

LAMPIRAN

Lampiran 1. Pemeriksaan analisis gradasi agregat halus

Jenis Pengujian : Pemeriksaan analisis gradasi agregat halus
 Bahan : Pasir Progo
 Asal : Sungai Progo
 Diperiksa : 14 Desember 2018

Tabel 1. Hasil pemeriksaan gradasi butiran agregat halus *sample 1*

Ukuran	Lubang Ayakan (mm)	Berat tertahan (gram)	Berat tertahan (%)	Berat tertahan komulatif (%)	Berat lolos komulatif (%)
No. 4	4,75	0	0	0	100
No. 8	2,36	25	2,5	2,5	97,5
No. 16	1,18	147	14,7	17,2	82,8
No. 30	0,6	280	28,0	45,2	54,8
No. 50	0,3	246	24,6	69,8	30,2
No. 100	0,15	205	20,5	90,3	9,7
Pan		97	9,7	100	0
Total		1000	100	325	

Analisis hitungan:

a. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan:} &= \frac{\text{Berat Tertahan}}{\text{Total}} \times 100\% \\
 &= \frac{147}{1000} \times 100\% \\
 &= 14,7\%
 \end{aligned}$$

b. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan komulatif:} &= \text{Persen berat tertahan no.8} + \text{Persen berat tertahan no.16} \\
 &= 2,5 + 14,7 \\
 &= 17,2\%
 \end{aligned}$$

c. Komulatif contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat lolos komulatif:} &= 100 - 17,2 \\
 &= 82,8\%
 \end{aligned}$$

$$\begin{aligned}
 \text{d. Modulus halus butir (MHB)} &= \frac{\text{jumlah berat tertahan komulatif}}{100} \\
 &= \frac{225}{100} \\
 &= 2,25\%
 \end{aligned}$$

Tabel 2. Hasil pemeriksaan gradasi butiran agregat halus *sample 2*

Ukuran	Lubang Ayakan (mm)	Berat tertahan (gram)	Berat tertahan (%)	Berat tertahan komulatif (%)	Berat lolos komulatif (%)
No. 4	4,75	0	0	0	100
No. 8	2,36	39	3.9	3.9	96.1
No. 16	1,18	152	15.2	19.1	80.9
No. 30	0,6	273	27.3	46.4	53.6
No. 50	0,3	215	21.5	67.9	32.1
No. 100	0,15	197	19.7	87.6	12.4
Pan		124	12.4	100	0
Total		1000	100	324.9	

Analisis hitungan:

a. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan:} &= \frac{\text{Berat Tertahan}}{\text{Total}} \times 100\% \\
 &= \frac{152}{1000} \times 100\% \\
 &= 15,2\%
 \end{aligned}$$

b. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan komulatif:} &= \text{Persen berat tertahan no.8} + \text{Persen berat tertahan no.16} \\
 &= 3,9 + 15,2 \\
 &= 19,1\%
 \end{aligned}$$

c. Komulatif contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat lolos komulatif:} &= 100 - 19,1 \\
 &= 80,9\%
 \end{aligned}$$

$$\begin{aligned}
 \text{d. Modulus halus butir (MHB)} &= \frac{\text{jumlah berat tertahan komulatif}}{100} \\
 &= \frac{224,9}{100} \\
 &= 2,25\%
 \end{aligned}$$

Tabel 3. Hasil pemeriksaan gradasi butiran agregat halus *sample 3*

Ukuran	Lubang Ayakan (mm)	Berat tertahan (gram)	Berat tertahan (%)	Berat tertahan komulatif (%)	Berat lolos komulatif (%)
No. 4	4,75	0	0	0	100
No. 8	2,36	30.5	3.05	3.05	96.95
No. 16	1,18	116.5	11.65	14.7	85.3
No. 30	0,6	280	28	42.7	57.3
No. 50	0,3	352.5	35.25	77.95	22.05
No. 100	0,15	192.5	19.25	97.2	2.8
Pan		28	2.8	100	0
Total		1000	100	335.6	

Analisis hitungan:

a. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan:} &= \frac{\text{Berat Tertahan}}{\text{Total}} \times 100\% \\
 &= \frac{116,5}{1000} \times 100\% \\
 &= 11,65\%
 \end{aligned}$$

b. Contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat tertahan komulatif:} &= \text{Persen berat tertahan no.8} + \text{Persen berat tertahan no.16} \\
 &= 3,05 + 11,65 \\
 &= 14,7\%
 \end{aligned}$$

c. Komulatif contoh saringan no.16

$$\begin{aligned}
 \text{Persen berat lolos komulatif:} &= 100 - 14,7 \\
 &= 85,3\%
 \end{aligned}$$

d. Modulus halus butir (MHB)

$$\begin{aligned}
 &= \frac{\text{jumlah berat tertahan komulatif}}{100} \\
 &= \frac{236}{100} \\
 &= 2,36\%
 \end{aligned}$$

Lampiran 2. Pemeriksaan kadar air agregat halus

Jenis Pengujian : Pemeriksaan kadar air agregat halus
 Bahan : Pasir Progo
 Asal : Sungai Progo
 Diperiksa : 22 Februari 2019

Tabel 1. Hasil pemeriksaan kadar air agregat halus

Uraian	Benda Uji			
	Satuan	1	2	3
Berat Wadah (W1)	gram	126	299	283
Berat wadah + Berat isi pasir (W2)	gram	1126	1299	1283
Berat wadah + Berat isi pasir keluar oven (W3)	gram	1105	1280	1265
Berat Air (W4)	gram	21	19	18
kadar air	%	2.150	1.940	1.830
Rata - rata	%	1.970		

Analisis hitungan:

- a. Berat air $= W2 - W3$
 Contoh benda uji 1 $= 1126 - 1105$
 $= 21 \text{ gr}$
- b. Kadar air $= \frac{W4}{W3 - W1} \times 100\%$
 Contoh benda uji 1 $= \frac{21}{1105 - 126} \times 100\%$
 $= 2,150\%$
- c. Kadar air rata-rata $= \frac{KA1 + KA2 + KA3}{3}$
 $= \frac{2,15 + 1,94 + 1,83}{3}$
 $= 1,970\%$

Lampiran 3. Pemeriksaan berat jenis dan penyerapan air agregat halus

Jenis Pengujian : Pemeriksaan berat jenis dan penyerapan air agregat halus
 Bahan : Pasir Progo
 Asal : Sungai Progo
 Diperiksa : 17 Desember 2018

Tabel 1. Data pemeriksaan berat jenis agregat halus

Uraian	Satuan	Benda Uji		
		1	2	3
Berat pikno berisi pasir dan air (Bt)	gram	1089	1076	1081
Berat pasir setelah kering (Bk)	gram	489	488	482
Berat pikno berisi air (B)	gram	773	767	773
Berat pasir keadaan jenuh kering muka (SSD)	gram	500	500	500

Tabel 2. Hasil pemeriksaan berat jenis agregat halus

Uraian	Satuan	Benda Uji			Rata-rata
		1	2	3	
Berat jenis curah		2.658	2.555	2.510	2.797
Berat jenis jenuh kering muka		2.717	2.618	2.604	2.825
Berat jenis tampak		2.827	2.726	2.770	2.878
Penyerapan air agregat halus	%	2.249	2.459	3.734	2,814

Analisis Hitungan:

- a. Berat jenis curah
- $$= \frac{Bk}{B+SSD-Bt}$$
- Contoh benda uji 1
- $$= \frac{489}{773+500-1089}$$
- $$= 2,658$$
- b. Berat jenis jenuh kering muka
- $$= \frac{500}{B+SSD-Bt}$$
- Contoh benda uji 1
- $$= \frac{500}{773+500-1089}$$
- $$= 2,717$$
- c. Berat jenis tampak
- $$= \frac{Bk}{B+Bk-Bt}$$
- Contoh benda uji 1
- $$= \frac{489}{773+489-1089}$$
- $$= 2,827$$
- d. Penyerapan air agregat kasar
- $$= \frac{SSD-Bk}{Bk} \times 100\%$$

$$\begin{aligned}\text{Contoh benda uji 1} &= \frac{500-489}{489} \times 100\% \\ &= 2,249\%\end{aligned}$$

$$\begin{aligned}\text{e. Berat jenis jenuh kering muka rata-rata} &= \frac{SSD1+SSD2+SSD\#}{3} \\ &= \frac{2,717+2,618+2,604}{3} \\ &= 2,646\end{aligned}$$

Lampiran 4. Pemeriksaan berat satuan agregat halus

Jenis Pengujian : Pemeriksaan berat satuan agregat halus
 Bahan : Pasir Progo
 Asal : Sungai Progo
 Diperiksa : 19 Desember 2018

Tabel 1. Hasil pemeriksaan berat satuan agregat halus

Uraian	Satuan	Benda Uji		
		1	2	3
Berat bejana kosong (B1)	gr	10160	10160	10160
Berat bejana kosong +pasir	gr	19240	19185	19420
Berat satuan	gr/cm ³	1.713	1.703	1.747
Rata - rata	gr/cm ³	1.721		

Analisis hitungan:

a. Bejana: $d = 15 \text{ cm}$
 $h = 30 \text{ cm}$

b. Volume bejana kosong $= \frac{1}{4} \pi r^2 t$
 $= \frac{1}{4} \pi \times 15^2 \times 30$
 $= 5301 \text{ cm}^3$

c. Berat satuan (B_{sat}) $= \frac{B_2 - B_1}{Volume}$

Contoh benda uji 1 $= \frac{19240 - 10160}{5301}$
 $= 1,713 \text{ gr/cm}^3$

d. Berat satuan rata-rata $= \frac{B_{1sat} + B_{2sat} + B_{3sat}}{3}$
 $= \frac{1,713 + 1,703 + 1,747}{3}$
 $= 1,721 \text{ gr/cm}^3$

Lampiran 5. Pemeriksaan kadar lumpur agregat halus

Jenis Pengujian : Pemeriksaan kadar lumpur agregat halus
 Bahan : Pasir Progo
 Asal : Sungai progo
 Diperiksa : 21 Desember 2018

Tabel 1. Hasil pemeriksaan kadar lumpur agregat halus

Uraian	Satuan	Benda Uji		
		1	2	3
Berat pasir kering tungku sebelum dicuci (W1)	gr	500	500	500
Berat Pasir kering tungku setelah dicuci+nampan (W2)	gr	765	602	611
Berat nampan (W3)	gr	285	127	126
Berat pasir kering tungku setelah dicuci (W4)	%	480	475	485
Kadar lumpur	%	4	5	3
Rata-rata	%	4		

