

DAFTAR PUSTAKA

- [ASTM] American Standard for Testing and Materials. 2005. Annual Book of ASTM Standards. Volume 04.10, Wood.D 143. Standard Methods Test of Testing Small Clear Specimens of Wood. USA.
- [SNI] Standar Nasional Indonesia. 2002. Metode Pengujian Berat Jenis Batang Kayu dan Kayu Struktur Bangunan. Badan Standarisasi Nasional
- Angraeni, A. 2016. Perubahan Sifat Mekanis Beberapa Jenis Kayu Cepat Tumbuh (*Fast Growing*) Hasil Proses Densifikasi. *Skripsi*. Fakultas Kehutanan Universitas Hasanuddin.
- Amin Y, dan Dwianto, W. 2006. Pengaruh Suhu dan Tekanan Uap Air Terhadap Fiksasi Kayu Kompresi Menggunakan Close Sistem System Compression. *Jurnal Ilmu dan Teknologi Kayu Tropis*. 4 (2): 55-50.
- Clotier, A., Changhua, F., Nicolas, M., Ahmed, K., and Pierre, B. 2008. *Densification of Wood Veneers Under the Effect of Heat, Steam and Wood Science and Technology*. Chile.
- Dumanauw, J.F.2001. Mengenal Kayu. Kansius. Jakarta
- Fitriaseh. 2022. Perubahan Struktur Anatomi Kayu Jabon Merah (*Neolamarckia Macrophylla*) Hasil Densifikasi Pada Pola Penggergajian Yang Berbeda. *Skripsi*. Fakultas Kehutanan universitas Hasanuddin
- Frida, K. 2006. *Tnjauan Kuat Tekan Dan Kuat Tarik Kayu Berdasarkan Pkki 1961, Sni M. 27– 1991–03dan Sni M. 25–1991– 0*. Jurusan Teknik Sipil Ft. Universitas Diponegoro
- Gong, M., and Cleven, I., 2007. *Improvement of Surface Properties of Low Density Wood: Mechanical Modification with Heat Treatment*. University of New Brunswick. Canada.
- Hill, C.A.S. 2011. *Wood Modification: An Update*. Bioresources 6(2): 918-919.
- Indrahayu. 2016. Perubahan Sifat Fisik Pada Beberapa Jenis Kayu Cepat Tumbuh (*Fast Growing Species*) Hasil Densifikasi. *Skripsi*. Fakultas Kehutanan Universitas Hasanuddin
- Inoue, M., Sekino, N., Morooka, T., Rowell, R.M., Norimoto, M. 2008. Fixation Of Compressive Deformation in Wood by Pre-Steamng. *Journal of Tropical Forest Science* 20(4): 273-281.
- Jayawikrama, K.J.S. 2001. Genetic Parameter Estimates for Radiata Pine in New ZealandAnd New South Wales: A Synthesis of Results. *Silvae Genet*. 50(2): 45–53.

