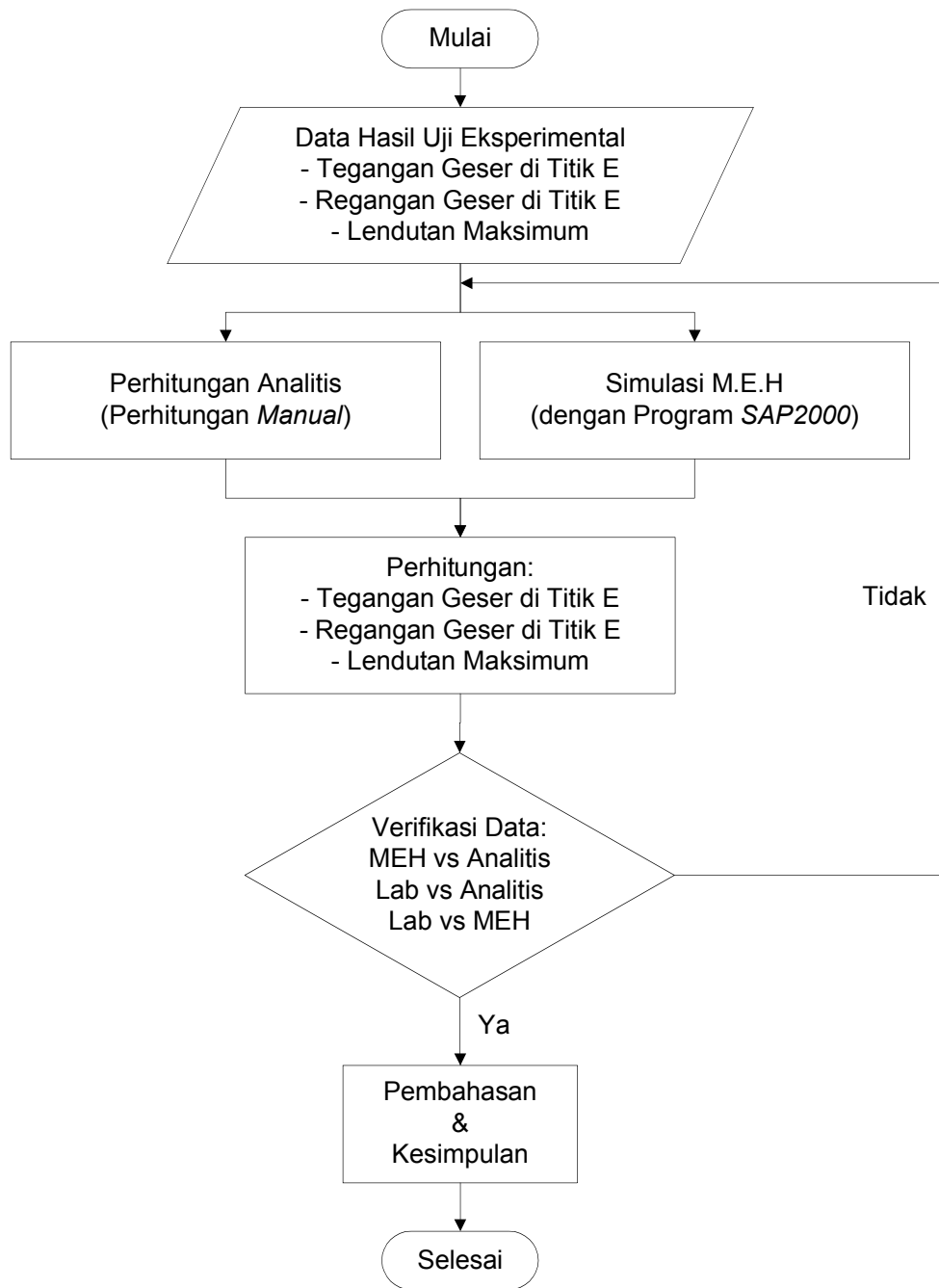


LAMPIRAN

DIAGRAM BAGAN ALIR PENELITIAN**Gambar L1.1 Bagan Alir Penelitian**

PERHITUNGAN ANALITIS

1. Menghitung Reaksi Perletakan

Reaksi tumpuan di titik A dapat dihitung dengan menggunakan keseimbangan titik momen pada titik B.

$$\sum M_B = 0$$

$$V_A \cdot 3,24 - 0,5 \cdot q \cdot 3,475^2 + 0,5 \cdot q \cdot 0,24 - P \cdot 1,63 = 0$$

$$V_A \cdot 3,24 - 0,5 \cdot 14 \cdot 3,475^2 + 0,5 \cdot 14 \cdot 0,24 - 601 \cdot 1,63 = 0$$

$$V_A = 328,3198 \text{ kg}$$

Maka diperoleh reaksi tumpuan di titik A (V_A) = 328,3198 kg = 3220,8172 N

Sedangkan reaksi tumpuan di titik B dapat dihitung dengan menggunakan keseimbangan titik momen pada titik A.

$$\sum M_A = 0$$

$$-V_B \cdot 3,24 + 0,5 \cdot q \cdot 3,48^2 + 0,5 \cdot q \cdot 0,235 - P \cdot 1,61 = 0$$

$$-V_B \cdot 3,24 + 0,5 \cdot 14 \cdot 3,48^2 + 0,5 \cdot 14 \cdot 0,235 - 601 \cdot 1,61 = 0$$

$$V_B = 324,6902 \text{ kg}$$

Maka diperoleh reaksi tumpuan di titik B (V_B) = 324,6902 kg = 3185,2109 N

Untuk kontrol keseimbangan dilakukan secara vertikal

$$\sum V = 0$$

$$V_A + V_B - q \cdot 3,715 - P = 0$$

$$328,3198 + 324,6902 - 14 \cdot 3,715 - 601 = 0$$

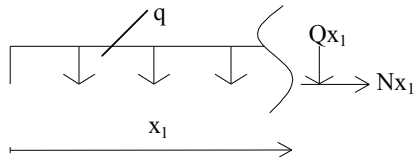
Maka kontrol keseimbangan cocok.

2. Menghitung Gaya Geser

Gaya geser potongan di titik A dapat dihitung dengan menggunakan keseimbangan vertikal.