Analisis hitungan:

- a. Berat pasir kering tungku setelah dicuci (W4) = $W2 - W3$
 Contoh benda uji 1 = $765 - 285$
 = 480
- b. Kadar lumpur = $\frac{W1 - W4}{W1} \times 100\%$
 Contoh benda uji 1 = $\frac{500 - 480}{500} \times 100\%$
 = 4%
- c. Rata-rata kadar lumpur = $\frac{KL1 + KL2 + KL3}{3} \times 100\%$
 = $\frac{4 + 5 + 3}{3} \times 100\%$
 = 4%

Lampiran 6. Pemeriksaan berat jenis dan penyerapan air agregat kasar

Jenis Pengujian : Pemeriksaan berat jenis dan penyerapan air agregat kasar
 Bahan : Kerikil Clereng
 Asal : Clereng
 Diperiksa : 21 Desember 2018

Tabel 1. Hasil pemeriksaan berat jenis dan penyerapan air agregat kasar

Uraian	Satuan	Benda Uji		
		1	2	3
Berat kerikil setelah dikeringkan (Bk)	gram	3000	3000	3000
Berat kerikil didalam air (Ba)	gram	1882	1891	1891
Berat kerikil keadaan jenuh (Bj)	gram	3086	3087	3081

Tabel 2. Hasil pemeriksaan berat jenis dan penyerapan air agregat kasar

Uraian	Satuan	Benda Uji			Rata-rata
		1	2	3	
Berat jenis curah		2.492	2.508	2.521	2.507
Berat jenis kering muka		2.563	2.581	2.589	2.578
Berat jenis tampak		2.683	2.705	2.705	2.698
Penyerapan air agregat kasar	%	2.867	2.900	2.700	2.822
Berat kerikil jenuh rata-rata	gram	3084.667			
Penyerapan air agregat kasar	%	2.822			

Analisis hitungan:

- a. Berat jenis curah $= \frac{Bk}{Bj - Ba}$
 Contoh benda uji 1 $= \frac{3000}{3086 - 1882}$
 $= 2,492$
- b. Berat jenis kering muka $= \frac{Bj}{Bj - Ba}$
 Contoh benda uji 1 $= \frac{3086}{3086 - 1882}$
 $= 2,563$
- c. Berat jenis tampak $= \frac{Bk}{Bk - Ba}$
 Contoh benda uji 1 $= \frac{5000}{5000 - 1882}$
 $= 2,683$
- d. Penyerapan air agregat kasar $= \frac{Bj - Bk}{Bk} \times 100\%$

$$\begin{aligned} \text{Contoh benda uji 1} &= \frac{3086-3000}{3000} \times 100\% \\ &= 2,867\% \end{aligned}$$

$$\begin{aligned} \text{e. Berat jenis jenuh rata-rata} &= \frac{B \text{ jenis 1} + B \text{ jenis 2} + B \text{ jenis jenuh 3}}{3} \\ &= \frac{3086 + 3087 + 3081}{3} \\ &= 3084,667 \end{aligned}$$

$$\begin{aligned} \text{f. Penyerapan air rata-rata AK} &= \frac{P.\text{air AK 1} + P.\text{air AK 2} + P.\text{air AK 3}}{3} \\ &= \frac{2,867 + 2,900 + 2,700}{3} \\ &= 2,822 \end{aligned}$$

Lampiran 7. Pemeriksaan berat satuan agregat kasar

Jenis Pengujian : Pemeriksaan berat satuan agregat kasar
 Bahan : Kerikil Clereng
 Asal : Clereng
 Diperiksa : 19 Desember 2018

Tabel 1. Hasil pemeriksaan berat satuan agregat kasar

Uraian	Satuan	Benda Uji		
		1	2	3
Berat bejana kosong (B1)	gr	10160	10160	10160
Berat bejana kosong +kerikil (B2)	gr	18120	18340	18360
Berat satuan	gr/cm ³	1.502	1.543	1.547
Rata - rata	gr/cm ³	1.531		

Analisi hitungan:

a. Bejana: $d = 15 \text{ cm}$

$h = 30 \text{ cm}$

$$\begin{aligned}
 \text{b. Volume bejana kosong} &= \frac{1}{4} \pi r^2 t \\
 &= \frac{1}{4} \pi \times 15^2 \times 30 \\
 &= 5301 \text{ cm}^3
 \end{aligned}$$

$$\text{c. Berat satuan } (B_{sat}) = \frac{B_2 - B_1}{Volume}$$

$$\begin{aligned}
 \text{Contoh benda uji 1} &= \frac{18120 - 10160}{5301} \\
 &= 1,502 \text{ gr/cm}^3
 \end{aligned}$$

$$\begin{aligned}
 \text{d. Berat satuan rata-rata} &= \frac{B_{1sat} + B_{2sat} + B_{3sat}}{3} \\
 &= \frac{1,502 + 1,543 + 1,547}{3} \\
 &= 1,531 \text{ gr/cm}^3
 \end{aligned}$$

Lampiran 8. Pemeriksaan kadar air agregat kasar

Jenis Pengujian : Pemeriksaan kadar air agregat kasar
 Bahan : Kerikil Clereng
 Asal : Clereng
 Diperiksa : 22 Februari 2019

Uraian	Satuan	Benda Uji		
		1	2	3
Berat pasir keadaan jenuh kering muka (B_1)	gram	3000	3000	3000
Berat pasir keadaan kering tungku (B_2)	gram	2889	2894	2883
Kadar air	%	3.70	3.53	3.90
Kadar air rata-rata	%	3.71		

Analisis Hitungan:

a. Kadar air

Contoh benda uji 1

$$\begin{aligned}
 &= \frac{B_1 - B_2}{B_1} \times 100\% \\
 &= \frac{3000 - 2889}{3000} \times 100\% \\
 &= 3,70\%
 \end{aligned}$$

b. Kadar air rata-rata

$$\begin{aligned}
 &= \frac{\text{Benda uji 1} + \text{Benda uji 2} + \text{Benda uji 3}}{3} \\
 &= \frac{3,70\% + 3,53\% + 3,90\%}{3} \\
 &= 3,71\%
 \end{aligned}$$

Lampiran 9. Pemeriksaan kadar lumpur agregat kasar

Jenis Pengujian : Pemeriksaan kadar lumpur agregat kasar
 Bahan : Kerikil
 Asal : Clereng
 Diperiksa : 21 Desember 2018

Tabel 1. Hasil pemeriksaan kadar lumpur agregat halus

Uraian	Satuan	Benda Uji		
		1	2	3
Berat wadah + Pasir setelah dioven pertama (W1)	gr	5235	5230	5425
Berat wadah + Pasir setelah dioven pertama (W2)	gr	4980	4945	5185
Kandungan air (W3 = W1-W2)	gr	255	285	240
Kadar lumpur	%	4,87	5,45	4,42
Rata-rata	%	4,91		

Analisis hitungan:

- a. Kandungan air $= B1 - B2$
 Contoh benda uji 1 $= 5235 - 4980$
 $= 255$
- b. Kadar lumpur $= \frac{B1-B2}{B1} \times 100\%$
 Contoh benda uji 1 $= \frac{2535-4980}{2535} \times 100\%$
 $= 4,87\%$
- c. Rata-rata kadar lumpur $= \frac{KL1+KL2+KL3}{3} \times 100\%$
 $= \frac{4,87+5,45+4,42}{3} \times 100\%$
 $= 4,91\%$

Lampiran 10. Pemeriksaan keausan (los angeles) agregat kasar

Jenis Pengujian : Pemeriksaan keausan (los angeles) agregat kasar
 Bahan : Kerikil Clereng
 Asal : Clereng
 Diperiksa : 21 Desember 2018

Tabel 1. Pemeriksaan keausan agregat kasar

Uraian	Satuan	Benda Uji		
		1	2	3
Berat sebelum pengujian los angeles (B1)	gram	5000	5000	5000
Berat sesudah pengujian los angeles (B2)	gram	3280	3490	3300
Keausan	%	34,40	30,20	34,00
Keausan rata-rata	%	32,87		

Analisis Hitungan:

$$\text{a. Keausan} = \frac{B1-B2}{B1} \times 100\%$$

$$\begin{aligned} \text{Contoh benda uji 1} &= \frac{5000-3280}{5000} \times 100\% \\ &= 34,40\% \end{aligned}$$

$$\begin{aligned} \text{b. Keausan rata-rata} &= \frac{\text{Keausan1} + \text{Keausan2} + \text{Keausan3}}{3} \\ &= \frac{34,40 + 30,20 + 34,00}{3} \\ &= 32,87\% \end{aligned}$$

Lampiran 11. Alat pemeriksaan bahan penyusun beton



Gambar 1 Timbangan



Gambar 2 Kaliper



Gambar 3 Saringan



Gambar 4 Timbangan dalam air

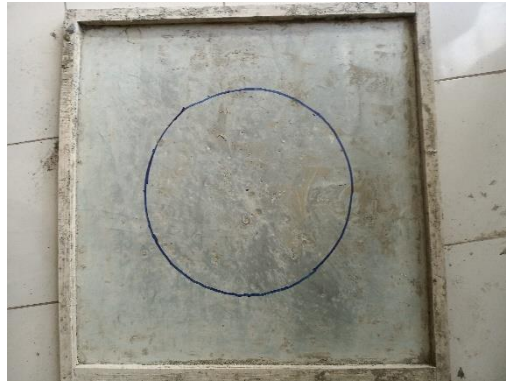


Gambar 5 Mesin los angeles



Gambar 6 Erlenmeyer

Lampiran 12. Alat pemeriksaan sifat segar beton



Gambar 7 Meja sebar T50



Gambar 8 Kerucut abrams



Gambar 9 Alat pengujian v-funnel

Lampiran 13. Alat pembuatan benda uji



Gambar 10 Concrete mixer



Gambar 11 Balok



Gambar 12 cetok



Gambar 13 Gelas ukur 1000 ml



Gambar 14 Nampan



Gambar 15 Flexural machine test

Lampiran 14. Bahan penyusun beton



Gambar 16 Semen holcim power max



Gambar 17 Zeolite



Gambar 18 Kerikil Agregat kasar (kerikil clereng)



Gambar 19 Agregat halus (pasir progo)



Gambar 20 Air



Gambar 21 Superplasticizer (Sikament LN)



Gambar 22 Nylon

Lampiran 15. Proses pengujian beton segar (*fresh properties*)



