PROCEEDNG
ICoSET
2017

International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH)
08 - 10 November 2017
Pekanbaru, Indonesia

ICoSET 2017 Partner and Support

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FOREWORD FROM CHAIR OF ICOSET & ICOSEEH

UNIVERSITAS ISLAM RIAU

In the name of Allah, Most Gracious, Most Merciful

Assalamualaikum Wr. Wb,

Welcome to the International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH).

ICoSET & ICoSEEH 2017 has a theme "Sustainability Development in Developing Country". This forum provides researchers, academicians, professionals, and disciplinary working or interested in the field of Science Electrical Technology and Social Education Economy and Humaniora to show their works and findings to the world.

I would like to express my hearty gratitude to all participants for coming, sharing and presenting your experiences in this vast conference. There are more than 150 papers submitted to ICoSET & ICoSEEH UIR 2017. However only high quality selected papers are accepted to be presented in this event, so we are also thankful to all the international reviewers and steering committee for their valuable work. I would like to give a compliment to all partners in publications and sponsor ships for their valuable supports.

Organizing such a prestigious conference was incredibly challenge and would have been impossible without our outstanding committee, So, I would like to extend my sincere appreciation to all committees and volunteers from Chiba University, Saga University, Universiti Teknologi Mara, Universiti Utara Malaysia, Dayen University, Kyungdong University for providing me with much needed support, advice, and assistance on all aspects of the conference. We do hope that this event will encourage the collaboration among us now and in the future.

We wish you all find opportunity to get rewarding technical programs, intellectual inspiration, renew friendships and forge innovation and that everyone enjoys some of what in Pekanbaru-Riau special.

Pekanbaru, 8th November 2017

Dr. Evizal Abdul Kadir, M.Eng

Chair of ICoSET & ICoSEEH 2017

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FOREWORD FROM RECTOR
UNIVERSITAS ISLAM RIAU

It is our great pleasure to join and to welcome all participants of the International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH) 2017 in Pekanbaru. I am happy to see this great work as part of collaborations among Chiba University, Saga University, Universiti Teknologi Mara, Universiti Utara Malaysia, Dayen University, Kyungdong University. In this occasion, I would like to congratulate all participants for their scientific involvement and willingness to share their findings and experiences in this conference.

I believe that this conference can play an important role to encourage and embrace cooperative, collaborative, and interdisciplinary research among the engineers and scientists. I do expect that this kind of similar event will be held in the future as part of activities in education research and social responsibilities of universities, research institutions and industries internationally.

My heart full gratitude is dedicated to organizing committee members and the staff of Islamic University of Riau for their generous effort and contribution toward the success of the ICoSET & ICoSEEH 2017.

Pekanbaru, 8th November 2017

Prof. Dr. H. Syafrinaldi, SH., MCL

Rector of Islamic University of Riau

Pekanbaru, Indonesia

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TIME SCHEDULE

International Conference on Science Engineering and Technology (ICoSET) and International Conference on Social Economic Education and Humaniora (ICoSEEH) Pekanbaru, Indonesia, 08-10 November 2017

TIME	ACTIVITIES	PERSON IN CHARGE	VENUE
November 08, 2017			
08.00-08.30	Registration	Committee	Auditorium Rectorat 4th Floor
08.30-09.15	Opening Ceremony:	Committee	
	Quran Recitition	Committee	
	Indonesia Raya National Anthem	Committee	
	Speech of the Committee	Chairman of the committee **Dr. Evizal Abdul Kadir, ST, M.Eng**	
	Opening speech	Rector of Islamic Universty of Riau **Prof. Dr. H. Syafrinaldi, SH., MCL**	
	Performing Arts (Traditional Dance)	Committee	
09.15-09.30	Photo Session and Coffee Break	Committee	
09.30-12.00	Keynote speakers: 1. Prof. Dr. Shigeki Inaba: Professor of Agronomy. Agricatural Plant Science & Agricultural Economics. Saga University, Japan. 2. Prof. John Lee PhD, ME, MSc, BSc: President Kyungdong Global Campus Research, Kyoto University, Japan 3. Yohei Murakami, Ph.D: Center for the Promotion of Interdisciplinary Education	Moderator 1. Dr. Ujang Paman Ismail, M.Agr 2. Dr. Evizal Abdul Kadir., M.Eng 3. Arbi Haza Nst, B.IT, M.IT	
12.00-13.00	Lunch Break	Committee	3rd Floor
13.00-15.00	Parallel Session 1 Participants	Moderator	4rd Floor
15.00-15.30	Coffee Break	Committee	
15.30-17.30	Parallel Session 2 Participants	Moderator	
17.30-17.45	Closing Ceremony	Committee	