Potongan di titik A

Interval DA : $0 < x_1 < 0,235$ m



$$\sum Q = 0$$

$$\sum H = 0$$

$$Q_A + q \cdot x_1 = 0$$

$$N_{x_1} = 0$$

$$Q_A = -q \cdot x_1$$

$$Q_A = -14 \cdot x_1$$

$$x_1 = 0 \text{ m} \quad \rightarrow \quad Q_A = 0 \text{ kg} \quad = 0 \text{ N}$$

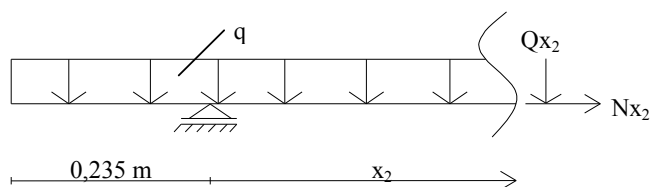
$$x_1 = 0,1175 \text{ m} \quad \rightarrow \quad Q_A = -1,645 \text{ kg} \quad = -16,1375 \text{ N}$$

$$x_1 = 0,235 \text{ m} \quad \rightarrow \quad Q_A = -3,29 \text{ kg} \quad =$$

Potongan di titik E

Untuk gaya geser potongan di titik E juga dihitung dengan menggunakan keseimbangan vertikal.

Interval AE : $0 < x_2 < 0,805$ m



$$\sum Q = 0$$

$$\sum H = 0$$

$$Q_E - V_A + q \cdot (0,235 + x_2) = 0$$

$$N_{x_2} = 0$$

$$Q_E = V_A - q \cdot (0,235 + x_2)$$

$$Q_E = -14 \cdot (0,235 + x_2)$$

$$x_2 = 0 \text{ m} \quad \rightarrow Q_E = 325,0298 \text{ kg}$$

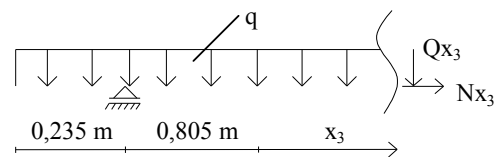
$$x_2 = 0,4025 \text{ m} \rightarrow Q_E = 319,3948 \text{ kg}$$

$$x_2 = 0,805 \text{ m} \rightarrow Q_E = 313,7598 \text{ kg}$$

Potongan di titik C

Untuk gaya geser potongan di titik C juga dihitung dengan menggunakan keseimbangan vertikal.

Interval EC : $0 < x_3 < 0,805 \text{ m}$



$$\sum Q = 0$$

$$\sum H = 0$$

$$Q_C - V_A + q \cdot (1,04 + x_3) = 0$$

$$N_{x_3} = 0$$

$$Q_C = V_A - q \cdot (1,04 + x_3)$$

$$Q_C = -14 \cdot (1,04 + x_3)$$

$$x_3 = 0 \text{ m} \quad \rightarrow Q_E = 313,7598 \text{ kg}$$

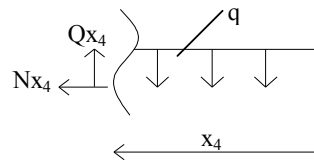
$$x_3 = 0,4025 \text{ m} \rightarrow Q_E = 308,1248 \text{ kg}$$

$$x_3 = 0,805 \text{ m} \rightarrow Q_E = 302,4898 \text{ kg}$$

Potongan di titik B

Untuk gaya geser potongan di titik B juga dihitung dengan menggunakan keseimbangan vertikal.

Interval FB : $0 < x_4 < 0,24$ m



$$\sum Q = 0$$

$$\sum H = 0$$

$$Q_B - q \cdot x_4 = 0$$

$$N_{x_4} = 0$$

$$Q_B = q \cdot x_4$$

$$Q_B = 14 \cdot x_4$$

$$x_4 = 0 \text{ m} \quad \rightarrow \quad Q_B = 0 \text{ kg}$$

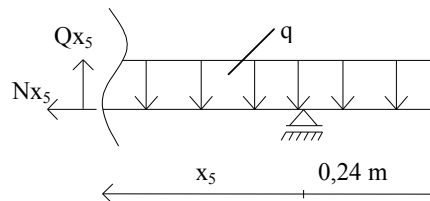
$$x_4 = 0,12 \text{ m} \quad \rightarrow \quad Q_B = 1,68 \text{ kg}$$

$$x_4 = 0,24 \text{ m} \quad \rightarrow \quad Q_B = 3,36 \text{ kg}$$

Potongan di titik C

Untuk gaya geser potongan di titik B juga dihitung dengan menggunakan keseimbangan vertikal.

Interval BC : $0 < x_5 < 1,63$ m



$$\sum Q = 0$$

$$\sum H = 0$$

$$Q_B - q \cdot (0,24 + x_5) + V_B = 0$$

$$N_{x_5} = 0$$

$$Q_B = q \cdot (0,24 + x_5) - V_B$$

$$Q_B = 14 \cdot (0,24 + x_5) - 324,6902$$

$$x_4 = 0 \text{ m} \quad \rightarrow Q_B = -321,3302 \text{ kg}$$

$$x_4 = 0,815 \text{ m} \quad \rightarrow Q_B = -309,9202 \text{ kg}$$

$$x_4 = 1,63 \text{ m} \quad \rightarrow Q_B = -298,5102 \text{ kg}$$

3. Menghitung Tegangan

Untuk menghitung tegangan, maka nilai gaya geser Q_E diambil dari potongan di titik E yaitu pada saat $x_2 = 0,805 \text{ m}$.

$$V_E = Q_E = 313,7598 \text{ kg} = 3077,9836 \text{ N}$$

$$\begin{aligned} \tau_{\text{maks}} &= \frac{V_E}{8 \cdot I \cdot t \cdot w} (bd^2 - bh^2 + th^2) \\ &= \frac{3077,9836}{8 \cdot 6,66 \cdot 10^6 \cdot 5} (75 \cdot 150^2 - 75 \cdot 136^2 + 5 \cdot 136^2) \\ &= 4,5382 \text{ N/mm}^2 \end{aligned}$$

Maka diperoleh nilai tegangan $\tau_{\text{maks}} = 4,5382 \text{ N/mm}^2$

4. Menghitung Regangan

Untuk menghitung regangan, maka diambil nilai tegangan dari hasil perhitungan sebelumnya yaitu $\tau_{\text{maks}} = 4,5382 \text{ N/mm}^2$

$$\gamma = \frac{\tau}{G}$$

$$\gamma = \frac{4,5382}{76923,0769}$$

$$= 5,8996.10^{-5}$$

Maka diperoleh nilai regangan $\gamma = 5,8996.10^{-5}$

5. Menghitung Lendutan

Untuk memudahkan menghitung lendutan, maka perhitungan dilakukan secara terpisah yaitu beban akibat terpusat dan beban akibat merata lalu kemudian hasilnya dijumlahkan.