Gambar 23 Pengujain meja sebar T50

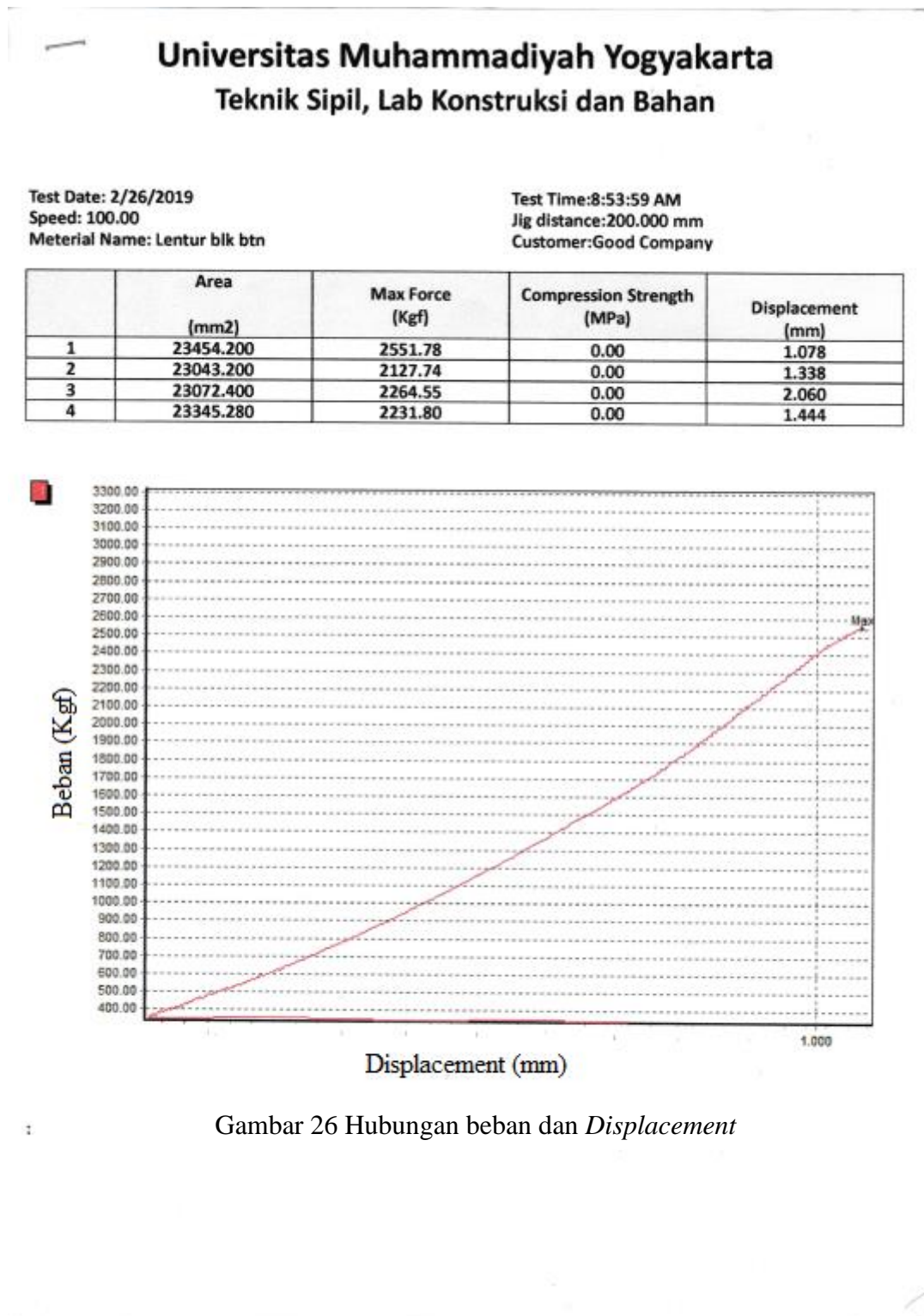


Gambar 24 Pengujian v-funnel



Gambar 25 Pengujian l-box

Lampiran 16. Hasil pengujian lentur

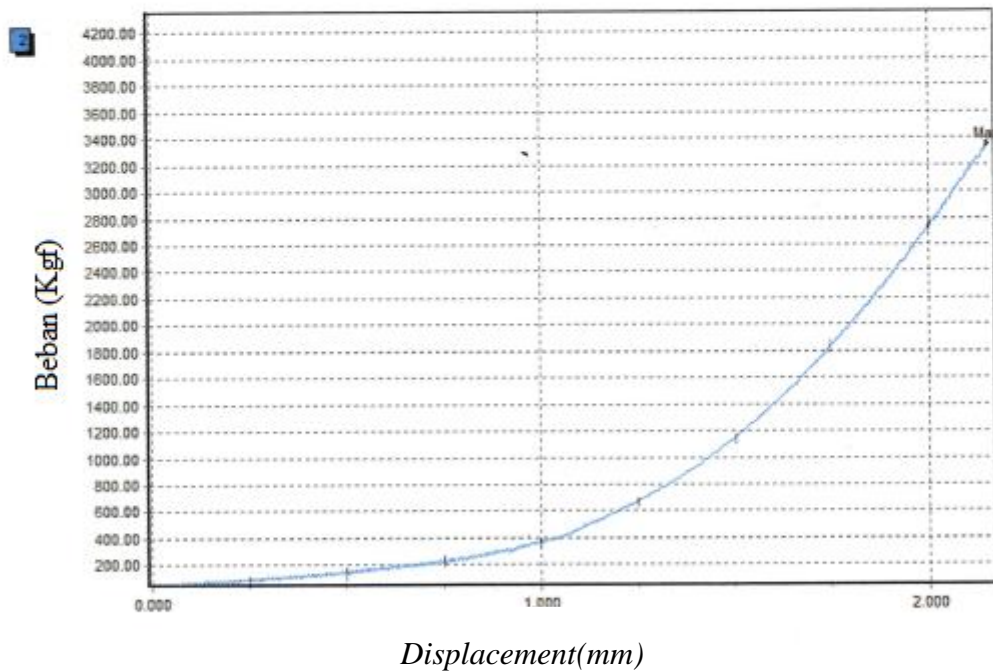


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Test Date: 3/8/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 2:32:46 PM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23210.520	2461.33	0.00	2.334
2	22176.800	3352.73	0.00	2.156
3	23012.400	2049.38	0.00	2.630
4	22678.400	2440.41	0.00	2.048
5	22891.440	2677.00	0.00	1.134
6	22799.560	2919.38	0.00	1.810



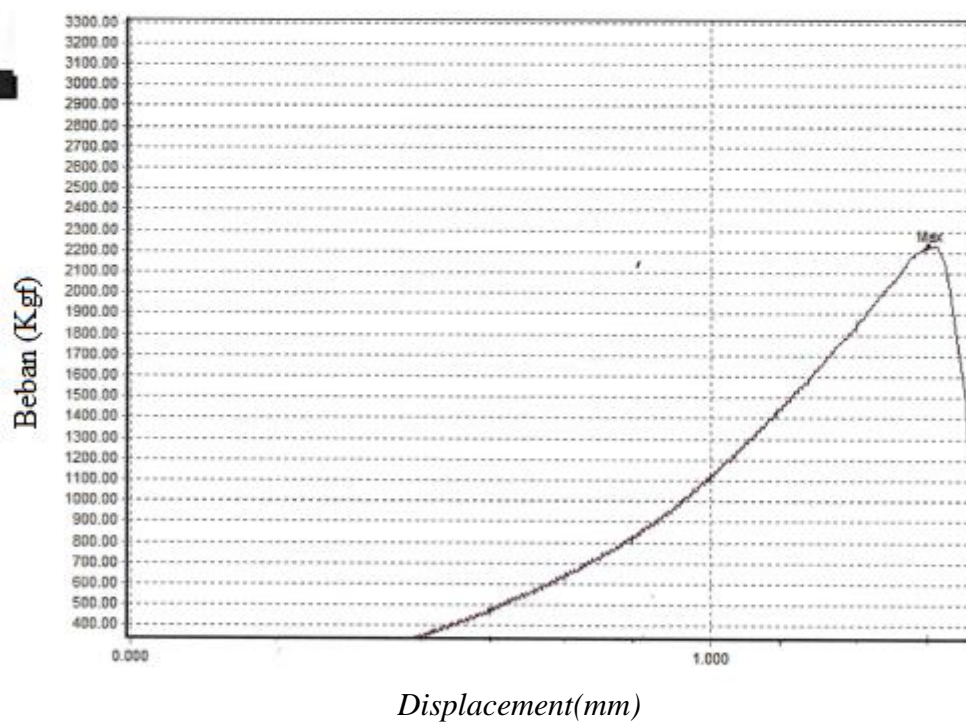
Gambar 27 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 2/26/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 8:53:59 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23454.200	2551.78	0.00	1.078
2	23043.200	2127.74	0.00	1.338
3	23072.400	2264.55	0.00	2.060
4	23345.280	2231.80	0.00	1.444



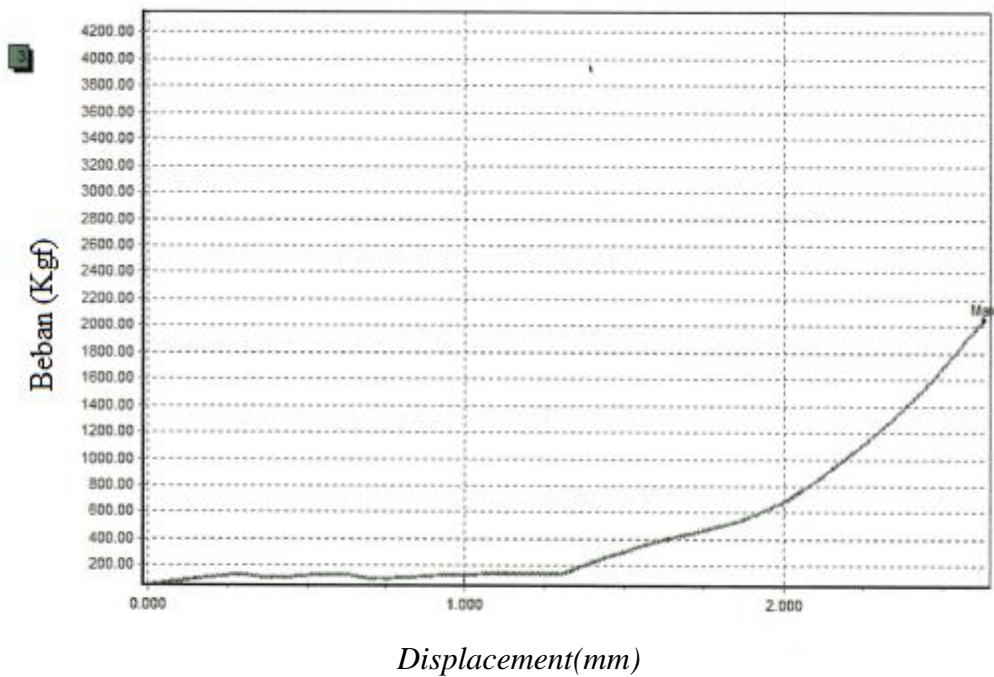
Gambar 28 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/8/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 2:32:46 PM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23210.520	2461.33	0.00	2.334
2	22176.800	3352.73	0.00	2.156
3	23012.400	2049.38	0.00	2.630
4	22678.400	2440.41	0.00	2.048
5	22891.440	2677.00	0.00	1.134
6	22799.560	2919.38	0.00	1.810



