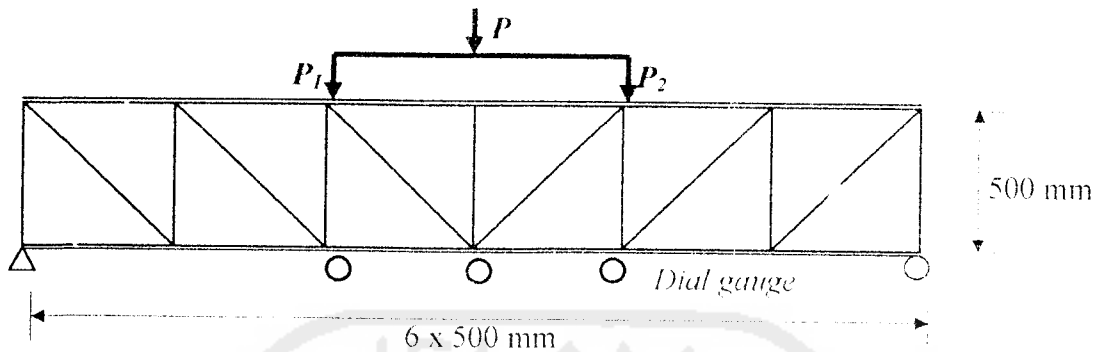




Lampiran 1

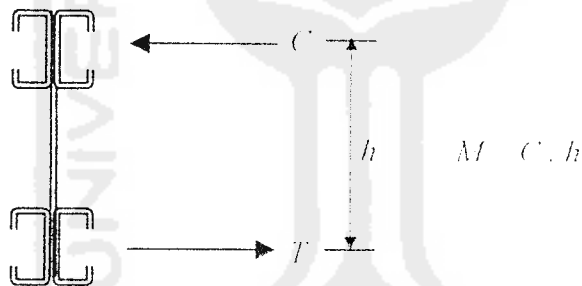
Perhitungan Rencana Profil



Profil C 100x50x2

$$\text{Pada sayap} = \frac{b}{t} = \frac{50}{2} = 25$$

$$\text{Pada badan} = \frac{h}{t} = \frac{100}{2} = 50$$



$$\sigma_1 = \sigma_3 = \frac{\pi^2 \cdot E \cdot k}{12(1 - 0,3^2)(h/t)^2}, \quad k = 0,425$$

$$= \frac{\pi^2 \cdot 2 \cdot 10^5 \cdot 0,425}{12(1 - 0,3^2)(25)^2} = 122,918 \text{ Mpa}$$

$$= 120 \text{ Mpa}$$

$$\sigma_2 = \frac{\pi^2 \cdot 2 \cdot 10^5 \cdot 4}{12(1 - 0,3^2)(50)^2} = 289,21 \text{ Mpa} > 240 \text{ Mpa}$$

$$= 240 \text{ Mpa}$$

Lampiran 2

Lanjutan Perhitungan Rencana Profil

$$\begin{aligned}P &= F_{cr} \cdot A \\&= 1200 \cdot (0,5 \cdot 0,02) \cdot 4 &= 48 \text{ kN} \\&= 2400 \cdot (1 \cdot 0,02) \cdot 2 &= \underline{96 \text{ kN}} \\&&144 \text{ kN}\end{aligned}$$

$$P_{rata-rata} = \frac{144}{2} = 72 \text{ kN}$$

$$\begin{aligned}M &= C \cdot h \\&= 72 \cdot 0,4 \\&= 28,8 \text{ kNm}\end{aligned}$$

$$\begin{aligned}M &= 1/6 PL \\28,8 &= 1/6 P \cdot 3\end{aligned}$$

$$\begin{aligned}P &= \frac{28,8 \cdot 6}{3} \\&= 57,6 \text{ kN} \\&= 5,76 \text{ ton} \approx 60 \text{ ton}\end{aligned}$$

- F_{cr} untuk batang vertikal = 65 kN (tekan)

$$\begin{aligned}F_{cr} &= \frac{\pi^2 EI}{(L \cdot r)^2} \\&= \frac{\pi^2 \cdot 2 \cdot 10^5}{(50)^2} = 251 \text{ Mpa} \approx 240 \text{ Mpa}\end{aligned}$$

$$A = \frac{65000}{240} = 270,8 \text{ mm}^2$$

$$\frac{\pi}{4} d^2 = 270 \text{ mm}^2$$

$$\begin{aligned}d &= \sqrt{\frac{4 \cdot 270}{\pi}} \\&= 18,56 \text{ mm} \approx 19 \text{ mm}\end{aligned}$$

