic section modulus of mechanical laminated wood beams with mechanical joining devices. The research studied blocks made of Acacia wood material Mangium, Keruing, Meranti Merah, Mersawa, Nyatoh, and Durian. Results obtained from previous research indicated that the elastic cross-section modulus ratio were ranged from 0.38 – 0.91. In general, the parameters of specific gravity, bolt diameter, and the ratio of the number of rows per bolt distance contribute to the elastic section modulus ratio of laminated beam-bolts.
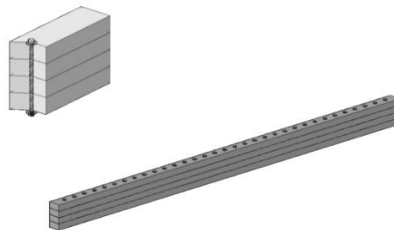

Figure 1. Schmatic of bolt-laminated timber beams (Pranata et.al., 2011).

1.2 Method
The research methodology is testing the test object experimentally in the laboratory. The study consisted of four stages, the first stage was a literature study on timber elastic modulus, timber flexural rigidity, and mechanical laminated timber. The second stage is the manufacture of mechanical laminated timber beam specimens using a bolt connection tool. The third stage is experimental testing in the laboratory. The fourth stage is a study to process the flexural capacity curve data, namely the load vs displacement relationship curve for the calculation of flexural rigidity, flexural strength, and displacement ductility ratio of mechanical laminated beams related to solid beams.

2. Basic Theory
2.1 Jabon Timber (*Anthocephalus cadamba Miq.*)
The Jabon tree (*Anthocephalus cadamba Miq.*) grows on various islands in Indonesia and is included in the strength-class III-IV category with a bending strength of 37.96 MPa, a modulus of rupture 67.79 MPa, and a modulus of elasticity of 6670.80 MPa. Jabon timber is included in the moderate class category of durability. Durability of timber as a building component against wood termite attacks, Jabon timber is included in the class II category, then resistance to wood rot fungus is included in the class IV-V category [PPPKKP, 2013].

2.2 Elastic Section Modulus

The Elastic Section Modulus (S) in the elastic limit load range can be calculated by Equation 1 [Gere and Goodno, 2018], which is based on the effect of the moment of inertia parameter of the cross section I and the distance from the outer edge fiber to the center of gravity of the y,

$$S = \frac{I}{y} \tag{1}$$

The relationship between the beam flexural strength and the elastic section modulus can be calculated as follows,

$$f_B = \frac{M}{S} \tag{2}$$

In the context of a mechanical laminated beam, the elastic section modulus is lower than that of a solid beam, the ratio can be calculated using Equation 3 and Equation 4 as follows,

$$S_{eff} = k_S \cdot S \tag{3}$$

$$f_{B\text{-lam}} = \frac{M}{S_{eff}} \tag{4}$$

where M is the bending moment, S_{eff} is the effective elastic modulus of the bolted laminated beam, k_S is the ratio of the elastic section modulus of the laminated beam to the intact beam, and $f_{B\text{-lam}}$ is the flexural strength of the laminated beam [Pranata etl. al., 2012].
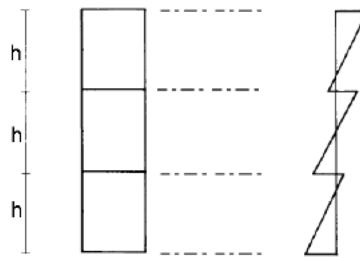

Figure 3. Horizontally laminated beams (Pranata et.al., 2012).
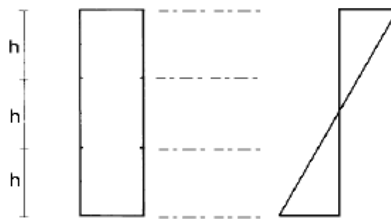

Figure 4. Solid beam cross-section (Pranata et.al., 2020).

2.3 Deformation of Beam

The modulus of elasticity is the proportional slope of the linear line of the load and deformation curve (range of elastic load), in this context the bending load on the beam and deformation is the deflection of the beam due to the load acting. For a simple beam condition with a load of two centered on each distance as far as a from each support as illustrated in Figure 3, the deformation relationship to the load is expressed in Equation 5 [Gere and Goodno, 2018].

$$\delta = \frac{P.a}{24EI} \left(3L^2 - 4a^2 \right) \tag{5}$$

With δ is deformation of beam due to flexural, P is concrentated load, L is length of beam span, E is modulus of elasticity (which is MoE paraller to the grain), and is the cross section momen inertia.
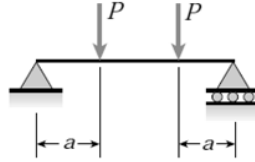

Figure 2. Beam with two concrentated loads [Gere and Goodno, 2018].

With the presence of more than one number of laminae, there is an interaction or slip between the laminates, because the compatibility of the strain mechanism between the bolt as a mechanical joint and lamina timber does not work perfectly and there is a partial interaction between the laminates, so that the bending behavior of the laminated beams is not the same as the solid beam (Figure 3 and Figure 4). Equation 6 is the development of Equation 1 in the context of calculating the deformation of mechanical laminated beams, with the magnitude of the flexural rigidity of laminated beams being lower than those of solid beam, which is in the form of parameters for the flexural rigidity ratio of mechanical laminated beams (laminate-bolt) or k_{EI}.

$$\delta = \frac{P_{lam}a}{24(k_{EI}.E.I)}(3L^2 - 4a^2) \tag{6}$$

2.4 Method to Determine Proportional Point
The flexural capacity of timber beams is obtained from the results of experimental testing in the laboratory in the form of a bending load versus beam deformation curve. To obtain information on changes in the condition of the beam material from elastic to post-elastic, it is necessary to know the location of the proportional point. There are several methods to determine the proportional point of the previous research by Munoz et al. (Munoz et. Al., 2010). One method of determining the proportional point is the Yasumura and Kawai method, with the basic principle that initial stiffness is calculated at conditions 0.1, 0.4, and 0.9 peak points. The condition of the elastic material is determined by the intersection of two linear lines, namely the meeting point formed between the 0.1-0.4PU lines and the 0.4PU and 0.9PU lines. The meeting point is then shifted parallel to coincide with the load vs deformation curve of the experimental test results.
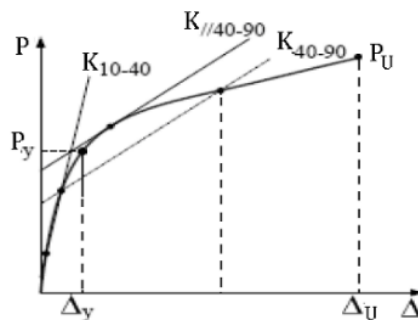

Figure 5. Load vs Deformation curve and determination of proportional point
in accordance with Yasumura and Kawai method (Munoz el. al., 2010).

3. Experimental Tests and Discussion
In this study, a mechanical laminated timber beams were tested with a mechanical connectors, namely a 100 mm diameter bolts. Timber beams made of Jabon timber (*Anthocephalus cadamba Miq.*). The

timber lamina has a cross-sectional size of 60 mm x 40 mm, the lamination system used is horizontal with 4 (four) laminae, so that the beam's final cross-section size is 60 mm x 160 mm. The distance between the bolts (spacing) is 100 mm.

Figure 6. Flexural test of the beam specimen using Universal Testing Machine.

Figure 6 show the testing process for one specimen of laminated timber beams. The test method is the four-point loading test with a distance of 500 mm (1/3 beam span). Furthermore, Figure 7 show the variety of beam failures that occur in the test object, namely simple tension, this is in accordance with one of the flexural test object failure models based on ASTM D143 [ASTM, 2014] so that the expected failure occurs in accordance with the test results.

Figure 7. Failure type of the beam for all beams specimens which are simple tension.

Figure 8 show a curve diagram of the load versus beam deformation relationship. The test results of all specimens show almost the same curve trend, the maximum deformation ranges from 7.65 mm to 10.54 mm, while the maximum load ranges from 9.98 kN to 13.74 kN. Figure 9 show an example of calculating the proportional point (proportional load) and the ultimate point (ultimate load). The complete calculation results are shown in Table 1. The results of Table 1 show that the average beam turnover ductility ratio is 1.28. The average proportional limit load is 10.43 kN, the ultimate limit load is 12.07 kN. Furthermore, using Equation 4, the flexural rigidity ratio of laminated beams is calculated. The complete calculation results are shown in Table 2.Calculation of the elastic section modulus and bending stress is carried out using Equation 4 and Equation 5. The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa (secondary data from Atlas elastic cross-section modulus, timber, beam, bolt-laminated, Jabon Indonesia). The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria.
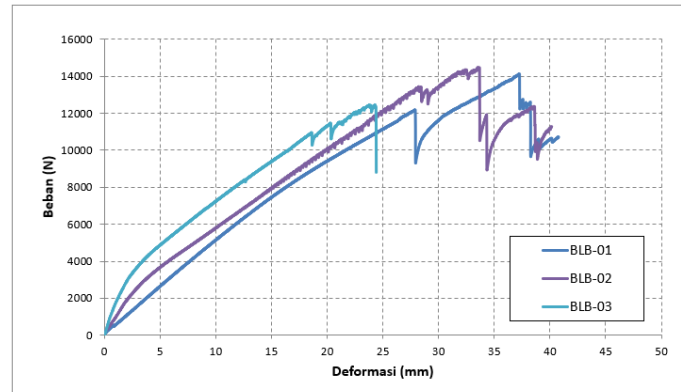
Figure 8. Load vs Deformation curves of the three specimens of the bolt-laminated timber beams.
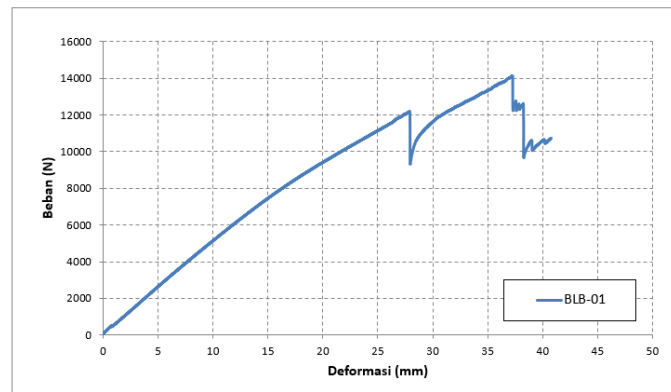

Figure 9. Calculation of proportional point and ultimate point for specimen BLB-01.

Table 1. Proportional point, ultimate point, deformation at proportional point, deformation at ultimate point, and displacement-ductility results.

Specimen	P_y (N)	d_y (mm)	P_u (N)	d_u (mm)	μ
BLB-01	12001.91	23.83	12280.28	24.32	1.02
BLB-02	13074.70	28.46	14330.85	33.58	1.18
BLB-03	12137.70	27.78	14127.15	37.27	1.34
Average	12404.77	26.69	13579.43	31.72	1.18

Table 2. Results of flexural rigidity ratio of bolt-laminated timber beams.

Specimen	M_y (kN.mm)	$f_{b\text{-}lam}$ (MPa)	f_b (MPa)	k_S
BLB-01	3000.478	11.72	37.96	0.31
BLB-02	3268.675	12.77	37.96	0.34
BLB-03	3034.425	11.85	37.96	0.31
Average	3101.193	12.11	37.96	0.32

The test results indicate that the failure of bolt-laminated Jabon timber beams is a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

4. Conclusion

The load-deflection curve of bolt-laminated timber beams shows a bilinear trend. The presence of a bolt gives the beam a ductile impact. Changes in the behavior of beams from elastic to plastic conditions are due to the effective stress that occurs in some parts of the timber material that has exceeded the yield limit criteria. When the proportional limit load is reached, the bolt has not yielded, so that after the beam has post-elastic behavior the bolt still functions as a shear transfer between laminae, likewise the normal stress that occurs on each of the outer edge fibers has not exceeded the ultimate limit criteria so that the beam is still capable, endure the bending moment. The failure behavior of bolted-laminated timber beam occurs due to bending failure.