$$P = 601 \text{ kg} = 5895,81 \text{ N}$$

$$q = 14 \text{ kg/m} = 0,1373 \text{ N/mm}$$

- Lendutan akibat beban terpusat :

$$\begin{aligned} \delta_{\text{maks-P}} = \delta_c &= \frac{P.a.(3.L^2 - 4.a^2)}{48.E.I} \\ &= \frac{5895,81.1610.(3.3240^2 - 4.1610^2)}{48.2.10^5 .6,66.10^6} \\ &= 3,1362 \text{ mm} \end{aligned}$$

Nilai hasil lendutan akibat beban terpusat adalah 3,1362 mm

- Lendutan akibat beban merata :

$$\begin{aligned} \delta_{\text{maks-q}} = \delta_c &= \frac{5.q.L^4}{384.E.I} \\ &= \frac{5.0,1373..3240^4}{384.2.10^5 .6,66.10^6} \\ &= 0,1479 \text{ mm} \end{aligned}$$

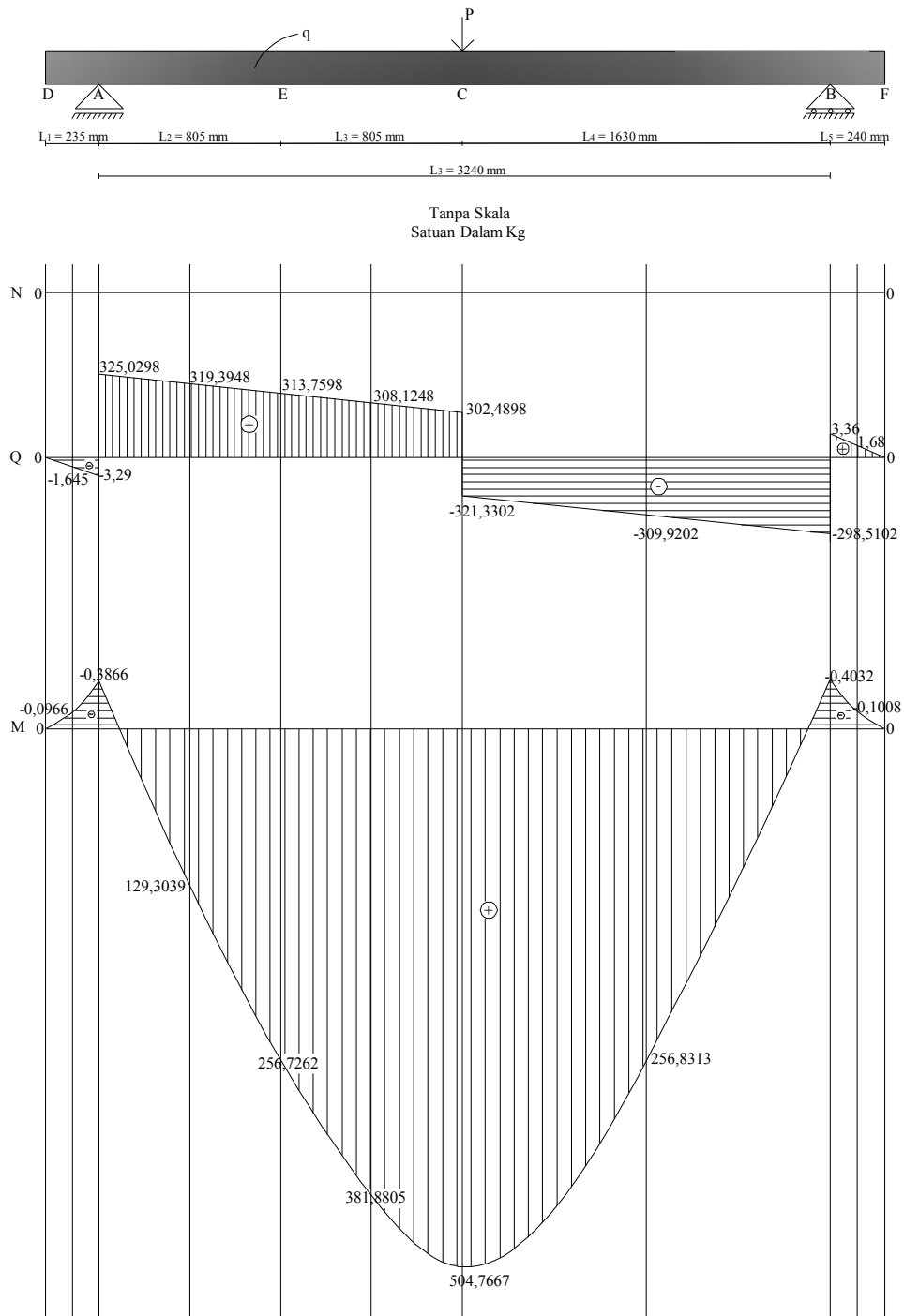
Nilai hasil lendutan akibat beban merata adalah 0,1479 mm

- Lendutan Total :