Lampiran 3

Lanjutan Perhitungan Rencana Profil

- F_{cr} untuk batang horizontal = 75 kN (tarik)

$$A = \frac{F_{cr}}{F_y} = \frac{75}{240000} = 3,125 \cdot 10^{-4} \text{ m}^2$$

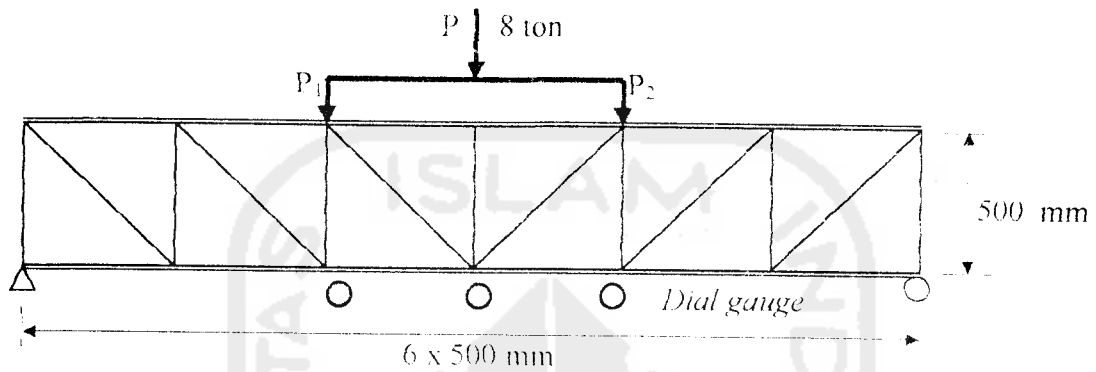
$$D = \sqrt{\frac{3,125 \cdot 10^{-4} \cdot 4}{\pi}}$$
$$= 0,01994 \text{ m}$$
$$= 19,94 \text{ mm}$$



Lampiran 4

Perhitungan F_y dan F_{cr}

Dari hasil uji tarik laboratorium terhadap profil C canai dingin C 100x50x2, diperoleh $F_y = 221 \text{ Mpa}$



Pada hasil pengujian lentur didapatkan $P_{maks} = 8 \text{ ton}$, dimana

$$P_1 = P_2 = \frac{1}{2} P = 4 \text{ ton} \approx 40 \text{ kN}$$

$$\begin{aligned} M &= \frac{1}{6} PL \\ &= \frac{1}{6} \cdot 40 \cdot 3 \\ &= 20 \text{ kNm} \end{aligned}$$

$$P_{cr} = \frac{M}{h} = \frac{20}{0,4} = 50 \text{ kN}$$

$$A = 890 \text{ mm}^2$$

$$F_{cr} = \frac{P}{A} = \frac{50000}{890} = 56.179 \text{ Mpa} < F_y = 221 \text{ Mpa}$$