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Rundown Parallel Session ICAST 2020
Saturday, November 28, 2020

Material Science and Chemical Engineering
Room : Material & Chemist
Session Chair : Iin Lidia Putama Mursal, S.Si, M.Si
Host : Devi Irawan, M.Kom
Zoom ID : 399 522 4428

No	Title Paper	Paper ID	Time
1.	Physical Properties of Liquid Soap Using Katuk Leaf Extract (Sauropus Androgynus (L) Merr.) As an Alternative to Natural Surfactants	011	13.30-13.50
2.	Formulation and Physical Evaluation of Body Lotion Preparation of Kacip Fatimah (Labisia pumila) Ethanolic Extracts as Antioxcidant	012	13.50-14.10
3.	Physical Stability Test Sunscreen Gel Extracts Blackberry Fruit	013	14.10-14.30
4.	Formulation and Physical Stability Test of Facial Wash Gel From Dragon Fruit Peel Extract (Hylocereus polyrhizus)	014	14.30-14.50
5.	Formulation and Antibacterial Activity of Foot Spray Ehanol Beluntas Leaf Extract (Pluchea Indica L.)	023	14.50-15.10
6.	Chemical Characteristics of Sweet Bread Motaf with Addition of Temulawak Starch	024	15.10-15.30
7.	Probiotic activity and antibiotic sensitivity of lactic acid bacteria isolated from healthy breastfed newborn baby feces	028	15.30-15.50
8.	Elastic Cross-Section Modulus of Jabon (Anthocephalus cadamba Miq.) Bolt-Laminated Timber Beams	049	15.50-16.10

Civil & Mechanical Engineering
Room : Civil & Mechanic
Session Chair : Dr. Nico Djunharto Djajasinga
Host : Lucky Nugroho, SE, MM, MAk, MCM
Zoom ID : 732 632 5568

No	Title Paper	Paper ID	Time
1.	Exploring Architectural Style of Gianyar and Creating Building Material Innovations	021	13.30-13.50
2.	Evaluation of Internal Forces and Support Reaction of Column	029	13.50-14.10

No	Title Paper	Paper ID	Time
	and Shearwall in 15th Building Design		
3.	Evaluation of road embankment stability due to rain infiltration	**076**	14.10-14.30
4.	Laboratory Investigation of Using Rubbercret as An Interlayer in Rigid Pavement Overlay	**079**	14.30-14.50
5.	A Fuzzy BWM method for evaluating supplier selection factors in a SME paper manufacturer	**030**	14.50-15.10
6.	Designing optimal distribution routes using a Vehicle Routing Problem (VRP) model in a logistics service provider	**031**	15.10-15.30
7.	Application of Anthropometry Methods in Ergonomic Chair Redesign To Prevent Fatigue A Case Study UKM Lestari Jaya, Tulungagung	**046**	15.30-15.50
8.	Heating Treatment of Air In Combustion Chamber For The Use of Mixture Ethanol and Gasoline Fuel	**077**	15.50-16.10
9.	The Sidewalk Structuring Strategy As Iconic Pedestrian Case Study: Pedestrian's Budi Luhur University – Jakarta	**085**	16.10-16.30
10.	Risk Allocation Model For Cisumdawu Toll Road Projects (Deni Setiawan, Roi Milyardi, Tan Lie Ing)	**086**	16.30-16.50

Information Technology & Application
Room   : IT & Apps
Session Chair : Aang Kisnu Darmawan, ST, MM
Host   : Petrus Dwi Ananto, M.Kom
Zoom ID   : 231 207 3830

No	Title Paper	Paper ID	Time
1.	Web-Based Design of Financial Apps: Case of Kosan 54	**027**	13.30-13.50
2.	Development of Virtual Reality Application to Increase Student Learning Motivation with Interactive Learning in Vocational Education	**032**	13.50-14.10
3.	Utilization of the Batch Training Method to Predict the Number of Natural Disasters and Their Impacts (Ni Luh Wiwik Sri Rahayu Ginantra,	**033**	14.10-14.30
4.	Mapping the Spread of Covid-19 in Asia Using Data Mining Algorithms	**034**	14.30-14.50
5.	Systematics Review on the Application of Social Media Analytics for detecting Radical and Extremist Group	**041**	14.50-15.10
6.	E-Finance Publication: A Bibliometric Constructing Networks Visualizing during Four Decades	**043**	15.10-15.30
7.	E-money Academic: Lesson from Literature Visualizing Scientometric Positioning (1968-2019)	**044**	15.30-15.50
8.	Decision Making Analysis for Free Internet Quota Assistance Online Learning during the Covid-19 Pandemic	**051**	15.50-16.10

No	Title Paper	Paper ID	Time
9.	Analysis of Custom IoT Based Electricity Monitoring System	**052**	16.10-16.30
10.	Improved Genetic Algorithm for Vehicle Routing Problem Pick-up and Delivery with Time Windows	**053**	16.30-16.50
11.	A Survey Blockchain and Smart Contract Technology In Government Agencies	**056**	16.50-17.10
12.	Multiple Smile Detection Using Histogram of Oriented Gradient and Support Vector Machine Methods	**057**	17.10-17.30

Health Technology and Other Topic Related
Room   : Health Tech & Others
Session Chair : Apt. Oktavia Eka Puspita, S.Farm, M.Sc
Host   : Supardi Amin, M.Kom
Zoom ID   : 559 986 9607

No	Title Paper	Paper ID	Time
1.	Role of Non-Governmental Organization (Ngo), Health Cadre and Health Personnel in The Management of Lung Tuberculosis (Tb) in North Aceh Regency in 2019	**042**	13.30-13.50
2.	Phytochemical and Hypoglycemia Effect Test Using Extract of Barangan Banana Peel With OGTT in Male White Rats of Sprague Dawley Strains Induced With Sucrose	**050**	13.50-14.10
3.	Learning Strategies for Mobile-Assisted Seamless Learning: A Students' Initial perceptionses	**066**	14.10-14.30
4.	Innovative Learning Media Based on e-Learning in the New Normal Era	**067**	14.30-14.50
5.	BTQ Teaching Based on 'Vlog Teachers' on Youtube Channel During Pandemic Era: Theory and Practice of Online Teaching	**068**	14.50-15.10
6.	Gadget Media for the Effectiveness of Student Learning	**069**	15.10-15.30
7.	Information Technology in the Development of Language Aspects of Early Childhood	**070**	15.30-15.50
8.	Design Seamless Learning Environment in Higher Education with Mobile Device	**071**	15.50-16.10
9.	Mobile Learning Application to Evoke Students' English skill	**072**	16.10-16.30
10.	Learning strategies for mobile-assisted seamless	**073**	16.30-16.50
11.	Mobile Support in Ubiquitous Learning Systems	**074**	16.50-17.10
12.	Google Classroom and Learning Evaluation: Assessment Strategies	**075**	17.10-17.30
13.	Overview of Management Information System and Supply Chain Management	**087**	17.30-17.50

Book of Abstract

1st International Conference on Advanced Science and Technology

ICAST

"Innovation Research for Science and Technology in Industry 4.0"

28 November 2020

Organized by:

Supported by:

Welcome Speech: Chairman of ICAST 2020

Distinguished guests and participants,
Assalamualaikum Warahmatullahi Wabarakatuh.
Good Morning Ladies and Gentlemen.
Welcome to Virtual Conference ICAST

On behalf of the Organizing Committees, we would like to express a warm welcome to all delegates and participants to the ICAST International Conference on Science and Technology 2020. It is a great honor for all collaboration institution including universiti teknikal malaysia melaka, university of bung karno, university of HKBP Nommensen and Sada Utama Indonesia to support the conference.

I believe that this conference is an important forum for exchange of information and research results among us, who come from different countries, different educational and research institutes, and different research interest. The main theme of conference is Innovation Research for Science and Technology in Industry 4.0 has been chosen. ICAST 2020 aims to bring together researchers, scientists, engineers, and scholar students to exchange and share their experiences, new ideas, and research results about all aspects of science, engineering and Technology, and discuss the practical challenges encountered and the solutions adopted. The conference invites delegates from across Indonesian and South East Asian region and beyond, and will be attended by participants from abroad university academics, researchers, practitioners, and professionals across a wide range of industries. Due to covid-19 outbreak, Universitas Budi Luhur collaborated with Sada Utama Indonesia as event organiser have successfully the conference has successfully held virtual 1st International conference on advanced science and technology, Saturday, November 28th, 2020. Total more than 100 participants in the plenary room were enthusiastic about listening to the keynote speakears from Assoc. Prof. Muhammad Imran Qureshi, Ph.D (Universiti Teknikal Malaysia Melaka), Assoc. Prof. Dr. Dahlan Abdullah, ST, M.Kom (Univeritas Malikusalleh).

In closing, I would like to thank the Rector of Universitas Budi Luhur, Universitas Bung Karno, Universiti Teknikal Malaysia Melaka and all parties, for supporting the successfull conference. I would also like to thank all contributors for your good cooperation. Special thanks for OC members for their hard work and patience.

Your Sincerely,

Dr. Darmawan Napitupulu, ST, M.Kom
Chair of the ICAST 2020

Program Schedule

Saturday, November 28th, 2020

Time	Event Details
08.30 – 09.00	Registration
Opening Ceremony	
09.00 – 09.35	Opening by MC
09.35 – 09.40	Prayer
09.40 – 09.45	Indonesia Raya Song
09.45 – 10.00	Welcome Speech from:
	1. Chairman of Organizing Committe
	2. Rector of Universitas Budiluhur
Keynote Speech	
10.00 – 11.00	Keynote 1: Assoc. Prof. Mohammad Imran Qureshi, Ph.D Universiti Teknikal Malaysia Melaka
11.00 – 12.00	Keynote 2: Dr. Sajjad Ali Mangi Mehran University of Engineering & Technology, Pakistan
12.00 – 13.00	Break/ISHOMA
13.00 – 13.30	Workshop Scientifc Writing
13.30 – 16.30	Parallel Sessions

Content

Abstracts of Parallel Sessions:
Material Science and Material Processing Technology

Physical Properties of Liquid Soap Using Katuk Leaf Extract (Sauropus Androgynus (L) Merr.) As an Alternative to Natural Surfactants

Iin L.P Mursal[1], Vinni Hermana[2]
[1,2]Buana Perjuangan University, Karawang, Indonesia

Katuk leaves (Sauropus androgynous (L) Merr.) Contain saponins which can potentially act as natural surfactants to replace Sodium Lauryl Sulfate (SLS). This study aims to determine the variation in the concentration of katuk leaf extract (Sauropus androgynous (L) Merr.) On the results of testing the physical properties of liquid soap formulations and to determine the potential of katuk leaf extract as an alternative to natural surfactant substitute (Sauropus androgynous (L) Merr) in the formulation. liquid soap preparations. The liquid soap formulation of katuk leaf extract with concentrations of 1%, 3%, 5%, 7% and 9% were replicated 5 times. The physical properties test carried out were organoleptic testing, pH, foam height, specific gravity and viscosity. Based on the research that has been done, it can be concluded that the variation in the concentration of katuk leaf extract has an effect on the physical properties of liquid soap which includes organoleptile, pH, high foam, specific gravity and viscosity. The liquid soap formulation uses katuk leaf extract which has potential as an alternative to natural surfactants instead of surfactants. It can be seen that the three formulas, namely F1, F2 and F3 as a whole meet SNI standards.

Formulation and Physical Evaluation of Body Lotion Preparation of Kacip Fatimah (Labisia pumila) Ethanolic Extracts as Antioxcidant

Anggun Hari Kusumawati[1], Ahdiyatul Munawaroh[2], Lia Fikayuniar[3]
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The antioxidant content in Kacip Fatimah is believed to play an important role in protecting against several diseases and delaying the aging process. From a cosmetic point of view, research has shown the Kacip Fatimah's ability to specifically protect the skin against photoaging due to its high antioxidant activity. However, there has been no research on Kacip Fatimah in cosmetic formulations and its efficacy for the skin. One form of cosmetic dosage is Body Lotion. Body Lotion is a practical preparation, easy and fast to apply to the whole body. The body lotion is made in the formulation of an oil in water (o/w) and made in 3 formulas the concentration of the extract 0.5 %, 1%, and 2%. The physical test of body lotion extract of Labisia pumila is organoleptic, homogeneity, pH, viscosity, the spread, and the attaching, the results of testing in analysis using SPSS with Kruskall-wallis and Mann-withney. The result showed that extract ethanol of Labisia pumila having strong antioxidant activity it is 87,752 ppm, and it can be concluded that variations concentration extract ethanol of Labisia pumila 0,5 %, 1% , 2 % affects the physical properties of body lotion. The greater concentration of extract, decrease the viscosity value with yaitu FI = 2863 cPs, FII = 1974 cPs, FIII = 1514 cPs, decrease the pH with

FI = 6,72; FII = 6,37; FIII = 6,23, increase the spreadability with FI = 7 cm, FII = 7,93 cm, FIII = 8,03 cm, and decrease the attachability with FI = 1,33 sec, FII = 1,3 sec, and FIII = 1,01 sec.