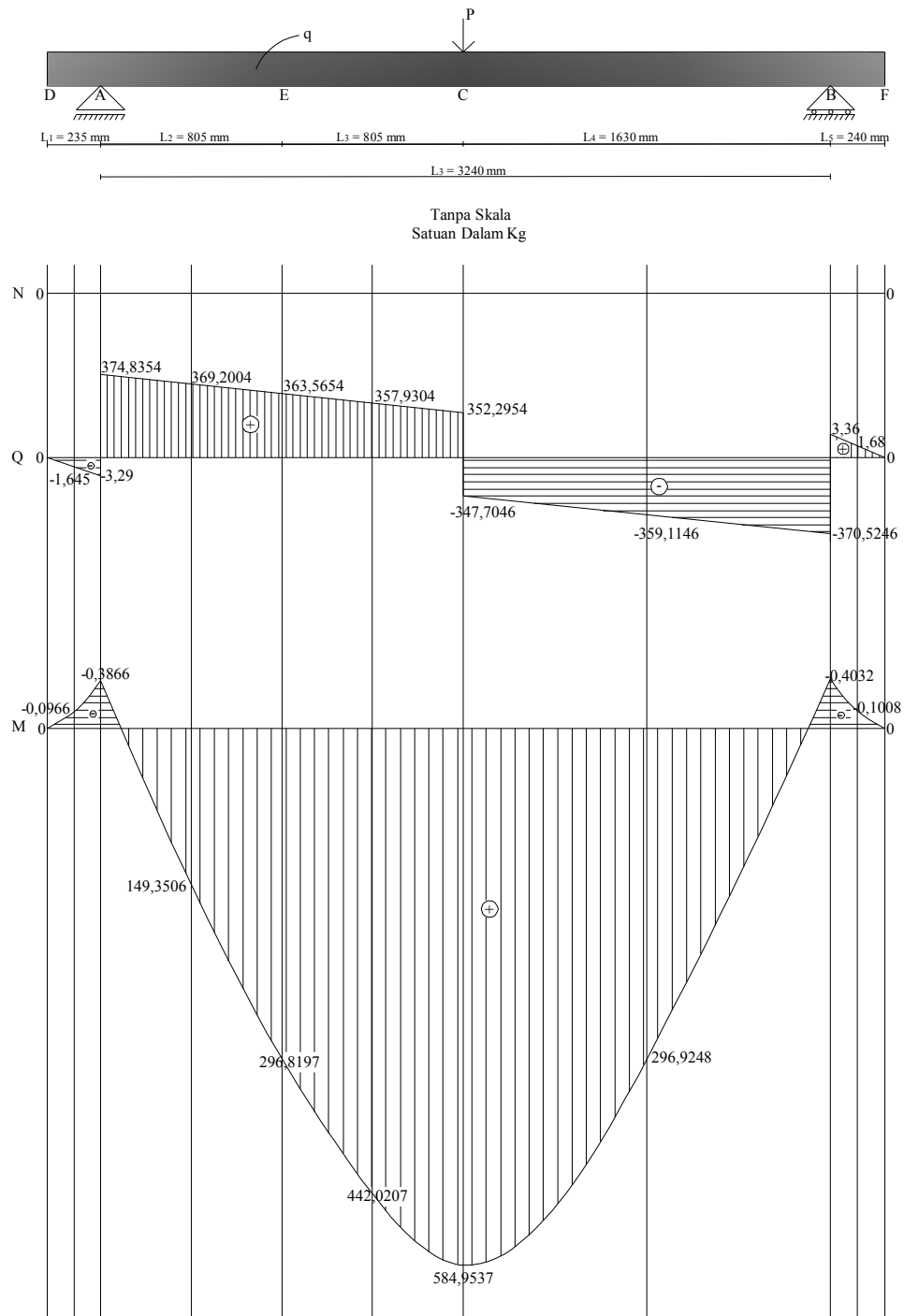
$$\begin{aligned}\delta_{\text{maks}} &= \delta_{\text{maks-P}} + \delta_{\text{maks-q}} \\ &= 3,1362 + 0,1479 \\ &= 3,2841 \text{ mm}\end{aligned}$$