Lampiran 5

Foto Pelaksanaan Pengujian

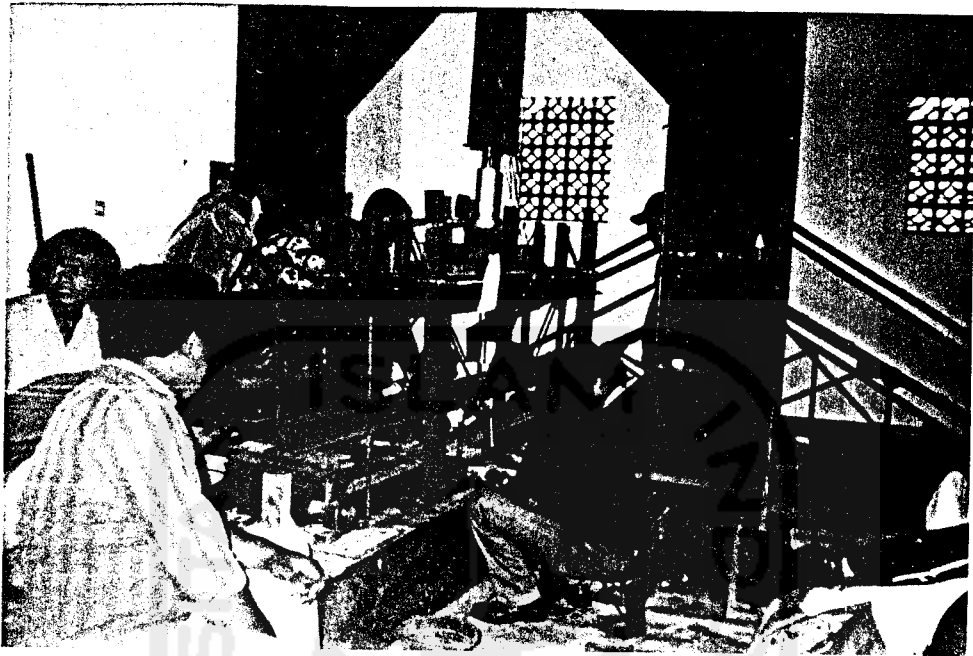


Foto 1. Pengujian Sampel dengan batang horisontal saling membelakangi
(*back to back*)

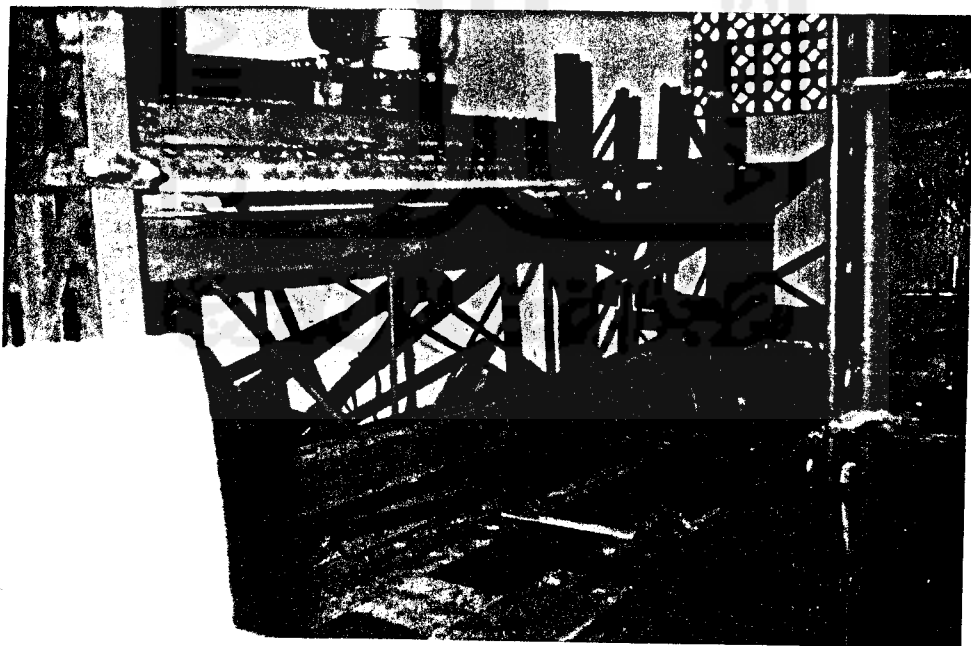


Foto 2. Pengujian Sampel dengan batang horisontal saling berhadapan
(*front to front*)