Physical Stability Test Sunscreen Gel Extracts Blackberry Fruit (Rubus fruticosus L.)

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Blackberry (Rubus sp.) fruit contains high levels of anthocyanins and other phenolic compounds, mainly flavonols and ellagitannins, which contribute to its high antioxidant capacity and other biological activities. Sunscreen preparations are cosmetic preparations that are used as protection to reduce the impact of sun exposure, whose formulations contain active ingredients to absorb or reduce sunlight, especially in areas exposed to ultraviolet rays and infrared waves. One of the potential natural ingredients for sunscreen is blackberry fruit (Rubus sp.). Contains flavonoid compounds that can prevent the harmful effects of UV rays. This study aims to determine the stability of the blackberry fruit extract sunscreen gel formula for 90 days of storage to determine the SPF value test results of blackberry fruit extract using UV-Visible. The research design is an experimental research conducted in a laboratory. The sample used in this study was Blackberry which was made into thick extract by maceration method. Furthermore, the thick extract obtained was made into a sunscreen gel and then tested for physical stability and the calculation of the SPF value. The sunscreen potency test is determined based on the method of calculating the percent erythema transmission value (%Te) and the percent transmission pigmentation (%Tp) as well as the Sun Protection Factor (SPF) value. On testing the SPF the average value on the test day 0, day 7, day 15, day 21, day 30, day 60, day 90, respectively 28,03±0,77; 28,28±0,16; 28,46±0,41; 28,66±0,59; 28,85±0,33; 29,04±0,11; 29.24±0,27. Percent of erythema (% Te) testing over 90 days was included in the total block category. Percent pigmentation (% Tp) testing for 90 days was included in the total block category and the SPF test for 90 days was included in the category ultra.

Formulation And Physical Stability Test of Facial Wash Gel From Dragon Fruit Peel Extract (Hylocereus polyrhizus)

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Cosmetics are a necessity in everyday life. Cosmetics are divided into two types, namely cosmetics for care (skincare) and decorative cosmetics (make-up). Facial wash is a form of cosmetic care to clean the face which can be in the form of foam, cream, and gel. Gel is a preparation that has good distribution, good release of active substances, and is easily washed with water. This research is to formulate dragon fruit peel (Hylocereus polyrhizus) into a facial wash. Dragon fruit peel is a waste that is often ignored by the community. The dragon fruit peel was extracted and then made a facial wash formulation with three formulas, namely 8%, 9%, and 10% followed by physical stability testing. This study aims to formulate and determine the physical stability of the facial wash gel formulation of dragon fruit peel extract stored at three

different temperatures, namely room temperature, under sunlight, and 40˚C. The stability of the preparation was seen based on the results of organoleptic testing, pH, viscosity, and accelerated foaming before and after storage. The results of the physical stability test were statistically processed using the One Way ANOVA method. The results of this study showed that the three formulas, especially formula 1, were more stable at room temperature, under sunlight and 40˚C.

Formulation and Antibacterial Activity of Foot Spray Ehanol Beluntas Leaf Extract (Pluchea Indica L.)

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Foot odor is one of the things that is quite disruptive to appearance, the 2014 American Podiatric Medical Association studied a significant increase in the prevalence of foot odor in the community. One of the causes of foot odor is the presence of bacteria, especially the bacteria Bacillus subtilis. This study used the ethanol extract of beluntas leaves (Pluchea Indica L.) as the active ingredient because the ethanol extract of beluntas leaves has been widely used and proven to have antibacterial activity besides the ethanol extract of beluntas leaves has a high enough compatibility to be used as a cosmetic product, including spray preparations. The spray form was chosen because of its easy and pleasant use. This study aims to make a foot odor control product in the form of a spray with 3 concentrations of beluntas leaf ethanol extract, 0.5%, 1.0% and 1.5% to study the antibacterial activity using the diffusion disk method. The statistical test used the Kruskal Wallis and Mann Whitney test to see a significant difference in formulas one, two and three. The results showed that the ethanol extract of beluntas leaves can be formulated in the form of spray with the results of the organoleptic examination of the three formulas in in the form of a clear, and slightly yellow green solution. The pH of the preparation is in the range 4.58 - 5.92. In formula 3 with a concentration of 1.5% beluntas leaf ethanol extract, it has a strong bacterial inhibition zone with an average inhibition zone diameter of 12.5 mm.

Chemical Characteristics of Sweet Bread Motaf with Addition of Temulawak Starch

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Bread is one of the processed foods from wheat that is widely consumed by the community and also used as a source of carbohydrates other than rice and noodles. In some countries, bread made from wheat flour is a staple food. Along with the development of the food industry made from wheat flour, the need for wheat flour is also increasing. So it is necessary to make efforts to find food sources other than wheat flour. In Indonesia, there are talipuk seeds which have the potential to be developed into a future source of carbohydrates and ginger which contains quite a lot of starch. The research objective is to analyze the chemical characteristics of modified talipuk flour (motaf) sweet bread with addition of ginger starch. The research was conducted using a completely randomized design method (CRD) which consisted of 5 treatments consisting of the

ratio of wheat flour, motaf, and ginger starch flour. The sweet bread of these 5 treatments was tested for moisture content, ash content, protein, fat, carbohydrate and crude fiber analysis. The data were analyzed using the effectiveness test. The results showed that the best treatment resulted in sweet bread made from modified talipuk flour (motaf) and ginger starch was treated with the addition of 0.01 g of ginger starch. The resulting sweet bread has 19.96% moisture content, 1.01% ash content, 8.65% protein content, 13.62% fat content, 56.76% carbohydrate content, 35.19% fiber content and the value of effectiveness results. the highest is 0.39.

Probiotic activity and antibiotic sensitivity of lactic acid bacteria isolated from healthy breastfed newborn baby feces

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Breast milk is a very nutritional food that helps with the production of good microbiota in the gut of an infant. Generally, two lactic acid bacteria (LAB), namely Lactobacillus and Bifidobacterium, are related to infant gut microbiota. LAB is often used as a probiotic agent, but some of the conditions required for every bacterium to be utilized for this purpose are safety, tolerance of acid and bile salt, making colonies in the gastrointestinal tract, producing antimicrobial substances, and capacity to maintain viability. This study aimed to investigate the acid and bile salt tolerance as a criterion of probiotic agent and antibiotic sensitivity of LAB isolated from the feces of a healthy breastfed newborn baby. The sample was obtained from the feces of the aforementioned subject (baby). Also, the feces were collected from the healthy infant room of Royal Prima Hospital Medan. Then stored in a sterile sample tube and taken to the Biomolecular Laboratory University of Prima Indonesia Medan for immediate processing using standard protocols. The result showed that the total colony of LAB from the feces was 10.2 x 108 CFU/mL. In an acidic condition at pH 3, there was one isolate that had 100% viability in the first hour period, but all of them had 100% at bile salt tolerance. However, sensitivity test of the isolated LAB indicated resistance to 6 types of antibiotics namely Erythromycin 5 µg, Gentamicin 10 µg, Oxacillin 5 µg, Ofloxacin 5 µg, Amoxycillin 25 µg, and Cefotaxime 30 µg. The study showed that LAB isolated from healthy newborn baby feces have potency as a probiotic as well as good tolerance with acid and bile salt, which is also resistant to 6 types of antibiotics.

Elastic Cross-Section Modulus of Jabon (Anthocephalus cadamba Miq.) Bolt-Laminated Timber Beams

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The strength and stiffness of the beam is related to the elastic cross-section modulus of the beam, which is related to the cross-section moment of inertia. The elastic cross-section modulus of mechanically laminated (bolt-laminated) timber beams are not the same as solid timber beam for the beam with the same cross-section, this can be happened due to the inertia moment of cross-section of the bolt-laminated beam is lower than the solid beam due to slip between laminae and the elastic modulus of every lamina are varying. The aim of this research was to study the elastic cross-section modulus of mechanically laminated timber timber using bolts as a connectors. The scope of the study are the beam test object made of Jabon timber (Anthocephalus cadamba Miq.) 60x160 mm cross-section size, three beam specimens with 1500 mm clear-span length, four lamina layers, lamination system using bolt as a connectors, flexural testing using the four-point loading test method in accordance with ASTM D143, the flexural behavior reviewed in this research are the flexural strength, the elastic cross-section modulus ratio, and the displacement ductility ratio. The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa (secondary data from Atlas elastic cross-section modulus, timber, beam, bolt-laminated, Jabon Indonesia). The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria. The test results indicate that the failure of bolt-laminated Jabon timber beams is a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

Abstracts of Parallel Sessions:
Civil & Mechanical Engineering

Exploring Architectural Style of Gianyar and Creating Building Material Innovations

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Traditional architectural styles are essential for presenting local identity, so that it is necessary to recognize and explore local architectural identities in an attempt to maintain traditional architectural styles as one of the richness of local culture. Generally, the traditional Balinese general, particularly the Gianyar architectural style, is still used by Balinese. The design's application is also attributable to the Balinese local government legislation surrounding the use of traditional Balinese buildings. However, the style's design process is an architectural challenge for building actors and people of whom the group's willingness to realize it is constrained when it relates to time and costs. Because of this situation, it is considered essential to producing a building material that gives a thick conventional impression through the efficient use of resources and funds. By introducing a phased approach, this research starts with an analysis of the Gianyar architecture, which is used as a guide in the design of traditional style materials used by the broader community.

Evaluation of Internal Forces and Support Reaction of Column and Shearwall in 15th Building Design

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In the case of 15th building, the structure type to earthquake resistant code is dual system reinforced concrete consists of frame and shear wall. The structure is analysis by dynamic analysis for whole structure and compare base shear by static analysis. By several trial position of shear wall can give first and second mode is translation and the third mode is rotation. In this case planar shear wall is used and placed in two direction of axis. The category of structural system is Other Structure for calculation of fundamental period (T). Fundamental Period (T) of structure is more than T maximum, so value of static seismic coefficient (Cs) taken from T maximum. Each of important element is column where the dimension and reinforcement are must satisfied for requirements. Shear wall have joint together with others shear wall, so one node used by several shear wall, make duplication forces in support reaction. For foundation design we can used 1st story internal forces in finding forces and compare them with after correction of support reaction caused duplication node in used with several shear walls. This

exercise could solve the problem to anticipate duplication forces in several planar shear wall using one foundation assembly from several shear walls. The results of preliminary design column based on axial forces is 23,12 % lower than internal forces. From preliminary design based on axial forces. The dimension of preliminary design columns are lower than ideal dimension with 3 % reinforcement ratio. The result of difference between internal forces columns and support reaction columns is 12,99 %. The result of difference between internal forces shear walls and support reaction shear wall is 0,80 %.

Evaluation of road embankment stability due to rain infiltration

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In the analysis of road embankment stability, rainfall is one of the landslides triggers which is often ignored in practical design. Rainfall will infiltrate into the soil and change the conditions of pore water pressure. The change in pore water pressure reduce the shear strength of the soil which can lead to landslides. This study aims to evaluate the stability of the road embankment slope after widening due to the effect of rain infiltration. The rain infiltration value is determined by the Green-Ampt method using rainfall data from four rain stations around the research location for the last 10 years. The changes in pore water pressure due to rain infiltration are used in the analysis of slope stability by the limit equilibrium method using the spencer method. The analysis results show that the safety factor decreases from 1.50 to 1.31. This result shows the importance of put the effect of rain infiltration in every road embankment stability analysis, considering the areas with higher rainfall could lead the reduce of safety factor to below the minimum safety factor required.