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TIME	ACTIVITIES	PERSON IN CHARGE	VENUE
November 09, 2017			
07.30-08.00	Re-registration	Committee	1st Floor
08.00-17.00	Siak Tour: 1. Istana Siak 2. Klenteng Hock Siu Kiong (Bangunan Merah) 3. Masjid Syahabuddin 4. Balai Kerapatan Adat		

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ROOM 1

Time Slot	No	Paper ID	Author	Title
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	2	1002	Arbi Haza Nasution, Yohei Murakami, Toru Ishida	Similarity Cluster of Indonesian Ethnic Languages
	3	1007	Jaroji, Agustiawan, Rezki Kurniati	Design Self Service Software Prototype For Village Office Using Unified Modeling Language
	4	1009	Yoanda Alim Syahbana, Memen Akbar	Analysis Of Frame Loss Position Influence And Type Of Video Content To Perceived Video Quality
	5	1010	Apri Siswanto, Norliza Katuk, Ku Ruhana Ku-Mahamud, Evizal Abdul Kadir	An Overview of Fingerprint Template Protection Approaches
	6	1013	Yuniarti Yuskar, Dewandra Bagus Eka Putra, Tiggi Choanji, Ziadul Faiez, Muhammad Habibi	Sandstone Reservoir Characteristic Based on Surficial Geological Data of Sihapas Formation in Bukit Suligi Area, Southwest Central Sumatra Basin
Parallel Presentation 2 (15.30-17.30)	7	1015	Raisa Baharuddin, Selvia Sutriana	Effect of Maturity Level of Compost And Shallot Varieties to Growth and Yield in Peat Soil
	9	1019	Ida Syamsu Roidah, Dona Wahyuning Laily	Improving Family Revenues Through Role of Household Mother In Rejotangan District
	10	1026	Fathra Annis Nauli1, Jumaini, Diva de Laura	Relationship Between Adolescent Characteristic and Bullying Incidents At Private Junior High School In Pekanbaru
	11	1025	Husnul Kausarian, Batara, Dewandra Bagus Eka Putra, Adi Suryadi Evizal Abdul Kadir	Measurement of Electric Grid Transmission Lines as the Supporting of National Energy Program in West Sumatera Area, Indonesia through Geological Mapping and Assessment

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ROOM 2

Time Slot	No	Paper ID	Author	Title
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	2	1016	Sisca Vaulina, Khairizal, Hajry Arief Wahyudy	Factors Affecting Production of Coconut (*Cocos Nucifera* Linn) In Gaung Anak Serka District Indragiri Hilir Regency, Riau Province
	3	1004	Nur Khamdi, Muhammad Imam Muthahhar	Determining Sliders Position by Using Pythagoras Principle of 3-DOF Linear Delta Robot
	4	1005	Desti	Morphological Characterization of Nibung (*Oncosperma Tigillarium* (Jack) Ridl.) As Riau Province Mascot Flora
	5	1006	Novrianti, Ali Musnal, Hardi, Bop Duana A, Leovaldo P	Weight On Bit Analysis In Rate Of Penetration Optimization Using Bourgoyne And Young Method
	6	1008	Idham Nugraha, Febby Asteriani, Puji Astuti, Retno Sawitri, Firdaus Agus	The Effects of Tengku Agung Sultanah Latifah Bridge Toward Physical Development in Siak Sub Districts
	7	1003	Heriyanto	Efficiency Of Rubber People Production In Kampar Regency Of Riau Province
	8	1011	Ariyon, M, Nugroho, R. S.	Production Optimization Esp-To-Gas Lift In High Gor Case Using Well Simulator
	9	1014	Anas Puri	Effect of Safety Factors on The Calculated Deflection of 1-Pile Row Full Scale Nailed-Slab Pavement System Resting on Soft Clay Due to Concentric Loadings
Parallel Presentation 2 (15.30-17.30)	10	1017	Dody Yulianto, Dedikarni, Kurnia Hastuti, Juraiz Saputra	Utilization Of Palm Oil Waste With Polypropylene Matriks (Pp) Recycling On Particle Board Composite (Particle Board)
	11	1018	Tengku Idris, Nurkhairo Hidayati,	Profile of Habits of Mind Student of Biology Education Program Islamic University of Riau
	12	1020	Hermaini, Sugeng Wiyono, Anas Puri	Study Of Concrete On Rigid Pavement With Addition Scanfibre
	13	1021	Muhammad Ariyon	Energy Resource Development Strategy At Indragiri Hulu Regency Riau Province
	14	1022	Rosyadi, Agusnimar, Abdul Fatah Rasidi	Giving *Chlorella sp* with Different Amount for DevelopmenT *Moina sp*
	15	1023	Sri Ayu Kurniati, Welly Sampurno	Analysis Of The Competitiveness Of Farming Oil Palm People Bengkalis Regency In Mandau
	16	1027	Ernita, M. Noer, Sidik Arif Irawan	Green Beans Plant Response (Vigna Radiata L) On Liquid Organic Fertilizer (Lof) Nasa and NPK Compound Fertilizer
	17	1028	Darus, Hajry Arief Wahyudy	Analysis Of Human Resources Work In Production Activity Hydroponic Vegetables Commodity (Case Study: Technical implementation Unit of Agro Garden in Islamic University of Riau)