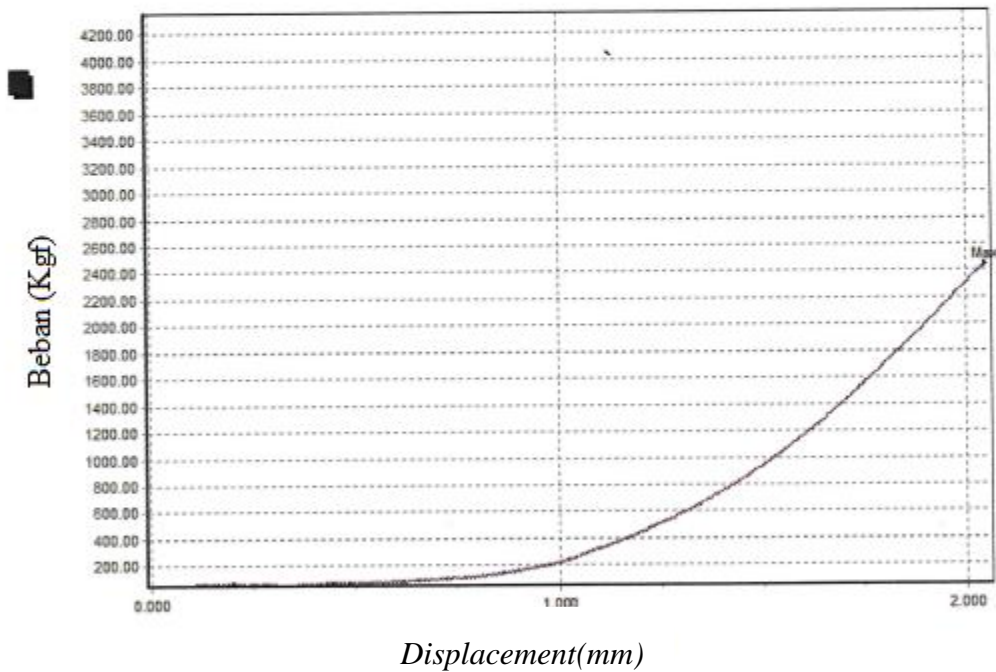
Gambar 29 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/8/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 2:32:46 PM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23210.520	2461.33	0.00	2.334
2	22176.800	3352.73	0.00	2.156
3	23012.400	2049.38	0.00	2.630
4	22678.400	2440.41	0.00	2.048
5	22891.440	2677.00	0.00	1.134
6	22799.560	2919.38	0.00	1.810



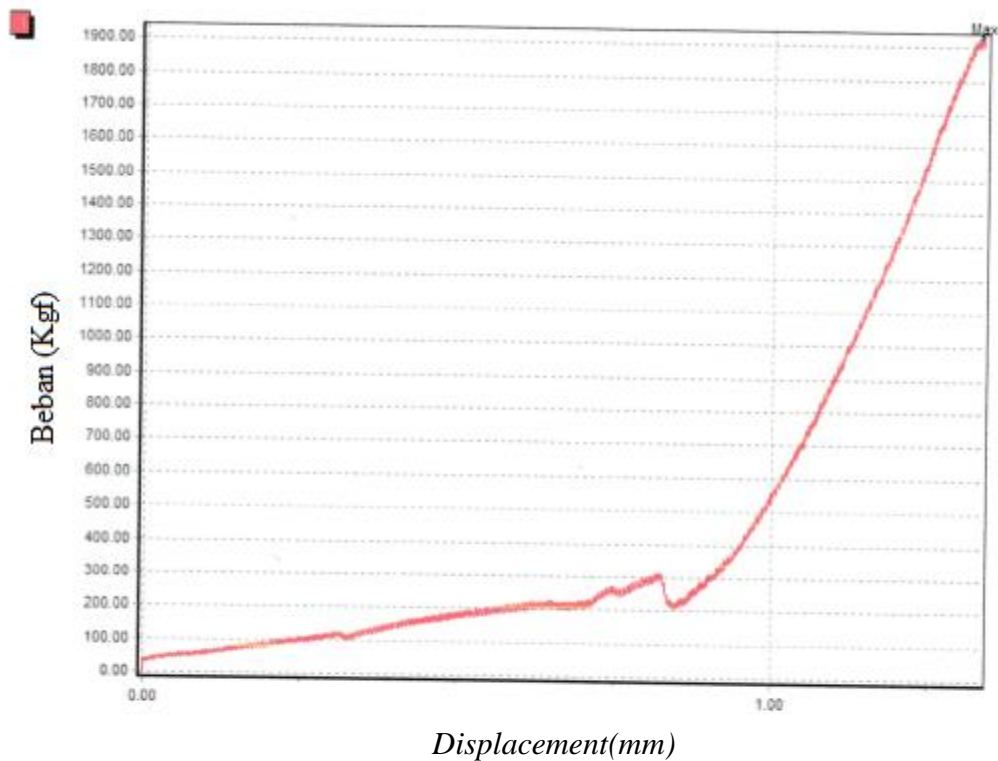
Gambar 30 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/18/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time:10:04:46 AM
Jig distance:200.000 mm
Customer:Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	22589.730	1929.45	0.00	2.668
2	23210.320	2089.44	0.00	2.290
3	22982.550	2248.43	0.00	2.512
4	22997.660	2209.12	0.00	1.494
5	22846.200	2265.31	0.00	2.362



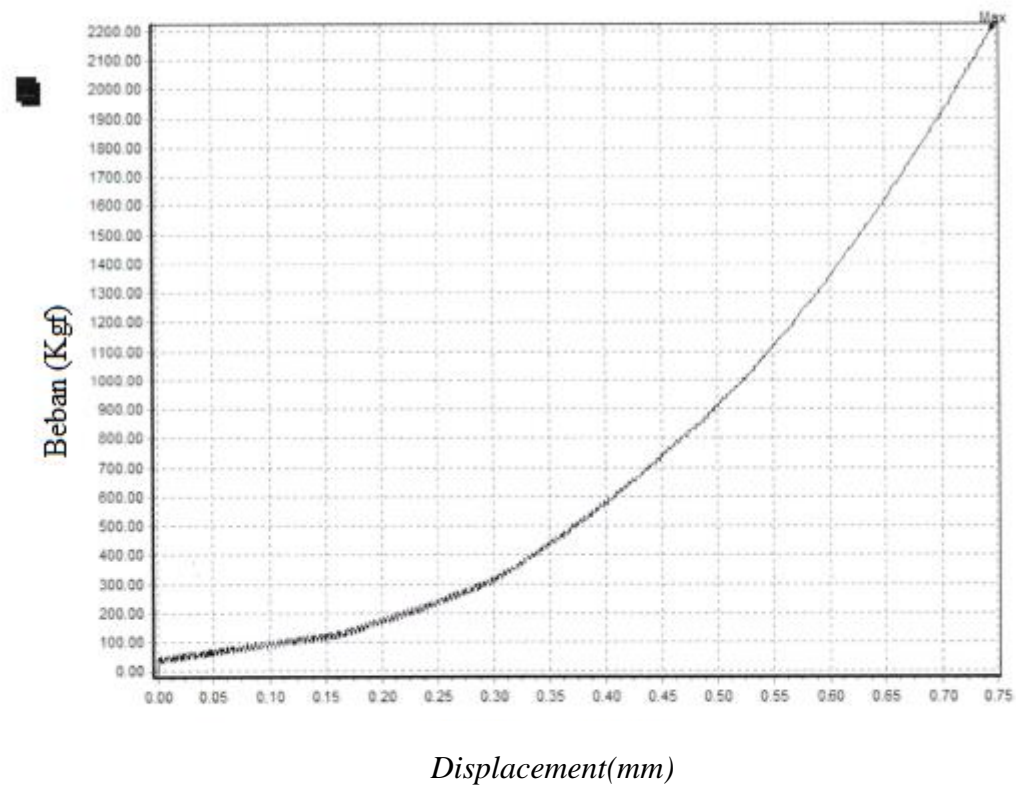
Gambar 31 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/18/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:04:46 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	22589.730	1929.45	0.00	2.668
2	23210.320	2089.44	0.00	2.290
3	22982.550	2248.43	0.00	2.512
4	22997.660	2209.12	0.00	1.494
5	22846.200	2265.31	0.00	2.362