Laboratory Investigation Of Using Rubbercret As An Interlayer In Rigid Pavement Overlay

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The most rehabilitating method to increase the capacity of the old concrete pavement is to place an overlay concrete on the existing pavement. According to previous researches, one of the more serious problems associated with this method is reflective cracking. Using interlayer materials as reflective cracking control, has been considered as an efficient method in terms of both

performance and cost. An experimental program was conducted to investigation the performance of rubbercret as an interlayer in rigid pavement overlay. Design of rubbercret mixture base on ASTM C270-57T. The amount of cement was 400 kg/m3, and the volumetric of shredded rubber and sand was varied from 100%:0%; 80%:20%; 60%;40%; 40%:60%; 20%:80%. To simulate the reflective cracking in overlaid pavement, a composite beam was developed with dimensions of 600×150×60 mm. Rubbercret was installed between the existing-overlay interface by design thickness 3 cm. Strain gauge and LVDT were installed at designed locations within the test to capture mechanical behavior of the beam due to static load. Three point flexural test with load beam centered was carried out to assess the performance of rubbercret in overlay system. The test result show that rubbercret interlayer design by 40% shredded rubber can separate well the movement of overlay and existing layer. It means that the composition of rubbercret interlayer can isolate the overlay layer from distress in the underlying pavement.

A Fuzzy BWM method for evaluating supplier selection factors in a SME paper manufacturer

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In today's competitive world, companies are required to increase productivity and produce high-quality products while managing their operational efficiency. This leads a firm to involve its performing suppliers by taking into account multiple factors. For small and medium-sized enterprises (SMEs), despite its importance, supplier selection is less considered. In this study, a case study for evaluating supplier selection factors in a small-medium scale paper manufacturer in Indonesia is demonstrated using the fuzzy best-worst method (fuzzy BWM). The BWM method that provides a structurally consistent factors comparison through the best and the worst criteria is extended using a fuzzy set to address the ambiguity from decision-makers' judgement. The evaluation includes five supplier criteria: service, flexibility and delivery, reputation, quality, and purchasing cost. To determine the fuzzy criteria' weights, the nonlinearly constrained optimization problem was introduced. The result indicated that the best and the worst criteria were respectively service and purchasing cost, while the service criterion was weakly crucial than quality. Besides, the Fuzzy BWM has also provided high consistency in the comparison. The optimal weights determined in this study can be applied for ranking suppliers for further attempts.

Designing optimal distribution routes using a Vehicle Routing Problem (VRP) model in a logistics service provider

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In a running business, it is common for companies to face some challenges. One of them is related to supply chain performances, especially product distribution. Companies often have a problem determining the distribution route from the origin (warehouse) to the destination (consumer). This research will discuss the distribution route in a case study at a logistics service provider in Yogyakarta. The problem is that each courier does not have a fixed distribution route, causing couriers to overload and less effective when distributing goods to consumers. To solve this problem, we created a delivery zone for each courier done in previous studies using courier assignment optimization to minimize mileage. Furthermore, based on the zones that have been created, we determined the route using the classical vehicle routing problem (VRP) mathematical model to minimize travel time in this study. Based on the results obtained, couriers not only reduce mileage but also travel time, which makes this distribution route more optimal. Later, a vehicle routing problem with time window can be carried out and compared with the current VRP for further research

Application of Anthropometry Methods in Ergonomic Chair Redesign to Prevent Fatigue A Case Study Ukm Lestari Jaya, Tulungagung

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Small and Medium Enterprises (UKM) Lestari Jaya is one of the home industries in Pucuk Village, Tulungagung Regency that produces chips from processed cassava ingredients which are commonly called samiler. These samiler chips are produced using manual methods so that the production process still depends on workers. So far, the work chairs used for military production, especially in the printing process, are not ergonomic and cause fatigue. This work chair is said to be not ergonomic in terms of the form of the backrest that is far from the back of the worker, the size that does not fit the worker's body shape, the chair material is made of plastic and the resistance of the chair in accepting body loads. Based on data from the Nordic Body Map questionnaire distributed to workers, chairs that are not ergonomic can cause fatigue in workers. Based on the above problems, a study was carried out to redesign an ergonomic work chair with the aim of reducing the risk of fatigue in workers. The anthropometric calculation of percentiles is used to determine chair size. The data is in the form of the 95th percentile for the seat height (45 cm) so that it can be used for people who have long or short legs, the 95th percentile for the width of the seat base (44.02 cm) so that the size of the seat base is wide, the 50th percentile is for the back height (56.58 cm) so that it can be used for tall and short people, the 50th percentile is for the length of the seat base (44.93 cm) so that people with large and

small popliteal bottoms can use this chair, and the 50th percentile is for the height of the armrests (23, 95 cm) to fit the average human hand size. The advantages of this chair design are that it is stronger, the size of the chair is in accordance with the worker's body size and the addition of functions, namely that the chair's height can be raised or lowered according to the worker's body size.

Heating Treatment of Air In Combustion Chamber For The Use of Mixture Ethanol and Gasoline Fuel

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This research was conducted to improve the machine performance with ethanol and gasoline mixture, because from fuel mixture with high concentrate causes value of flash point and heat evaporation fuels becomes higher. To overcome these, the air that entrance in combustion chamber heated up to 26°C, 30°C, 40°C and 50°C, the fuel used are E0, E30 and E50 on 2000 to 8000 rotation. The result of research shows E0 fuel highest torque on 30°C with a value 8,98 Nm had 0,22% increase, E30 fuel highest torque on 50°C with a value 9,5 Nm had 1,05% increase and E50 fuel highest torque on 50°C with a value 7,77 Nm had 0,64% increase. On E0 power is 5,96 kW on 30°C had 0,33% increase, the highest power of E30 is 6,29 kW on 50°C had 1,9% increase and the highest power of E50 on 50°C with a value 4,49 kW had 0,89% increase. For the highest consumption is 2000 rotation, for E0 fuel on 50°C with a value 1,43Kg / Hp.Hour, E30 with a value 1,48 Kg/Hp.Hour on 26°C and E50 with a value 2,03 Kg/ Hp.Hour on 26°C, this result shows that air heating treatment can improve the vehicle machine performance.

The Sidewalk Structuring Strategy As Iconic Pedestrian Case Study: Pedestrian's Budi Luhur University – Jakarta

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Over time, sidewalks do not only function as a space for circulation/ movement of pedestrians. The sidewalk is expected to be able to improve the quality of the space where the sidewalk is located and can be an identity/ icon for the surrounding environment. The existence of the sidewalks at the Budi Luhur University Campus has not been properly arranged so that it cannot yet be an identity/ iconic for Budi Luhur University. From the formulation of the problem, research will be conducted with descriptive methods. Descriptive method is used to make a systematic, factual and accurate description, facts, properties and relationships between the phenomena investigated. This depiction is obtained through field observations, interviews and data from relevant agencies. The method of approach taken to achieve the stated goals is Identification of Design Norms; Identification of Comparative Study and Identification of Potential and Problems. The results of this study in the form of the concept of pavement arrangement as an iconic pedestrian.

Risk Allocation Model for Cisumdawu Toll Road Projects

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Toll road infrastructure development in Indonesia has increased in recent years. The increase in the volume of toll road infrastructure development is influenced by Law No. 17 of 2007 concerning the National Long-Term Development Plan 2005-2025 stipulates that the vision of national development is to realize an Independent, Advanced, Fair, and Prosperous Indonesia. One of the toll road infrastructure that has become a national strategic program is the Cisumdawu Toll Road (Cileunyi - Sumedang - Dawuan) in West Java. In the Cisumdawu Toll Road project there are some complex problems, including the first tunnel structure in Indonesia that functions as a toll road. This complex construction project is currently experiencing delays which creates risks for project delays. In this study the aim is to identify risks and create an optimal risk allocation model between the project owner and the contractor on the Toll Road project (Cileunyi - Sumedang - Dawuan). The allocation of risk between project owner and contractor in a contract plays an important role for the success of the project. It should be based on a proper assessment of the involved risks and choosing the party best able to manage them. This research was obtained about risks that can be impacted by the project in each phase. The scope of non-excusable factors often is considered a contractor's fault which results in project construction. Furthermore, the literature review has shown the factor that can affect the delay time in Cisumdawu Toll Road Project Phase II project. There was different perception of risk identify between the labor who work either in the inside or outside even in the same project which is road project. Based on the results of descriptive test of the 5 main risks include the most important risk is soil work. It needs more detailed research that can be analyzed more deeply on the effects of identifying risk besides the soil work. Risk allocation model is applied to determine the best able party to manage the risk by considering magnitude and cost of each risk factor. The results show that the risk of natural disasters risk should not bear by the contractors. Force Majeure risk should be allocated to the owner by creating an addendum contract for recovery works with unit price payment mechanism.

Abstracts of Parallel Sessions:
Information Technology and Application

Web-Based Design of Financial Apps: Case of Kosan 54

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Financial Management is a financial planning in budgeting, auditing, management, control, deposit funds held for financial decisions effectively and efficiently. As the existing financial management processes in boarding house number 54 are still used manually so it always making mistake in terms of recording and making their own bills and financial statements, and the process of bill payment by boarding members. Therefore, it required a system that can perform data processing in an integrated and well computerized with the use of WEB-based system. The designed system is a WEB-based Financial Management Application. To build the application, used some software such as MySQL database, as well as using PHP programming language. With the finance management application will help the planning of appropriate financial income and expenses incurred.

Development of Virtual Reality Application to Increase Student Learning Motivation with Interactive Learning in Vocational Education

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In Vocational Education, learning by doing is very important to complement the concept of learning with technical introduction to maximize the results of the material received. However, in various subject areas, learning is still carried out conventionally and students are unable to apply their knowledge practically even though they have theoretical understanding. This is closely related to the lack of motivation from students in the classroom because there is no interactive course content required for visualization of concepts in each subject area. Even during the COVID-19 pandemic, teaching and learning activities had to be carried out online at their respective homes. So that further limits the scope of student practice to maximize learning outcomes. As a result, it is not possible for students to understand more in-depth concepts of subject matter using conventional learning methods. Students' motivation to learn will increase if students are provided with practical tools so that they can be visually involved and engage with what they teach in class. The development of practical tools with Virtual Reality technology, which can visualize 3D models can be a solution to meet this goal. The main objective of this

paper is to create and use Virtual Reality as an immersive learning medium and its contribution to student motivation to understand the definition of subject matter in various fields.

Utilization of the Batch Training Method to Predict the Number of Natural Disasters and Their Impacts

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Indonesia is one of the countries that often experiences natural disasters, including earthquakes, floods, tsunamis, etc. All of this causes losses, both casualties, damage, and suffering for the population. Based on this, this paper is proposed, which aims to predict the number of natural disasters in Indonesia for the coming years, casualties, damage, and their consequences. This paper is an extension of previous research, which is still an architectural model to predict Indonesia's natural disasters and their impacts. Model 4-10-1 is the best in this study, which produces 91% accuracy. Based on this architectural model, this paper will predict the number of natural disasters that occur in Indonesia and their impacts for the years to come. The research dataset and algorithms used remain the same, namely the natural disaster dataset for 2008-2019 sourced from the National Disaster Management Agency and the Batch Training algorithm. Specifically, the results of this proposed paper are in the form of a prediction of the number of natural disasters that will occur, dead and missing victims, injured, suffering and displaced, houses severely damaged, moderately damaged, lightly damaged to submerged, and damage to facilities and infrastructure such as health facilities, facilities. worship and educational facilities.

Mapping the Spread of Covid-19 in Asia Using Data Mining Algorithms

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Until now, Covid-19 is a phenomenal problem faced by almost the entire world, especially countries on the Asian continent. Not only causing casualties, but this virus also affects the wheels of the country's economy. The purpose of this paper is to view and map the spread of the Covid-19 virus in Asia based on Total Cases, Total Deaths, Total Recovered and Active Cases from 49 Countries. The research data in this paper were obtained from the Worldometer's website sourced from WHO, CDC, NHC and others. In this proposed paper, the algorithm used is K-Means Clustering with the help of Rapidminer. The results of this proposed paper are in the form of grouping or mapping the spread of the Covid-19 virus in Asia which is divided into 4

zones, including Red Zone (active case rate of Covid -19 and very high mortality rate) consisting of 1 country, Orange Zone (active case rate covid -19 and the death rate is quite high) consisting of 8 countries, the Yellow Zone (active case rate of covid -19 and moderate mortality rate) consisting of 13 countries, and the Blue Zone (active case rate of covid -19 and low mortality rate) consisting of 27 countries.