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UTILIZATION OF PALM OIL WASTE WITH POLYPROPYLENE MATRIKS (PP) RECYCLING ON PARTICLE BOARD COMPOSITE

Dody Yulianto[1], Dedikarni[2], Kurnia Hastuti[3], Juraiz Saputra[4]
[1,2,3,4]*Department of Mechanical Engineering,Faculty of Engineering, Universitas Islam Riau*
Jl. Kaharuddin Nasution, Marpoyan, Pekanbaru 28284
Riau, Indonesia
Email : dody_yulianto@eng.uir.ac.id

Abstract

Oil palm plants that have reached the age of no longer productive at the age of approximately 25 years should be done rejuvenation (replanting). The plant will become a waste that can be utilized optimally as a particle board so it is not wasted in vain. Research conducted on particle board composites reinforced with fiber-shaped palm rods and particles arranged with a polypropylene (PP) matrix of waste plastic bottles. The research stages were started from the selection of fibers, particle size, mixing and addition of Adiptif Maleic Anhydride (MAH) ingredients by 5% by weight of matrix and Benzoyl Peroxide (BPO) by 15% of MAH weight and particle formation, up to the testing stage. Composite particle board is made by hot press method. The composite particle board consisting of fibers / particles with polypropylene matrix (PP) measured its composite mechanical properties against bending strength with variation of volume fraction of oil palm rod - polypropylene (PP) by 60%: 50%, 50%: 50%, and 40% : 60%. The specimens and bending testing procedures refer to the ASTM D 790-03 standard. Testing of mechanical properties tends to increase with increasing adhesive (matrix) levels. The highest bending strength on particle board composites with a 40%: 60 composition of 13.01 N / mm2 is higher than that of composite particle board with a composition of 60%: 40%, 50%: 50% of 11.17 N / mm2. This research has obtained the right composition on the manufacture of particleboard that meets the SNI 03-2105-1996 quality standard. The results of this research is one of the solutions in the utilization of waste oil palm and recycled plastics so as to have a favorable economic value for the community around the palm plantation.

***Keywords**: Particle Board, Palm Oil Rod, Polypropylene.*

1. INTRODUCTION

1.1 Background

Increasing population growth makes human need for wood as construction of building or furniture continue to increase while wood willingness as raw material continue to decrease. According to the directorate general of forestry production

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development (Bakar 2003) that the last 5 years of timber production in the period of 2001 - 2005 ranged from 11 - 21 million m3 / year except in 2005 the production of logs reached 24 million m3. This indicates that the demand for timber is increasing every year.

With the depletion of wood availability, then one effort that can be developed is the manufacture of composite board. Namely the manufacture of composites by using recycled plastics. The manufacture of composites with recycled plastics can have a good impact because in addition to improving the efficiency of timber utilization, it can also reduce the loading of plastic waste. The advantages of this product include cheaper production costs, raw materials abundant, flexible in the process of making and have better properties.

Simultaneously, the potential for palm oil is increasing at this time, with the growing extent of oil palm plantations in Indonesia. The high waste generated at this time because the utilization of oil palm is limited to the utilization of fruit, fiber, bunches and palm stem. While on the stem is generally burned or let it accumulate into waste that can cause various impacts and environmental disturbances.