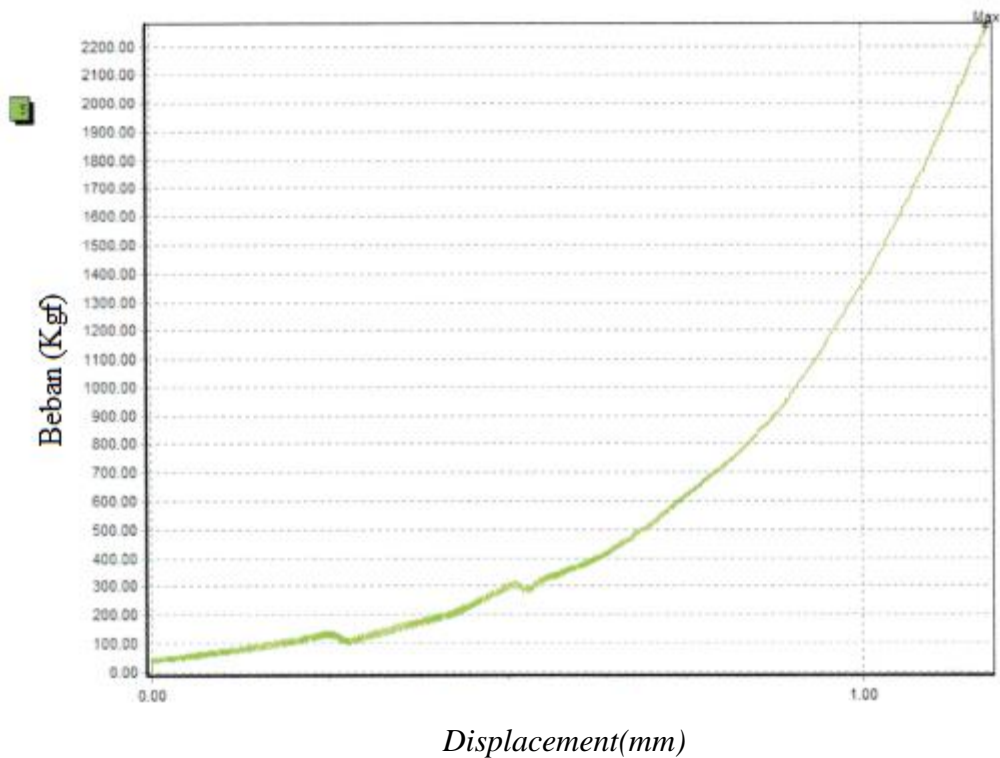
Gambar 32 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/18/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:04:46 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	22589.730	1929.45	0.00	2.668
2	23210.320	2089.44	0.00	2.290
3	22982.550	2248.43	0.00	2.512
4	22997.660	2209.12	0.00	1.494
5	22846.200	2265.31	0.00	2.362



Gambar 33 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/8/2019

Speed: 100.00

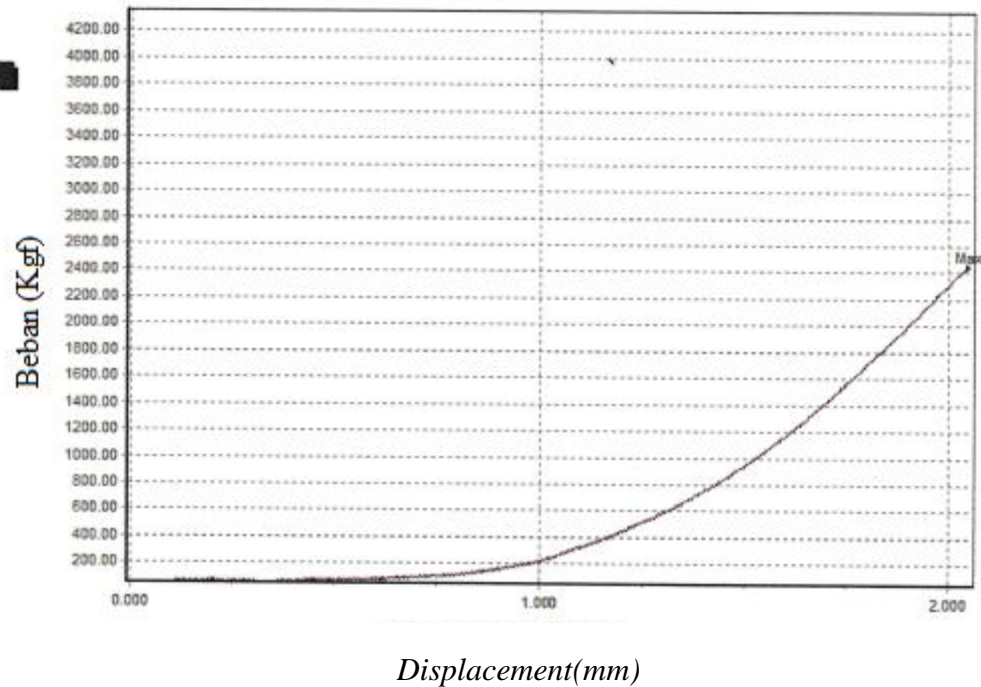
Material Name: Lentur blk btn

Test Time: 2:32:46 PM

Jig distance: 200.000 mm

Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23210.520	2461.33	0.00	2.334
2	22176.800	3352.73	0.00	2.156
3	23012.400	2049.38	0.00	2.630
4	22678.400	2440.41	0.00	2.048
5	22891.440	2677.00	0.00	1.134
6	22799.560	2919.38	0.00	1.810



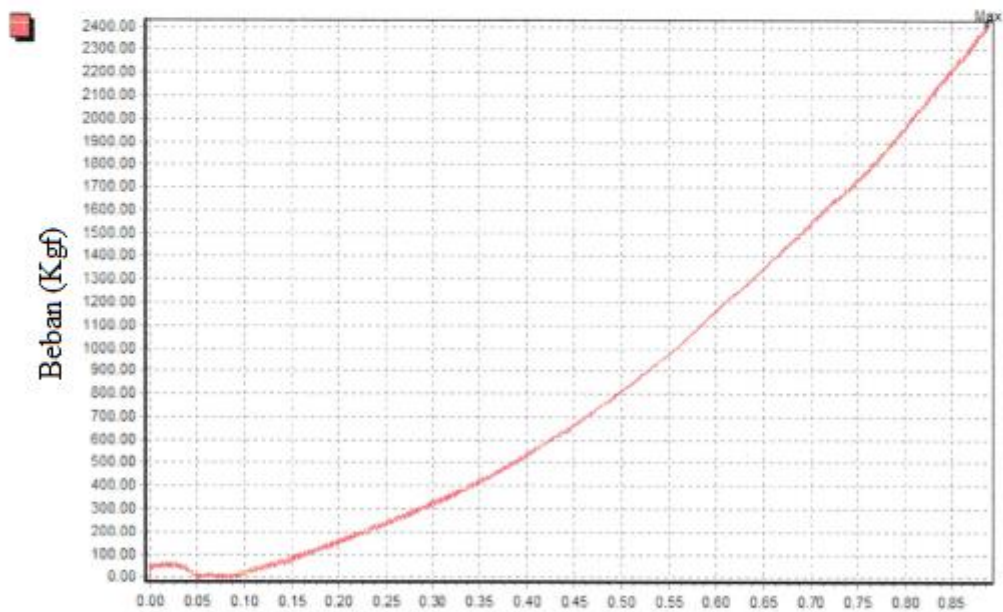
Gambar 34 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/12/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 9:00:00 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23209.620	2410.18	0.00	1.780
2	23376.720	2494.33	0.00	2.248
3	23284.510	2341.40	0.00	2.450
4	23608.300	2296.80	0.00	2.174
5	23393.400	2117.16	0.00	1.546
6	23012.850	2295.29	0.00	1.384
7	23256.160	2523.81	0.00	2.610
8	23195.280	2523.81	0.00	1.426
9	23119.000	2466.87	0.00	1.310



Displacement(mm)

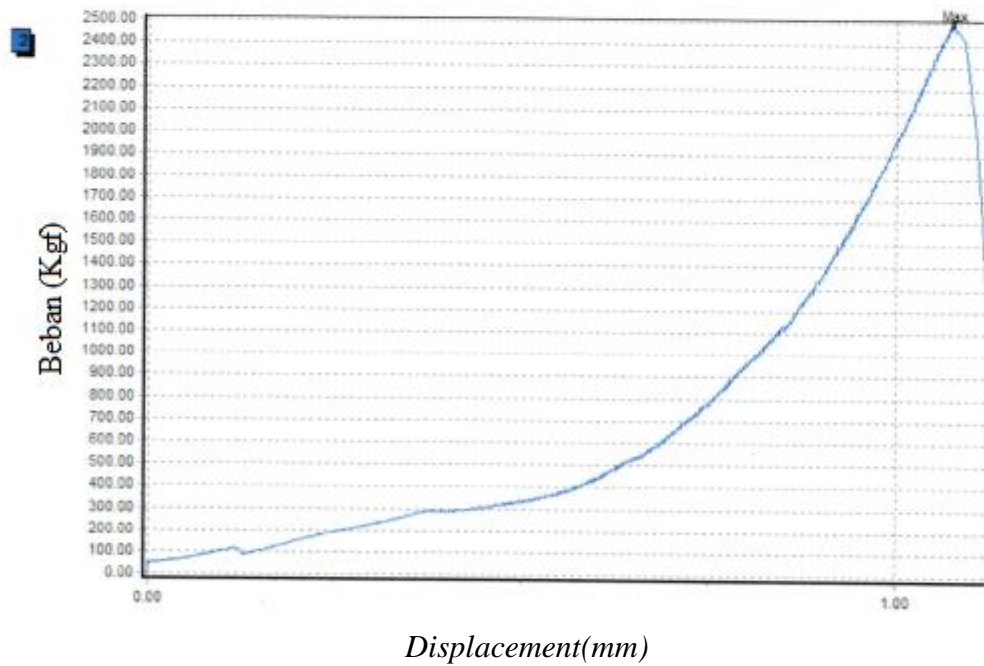
Gambar 35 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/12/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 9:00:00 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23209.620	2410.18	0.00	1.780
2	23376.720	2494.33	0.00	2.248
3	23284.510	2341.40	0.00	2.450
4	23608.300	2296.80	0.00	2.174
5	23393.400	2117.16	0.00	1.546
6	23012.850	2295.29	0.00	1.384
7	23256.160	2523.81	0.00	2.610
8	23195.280	2523.81	0.00	1.426
9	23119.000	2466.87	0.00	1.310