Systematics Review on the Application of Social Media Analytics for detecting Radical and Extremist Group

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Recently, social media platforms such as Twitter, Tumblr, Facebook, YouTube, blogs and discussion forums are being mistreated by radical groups to promote their ideologies and encourage radicalization. Social medias also have been used to create online extremist community and recruit new followers. In this paper work, the authors conduct a schematics literatures review on all available techniques and perform a comprehensive analysis on the application of social media analytic for detecting radical group to understand the circumstances, trends and its gaps. Further, the author provides the characterization, classification and meta-analysis in order to achieve a better understanding of the literature on the extremist detection through intelligent social media. It is found that for over the last 10 years many researchers have been conduct deep investigation on the use of social media analytics on predicting and identifying online radicalization. Besides, a number of algorithms, techniques, and tools have been applied on the recent literatures to oppose those cyber-extremist activists. This paper also highlighting the accuracy and the limitations of the methods for detecting extremist. The goal of this research is to provide an academic base for future research in the adoption of social media analysis for detecting extremist.

E-Finance Publication: A Bibliometric Constructing Networks Visualizing during Four Decades

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E-finance is increasingly developing as a modern digital technology that is widely used by the public. There is no overview of publications in the area of E-Finance Research which shows the big picture using data from all countries This paper aims to review the status and visual map position of research in the internationally E-Finance studies indexed Scopus that used a bibliometric positioning overview. The research was carried out using bibliometric techniques.

Data analysis as well as visualization utilizing VOSViewer program and the Scopus function for analyze search results. In this review, the details collected applied to 228 documents issued from 1981 through 2019. The study reveal that Martin, P.L. and Goethe-Universität Frankfurt am Main were the most active individual scientists and affiliated institutions in E-Finance publication. In Finance, the Computer Science and International Journal of Electronic Finance were the most areas of study and dissemination sources. There were three worldwide group maps with collaborative researchers. In order to identify the body of knowledge created from thirty-eight years of publication, this study constructed a convergence axis grouping comprising of E-Finance: Technology, Electronic Finance, Economic Growth, Proof of Theorem, Information Systems, Information Services, Processing, and E-Government. abbreviated as TEETIPE theme.

E-money Academic: Lesson from Literature Visualizing Scientometric Positioning (1968-2019)

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There is no overview of publications in the area of E-Money Research which shows the big picture using data from all countries This paper aims to review the status and visual map position of research in the internationally e-money studies indexed Scopus that used a bibliometric positioning overview. The research was carried out using bibliometric techniques. Data analysis as well as visualization utilizing VOSViewer program and the Scopus function for analyze search results. In this review, the details collected applied to 3,011 documents issued from 1968 through 2019. The study reveal that Miller, A. and Chinese Academy of Sciences were the most active individual scientists and affiliated institutions in e-money publication. In e-money, computer science and Lecture Notes in Computer Science Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics were the most areas of study and dissemination sources. There were nine worldwide group maps with collaborative researchers. In order to identify the body of knowledge created from forty-three years of publication, this study constructed a convergence axis grouping comprising of e-money: Profitability, Finance, Mobile telecommunication system, Electronic cash system, Investments, Intelligent system, abbreviated as MEFPII themes.

Decision Making Analysis for Free Internet Quota Assistance Online Learning during the Covid-19 Pandemic

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One of the Indonesian government's efforts to reduce the impact of the crisis due to the Covid-19 pandemic is through the distribution of social assistance through the distribution of free internet

data for students to support online learning during the implementation of government policies regarding large-scale social restrictions. This social assistance involves 350 students as an alternative as a target for decision making. In an effort to support this policy, this study offers a multi-criteria decision-making analysis approach using the Moora and Vikor methods. The results of this study present the optimal performance of the accuracy, precision and error rate of the two methods.

Analysis of Custom IoT Based Electricity Monitoring System

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Electricity is a resource that currently exists in various sectors of the community. Each person's electricity needs are different depending on the needs of the electronic equipment used. Excessive use of electronic equipment creates extreme electrical power. Electricity consumption is an issue that discussed since a long ago. This research aims to present a custom electronic sensor to monitor electricity consumption based on the Internet of Things. It also explained the correlation between input and output points from the custom electronic sensor. The method of this research consists of 4 steps: system requirement, system design, system implementation, and last, testing and analysis. The system developed is able to get the current, voltage, and power data. The data then processed by Arduino UNO and directly send by ESP8266 to Blynk Application on Android smartphones via Internet communication. The voltage testing is done in the voltage and current sensors to get the program's main loop's constant values. The system input value and the Blynk Application value are also measured to check the system's error.

Improved Genetic Algorithm for Vehicle Routing Problem Pick-up and Delivery with Time Windows

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Some problems happen in transportation and distribution. Vehicle Routing Problem (VRP) can be applied in some systems above. Deciding the optimal route for every vehicle will have some impacts on increasing economic interests and expected logistical planning results. This research will raise the problem of a shipping and logistics company. There are 45 branch offices with one main depot to serve a certain area that will be a transit point before all packages will be sent to the destination. The vehicle will depart from the depot to all branch offices to delivers and pick the package up in certain hours. In every route, planning should be considered to the amount of load when loading and unloading, because every vehicle has carrying capacity, and also every branch office has various loading and unloading service time windows. Based on the description of the problem, this research was conducted to find the optimal solution in the Vehicle Routing

Problem Pick-up and Delivery with Time Windows (VRPPDTW). An improved genetic algorithm was developed to solve these problems by adjusting the procedures for the crossover and mutation stages. The result informs that the route proposed from improved genetic algorithms is better than the company's existing route in all aspects. In the other hand, we carried out an analysis effect of the number of iterations on distance traveled, the number of penalties, and the fitness value. This algorithm can be applied in VRPPDTW and produces an optimal solution.

A Survey Blockchain and Smart Contract Technology in Government Agencies

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The development of Blockchain and Smart Contract technology provides significant changes in the form of solutions to social technology problems, such as the problem of document forgery on e-government services. In its implementation of government services, there are several challenges faced, such as social technology problems, blockchain mechanisms, virtual machines, and smart contract code levels, and automation of disintermediation. In this paper, the methodology and results of some recent papers are summarized and discussed in which the authors investigated the state of smart contract utilization in e-government service and the weaknesses and potential problems in utilization in e-government service.

Multiple Smile Detection Using Histogram of Oriented Gradient and Support Vector Machine Methods

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The face or the front of the head consists of the eyes, nose and mouth. Each face has its uniqueness from the many human faces. The face is used to show happy and sad expressions and feelings. Smiling also includes self-expression from others. The analysis of facial expressions plays a key role in analyzing human emotions and behavior. Smile detection is a specialized task in facial expression analysis with a variety of potential applications such as photo selection, user experience analysis, smile payments, and patient monitoring. Conventional approaches often extract low-level face descriptors and smile detection based on strong binary classifiers. In this paper, we propose an effective Histogram of Oriented method supporting vector engines for smile detection. The experimental results show that our proposed network outperforms the current state of the method. The test results using the Histogram of Oriented Gradient and

Support Vector Machine method for smile detection were 87% for a precision value of 88% and a recall value of 83% and accuracy. In the future, we want to exploit some of the latest effective designs. we will try to update our mouth model so we can support a bigger head turn and face size scale.

Abstracts of Parallel Sessions:
Health Technology and Other Topic Related

Role of Non-Governmental Organization (Ngo), Health Cadre and Health Personnel in The Management of Lung Tuberculosis (Tb) in North Aceh Regency in 2019

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The Directly Observed Treatment, Short-course (DOTS) strategy has been proven effective in controlling tuberculosis (TB); nevertheless, TB's community burden is still very high. This study aims to determine the role of non-governmental organizations (NGOs), health cadre, and health workers in the North Aceh Regency in overcoming TB. This study used qualitative research methods. The results showed a reasonably synergistic collaboration between NGOs, health cadres, and health personnel in the TB control program. In general, the TB control programs are inclined with national programs such as TOSS TB (Temukan Obati Sampai Sembuh – Find Treat and Cure TB), implementing DOTS strategy, counseling to prevent TB transmission, and nutrition monitoring. However, the targets of each program have not been fully achieved. This study found several obstacles in the field, such as the lack of program implementation funds, the increasing number of MDR-TB cases, and TB co-infection diseases.

Phytochemical and Hypoglycemia Effect Test Using Extract of Barangan Banana Peel With OGTT in Male White Rats of Sprague Dawley Strains Induced With Sucrose

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Banana peel extracts are known to have certain hyperglycemic effects on blood sugar levels. They are needed in developing various anti-diabetic drugs that can be used to manage diabetes mellitus in humans. In addition, many phytochemicals such as flavonoids, alkaloids, saponins, triterpenes, tannins, and glycosides exhibit certain forms of anti-hyperglycemic activitiy. The purpose of this study was to observe the phytochemical and hypoglycemic effects of barangan banana peel extract by examining the oral glucose tolerance tests (TTGO) carried out on white male rats that were induced with sucrose. A total of 25 rats were divided into 5 groups. Three groups were given barangan banana peel extract, one group was treated as a negative control and

given aquadest, while the last group was treated as a positive control and given glibenclamide. All groups of rats were given oral glucose at a dose of 2 g / kgBW. The results show that the phytochemical tests conducted in the experiment, yielded positive results on all examinations. In OGTT, the difference in blood sugar levels was not significant at (-30) or 30 minutes before treatment until 0 minutes after treatment. This showed that the blood sugar levels of the animals were uniform. However, after a while, each treatment group began to show significant changes in blood sugar levels, as seen from the P value <0.05. After 30 minutes of observation, a significant difference in the aquadest group was observed at the highest dose, which was the same in the group of rats treated with glibenclamide when compared to the aquadest group. Furthermore, the extract with high doses of blood sugar levels did not significantly decrease. However, the dose of 500 mg / kgBW showed a significant reduction when compared to the glibenclamide group. In conclusion the research show that barangan banana peel extract has the potential to be used as an antidiabetic drug.

Learning Strategies for Mobile-Assisted Seamless Learning: A Students' Initial perceptionses

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This study aims to analyze the management of learning during a pandemic using a mobile-assisted seamless learning approach at SMP Lubbul Labib, Maron, Probolinggo, East Java, Indonesia. This study uses a qualitative approach with phenomenology. The results showed that the learning strategy through cellular aids in increasing student learning motivation was carried out through; making learning planning, determining learning objectives and targets, using methods, utilizing learning media, and assessing which are carried out in a planned and systematic manner.

Innovative Learning Media Based on e-Learning in the New Normal Era

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The use of instructional media is the most effective way to be used so that all learning objectives can be achieved. Innovative learners can empower the media provided by schools and under the development and demands of the times. This research approach uses a qualitative approach to the

type of case study research. The research instrument used in this study was an interview guide designed for learners. The collected data is analyzed and categorized into main issues and themes based on literature using three channels, namely data reduction, data presentation, concluding/verification. The results are presented through a form of descriptive analysis. Based on the results of the study it can be concluded that the use of instructional media on innovative learning will greatly help learners to be able to solve problems in the learning process. By combining innovative learning media and e-Learning model is a basic form and logical consequence of the development of information and communication technology that provides flexibility, interactivity, speed, visualization through various advantages of each media in the new normality era.

BTQ Teaching Based on 'Vlog Teachers' on Youtube Channel During Pandemic Era: Theory and Practice of Online Teaching

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This study aims to analyze the implementation of online learning through teacher vlogs at Madrasah Tsanawiyah. The study was applied in class IX at MTs Nurul Jadid, Paiton Probolinggo. This research was conducted during a period of large-scale social restrictions during the COVID-19 pandemic. By using a qualitative paradigm, this research makes primary data of teachers reading the BTQ, the admin and students. Data collection instruments are using interviews, observation and documentation. The results showed: First, the teacher planned the preparation of teaching materials, making BTQ vlog videos, and assigning vlogs to students. Second, the implementation of learning includes BTQ vlog, exploration, elaboration, and confirmation using Youtube media. Third, the results of learning to read BTQ can motivate students to grow their creativity. This research also shows that there is a shift in the model of reading the BTQ which has been conducted face to face with the use of YouTube media.