Maka nilai hasil lendutan total adalah 3,2841 mm

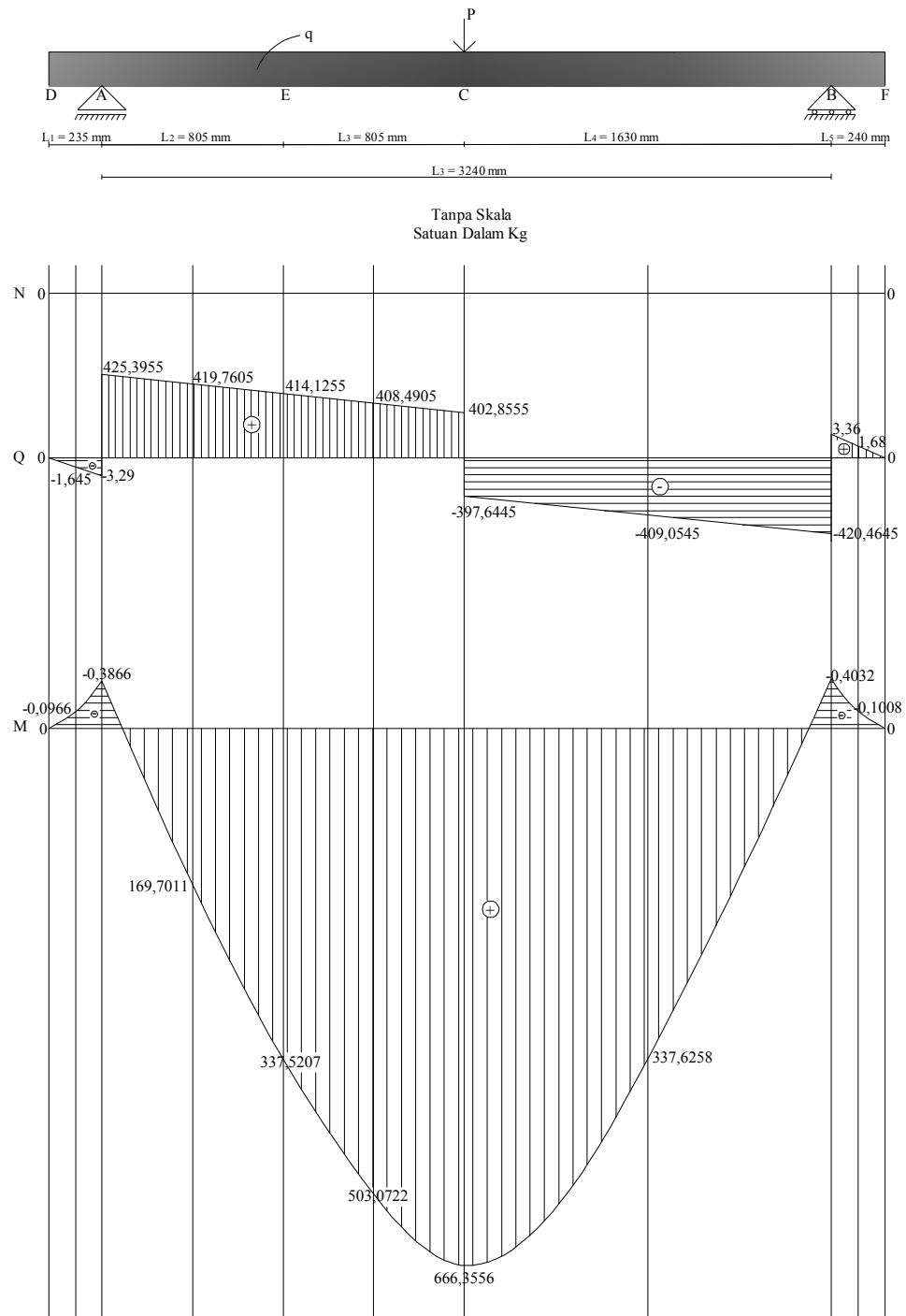
DIAGRAM GAYA NORMAL, GAYA GESER, DAN MOMEN LENTUR



Gambar L3.1 Diagram N, Q, M untuk beban 601 kg



Gambar L3.2 Diagram N, Q, M untuk beban 700 kg



Gambar L3.3 Diagram N, Q, M untuk beban 800,5 kg

Tabel Hasil Perhitungan Gaya Dalam

		601 kg		700 kg		800,5 kg	
		Gaya Geser	Momen	Gaya Geser	Momen	Gaya Geser	Momen
		kg	kgm	kg	kgm	kg	kgm
Tumpuan	VA	328.3198		378.1254		428.6855	
	VB	324.6902		373.8846		423.8245	
Interval AE 0<x1<0.235 m	x1 = 0 m	0	0	0	0	0	0
	x1 = 0.1175	-1.6450	-0.0966	-1.6450	-0.0966	-1.6450	-0.0966
	x1 = 0.235	-3.2900	-0.3866	-3.2900	-0.3866	-3.2900	-0.3866
Interval AE 0<x2<0.805 m	x2 = 0 m	325.0298	-0.3866	374.8354	-0.3866	425.3955	-0.3866
	x2 = 0.4025 m	319.3948	129.3039	369.2004	149.3506	419.7605	169.7011
	x2 = 0.805 m	313.7598	256.7262	363.5654	296.8197	414.1255	337.5207
Interval EC 0<x3<0.805 m	x3 = 0 m	313.1248	256.7262	363.5654	296.8197	414.1255	337.5207
	x3 = 0.4025 m	308.1248	381.8805	357.9304	442.0207	408.4905	503.0722
	x3 = 0.805 m	302.4898	504.7667	352.2954	584.9537	402.8555	666.3556
Interval FB 0<x4<0.24 m	x4 = 0 m	-321.3302	504.7667	-347.7046	584.9537	-397.6445	666.3556
	x4 = 0.12 m	.309.9202	256.8313	-359.1146	296.9248	-409.0545	337.6258
	x4 = 0.24 m	-298.5102	-0.4032	-370.5246	-0.4032	-420.4645	-0.4032
Interval BC 0<x5<1.63 m	x5 = 0 m	3.3600	-0.4032	3.3600	-0.0403	3.3600	-0.4032
	x5 = 0.815 m	1.6800	-0.1008	1.6800	-0.1008	1.6800	-0.1008
	x5 = 1.63 m	0	0	0	0	0	0

DATA GESER HASIL UJI EKSPERIMENTAL

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
0.00	0.00	0.00000000	0.00000000	0.00000000	0.00000000
0.04	61.00	0.00000200	0.00000300	0.15384615	0.23076923
0.08	71.50	0.00000300	0.00000400	0.23076923	0.30769231
0.08	75.50	0.00000700	0.00000900	0.53846154	0.69230769
0.12	77.50	0.00000900	0.00001100	0.69230769	0.84615385
0.12	78.50	0.00000900	0.00001000	0.69230769	0.76923077
0.12	79.00	0.00000900	0.00001200	0.69230769	0.92307692
0.16	81.50	0.00001100	0.00001300	0.84615385	1.00000000
0.16	83.00	0.00001100	0.00001300	0.84615385	1.00000000
0.20	87.50	0.00001200	0.00001300	0.92307692	1.00000000
0.20	89.50	0.00001100	0.00001400	0.84615385	1.07692308
0.24	92.00	0.00001200	0.00001300	0.92307692	1.00000000
0.24	94.00	0.00001200	0.00001400	0.92307692	1.07692308
0.24	94.50	0.00001300	0.00001400	1.00000000	1.07692308
0.28	99.00	0.00001300	0.00001600	1.00000000	1.23076923
0.28	101.50	0.00001400	0.00001500	1.07692308	1.15384615
0.32	106.00	0.00001400	0.00001600	1.07692308	1.23076923
0.32	110.00	0.00001400	0.00001600	1.07692308	1.23076923
0.36	114.50	0.00001300	0.00001600	1.00000000	1.23076923
0.36	118.00	0.00001400	0.00001600	1.07692308	1.23076923
0.36	120.50	0.00001500	0.00001700	1.15384615	1.30769231
0.40	124.50	0.00001300	0.00001800	1.00000000	1.38461538
0.40	127.50	0.00001600	0.00001700	1.23076923	1.30769231
0.44	130.50	0.00001500	0.00001700	1.15384615	1.30769231
0.44	133.50	0.00001600	0.00001900	1.23076923	1.46153846
0.44	136.00	0.00001500	0.00001800	1.15384615	1.38461538
0.48	139.00	0.00001600	0.00001900	1.23076923	1.46153846
0.48	142.50	0.00001700	0.00002000	1.30769231	1.53846154
0.52	146.50	0.00001500	0.00001900	1.15384615	1.46153846
0.52	150.00	0.00001800	0.00002000	1.38461538	1.53846154
0.52	152.50	0.00001700	0.00002100	1.30769231	1.61538462
0.56	156.50	0.00001800	0.00002100	1.38461538	1.61538462
0.56	157.00	0.00001700	0.00002000	1.30769231	1.53846154
0.60	158.50	0.00001800	0.00002100	1.38461538	1.61538462
0.60	159.50	0.00002000	0.00002200	1.53846154	1.69230769
0.64	161.50	0.00001800	0.00002200	1.38461538	1.69230769
0.64	164.00	0.00001900	0.00002100	1.46153846	1.61538462
0.64	165.50	0.00001800	0.00002100	1.38461538	1.61538462
0.68	168.50	0.00002000	0.00002200	1.53846154	1.69230769
0.68	171.00	0.00002000	0.00002200	1.53846154	1.69230769