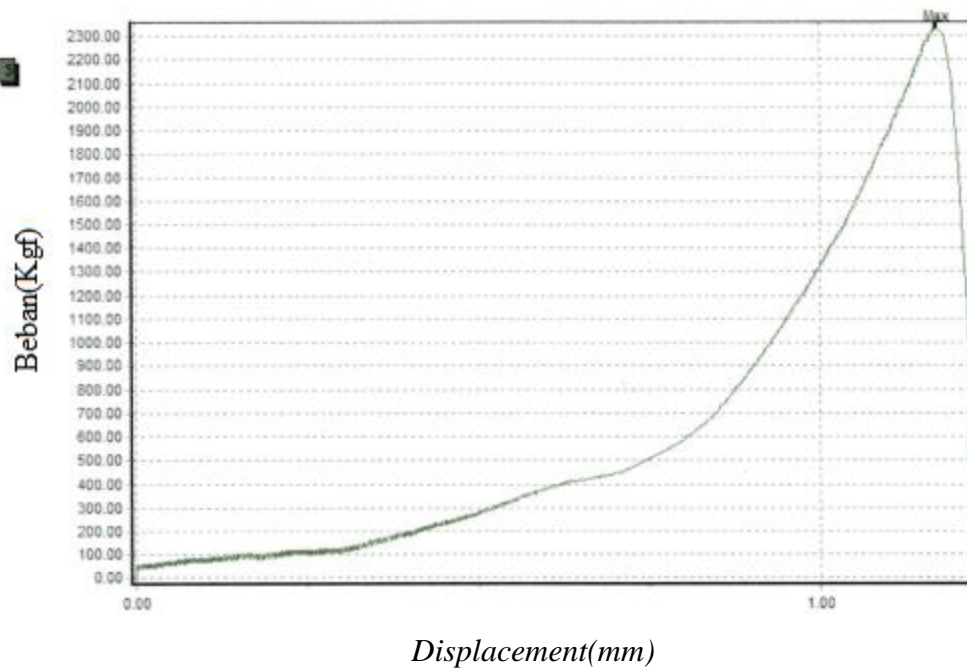
Gambar 36 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/12/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 9:00:00 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23209.620	2410.18	0.00	1.780
2	23376.720	2494.33	0.00	2.248
3	23284.510	2341.40	0.00	2.450
4	23608.300	2296.80	0.00	2.174
5	23393.400	2117.16	0.00	1.546
6	23012.850	2295.29	0.00	1.384
7	23256.160	2523.81	0.00	2.610
8	23195.280	2523.81	0.00	1.426
9	23119.000	2466.87	0.00	1.310



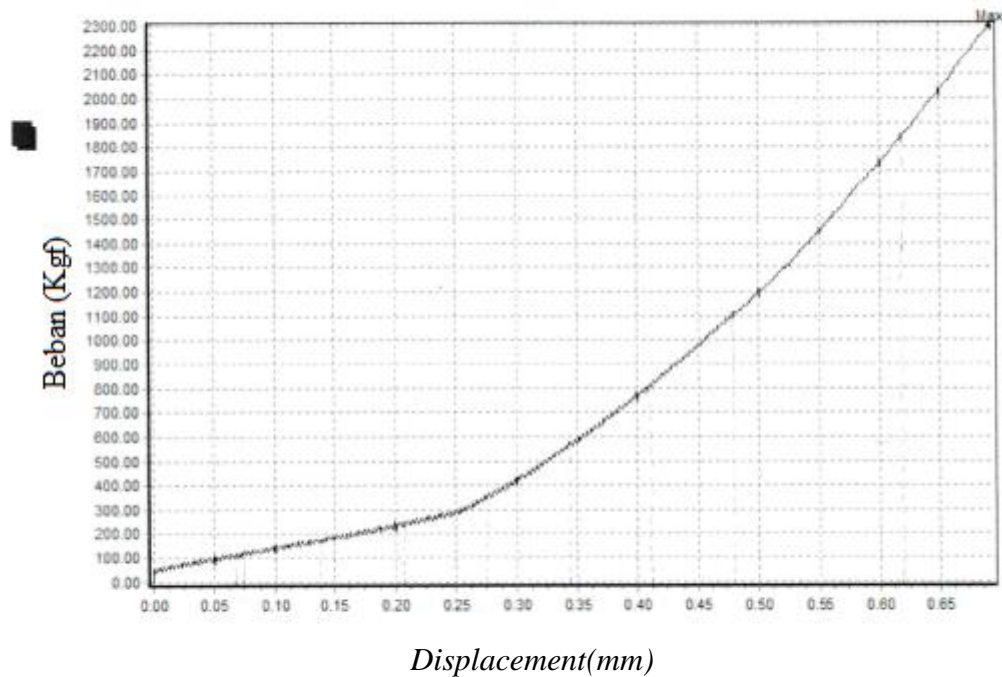
Gambar 37 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/12/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 9:00:00 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23209.620	2410.18	0.00	1.780
2	23376.720	2494.33	0.00	2.248
3	23284.510	2341.40	0.00	2.450
4	23608.300	2296.80	0.00	2.174
5	23393.400	2117.16	0.00	1.546
6	23012.850	2295.29	0.00	1.384
7	23256.160	2523.81	0.00	2.610
8	23195.280	2523.81	0.00	1.426
9	23119.000	2466.87	0.00	1.310



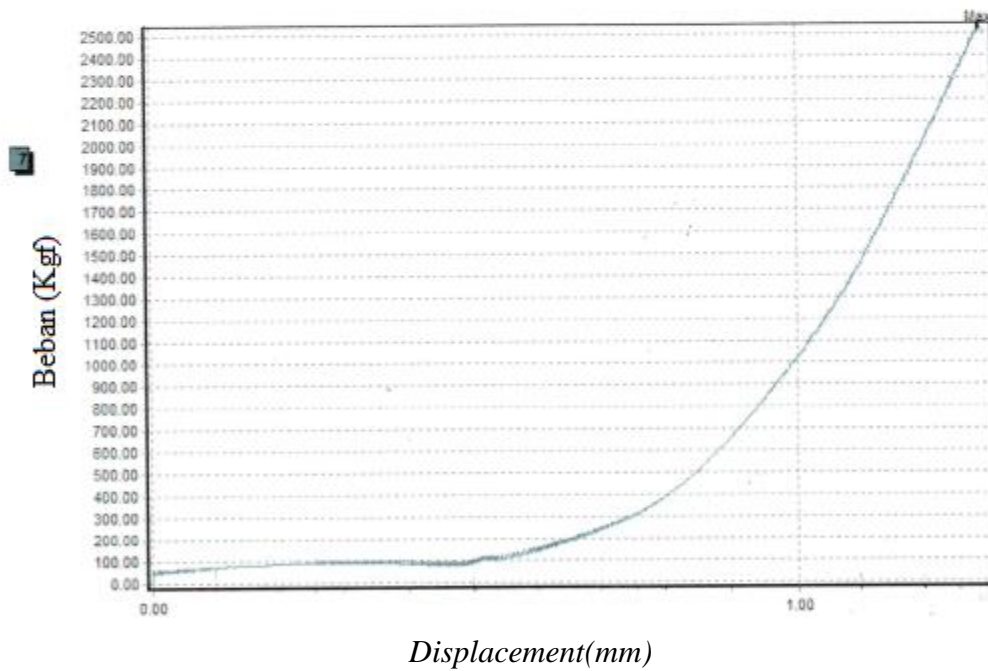
Gambar 38 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/12/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 9:00:00 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23209.620	2410.18	0.00	1.780
2	23376.720	2494.33	0.00	2.248
3	23284.510	2341.40	0.00	2.450
4	23608.300	2296.80	0.00	2.174
5	23393.400	2117.16	0.00	1.546
6	23012.850	2295.29	0.00	1.384
7	23256.160	2523.81	0.00	2.610
8	23195.280	2523.81	0.00	1.426
9	23119.000	2466.87	0.00	1.310



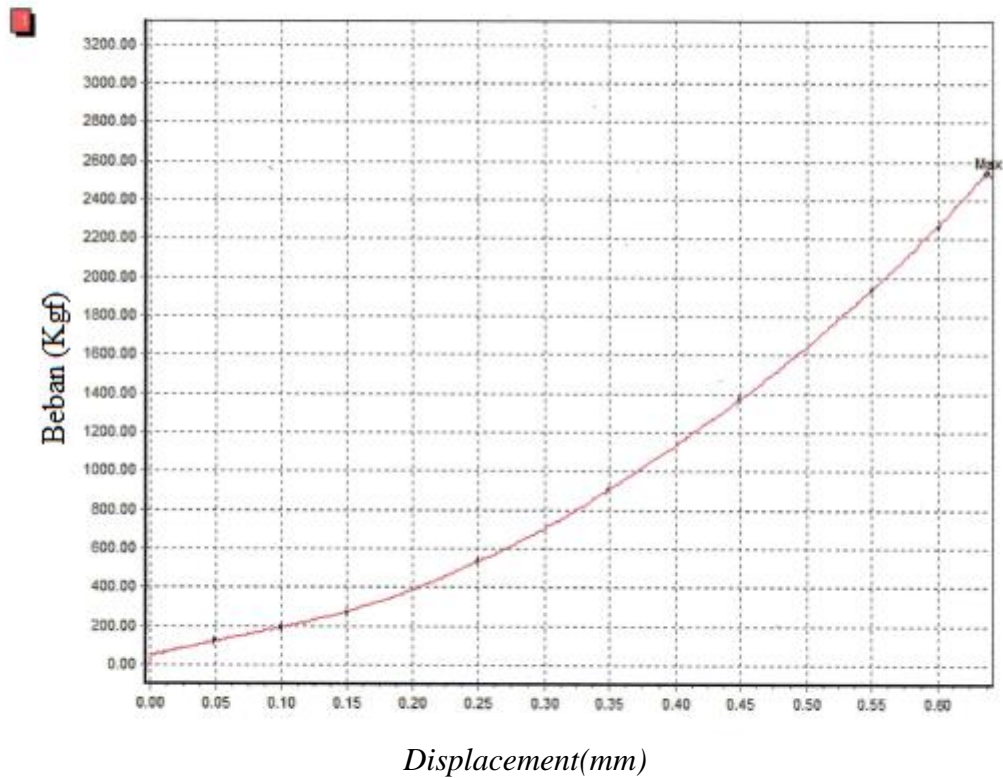
Gambar 39 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/1/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:06:32 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23012.250	2537.67	0.00	1.276
2	22195.710	2557.07	0.00	1.746