Gadget Media for the Effectiveness of Student Learning

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This study aims to analyze the use of media ganget for the effectiveness of learning in Madarasah Ibtidaiyah Ainul Yaqin Sumberanyar Paiton Probolinggo East Java. This research uses a qualitative approach with a case study. The results showed that: efforts to overcome ineffectiveness in student learning in religious subjects at Madarasah Ibtidaiyah Ainul Yaqin Sumberanyar Paiton Probolinggo, East Java was done by watching videos of the Story of the

Prophet, Companions of the Prophet, studying the Koran, memorizing Asmaul Husna. Through the video, it can be adjusted to the theme of the material and adjusted to the Learning Program Plan (RPP).

Information Technology in the Development of Language Aspects of Early Childhood

Abd Hamid Wahid[1], Fathor Rozi[1*], Mamluatun Ni'mah[2], Hasan Baharun[1], Musyrifah[1], Wiwin Hidayati1, Ana Sriwahyuningsih[1]
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This study aims to analyze the use of Information Technology in the development of language aspects of early childhood in Raudhatul Athfal Tarbiyatul Ula and Raudhatul Athfal Darul Arofah Sumberkare Wonomerto Probolinggo, East Java. This research uses a qualitative approach with case studies. The results showed that: the use of information technology in the development of language aspects of early childhood, as follows; Children can develop language through audiovisuals, children can develop language with busy books, develop children's language through play media and can develop children's language through teaching aids.

Design Seamless Learning Environment in Higher Education with Mobile Device

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Mobile learning functions to facilitate student learning because it has characteristics that are practical to carry anywhere, so mobile learning has its interests. With mobile learning, learning is more flexible and effective. The consideration of the effectiveness of mobile learning-based learning demands the importance of research on the development of cutting-edge learning models to help students and educators to make learning easier and provide learning motivation for students in higher education. This research is descriptive quantitative research with data collection techniques using a questionnaire. This research was conducted from April to June 2020 in the PGMI Nurul Jadid University. The research population is students of the PGMI who are still active in the 2019/2020 academic year. Mobile learning based on mobile devices is in the useful category with a frequency of 28 and a percentage of 75.67, the rest is in the fairly good category, a frequency of 3 is obtained with a percentage of 8.10%, in the very good category a frequency of 4 is obtained with a percentage of 10.82%, and less, obtained a frequency of 2 with a percentage of 5.40%.

Mobile Learning Application to Evoke Students' English skill

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The goal is to analyze the use of mobile learning application to evoke students' English skill. This research uses a qualitative and quantitative approach with the subject was students of SMAN 1 Kraksaan Probolinggo East Java Indonesia. The results showed that students are motivated to learn English independently. What's more, partly most students feel helped in mastering aspects of learning English, such as listening skills, reading, speaking, writing, adding vocabulary, as well as understand grammar.

Learning Strategies for Mobile-Assisted Seamless

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This study aims to analyze students' motivation and learning strategies using seamless assisted mobile media. The research was conducted at the University of Nurul Jadid. The method used in this research is qualitative. The results of the study concluded that learning strategies with seamless assisted mobile media can develop student learning motivation in the aspects of attention, relevance, self-confidence, and satisfaction. In the attention aspect, it generates enthusiasm and good attention and becomes more interested in learning. The relevance aspect shows good motivation in terms of relevance. The self-confidence aspect produces good self-confidence, as well as the satisfaction aspect of the learning process.

Mobile Support in Ubiquitous Learning Systems

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The very rapid development of technology requires us to keep pace with the times as it develops. These technological advances have made everything more modern, practical and efficient. This study aims to determine our perceptions of the use of mobile devices as a learning system. The existence of this mobile device makes the learning system more practical, besides that it can also

be used anywhere. This research uses a qualitative approach with case studies. The results showed that: the impact of mobile devices is very influential and helps a lot in the learning system, the learning process becomes easier, and also broad. Through mobile devices students are easier to memorize and can be done at any time and can be applied everywhere.

Google Classroom and Learning Evaluation: Assessment Strategies

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This research was conducted to analyze the assessment strategy using Google Classroom at Nurul Jadid University, Paiton, Probolinggo, East Java, Indonesia. It uses a case study type qualitative approach. The results of this study indicate that the Google Class room based assessment strategy is carried out through; assessment of student discipline, assessment of student performance / portfolio assessment, self-assessment and assessment through forms.

Overview of Management Information System and Supply Chain Management
A Bibiometric Study

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In business and industry, changes have entered into a movement in the use of the Management Information System (MIS) related to Supply Chain Management (SCM) which requires organizations to have high competitiveness to keep up with increasingly fierce competition. There has not been much research on MIS related to SCM that describes the body literature from year to year. This study aims to describe in the form of a map of research in the field of MIS related to SCM from international scale publications from the search engine Scopus. This study uses bibiometric and analyze search results provided by Scopus and with the help of Vosviewer software to show the keyword clusters that can be identified from all relevant research in this study. The data obtained were 381 documents published from 1994 to the cut of November 20, 2020. The results showed that the most productive researchers in this field were Chay and Chou with 5 articles each and the international level institution was the Hong Kong Polytechnic University with 13 documents. . Meanwhile, most fields of study are Computer Science with 210 documents or equivalent (29.4%). This study proposes a classification of the convergence axis of MIS and SCM in the form of five-character clusters in the body literature, namely Supply Chain Management (SCM), Enterprise Resources Planning (ERP), Decision Support System (DSS), Informatic Management System (IMS), and Knowledge Management (KM).

ICAST PLENARY AND PARALLEL SESSION GUIDELINES

- The conference will be conducted virtually using Zoom Webinar Platform

- The plenary and parallel session will be conducted on 28 November 2020, kindly refer to the updated schedule of the conference

- You will receive draft of abstract book which contain the list of the title, author and their abstract prior to the conference day

- **Only one author as presenter** is allowed to attend the plenary session as well as parallel session since the limit of zoom capacity.

- All Presenters and Moderators (Session Chairs) must have to use the Virtual Background of the conference during all sessions

- You are expected to Login to Zoom Webinar using the given link at least 15 minutes prior to your session, for a brief introduction and preparation on the day

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-OO-

Elastic Cross-Section Modulus Ratio of Jabon (*Anthocephalus cadamba Miq.*) Bolt-Laminated Timber Beams

Y A Pranata[1,*], A Kristianto[2], and A Darmawan[3]

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Abstract. The strength and stiffness of the beams are related to the elastic cross-section modulus of the beam, which are related to the cross-section moment of inertia. The elastic cross-section modulus of mechanically laminated (bolt-laminated) timber beams are not the same as solid timber beam for the beam with the same cross-section, this can be happened due to the inertia moment of cross-section of the bolt-laminated beam is lower than the solid beam due to slip between laminae and the elastic modulus of every lamina are varying. The aim of this research was to study the elastic cross-section modulus of mechanically laminated timber using bolts as a shear connectors. The scope of the study are the beam specimens made from Jabon timber (*Anthocephalus cadamba Miq.*) 60 mm x 160 mm cross-section size, three beam specimens with 1500 mm clear-span length, four lamina layers, lamination system using bolt as a shear connectors to reduce slip between laminae, flexural testing using the four-point loading test method according to the ASTM D198, the flexural behavior reviewed in this research are the flexural strength, the elastic cross-section modulus ratio, and the displacement ductility ratio. The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa. The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria. The test results indicate that the failure of bolt-laminated Jabon timber beams are a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

Keywords: Elastic cross-section modulus, timber, beam, bolt-laminated, Jabon

1. Introduction

Laminated timber, especially mechanically, has been widely applied to bridge structures and agricultural support building structures for a long time in America. The concept of mechanical lamination is that the wooden laminates are connected to a bolt joint, which acts as a shear barrier so that the slip that occurs between the laminates due to working loads can be prevented. The laminate system is one of the engineered wood solutions amidst the limited production of large diameter whole wood from forests. Mechanical laminated wood elements are structural components composed of horizontal or vertical laminates, which are mechanically joined using nails, screws, or bolts [Kramer and Blass, 2001]. The bonding behavior between the laminae occurs as a result of the horizontal slip

between the laminae being prevented and restrained by the sliding linkage device at certain intervals with the mechanical coupling.

The aim of this research was to study the elastic cross-section modulus of mechanically laminated timber using bolts as a connectors. The scope of the study are the beam specimens made from Jabon timber (*Anthocephalus cadamba Miq.*) 60 mm x160 mm cross-section size, three beam specimens with 1500 mm clear-span length, four lamina layers, lamination system using bolt diameter 10 mm as a shear-connectors, flexural testing using the four-point loading test method according to the ASTM D198 [ASTM, 2014], the flexural behavior reviewed in this research are the flexural strength, the elastic cross-section modulus ratio, and the displacement ductility ratio.

This study is a continuation of previous research conducted by Pranata et.al. [Pranata et.al., 2012], namely the ratio of the elastic section modulus of mechanical laminated wood beams with mechanical joining devices. The research studied beams made from Acacia Mangium, Keruing, Meranti Merah, Mersawa, Nyatoh, and Durian timbers. Results obtained from previous research indicated that the elastic cross-section modulus ratio were ranged from 0.38-0.91. In general, the parameters of specific gravity, bolt diameter, and the ratio of the number of rows per bolt distance contribute to the elastic section modulus ratio of laminated beam-bolts.
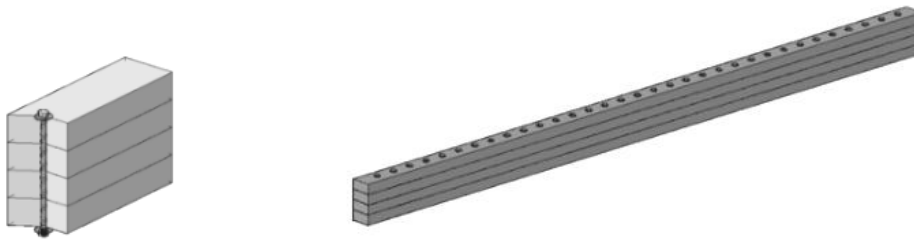

Figure 1. Schematic of bolt-laminated timber beams (Pranata et.al., 2011).

The research methodology is testing the test object experimentally in the laboratory. The study consisted of four stages, the first stage was a literature study on timber elastic modulus, timber flexural rigidity, and mechanical laminated timber. The second stage is the manufacture of mechanical laminated timber beam specimens using a bolt connection tool. The third stage is experimental testing in the laboratory. The fourth stage is a study to process the flexural capacity curve data, namely the load vs displacement relationship curve for the calculation of flexural rigidity, flexural strength, and displacement ductility ratio of mechanical laminated beams related to solid beams.

2. Basic Theory
2.1 Jabon Timber (*Anthocephalus cadamba Miq.*)
The Jabon tree (*Anthocephalus cadamba Miq.*) grows on various islands in Indonesia and is included in the strength-class III-IV category with a bending strength of 37.96 MPa, a modulus of rupture 67.79 MPa, and a modulus of elasticity of 6670.80 MPa. Jabon timber is included in the moderate class category of durability. Durability of timber as a building component against wood termite attacks, Jabon timber is included in the class II category, then resistance to wood rot fungus is included in the class IV-V category [PPPKKP, 2013].

2.2 Elastic Section Modulus
The Elastic Section Modulus (S) in the elastic limit load range can be calculated by Equation 1 [Gere and Goodno, 2018], which is based on the effect of the moment of inertia parameter of the cross section I and the distance from the outer edge fibre to the centre of gravity of the y,

$$S = \frac{I}{y} \tag{1}$$

In the context of a mechanical laminated beam, the elastic section modulus is lower than that of a solid beam, the ratio can be calculated using Equation 2 and Equation 3 as follows,

$$S_{eff} = k_S . S \tag{2}$$

$$f_{B\text{-}lam} = \frac{M}{S_{eff}} \tag{3}$$

where M is the bending moment, S_{eff} is the effective elastic modulus of the bolted laminated beam, k_S is the ratio of the elastic section modulus of the laminated beam to the solid beam, and $f_{B\text{-}lam}$ is the flexural strength of the laminated beam [Pranata et.al., 2012].