The palm oil rods consist of two main components, namely vascular bundles and parenchyma tissue. The result of chemical analysis showed that the level of palm oil starch was high (Bakar, 2003). This starch can inhibit the gluing process on the particle board manufacture. One way to reduce this starch is by soaking the particles before the particles are processed further. According to Hadi (1991) and Afandy (2007) the cold soaking and heat immersion treatment of the particles causes a decrease in particulate matter, so that the contaminants present on the cell wall can be removed.

Meanwhile, the high plastic waste in each year continues to increase and will cause problems in handling the environment. Martaningtyas (2006) describes the plastic needs of the Indonesian community in 2002 around 1.9 million tons and then increased to 2.1 million tons in 2003, while plastic demand in 2004 was estimated at 2.3 million tons. This means that tens of tons of plastic have been produced and used by the community. Plastics have become an increasing number of life necessities that will impact the increase of environmental waste every year.

Polymers in general can increase the mechanical strength of composites. According to Jiang and Li 2017, the recorded statistics on particle board have identified the strength value of the optimum internal bond of 0.83 MPa representing the overall mechanical improvement of the particle board.

Polypropylene (PP), is one of the more rigid polymeric materials, has better tensile strength and clarity than Polyethylene and also low water vapor permeability and high Polypropylene melting point is 1700C. This material is widely used to make tools for everyday purposes, one of them on a glass of mineral water. Polypropylene is a recyclable plastic type that has the potential as a matrix in the manufacture of particle board composites because it is lightweight easily formed, resistant to chemicals.

Research conducted (Maryam Jamilah Lubis, et al 2009) on the use of waste oil palm stem and recycled plastic Polyethylene (PE) as plastic composite board stated that the addition of MAH and DCP additives on the composite board resulted in improved physical and board quality on the ratio of 70: 30 particles and plastic compositions. These results have met the JIS A 5908 (2003) standard but only on testing their physical properties while in mechanical tests have not met the standard.

So here the author wants to do the development of previous research that is expected to increase the value of mechanical strength. The difference of this study with the research conducted (Maryam

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Jamilah Lubis, et al 2009) is to replace the matrix Polyethylene (PE) with a type of Polypropylene (PP) recycled plastic that has a tensile strength and clarity is better. Based on the above background, the authors want to conduct research with the title "Analysis of Bending Strength and Impact on Oil Palm Waste Trunk With Polypropylene Matrix (PP) Recycled On Particle Board Composite (particle board)".

2. METHODOLOGY

In this research and testing required some equipment and materials for workmanship as follows:

The equipment used in this study is as follows:

1. Test tool:
   The bending test aims to determine the combination of the quality of a material due to tensile, tap and shear loads.
2. Hot press printing tool aims as a hot press tool to print the particle board into a sheet.
3. Measuring tools: digital scales are used to measure the weight of each composition.
4. Screen 16 mesh: 16 mesh screen is used to filter the fiber of oil palm rod so that get particle granules.
5. Fan: the fan is used to assist or accelerate the cooling when finished in the heat.
6. Other Helping Tools: gloves, screwdrivers, chisels, aluminum foil, scissors, knives etc.

The materials used in this study are as follows:

1. Fibers of oil palm stalks that have been done several stages of treatment so that it can be taken fiber to be a test sample Impact and Bending. In this test there are 2 samples that is rough fiber fiber and fiber bar (Particle), can be seen in figure 2.1.

Figure 2.2 Fibers of oil palm stems

Figure 2.2 Particles of oil palm rods

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2. Recycled plastic, the type of bioplastic used is glass plastic mineral water pack as powder binder particles of palm fiber rod fibers are polypropilene (PP) type.

Figure 2.3 Polypropylene Plastics

3. Maleic Anhydride (MAH), As an additive on particle board useful as compatibilizer, mesenyawakan fiber material with adhesive (matrix).

Figure 2.4 Maleic Anhydride (MAH)

4. Benzoyl Peroxide (BPO), As an initiator of polymerization on the manufacture of stirene polymers and other resins, and plays an important role in the maleolation reaction between the PP chain and MAH.