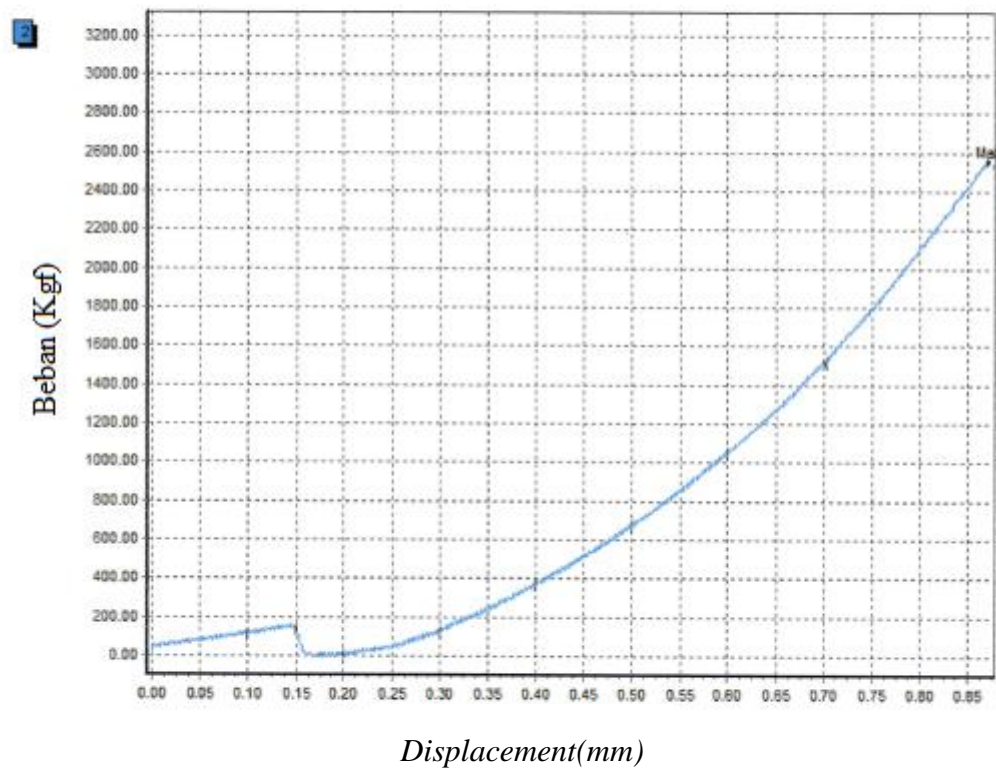
Gambar 40 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/1/2019
Speed: 100.00
Material Name: Lentur blk btr

Test Time: 10:06:32 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23012.250	2537.67	0.00	1.276
2	22195.710	2557.07	0.00	1.746



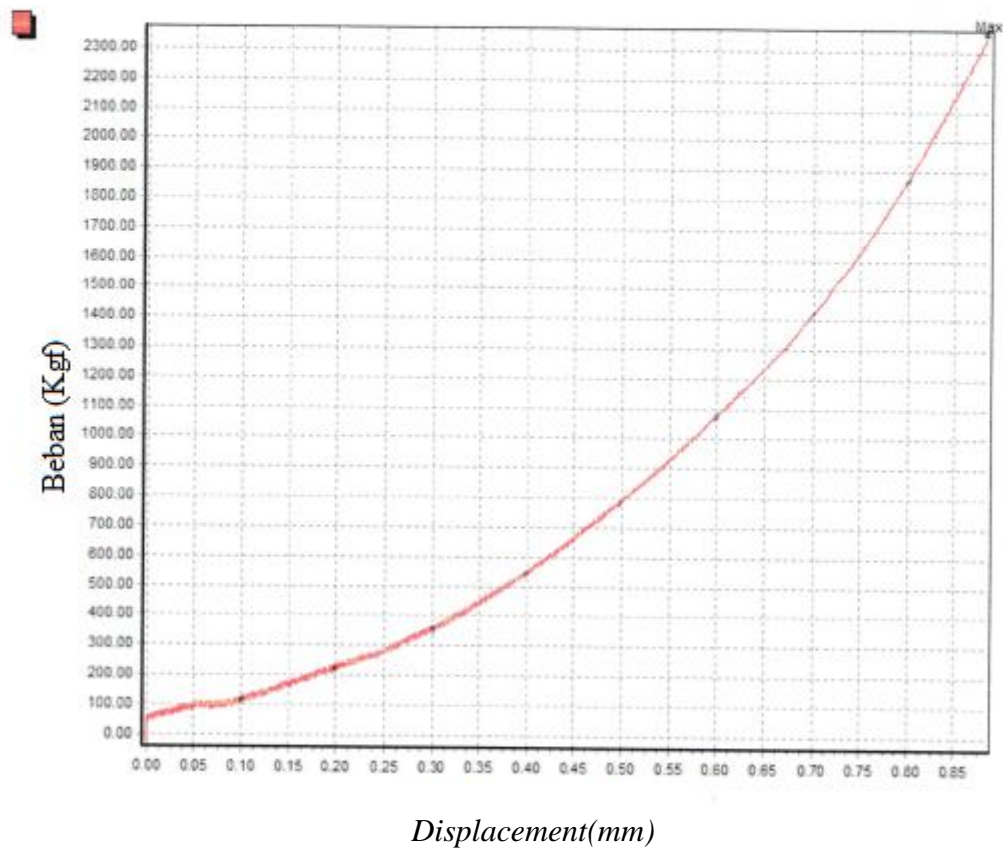
Gambar 41 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/14/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:26:06 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	22452.620	2359.54	0.00	1.766
2	22635.200	2949.36	0.00	1.276



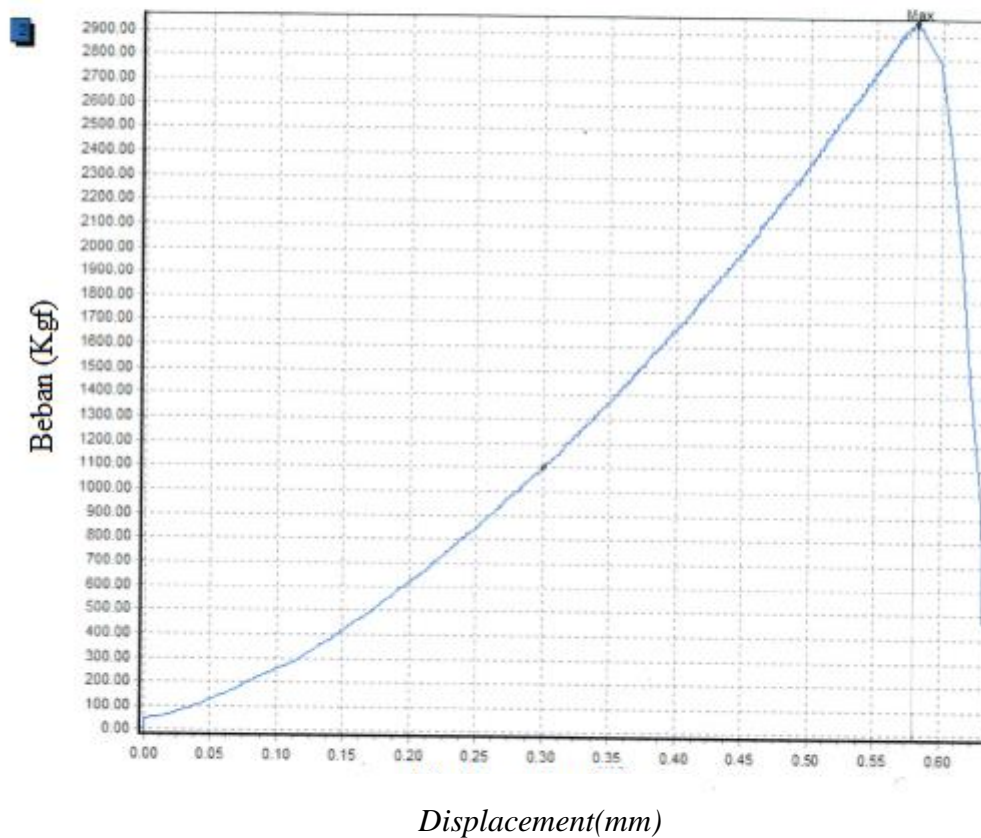
Gambar 42 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/14/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:26:06 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	22452.620	2359.54	0.00	1.766
2	22635.200	2949.36	0.00	1.276



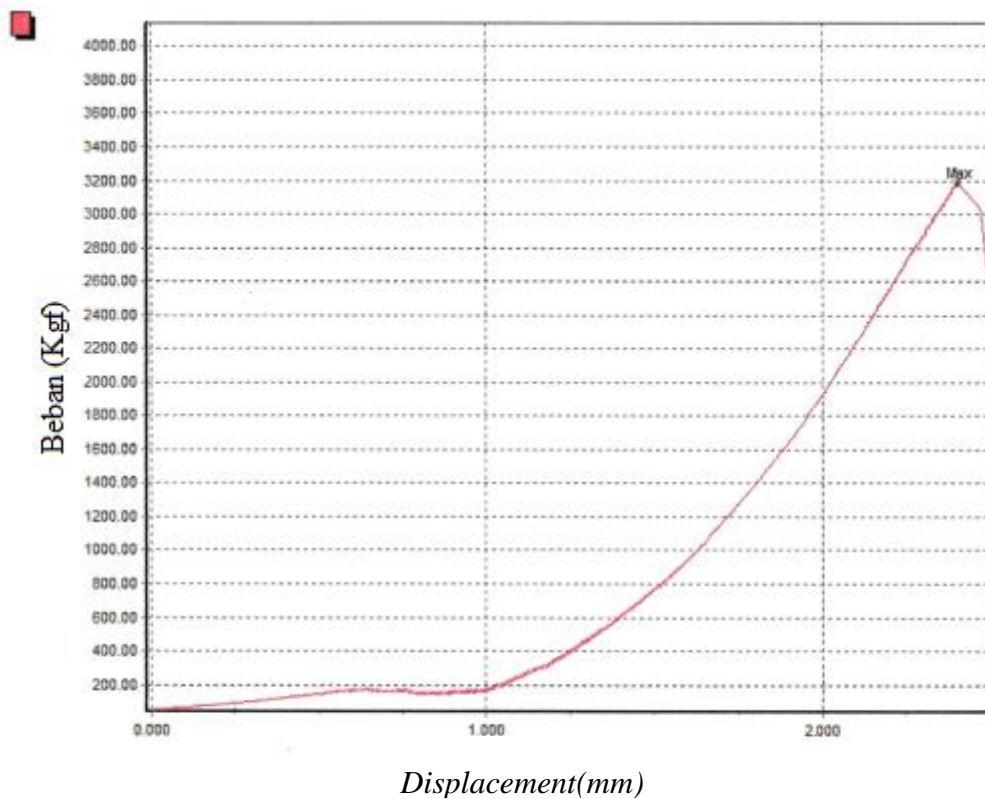
Gambar 43 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/5/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:51:44 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23378.250	3185.69	0.00	2.494