Horizontally laminated beam
(pranata et.al., 2012)

(b). Solid beam
(Pranata et.al., 2020).

(a).
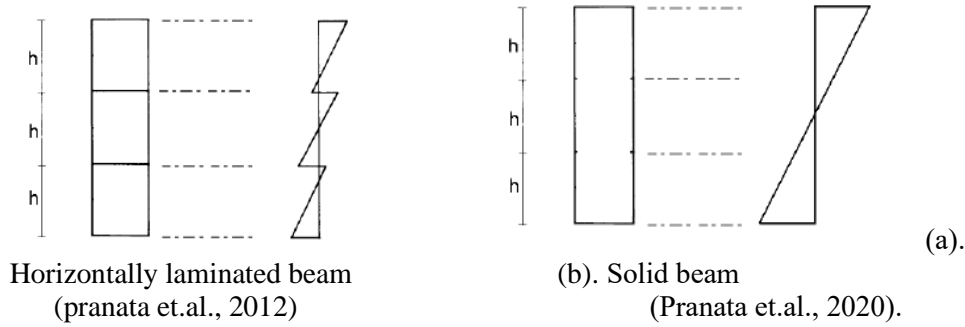
Figure 3. Cross-section of beam.

2.3 Deformation of Beam

The modulus of elasticity is the proportional slope of the linear line of the load and deformation curve (range of elastic load), in this context the bending load on the beam and deformation is the deflection of the beam due to the load acting. For a simple beam condition with a load of two centred on each distance as far as a from each support as illustrated in Figure 4, the deformation relationship to the load is expressed in Equation 4 [Gere and Goodno, 2018].

$$\delta = \frac{P.a}{24EI}\left(3L^2 - 4a^2\right) \tag{4}$$

With δ is deformation of beam due to flexural, P is concentrated load, L is length of beam span, E is modulus of elasticity (which is MoE parallel to the grain), and is the cross section moment of inertia. With the presence of more than one number of laminae, there is an interaction or slip between the laminates, because the compatibility of the strain mechanism between the bolt as a mechanical joint and lamina timber does not work perfectly and there is a partial interaction between the laminates, so that the bending behavior of the laminated beams is not the same as the solid beam (Figure 3.a and Figure 3.b). Equation 5 is the development of Equation 1 in the context of calculating the deformation of mechanical laminated beams, with the magnitude of the flexural rigidity of laminated beams being lower than those of solid beam, which is in the form of parameters for the flexural rigidity ratio of mechanical laminated beams (laminate-bolt) or k_{EI}.

$$\delta = \frac{P_{lam}a}{24\left(k_{EI}.E.I\right)}\left(3L^2 - 4a^2\right) \tag{5}$$

2.4 Method to Determine Proportional Point

The flexural capacity of timber beams is obtained from the results of experimental testing in the laboratory in the form of a bending load versus beam deformation curve. To obtain information on changes in the condition of the beam material from elastic to post-elastic, it is necessary to know the location of the proportional point. There are several methods to determine the proportional point of the

previous research by Munoz et al. (Munoz et. Al., 2010). One method of determining the proportional point is the Yasumura and Kawai method, with the basic principle that initial stiffness is calculated at conditions 0.1, 0.4, and 0.9 peak points (P_U). The condition of the elastic material is determined by the intersection of two linear lines, namely the meeting point formed between the 0.1-$0.4P_U$ lines and the $0.4P_U$ and $0.9P_U$ lines. The meeting point is then shifted parallel to coincide with the load vs deformation curve of the experimental test results.

3. Experimental Tests and Discussion

In this study, a mechanical laminated timber beams were tested with a mechanical connectors, namely a 100 mm diameter bolts. Timber beams made of Jabon timber (*Anthocephalus cadamba Miq*.). The timber lamina has a cross-sectional size of 60 mm x 40 mm, the lamination system used is horizontal with 4 (four) laminae, so that the beam's final cross-section size is 60 mm x 160 mm. The distance between the bolts (spacing) is 100 mm.

Figure 4. Flexural test of the beam specimen using Universal Testing Machine.

Figure 4 show the testing process for one specimen of laminated timber beams. The test method is the four-point loading test with a distance of 500 mm (1/3 beam span). Furthermore, Figure 5 show the variety of beam failures that occur in the test object, namely simple tension, this is in accordance with one of the flexural test object failure models based on ASTM D143 [ASTM, 2014] so that the expected failure occurs in accordance with the test results.

Figure 4. Failure type of the beam for all beams specimens which are simple tension.

Figure 5 show a curve diagram of the load versus beam deformation relationship. The test results of all specimens show almost the same curve trend, the maximum deformation ranges from 24.32 mm to 37.27 mm, while the maximum load ranges from 12.28 kN to 14.13 kN. Figure 6 show an example of calculating the proportional point (proportional load) and the ultimate point (ultimate load). The complete calculation results are shown in Table 1. The results of Table 1 show that the average beam turnover ductility ratio is 1.18. The average proportional limit load is 12.40 kN, the ultimate limit load is 13.58 kN. Furthermore, using Equation 3, the flexural rigidity ratio of laminated beams is calculated. The complete calculation results are shown in Table 2. Calculation of the elastic section modulus and bending stress is carried out using Equation 2 and Equation 3.
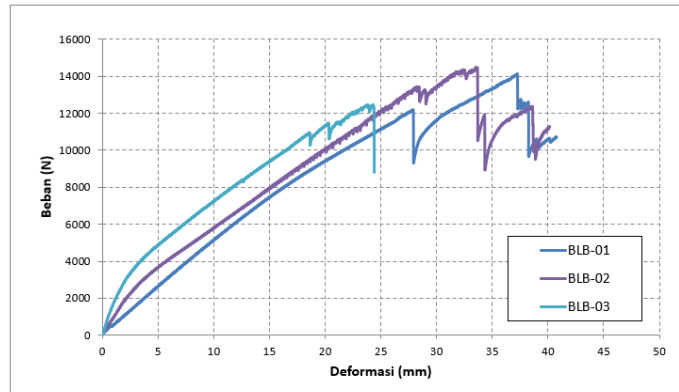
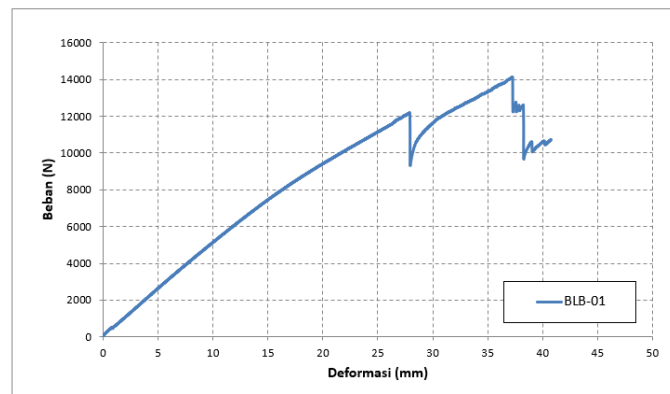**Figure 5.** Load vs Deformation curves of the bolt-laminated timber beams.

Figure 6. Calculation of proportional and ultimate points for specimen BLB-01.

Table 1. Proportional point, ultimate point, deformation at proportional point, deformation at ultimate point, and displacement-ductility results.

Specimen	P_y (N)	d_y (mm)	P_u (N)	d_u (mm)	μ
BLB-01	12001.91	23.83	12280.28	24.32	1.02
BLB-02	13074.70	28.46	14330.85	33.58	1.18
BLB-03	12137.70	27.78	14127.15	37.27	1.34
Average	12404.77	26.69	13579.43	31.72	1.18

Table 2. Results of flexural rigidity ratio of bolt-laminated timber beams.

Specimen	M_y (kN.mm)	$f_{b\text{-lam}}$ (MPa)	f_b (MPa)	k_S
BLB-01	3000.478	11.72	37.96	0.31
BLB-02	3268.675	12.77	37.96	0.34
BLB-03	3034.425	11.85	37.96	0.31
Average	3101.193	12.11	37.96	0.32

The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa (secondary data from Atlas elastic cross-section modulus, timber, beam, bolt-laminated, Jabon Indonesia). The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the

ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria. The test results indicate that the failure of bolt-laminated Jabon timber beams are a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

4. Conclusion

The load-deflection curve of bolt-laminated timber beams shows a bilinear trend. The presence of a bolt gives the beam a ductile impact. Changes in the behavior of beams from elastic to plastic conditions are due to the effective stress that occurs in some parts of the timber material that has exceeded the yield limit criteria. When the proportional limit load is reached, the bolt has not yielded, so that after the beam has post-elastic behavior the bolt still functions as a shear transfer between laminae, likewise the normal stress that occurs on each of the outer edge fibres has not exceeded the ultimate limit criteria so that the beam is still capable, endure the bending moment. The failure behavior of bolted-laminated timber beam occurs due to bending failure.

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Preface

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Preface

Distinguished guests and participants,
Assalamualaikum Warahmatullahi Wabarakatuh.
Good Morning Ladies and Gentlemen.
Welcome to International Conference on Advanced Science & Technology (ICAST) 2020

On behalf of the Organizing Committees, we would like to express a warm welcome to all delegates and participants to the ICAST International Conference on Science and Technology 2020. It is a great honor for all collaboration institution including universiti teknikal malaysia melaka, university of bung karno, university of HKBP Nommensen and Sada Utama Indonesia to support the conference.

This conference is an important forum for exchange of information and research results among us, who come from different countries, different educational and research institutes, and different research interest. The main theme of conference is Innovation Research for Science and Technology in Industry 4.0 has been chosen. ICAST 2020 aims to bring together researchers, scientists, engineers, and scholar students to exchange and share their experiences, new ideas, and research results about all aspects of science, engineering and Technology, and discuss the practical challenges encountered and the solutions adopted. The conference invites delegates from across Indonesian and South East Asian region and beyond, and will be attended by participants from abroad university academics, researchers, practitioners, and professionals across a wide range of industries. Due to Covid-19 outbreak, the conference 1st International conference on advanced science and technology has been successfully held virtual on November 28th, 2020. Total more than 100 participants in the plenary room were enthusiastic about listening to the keynote speakears from Assoc. Prof. Muhammad Imran Qureshi, Ph.D (Universiti Teknikal Malaysia Melaka), Assoc. Prof. Dr. Dahlan Abdullah, ST, M.Kom (Univeritas Malikusalleh).

In closing, we would like to thank the Rector of Universitas Budi Luhur, Universitas Bung Karno, Universiti Teknikal Malaysia Melaka and all parties, for supporting the successfull conference. We would also like to thank all contributors for your good cooperation. Special thanks for OC members for their hard work and patience.