- Kidung, T.P. 2017. Modifikasi Perlakuan Awal Pada Proses Densifikasi Untuk Meningkatkan Kekuatan dan Kerapatan Kayu Gmelina (*Gmelina Arborea Roxb*) Sebagai Bahan Baku Konstruksi. *Skripsi*. Fakultas Kehutanan. Universitas Hasanuddin.
- Kutnar, A. and Sernek, M. 2007. *Densification of Wood*. Zbornik Gozdarstva In Lesarstva 82: 53-62.
- Kollman, F.F.P., Kuenzi, E, and Stamm, A.J. 2005. *Principles of Wood Scinces and Technology II Wood Based Materilas*. Springer-Verlag Berlin Heidelberg. New York
- Listyanto, T., Rahman, F. dan Swargarini, H. 2016. Kualitas Pengeringan Kayu Mahoni Pada Berbagai Variasi Kerapatan Incising Dengan Dua Skedul Pengeringan Suhu tinggi. *Jurnal Ilmu Kehutanan*, 10(2), 119. doi: 10.22146/jik.16513.
- Navi, P. dan Fred, G. 2000. *Effects of Thermo-Hydro-Mecanical Treatment on The Structure and Properties of Wood*. *Holzforschung*. Vol. 54 (30): 287-293.
- Panshin, A. J. and de Zeeuw. 1980. *Textbook of Wood Technology*. Vol 1. London:McGraw Hill Book Co, N. Y.
- Phebryanti, S. 2015. Kayu Kelapa Sebagai Bahan Alternative Untuk Meubel di Area Publik Rumah Tangga. *Jurnal Intra*. Vol. 3 (1): 53-56
- Sanusi, D. 2010. *Kimia Kayu*. Fakultas Kehutanan Universitas Hasanuddin. Makassar.
- Sarino, F., H. Usman. dan Nurhaidah. 2013. *Sifat Fisik dan Mekanika Kayu Benaung (Octomeles Sumatrana Miq) Yang Didensifikasi Berdasarkan Suhu Dan Waktu Kempa*. Fakultas Kehutanan. Universitas Tanjungpura.
- Simpson, W. and Tenwolde, A. 1999. *Physical Properties and Moisture Relations of Wood*. *Wood Handbook : Wood As An Engineering Material*. Madison, WI : USDA Forest Service, Forest Products Laboratory, 1999. General Technical Report FPL ; GTR-113: Pages 3.1-3.24
- Sulistiyono., Nugroho, N. dan Surjokusumo, S. 2003. *Densification of Wood Engineering Techniques II: Physical and Mechanical Properties of Agathis Wood (Agathis Lorantifolia Salisb.) Densification In Building Construction Wood*. (In Indonesia) *Bulletin Keteknikan Pertanian* 17(1): 32-45.
- Tomme, F., Girardet, F., Gfeller, B., and Navi, P. 1998. Densified wood: An innovative product with highly enhanced characters. In *Proceedings of the 5th World Conference on Timber Engineering*. Vol.2. Montreux-Lausanne, Switzerland.

- Wahyudi, I. 2013. *Relationship Of Wood Anatomy Structure with Wood Properties, Utility, And Its Processing*. Research and Development of Indonesian Wood Anatomy Discussion. Bogor. Indonesia.
- Wang, J. and Cooper, P. A. 2005. Vertical density profiles in thermally compressed balsam fir wood, *Forest Products Journal* 55, 65-68.
- Wardhani I. Y., Surjokusumo S., Hadi Y.S dan Nugroho N. 2006. *Penampilan Kayu Kelapa (Cocos nucifera Linn) Bagian Dalam yang Dimanfaatkan*. *Jurnal Ilmu dan Teknologi Kayu Tropis* 4(2): 50 - 54
- Yunianti, A.D., Kidung, T.P., Suhasman, Taskirawati, I., Agussalim dan Muin, M. 2019. *Modified Densification Process for Increasing Strength Properties of Pine and Gmelina Wood from Community Forests*. *Korean Wood Sci. Technol.* 47(4): 418-42

LAMPIRAN

Lampiran 1. Data Hasil Pengamatan Kerapatan

Sampel	Perlakuan	Massa (G)	Volume (Cm ³)	Kerapatan (G/Cm ³)	Rata-Rata Kerapatan (G/Cm ³)
Kontrol J34(T)B	Tampa Perendaman	3.14	6.32	0.50	0.51
Kontrol J34(T)A	Tampa Perendaman	3.24	5.97	0.54	
Kontrol J33 T A	Tampa Perendaman	3.13	6.52	0.48	
Kontrol J34 R B	Tampa Perendaman	2.84	6.53	0.43	0.42
Kontrol J34 R A	Tampa Perendaman	2.53	6.2	0.41	
Kontrol J320 R A	Tampa Perendaman	2.59	6.14	0.42	
J42(T)B	CH ₃ cooh.H ₂ O ₂	2.47	4.68	0.53	0.48
J48(T)B	CH ₃ cooh.H ₂ O ₂	2.10	4.96	0.42	
J39(T)A	CH ₃ cooh.H ₂ O ₂	2.59	5.19	0.50	
J35 R B	CH ₃ cooh.H ₂ O ₂	2.34	4.84	0.48	0.48
J46 R B	CH ₃ cooh.H ₂ O ₂	2.54	5.36	0.47	
J34 R A	CH ₃ cooh.H ₂ O ₂	2.89	5.98	0.48	
J19(T)E AIR	Aquades	2.97	5.3	0.56	0.55
J19(T)A AIR	Aquades	2.95	5.29	0.56	
J48(T)B AIR	Aquades	2.93	5.65	0.52	
J17 R B AIR	Aquades	3.21	6.02	0.53	0.57
J17 R A AIR	Aquades	3.15	5.73	0.55	
J17 R E AIR	Aquades	3.19	5.08	0.63	