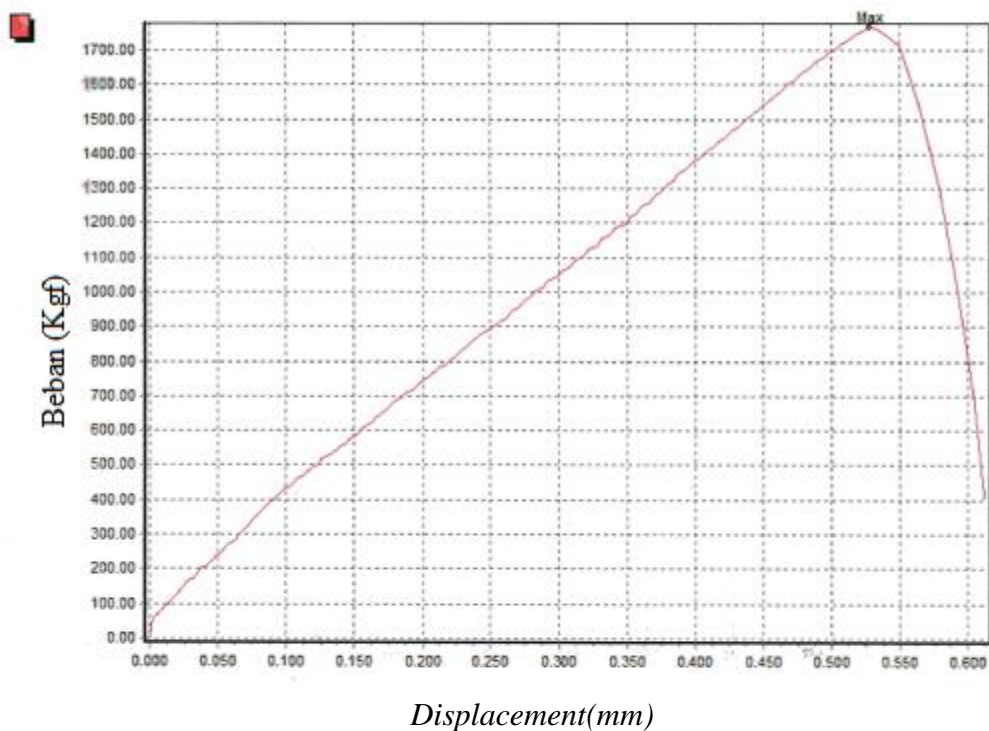
Displacement(mm)
Gambar 44 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 2/22/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:11:46 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23042.600	1767.45	0.00	0.618
2	23012.890	2578.23	0.00	1.828
3	22664.740	2682.54	0.00	1.464
4	22587.530	2541.70	0.00	2.204



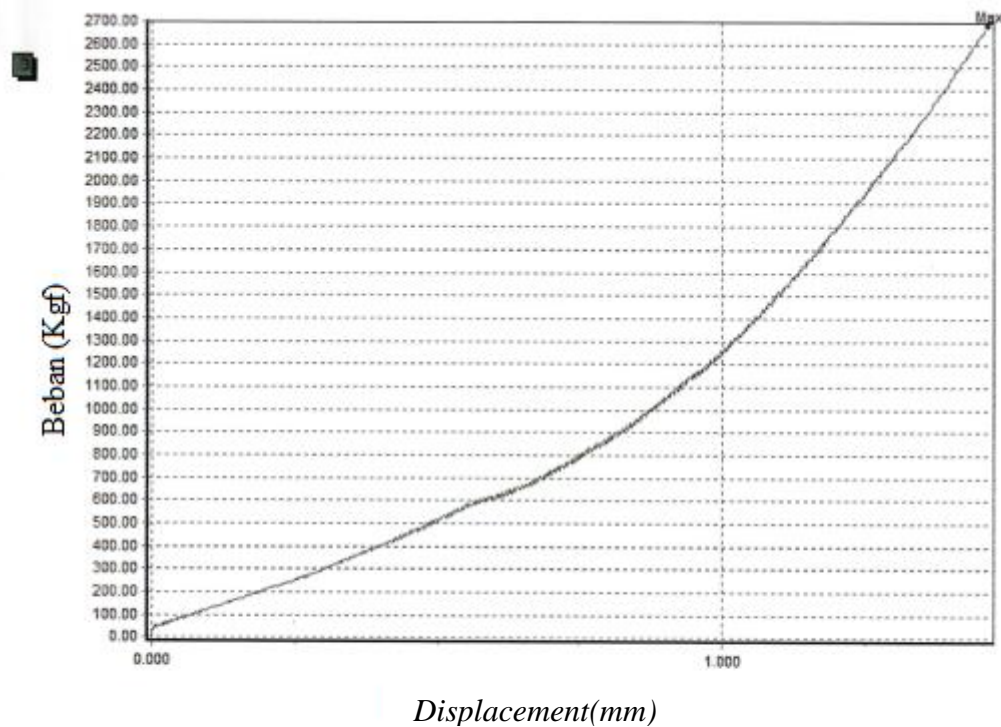
Gambar 45 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 2/22/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 10:11:46 AM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23042.600	1767.45	0.00	0.618
2	23012.890	2578.23	0.00	1.828
3	22664.740	2682.54	0.00	1.464
4	22587.530	2541.70	0.00	2.204



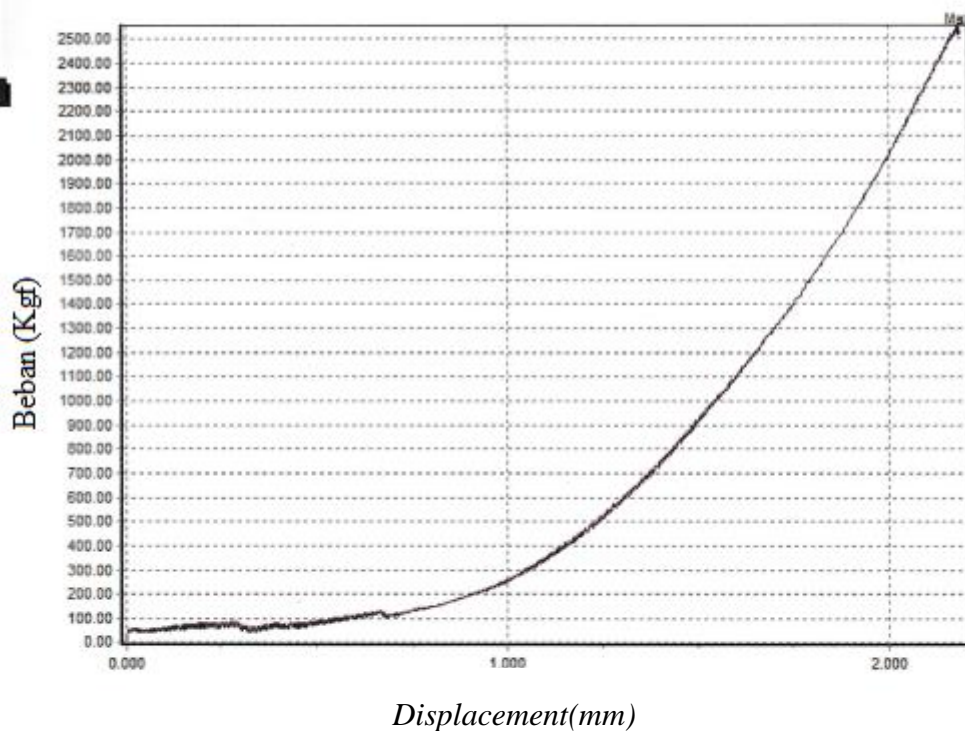
: *Displacement(mm)*
Gambar 46 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 2/22/2019
Speed: 100.00
Material Name: Lentur bik btn

Test Time:10:11:46 AM
Jig distance:200.000 mm
Customer:Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23042.600	1767.45	0.00	0.618
2	23012.890	2578.23	0.00	1.828
3	22664.740	2682.54	0.00	1.464
4	22587.530	2541.70	0.00	2.204



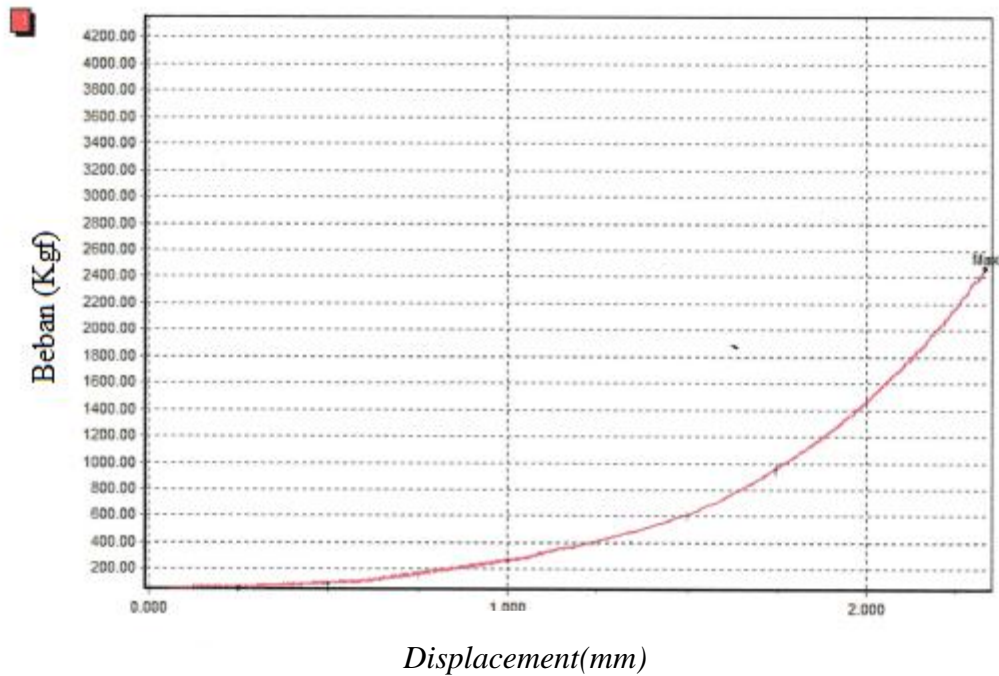
Gambar 47 Hubungan beban dan *Displacement*

Universitas Muhammadiyah Yogyakarta
Teknik Sipil, Lab Konstruksi dan Bahan

Test Date: 3/8/2019
Speed: 100.00
Material Name: Lentur blk btn

Test Time: 2:32:46 PM
Jig distance: 200.000 mm
Customer: Good Company

	Area (mm ²)	Max Force (Kgf)	Compression Strength (MPa)	Displacement (mm)
1	23210.520	2461.33	0.00	2.334
2	22176.800	3352.73	0.00	2.156
3	23012.400	2049.38	0.00	2.630
4	22678.400	2440.41	0.00	2.048
5	22891.440	2677.00	0.00	1.134
6	22799.560	2919.38	0.00	1.810



Gambar 48 Hubungan beban dan *Displacement*