Figure 2.5 Benzoyl Peroxide (BPO)

Volume Fraction Determination

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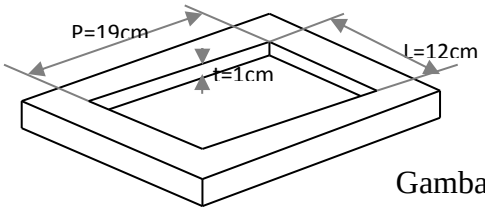

Gambar 2.6 Cetakan

Based on the size of the mold above the printed volume can be calculated as follows:

V = Length x Width x Height (cm3) = 190 mm x 120 mm x 10 mm = 228000mm = 228 cm3

Table 2.1 composition of fiber and matrix raw materials

Fiber Trunk	Fiber levels (%)	Plastic levels(%)
Fiber	60	40
	50	50
	40	60
Particle	60	40
	50	50
	40	60

To calculate the weight percentage of palm fiber rod and the weight of the matrix that needs to be known is the volume of the mold. Printing equipment used in the manufacture of test specimens using printing presses located on a hot press machine whose size has been specified is () = 228 cm3, polypropylene () = 0.887 gr / cm3 matrix mass, and also the mass of palm fiber rod fiber () = 0.601 gr / cm3.
From the above results we can calculate the weight of fiber without plastic:
Mass = V mold × fiber
= 228 cm³ × 0.601 gr / cm³
= 137,028 gr

Weightless plastic plastics:
Mass = V mold × plastic
= 228 cm³ × 0.887 gr / cm³
= 202.236 gr
So to get the desired variations need to be calculated as follows:

Specimen 1.
To obtain a specimen with a composition of 60% fiber and 40% plastic then:
Weight fiber 60% and 40% plastic, then:
Fiber = 60% × 137,028 gr
= 82.22 gr
Plastic = 40% × 202,236 gr
= 80.90 gr

Specimen 2.
To get the specimen with the composition of 50% fiber and 50% plastic then:
50% fiber weight and 50% plastic, then:
Fiber = 50% × 137,028 gr
= 68.51 gr
Plastic = 50% × 202,236 gr
= 101.12 gr

Specimen 3.
To get specimen with 40% fiber and 60% plastic composition then:
40% fiber weight and 60% plastic, then:
Fiber = 40% × 137,028 gr
= 54.81 gr
Plastic = 60% × 202,236 gr
= 121.34 gr

Composition of MAH and BPO (additive)

The addition of additives is essential in making good quality composite boards,

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adding additives of 5% by weight of Polypropylene to MAH, and to ODS by 15% by weight of maleic anhydride (MAH).

Then to get the desired composition can be calculated in the following way.

- Use of Maleic Anhydrid (MAH) as much as 5% of plastic weight, then.

Plastic 40% = 80.90 gr x 5% = 4,045 gr
Plastic 50% = 101.12 gr x 5% = 5,056 gr
Plastic 60% = 121,34 gr x 5% = 6,067 gr

- Use of Benzoyl Peroxide (BPO) as much as 15% of MAH weight, hence

MAH = 4,045 gr x 15% = 0,607 gr
MAH = 5,056 gr x 15% = 0,758 gr
MAH = 6,067 gr x 15% = 0,910 gr

	Area (mm^2)	Yield Strength (N/mm^2)	Bending Strength (N/mm^2)
particle 60%	420.900	0.27	3.87
particle 50%	406.413	0.47	9.89
Particle 40%	380.117	0.50	11.17

Preparation of test samples

Figure 2.6 Sample impact test

specimen	Area (mm^2)	Yield Strength (N/mm^2)	Bending Strength (N/mm^2)
Fiber 60%	400.050	0.40	7.31
Fiber 50%	363.330	0.55	10.34
Fiber 40%	338.000	0.50	13.01

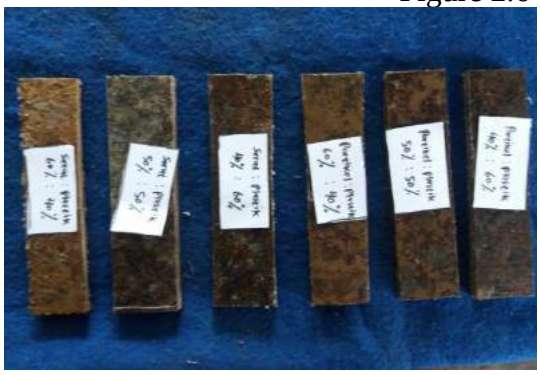

Figure 2.6 Bending test sample

Testing

Test Bending

Bending test standard used ASTM (America society of tenchichal and Matherial) D-790-03 (Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating materials).