Lampiran 2. Data Perhitungan Perubahan Dimensi

Kode Sampel	Sebelum				Rata-Rata	Sesudah				Rata-Rata	Perubahan Dimensi
	A	B	C	D		A	B	C	D		
J48TB	16.88	17.23	17.17	17.15	17.11	12.34	12.44	12.32	11.99	12.27	4.84
J42TA	16.91	17.44	16.84	17.43	17.16	12.27	13.16	12.19	12.29	12.48	4.68
J39TC	17.2	16.51	16.18	16.77	16.67	13.75	12.97	13.46	13.36	13.39	3.28
J34RA	16.61	16.28	16.11	16.7	16.43	11.79	11.61	12.04	11.7	11.79	4.64
J35RB	16.84	16.46	16.81	17.55	16.92	12.52	11.9	11.73	12.23	12.10	4.82
J36RB	18.58	18.49	18.58	18.67	18.58	14.36	14.4	14.87	15.44	14.77	3.81
P26RC	17.05	16.96	17.7	17.76	17.37	12.22	11.98	12.77	12.05	12.26	5.11
P26RE	17.1	17.3	17.1	17.67	17.29	12.29	11.96	13.04	13.38	12.67	4.63
P26RC	17.05	16.96	17.7	17.76	17.37	15.2	14.2	14.43	14.79	14.66	2.71
P28TC	16.87	17.12	17.11	16.73	16.96	12.65	12.32	12.53	13.2	12.68	4.28
P28TD	16.68	17.11	17.13	16.85	16.94	13.9	13.15	13.41	14.25	13.68	3.27
P26RE	17.1	17.3	17.1	17.67	17.29	12.93	13.53	14.6	13.94	13.75	3.54

Kode Sampel	Ket	Ketebalan	Compression Set (%)	Nila Rata-Rata Ketebalan		Rata-Rata Compression Set
J48TB	CH ₃ COOH & H ₂ O ₂	12.27	28.26	Tangensial	12.71	25.1
J42TA	CH ₃ COOH & H ₂ O ₂	12.48	27.27			
J39TC	CH ₃ COOH & H ₂ O ₂	13.39	19.68			
J34RA	CH ₃ COOH & H ₂ O ₂	11.79	28.25	Radial	12.89	25.8
J35RB	CH ₃ COOH & H ₂ O ₂	12.10	28.50			
J36RB	CH ₃ COOH & H ₂ O ₂	14.77	20.52			
P26RC	Air	12.26	29.44	Radial	13.20	23.9
P26RE	Air	12.67	26.75			
P26RC	Air	14.66	15.62			
P28TC	Air	12.68	25.25	Tangensial	13.37	21.7
P28TD	Air	13.68	19.27			
P26RE	Air	13.75	20.49			