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
0.72	177.00	0.00002000	0.00002300	1.53846154	1.76923077
0.72	178.00	0.00002100	0.00002300	1.61538462	1.76923077
0.76	181.00	0.00002200	0.00002400	1.69230769	1.84615385
0.76	182.50	0.00002300	0.00002400	1.76923077	1.84615385
0.80	186.00	0.00002200	0.00002500	1.69230769	1.92307692
0.80	190.00	0.00002200	0.00002400	1.69230769	1.84615385
0.84	196.00	0.00002300	0.00002500	1.76923077	1.92307692
0.84	199.50	0.00002200	0.00002300	1.69230769	1.76923077
0.84	203.50	0.00002400	0.00002500	1.84615385	1.92307692
0.88	207.00	0.00002400	0.00002700	1.84615385	2.07692308
0.88	209.50	0.00002400	0.00002600	1.84615385	2.00000000
0.92	213.00	0.00002300	0.00002600	1.76923077	2.00000000
0.92	216.00	0.00002500	0.00002700	1.92307692	2.07692308
0.92	218.00	0.00002400	0.00002700	1.84615385	2.07692308
0.96	222.50	0.00002500	0.00002800	1.92307692	2.15384615
0.96	226.00	0.00002500	0.00002800	1.92307692	2.15384615
1.00	229.50	0.00002600	0.00002800	2.00000000	2.15384615
1.00	232.00	0.00002600	0.00002900	2.00000000	2.23076923
1.00	233.00	0.00002600	0.00002900	2.00000000	2.23076923
1.04	233.50	0.00002600	0.00003100	2.00000000	2.38461538
1.04	234.50	0.00002700	0.00002900	2.07692308	2.23076923
1.08	237.50	0.00002700	0.00003000	2.07692308	2.30769231
1.08	239.00	0.00002700	0.00003100	2.07692308	2.38461538
1.12	243.00	0.00002800	0.00003100	2.15384615	2.38461538
1.12	245.00	0.00002800	0.00003100	2.15384615	2.38461538
1.12	247.50	0.00002800	0.00003200	2.15384615	2.46153846
1.16	251.00	0.00002900	0.00003200	2.23076923	2.46153846
1.16	253.00	0.00002800	0.00003200	2.15384615	2.46153846
1.20	256.00	0.00003000	0.00003200	2.30769231	2.46153846
1.20	259.00	0.00002900	0.00003300	2.23076923	2.53846154
1.20	262.00	0.00003000	0.00003300	2.30769231	2.53846154
1.24	264.50	0.00003000	0.00003400	2.30769231	2.61538462
1.24	266.50	0.00003000	0.00003400	2.30769231	2.61538462
1.28	269.00	0.00002900	0.00003400	2.23076923	2.61538462
1.28	271.50	0.00003100	0.00003500	2.38461538	2.69230769
1.32	274.50	0.00003100	0.00003400	2.38461538	2.61538462
1.32	277.00	0.00003100	0.00003500	2.38461538	2.69230769
1.32	278.50	0.00003100	0.00003600	2.38461538	2.76923077
1.36	281.50	0.00003100	0.00003500	2.38461538	2.69230769
1.36	285.00	0.00003200	0.00003500	2.46153846	2.69230769
1.40	288.00	0.00003100	0.00003600	2.38461538	2.76923077
1.40	290.00	0.00003200	0.00003700	2.46153846	2.84615385
1.40	294.50	0.00003300	0.00003600	2.53846154	2.76923077

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
1.44	299.00	0.00003400	0.00003700	2.61538462	2.84615385
1.44	301.00	0.00003200	0.00003800	2.46153846	2.92307692
1.48	306.00	0.00003300	0.00003700	2.53846154	2.84615385
1.48	309.00	0.00003400	0.00003800	2.61538462	2.92307692
1.52	313.50	0.00003400	0.00003700	2.61538462	2.84615385
1.52	317.00	0.00003500	0.00003800	2.69230769	2.92307692
1.52	319.00	0.00003400	0.00003800	2.61538462	2.92307692
1.56	323.00	0.00003400	0.00003900	2.61538462	3.00000000
1.56	325.50	0.00003600	0.00004000	2.76923077	3.07692308
1.60	328.50	0.00003600	0.00003900	2.76923077	3.00000000
1.60	331.50	0.00003500	0.00004100	2.69230769	3.15384615
1.60	334.00	0.00003500	0.00004000	2.69230769	3.07692308
1.64	336.50	0.00003700	0.00004200	2.84615385	3.23076923
1.64	339.50	0.00003800	0.00004100	2.92307692	3.15384615
1.68	343.00	0.00003700	0.00004100	2.84615385	3.15384615
1.68	346.00	0.00003700	0.00004100	2.84615385	3.15384615
1.72	349.50	0.00003800	0.00004100	2.92307692	3.15384615
1.72	351.50	0.00003800	0.00004200	2.92307692	3.23076923
1.72	354.00	0.00003800	0.00004100	2.92307692	3.15384615
1.76	357.00	0.00003800	0.00004300	2.92307692	3.30769231
1.76	360.50	0.00003800	0.00004200	2.92307692	3.23076923
1.80	363.50	0.00004000	0.00004400	3.07692308	3.38461538
1.80	367.00	0.00004000	0.00004300	3.07692308	3.30769231
1.80	369.00	0.00003900	0.00004300	3.00000000	3.30769231
1.84	373.00	0.00004000	0.00004500	3.07692308	3.46153846
1.84	375.50	0.00004000	0.00004500	3.07692308	3.46153846
1.88	378.50	0.00004100	0.00004600	3.15384615	3.53846154
1.88	382.00	0.00004100	0.00004500	3.15384615	3.46153846
1.92	385.00	0.00004000	0.00004500	3.07692308	3.46153846
1.92	388.00	0.00004200	0.00004500	3.23076923	3.46153846
1.92	391.00	0.00004200	0.00004700	3.23076923	3.61538462
1.96	393.50	0.00004200	0.00004800	3.23076923	3.69230769
1.96	396.00	0.00004300	0.00004600	3.30769231	3.53846154
2.00	399.00	0.00004200	0.00004800	3.23076923	3.69230769
2.00	402.00	0.00004300	0.00004600	3.30769231	3.53846154
2.00	405.00	0.00004400	0.00004800	3.38461538	3.69230769
2.04	407.50	0.00004400	0.00004800	3.38461538	3.69230769
2.04	408.50	0.00004400	0.00004700	3.38461538	3.61538462
2.08	410.50	0.00004400	0.00005000	3.38461538	3.84615385
2.08	412.50	0.00004500	0.00005000	3.46153846	3.84615385
2.12	415.50	0.00004400	0.00004800	3.38461538	3.69230769
2.12	417.00	0.00004400	0.00004900	3.38461538	3.76923077
2.12	419.00	0.00004500	0.00005000	3.46153846	3.84615385