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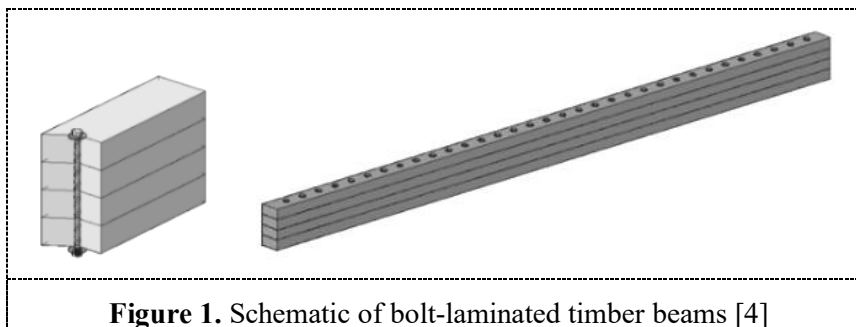

Figure 1. Schematic of bolt-laminated timber beams [4]

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2.2. Elastic Section Modulus
The Elastic Section Modulus (S) in the elastic limit load range can be calculated by Equation 1 [6], which is based on the effect of the moment of inertia parameter of the cross section (I) and the distance from the outer edge fibre to the centre of gravity (y),
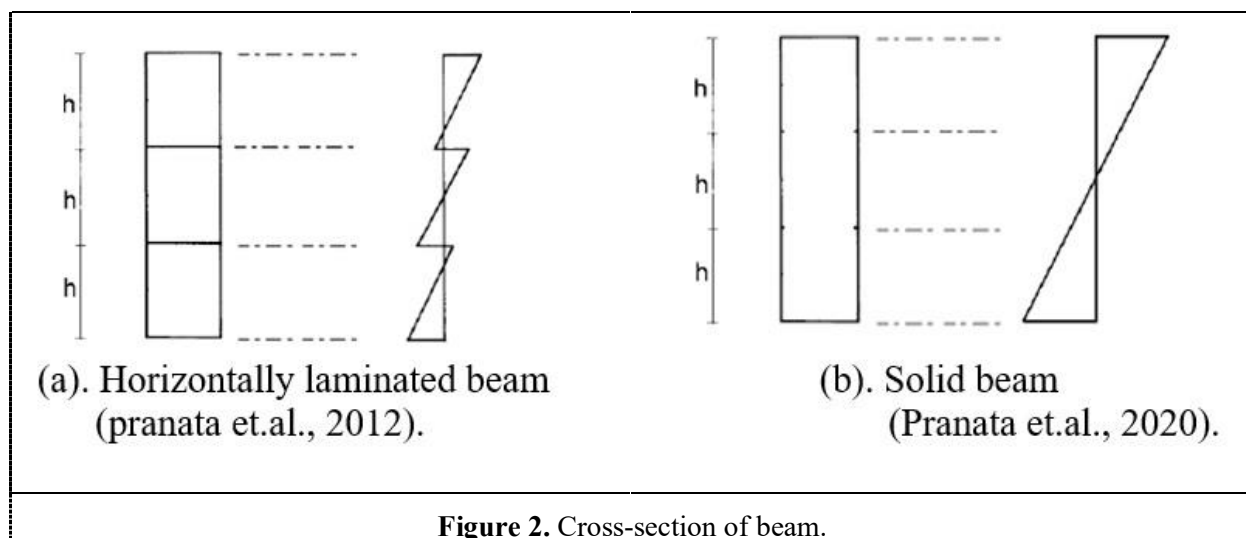
$$S = \frac{I}{y} \tag{1}$$

In the context of a mechanical laminated beam, the elastic section modulus is lower than that of a solid beam, the ratio can be calculated using Equation 2 and Equation 3 as follows,

$$S_{eff} = k_S \cdot S \tag{2}$$

$$f_{B\text{-}lam} = \frac{M}{S_{eff}} \tag{3}$$

where M is the bending moment, Seff is the effective elastic modulus of the bolted laminated beam, kS is the ratio of the elastic section modulus of the laminated beam to the solid beam, and fB-lam is the flexural strength of the laminated beam [3].

Figure 2. Cross-section of beam.

(a). Horizontally laminated beam (pranata et.al., 2012).

(b). Solid beam (Pranata et.al., 2020).

2.3. Deformation of Beam

The modulus of elasticity is the proportional slope of the linear line of the load and deformation curve (range of elastic load), in this context the bending load on the beam and deformation is the deflection of the beam due to the load acting. For a simple beam condition with a load of two centred on each distance as far as a from each support, the deformation relationship to the load is expressed in Equation 4 [6].

$$\delta = \frac{P.a}{24EI}\left(3L^2 - 4a^2\right) \tag{4}$$

With δ is deformation of beam due to flexural, P is concentrated load, L is length of beam span, E is modulus of elasticity (which is MoE parallel to the grain), and is the cross section moment of inertia. With the presence of more than one number of laminae, there is an interaction or slip between the laminates, because the compatibility of the strain mechanism between the bolt as a mechanical joint and lamina timber does not work perfectly and there is a partial interaction between the laminates, so that the bending behavior of the laminated beams is not the same as the solid beam (Figure 2.a and Figure 2.b). Equation 5 is the development of Equation 1 in the context of calculating the deformation of mechanical laminated beams, with the magnitude of the flexural rigidity of

laminated beams being lower than those of solid beam, which is in the form of parameters for the flexural rigidity ratio of mechanical laminated beams (laminate-bolt) or k_{EI}.

$$\delta = \frac{P_{lam}a}{24\left(k_{EI}.E.I\right)}\left(3L^2 - 4a^2\right) \tag{5}$$

2.4. Method to Determine Proportional Point

The flexural capacity of timber beams is obtained from the results of experimental testing in the laboratory in the form of a bending load versus beam deformation curve. To obtain information on changes in the condition of the beam material from elastic to post-elastic, it is necessary to know the location of the proportional point. There are several methods to determine the proportional point of the previous research by Munoz et al. [7] One method of determining the proportional point is the Yasumura and Kawai method, with the basic principle that initial stiffness is calculated at conditions 0.1, 0.4, and 0.9 peak points (PU). The condition of the elastic material is determined by the intersection of two linear lines, namely the meeting point formed between the 0.1-0.4PU lines and the 0.4PU and 0.9PU lines. The meeting point is then shifted parallel to coincide with the load vs deformation curve of the experimental test results.

3. Experimental Tests and Discussion

In this study, a mechanical laminated timber beams were tested with a mechanical connectors, namely a 100 mm diameter bolts. Timber beams made of Jabon timber (Anthocephalus cadamba Miq.). The timber lamina has a cross-sectional size of 60 mm x 40 mm, the lamination system used is horizontal with 4 (four) laminae, so that the beam's final cross-section size is 60 mm x 160 mm. The distance between the bolts (spacing) is 100 mm.

Figure 3. Flexural test of the beam specimen using Universal Testing Machine.
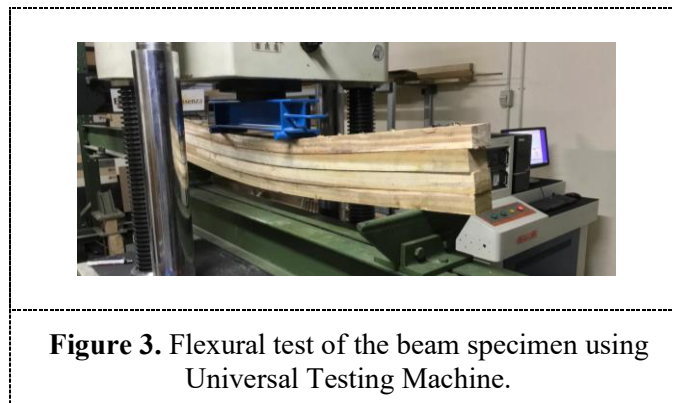
Figure 3 show the testing process for one specimen of laminated timber beams. The test method is the four-point loading test with a distance of 500 mm (1/3 beam span). Furthermore, Figure 4 show the variety of beam failures that occur in the test object, namely simple tension, this is in accordance with one of the flexural test object failure models based on ASTM D143 [2] so that the expected failure occurs in accordance with the test results.

Figure 4. Failure type of the beam for all beams specimens which are simple tension.

Figure 5 show a curve diagram of the load versus beam deformation relationship. The test results of all specimens show almost the same curve trend, the maximum deformation ranges from 24.32 mm to 37.27 mm, while the maximum load ranges from 12.28 kN to 14.13 kN. Figure 6 show an example of calculating the proportional point (proportional load) and the ultimate point (ultimate load). The complete calculation results are shown in Table 1. The results of Table 1 show that the average beam turnover ductility ratio is 1.18. The average proportional limit load is 12.40 kN, the ultimate limit load is 13.58 kN. Furthermore, using Equation 3, the flexural rigidity ratio of laminated beams is calculated. The complete calculation results are shown in Table 2. Calculation of the elastic section modulus and bending stress is carried out using Equation 2 and Equation 3.
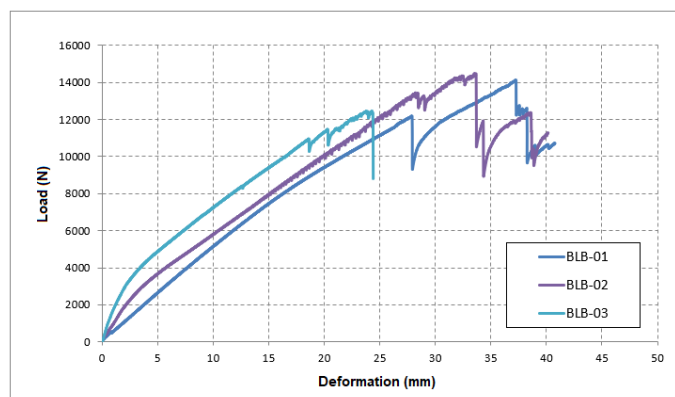

Figure 5. Load vs Deformation curves of the bolt-laminated timber beams.

Figure 6. Calculation of proportional and ultimate points for specimen BLB-01.
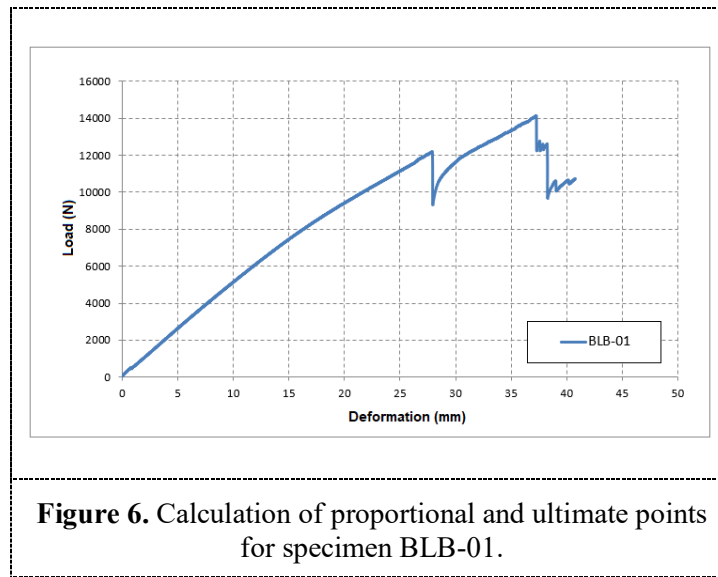
Table 1. Proportional point, ultimate point, deformation at proportional point, deformation at ultimate point, and displacement-ductility results.

Specimen	P_y (N)	d_y (mm)	P_u (N)	d_u (mm)	μ
BLB-01	12001.91	23.83	12280.28	24.32	1.02
BLB-02	13074.70	28.46	14330.85	33.58	1.18
BLB-03	12137.70	27.78	14127.15	37.27	1.34
Average	12404.77	26.69	13579.43	31.72	1.18

Table 2. Results of flexural rigidity ratio of bolt-laminated timber beams.

Specimen	M_y (kN.mm)	f_{b-lam} (MPa)	f_b (MPa)	k_S
BLB-01	3000.478	11.72	37.96	0.31
BLB-02	3268.675	12.77	37.96	0.34
BLB-03	3034.425	11.85	37.96	0.31
Average	3101.193	12.11	37.96	0.32

The bending strength of bolt-laminated timber beams obtained from an experimental test is 12.11 MPa (average) in the term of proportional limit load, while the bending strength of a solid timber beam is 37.96 MPa (secondary data from Atlas elastic cross-section modulus, timber, beam, bolt-laminated, Jabon Indonesia). The results showed that the elastic cross-section modulus and the flexural stress of the bolt-laminated timber beams were lower with a ratio of 0.32 than the solid timber beam, and the ductility ratio of the bolt-laminated timber beams was 1.18 so that they were categorized in the limited ductility criteria. The test results indicate that the failure of bolt-laminated Jabon timber beams are a failure of bending. The elastic modulus cross-section parameters of laminated timber beams are useful for the design of beam structure components in buildings, especially in the calculation of beam strength and beam stiffness as a serviceability requirement.

4. Conclusion

The load-deflection curve of bolt-laminated timber beams shows a bilinear trend. The presence of a bolt gives the beam a ductile impact. Changes in the behavior of beams from elastic to plastic

conditions are due to the effective stress that occurs in some parts of the timber material that has exceeded the yield limit criteria. When the proportional limit load is reached, the bolt has not yielded, so that after the beam has post-elastic behavior the bolt still functions as a shear transfer between laminae, likewise the normal stress that occurs on each of the outer edge fibres has not exceeded the ultimate limit criteria so that the beam is still capable, endure the bending moment. The failure behavior of bolted-laminated timber beam occurs due to bending failure.

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