Lampiran 3 Data Hasil Perhitungan MOE dan MOR

Kode Sampel	Lebar (mm)			Tebal (mm)			L rata-rata	T rata-rata	Jarak Sangg a	P Max	$\Delta P/\Delta Y$ (A)	$\Delta P/\Delta Y$ (A)	MOR	MOE
	1	2	3	1	2	3	(cm)	(cm)	(cm)	(kg)	(kg/mm)	(kg/cm)	(kg/cm ²)	(kg/cm ²)
Kontrol J34TB	15.7	15.97	15.92	12.5	12.31	12.42	1.59	1.24	17	47	17.033	170.3	490.57	69003.02
Kontrol J34TA	15.5	16	15.7	12.3	12.4	12.6	1.57	1.24	17	50	17.257	172.6	524.22	70092.02
Kontrol J33 T A	14.45	14.53	14.43	12.9 4	13.21	12.81	1.45	1.30	17	78	17.482	174.8	815.02	67751.09
Kontrol J34 R B	15.71	15.87	15.79	12.3 1	12.33	12.37	1.58	1.23	17	45	19.715	197.2	477.50	81678.53
Kontrol J34 R A	15.8	15.7	15.9	12.5	12.4	12.6	1.58	1.25	17	56	17.312	173.1	578.43	68904.39
Kontrol J320 R A	14.6	14.68	14.57	12.8 5	13.14	13.04	1.46	1.30	17	48	12.581	125.8	494.74	48008.89
J42(T)B	15.65	15.89	15.84	12.5 6	12.74	12.65	1.58	1.27	17	45	16.315	163.2	454.04	62679.93
J48(T)B	15.83	16.69	16.01	12.0 2	12.02	12.48	1.62	1.22	17	50	10.711	107.1	531.87	45081.59
J39(T)A	15.82	15.81	15.94	13.6 2	13.32	13.31	1.59	1.34	17	42	15.601	156.0	375.22	50037.25
J35 R B	15.78	16	15.92	12.2 8	11.89	12.32	1.59	1.22	17	40	17.224	172.2	433.61	73937.68
J46 R B	15.73	15.91	15.92	11.7 5	11.71	12.09	1.59	1.19	17	39	12.002	120.0	446.73	55881.08
J34 R A	15.63	16.1	16.63	14.7 8	15	14.83	1.61	1.49	17	45	16.266	162.7	321.93	37693.77

J19(T)E AIR	15.84	15.96	15.65	15.3 4	14.05	14.78	1.58	1.47	17	76	14.43	154.3	565.23	49707.48
J19(T)A AIR	15.7	15.9	16	14.7	14.2	14.9	1.58	1.47	17	64	15.78	164.6	565.23	49707.48
J48(T)B AIR	15.87	16.09	15.98	13.1 8	13.22	13.67	1.60	1.34	17	53	12.788	157.9	474.07	41249.47
J17 R B AIR	15.62	15.66	15.82	15.3 8	16.6	16.29	1.57	1.61	17	55	17.26	172.6	658.75	88759.06
J17 R A AIR	15.63	16.1	16.63	14.7 8	15	14.83	1.57	1.61	17	47	19.27	136.7	658.75	88759.06
J45 R A AIR	15.76	16.1	16.08	14.2 2	15.12	14.26	1.60	1.45	17	31	18.581	155.8	234.20	89090.71

Lampiran 4. Dokumentasi Penelitian



Gambar 1. Pemotongan sampel penelitian



Gambar 2. Proses Pengempaan



Gambar 3. Sampel uji

CURRICULUM VITAE

Data Pribadi :

Nama : Hasanuddin
Tempat/ Tanggal Lahir : Majene, 30 September 1997
Pendidikan Terakhir : SI Kehutanan Universitas Hasanuddin
Alamat Tempat Tinggal : Perintis Kemerdekaan VII
Alamat Daerah : Kelurahan Galung, Kec. Banggae, Kab. Majene
Email : hasanuddin955@gmail.com
No. Hp : 082188004400
Jenis Kelamin : Laki-laki
Agama : Islam
Status : Belum Menikah
Kewarganegaraan : Indonesia
Nama Orang Tua
 a. Ayah : Aswadi
 b. Ibu : Halma
Alamat Orang Tua
 a. Ayah : Kelurahan Galung, Kec. Banggae, Kab. Majene
 b. Ibu : Kelurahan Galung, Kec. Banggae, Kab. Majene



Riwayat Pendidikan :

1. TK : TK PGRI Sendana
2. SD : SD Negeri 24 Saleppa
3. SMP : SMP Negeri 3 Majene
4. SMA : SMA Negeri 1 Majene
5. Perguruan Tinggi : Universitas Hasanuddin, Fakultas Kehutanan S.I
(2018-2022)