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
2.16	421.50	0.00004600	0.00005100	3.53846154	3.92307692
2.16	424.00	0.00004600	0.00005200	3.53846154	4.00000000
2.20	426.50	0.00004600	0.00005100	3.53846154	3.92307692
2.20	429.00	0.00004700	0.00005200	3.61538462	4.00000000
2.20	431.50	0.00004500	0.00005200	3.46153846	4.00000000
2.24	435.50	0.00004600	0.00005200	3.53846154	4.00000000
2.24	438.00	0.00004600	0.00005400	3.53846154	4.15384615
2.28	440.00	0.00004600	0.00005100	3.53846154	3.92307692
2.28	443.00	0.00004700	0.00005200	3.61538462	4.00000000
2.32	445.50	0.00004700	0.00005200	3.61538462	4.00000000
2.32	448.50	0.00004900	0.00005400	3.76923077	4.15384615
2.32	449.50	0.00004900	0.00005300	3.76923077	4.07692308
2.36	453.00	0.00005000	0.00005400	3.84615385	4.15384615
2.36	455.00	0.00004900	0.00005400	3.76923077	4.15384615
2.40	457.00	0.00005000	0.00005400	3.84615385	4.15384615
2.40	460.50	0.00005100	0.00005500	3.92307692	4.23076923
2.40	463.50	0.00005000	0.00005500	3.84615385	4.23076923
2.44	468.50	0.00005100	0.00005500	3.92307692	4.23076923
2.44	471.50	0.00005000	0.00005500	3.84615385	4.23076923
2.48	476.50	0.00005100	0.00005700	3.92307692	4.38461538
2.48	479.50	0.00005200	0.00005600	4.00000000	4.30769231
2.52	484.00	0.00005000	0.00005600	3.84615385	4.30769231
2.52	486.50	0.00005300	0.00005700	4.07692308	4.38461538
2.52	489.00	0.00005100	0.00005800	3.92307692	4.46153846
2.56	492.00	0.00005100	0.00005800	3.92307692	4.46153846
2.56	495.00	0.00005400	0.00005800	4.15384615	4.46153846
2.60	498.50	0.00005200	0.00005700	4.00000000	4.38461538
2.60	501.00	0.00005300	0.00005900	4.07692308	4.53846154
2.60	504.50	0.00005300	0.00005800	4.07692308	4.46153846
2.64	506.00	0.00005400	0.00005900	4.15384615	4.53846154
2.64	509.00	0.00005200	0.00006100	4.00000000	4.69230769
2.68	512.50	0.00005300	0.00006000	4.07692308	4.61538462
2.68	516.00	0.00005400	0.00006000	4.15384615	4.61538462
2.68	519.00	0.00005400	0.00006000	4.15384615	4.61538462
2.72	522.50	0.00005400	0.00006300	4.15384615	4.84615385
2.72	524.50	0.00005500	0.00006000	4.23076923	4.61538462
2.76	528.00	0.00005700	0.00006200	4.38461538	4.76923077
2.76	531.00	0.00005600	0.00006200	4.30769231	4.76923077
2.80	534.50	0.00005600	0.00006300	4.30769231	4.84615385
2.80	537.00	0.00005700	0.00006300	4.38461538	4.84615385
2.80	539.00	0.00005600	0.00006300	4.30769231	4.84615385
2.84	542.00	0.00005700	0.00006300	4.38461538	4.84615385
2.84	543.50	0.00005700	0.00006400	4.38461538	4.92307692

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
2.88	546.00	0.00005700	0.00006400	4.38461538	4.92307692
2.88	548.00	0.00005700	0.00006400	4.38461538	4.92307692
2.92	551.00	0.00005700	0.00006500	4.38461538	5.00000000
2.92	552.50	0.00005900	0.00006600	4.53846154	5.07692308
2.92	554.00	0.00005800	0.00006500	4.46153846	5.00000000
2.96	556.00	0.00005900	0.00006600	4.53846154	5.07692308
2.96	559.50	0.00005900	0.00006500	4.53846154	5.00000000
3.00	562.50	0.00005900	0.00006700	4.53846154	5.15384615
3.00	564.50	0.00006000	0.00006800	4.61538462	5.23076923
3.00	567.00	0.00006000	0.00006600	4.61538462	5.07692308
3.04	569.00	0.00005900	0.00006700	4.53846154	5.15384615
3.04	572.00	0.00006000	0.00006800	4.61538462	5.23076923
3.08	575.00	0.00006100	0.00006700	4.69230769	5.15384615
3.08	578.00	0.00006100	0.00006900	4.69230769	5.30769231
3.08	580.00	0.00006100	0.00006800	4.69230769	5.23076923
3.12	583.00	0.00006100	0.00006900	4.69230769	5.30769231
3.12	585.00	0.00006200	0.00007000	4.76923077	5.38461538
3.16	588.00	0.00006300	0.00006900	4.84615385	5.30769231
3.16	591.00	0.00006100	0.00007000	4.69230769	5.38461538
3.20	594.00	0.00006300	0.00007000	4.84615385	5.38461538
3.20	596.50	0.00006300	0.00007000	4.84615385	5.38461538
3.20	597.50	0.00006400	0.00007200	4.92307692	5.53846154
3.24	601.00	0.00006400	0.00007000	4.92307692	5.38461538
3.24	603.00	0.00006300	0.00007100	4.84615385	5.46153846
3.28	606.00	0.00006400	0.00007100	4.92307692	5.46153846
3.28	608.00	0.00006300	0.00007100	4.84615385	5.46153846
3.32	610.50	0.00006400	0.00007300	4.92307692	5.61538462
3.32	612.00	0.00006500	0.00007200	5.00000000	5.53846154
3.32	614.50	0.00006400	0.00007200	4.92307692	5.53846154
3.36	617.00	0.00006400	0.00007300	4.92307692	5.61538462
3.36	619.50	0.00006500	0.00007200	5.00000000	5.53846154
3.40	624.00	0.00006500	0.00007300	5.00000000	5.61538462
3.40	627.00	0.00006600	0.00007300	5.07692308	5.61538462
3.40	629.50	0.00006600	0.00007500	5.07692308	5.76923077
3.44	632.50	0.00006700	0.00007600	5.15384615	5.84615385
3.44	636.50	0.00006700	0.00007500	5.15384615	5.76923077
3.48	640.50	0.00006600	0.00007600	5.07692308	5.84615385
3.48	643.50	0.00006700	0.00007700	5.15384615	5.92307692
3.48	646.50	0.00006800	0.00007600	5.23076923	5.84615385
3.52	650.00	0.00006700	0.00007600	5.15384615	5.84615385
3.52	652.50	0.00006800	0.00007700	5.23076923	5.92307692
3.56	655.00	0.00007000	0.00007700	5.38461538	5.92307692
3.56	658.50	0.00006700	0.00007800	5.15384615	6.00000000