The method of bending test is done by Three Points of Bending method with the distance of 10 times thickness of specimen.

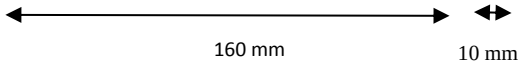

Figure of Bending test specimen size

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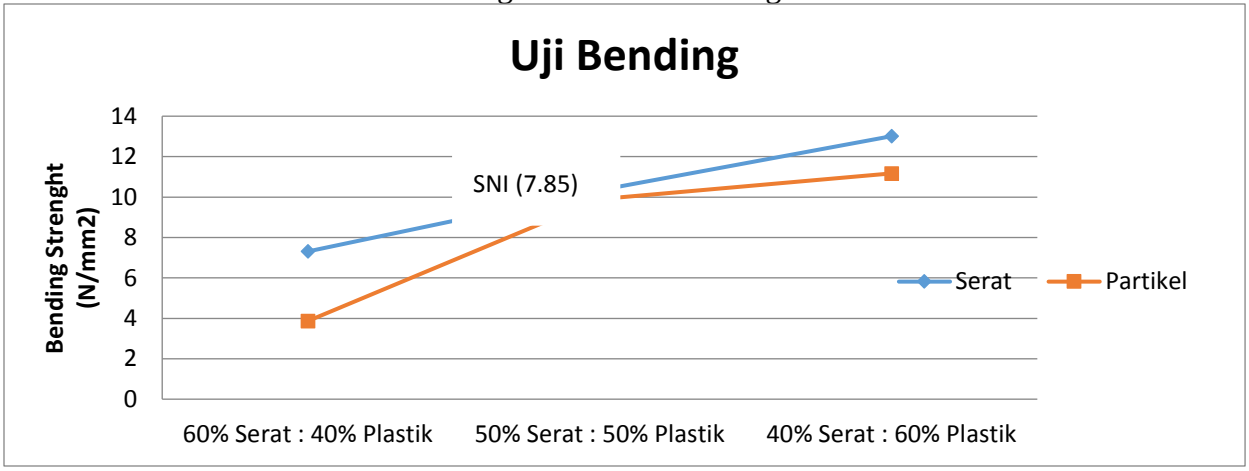
3.TESTING AND PROCESSING DATA

Figure 3.1 specimens of fibers and particles after bending test

4. ANALYST AND DISCUSSION

Figure 4.1 Test Bending



The graph above shows that the optimum particle bending strength of the particle board composite of palm fiber fibers is found in the fiber fraction: 40%: 60% matrix with Bending Strength 13.01, while the optimum value of the particle board composite of the oil palm stalk particles is in the fiber fraction : 40% matrix: 60% with Bending Strenght value 11.17. From the graph above we can conclude that in Bending test of particle board composite between fiber and particle material when viewed from the highest value bending strenght particle board of palm fiber fiber is clearly stronger than particle board made from particle.

In boards made of fibers and particles we can see on the graph with increasing adhesive (matrix) then the strength of bending produced will be better this is because with the addition of adhesive (matrix) also means reducing the amount of fiber used, thus

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reducing the area and volume of fiber that can covered adhesive (matrix). The denser and wider the area of contact between the fibers makes the use of adhesive (matrix) to be more effective which will produce a better bending strength of the board therefore with the increase of the matrix will result in improved bending of the particle board.

In the above diagram it can be seen also that on fibers starting from the composition of 50%: 50% already meets the SNI 03-2015-1996 standards, as well as on composition particles starting from 50%: 50% already meet the SNI standard. The bending strength value of SNI 7.85 N / mm2 while the bending strength value on the particles of oil palm stems starting from the composition of 50%: 50% is (10.34 N / mm2) on the fiber and (9.89 N / mm2) on the particles.

4. CONCLUSION

1. 1.The bending test of particle board made of fiber material is stronger than particle board made of particle material with the highest bending strength value in fiber 13.01 N / mm2 whereas on particle material 11.17 N / mm2 lies in the same composition that is 40% fiber: 60% matrix.
2. 2. Addition of MAH and BPO additives on this particle board resulted in improved board quality with MAH composition of 5% by weight of plastic and BPO 15% of MAH weight.
3. On the strength of Bending particle board from palm oil stem waste both made of fiber and particles have fulfilled the requirements of SNI 03-2105-1996 standard, starting from the composition of 50% fiber: 50% matrix

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