Lendutan mm	Beban kg	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
3.60	661.50	0.00006800	0.00007800	5.23076923	6.00000000
3.60	664.00	0.00006900	0.00007900	5.30769231	6.07692308
3.60	665.50	0.00006900	0.00007700	5.30769231	5.92307692
3.64	669.50	0.00006900	0.00007900	5.30769231	6.07692308
3.64	671.50	0.00006900	0.00008000	5.30769231	6.15384615
3.68	674.50	0.00006900	0.00008000	5.30769231	6.15384615
3.68	677.00	0.00007000	0.00008000	5.38461538	6.15384615
3.68	679.00	0.00007000	0.00008000	5.38461538	6.15384615
3.72	683.00	0.00007100	0.00008100	5.46153846	6.23076923
3.72	684.50	0.00007000	0.00008000	5.38461538	6.15384615
3.76	686.50	0.00007100	0.00008100	5.46153846	6.23076923
3.76	689.50	0.00007100	0.00008100	5.46153846	6.23076923
3.80	693.00	0.00007100	0.00008100	5.46153846	6.23076923
3.80	695.50	0.00007100	0.00008200	5.46153846	6.30769231
3.80	697.50	0.00007200	0.00008300	5.53846154	6.38461538
3.84	700.00	0.00007200	0.00008300	5.53846154	6.38461538
3.84	703.00	0.00007200	0.00008200	5.53846154	6.30769231
3.88	706.00	0.00007300	0.00008300	5.61538462	6.38461538
3.88	708.50	0.00007300	0.00008500	5.61538462	6.53846154
3.92	712.00	0.00007300	0.00008300	5.61538462	6.38461538
3.92	713.50	0.00007300	0.00008400	5.61538462	6.46153846
3.92	717.00	0.00007500	0.00008300	5.76923077	6.38461538
3.96	719.50	0.00007400	0.00008500	5.69230769	6.53846154
3.96	722.50	0.00007500	0.00008400	5.76923077	6.46153846
4.00	725.00	0.00007300	0.00008500	5.61538462	6.53846154
4.00	727.50	0.00007500	0.00008500	5.76923077	6.53846154
4.00	729.00	0.00007400	0.00008600	5.69230769	6.61538462
4.04	731.50	0.00007400	0.00008600	5.69230769	6.61538462
4.04	735.00	0.00007600	0.00008600	5.84615385	6.61538462
4.08	737.50	0.00007500	0.00008700	5.76923077	6.69230769
4.08	740.00	0.00007700	0.00008700	5.92307692	6.69230769
4.08	742.50	0.00007600	0.00008700	5.84615385	6.69230769
4.12	745.50	0.00007600	0.00008800	5.84615385	6.76923077
4.12	747.00	0.00007600	0.00008700	5.84615385	6.69230769
4.16	749.50	0.00007600	0.00008800	5.84615385	6.76923077
4.16	752.50	0.00007700	0.00008900	5.92307692	6.84615385
4.20	756.50	0.00007800	0.00008900	6.00000000	6.84615385
4.20	758.50	0.00007800	0.00008900	6.00000000	6.84615385
4.20	761.00	0.00007700	0.00009100	5.92307692	7.00000000
4.24	763.00	0.00007900	0.00008900	6.07692308	6.84615385
4.24	765.50	0.00007800	0.00009100	6.00000000	7.00000000
4.28	768.00	0.00007900	0.00009000	6.07692308	6.92307692
4.28	771.50	0.00008000	0.00009100	6.15384615	7.00000000

Lendutan	Beban	Regangan		Tegangan (N/mm ²)	
		Web Depan	Web Belakang	Web Depan	Web Belakang
mm	kg				
4.28	774.00	0.00007900	0.00009000	6.07692308	6.92307692
4.32	776.00	0.00007900	0.00009300	6.07692308	7.15384615
4.32	778.50	0.00008000	0.00009200	6.15384615	7.07692308
4.36	780.50	0.00008000	0.00009200	6.15384615	7.07692308
4.36	784.00	0.00008000	0.00009300	6.15384615	7.15384615
4.36	786.50	0.00007900	0.00009200	6.07692308	7.07692308
4.40	789.00	0.00008000	0.00009300	6.15384615	7.15384615
4.40	791.50	0.00008100	0.00009200	6.23076923	7.07692308
4.44	794.00	0.00008000	0.00009400	6.15384615	7.23076923
4.44	796.00	0.00008000	0.00009400	6.15384615	7.23076923
4.48	800.50	0.00008100	0.00009400	6.23076923	7.23076923
4.48	803.00	0.00008200	0.00009300	6.30769231	7.15384615
4.48	805.00	0.00008200	0.00009500	6.30769231	7.30769231
4.52	808.00	0.00008100	0.00009500	6.23076923	7.30769231
4.52	808.50	0.00008200	0.00009700	6.30769231	7.46153846
4.56	812.00	0.00008300	0.00009600	6.38461538	7.38461538
4.56	815.00	0.00008300	0.00009600	6.38461538	7.38461538
4.60	817.50	0.00008400	0.00009600	6.46153846	7.38461538
4.60	820.50	0.00008300	0.00009800	6.38461538	7.53846154
4.60	823.00	0.00008300	0.00009700	6.38461538	7.46153846
4.64	826.00	0.00008300	0.00009800	6.38461538	7.53846154
4.64	828.50	0.00008400	0.00009800	6.46153846	7.53846154
4.68	831.00	0.00008400	0.00009900	6.46153846	7.61538462
4.68	832.50	0.00008400	0.00009900	6.46153846	7.61538462
4.68	835.00	0.00008500	0.00009900	6.53846154	7.61538462
4.72	837.50	0.00008500	0.00010000	6.53846154	7.69230769
4.72	841.00	0.00008600	0.00009800	6.61538462	7.53846154
4.76	843.50	0.00008400	0.00009800	6.46153846	7.53846154
4.76	846.50	0.00008500	0.00010000	6.53846154	7.69230769
4.76	849.50	0.00008600	0.00010000	6.61538462	7.69230769
4.80	850.50	0.00008600	0.00010100	6.61538462	7.76923077
4.80	852.50	0.00008600	0.00010200	6.61538462	7.84615385
4.84	856.50	0.00008600	0.00010200	6.61538462	7.84615385
4.84	859.50	0.00008700	0.00010200	6.69230769	7.84615385
4.88	861.00	0.00008800	0.00010200	6.76923077	7.84615385