Lampiran 6

Foto Hasil Pengujian

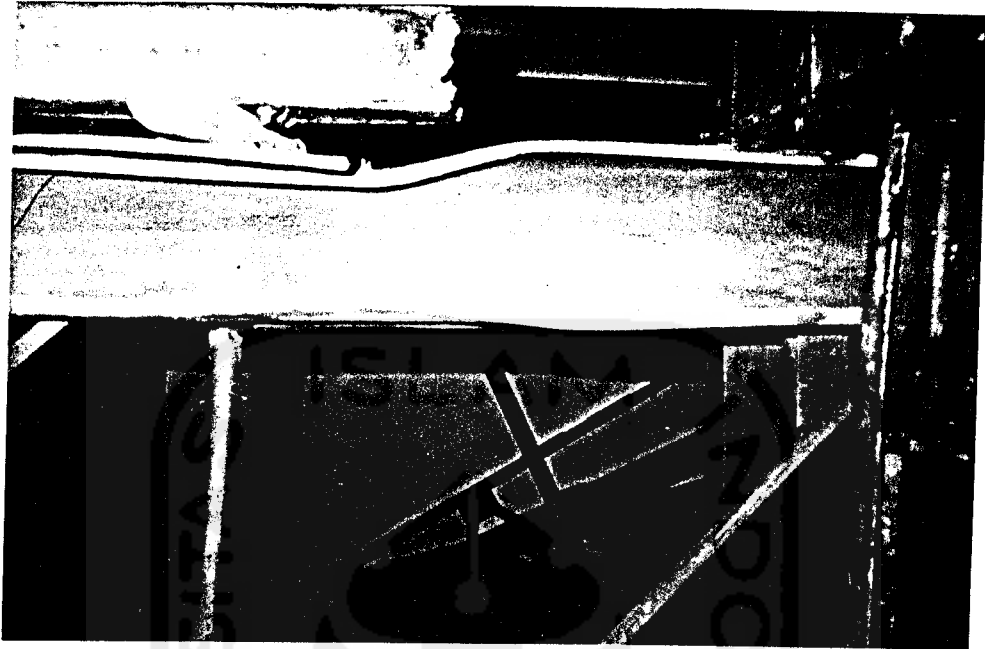


Foto 3. Hasil Pengujian Sampel dengan batang horisontal saling membelakangi
(*back to back*)



Foto 4. Hasil Pengujian Sampel dengan batang horisontal saling berhadapan
(*front to front*)

```

*****
*                                     *
*   STRUCTURE DATA                   *
*                                     *
*****

```

COORDINATE DATA (MM)**			**BOUNDARY DATA**	
DE	1-COOR	2-COOR	1-B	2-B
1	0.00	0.00	L	L
2	500.00	0.00		
3	1000.00	0.00		
4	1500.00	0.00		
5	2000.00	0.00		
6	2500.00	0.00		
7	3000.00	0.00	F	L
8	0.00	500.00		
9	500.00	500.00		
10	1000.00	500.00		
11	1500.00	500.00		
12	2000.00	500.00		
13	2500.00	500.00		
14	3000.00	500.00		

ELEMENT DATA**				
EM	1-NODE	2-NODE	HINGE	MATERIAL
1	1	2		1
2	2	3		1
3	3	4		1
4	4	5		1
5	5	6		1
6	6	7		1
7	8	9		1
8	9	10		1
9	10	11		2
10	11	12		2
11	12	13		1
12	13	14		1
13	1	8		3
14	2	9		3
15	3	10		3
16	4	11		3
17	5	12		3
18	6	13		3
19	7	14		3

ELEMENT DATA**

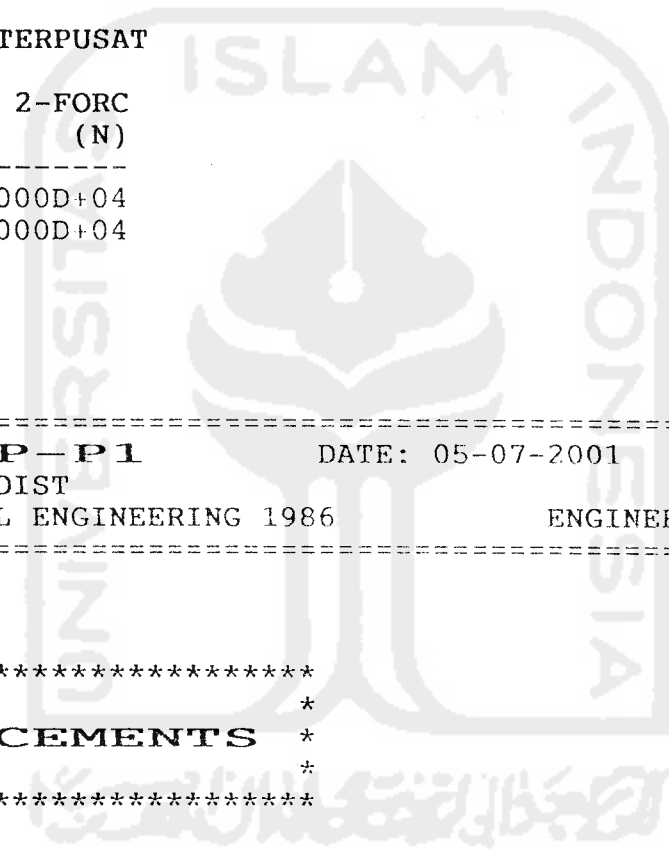
EM	1-NODE	2-NODE	HINGE	MATERIAL
20	2	8		3
21	3	9		3
22	4	10		3
23	4	12		3
24	5	13		3
25	6	14		3

MATERIAL DATA**

TE	E-MODULUS (N/MM ²)	AXIAL-AREA (MM ²)
1	2.100D+05	8.900D+02
2	8.400D+03	8.900D+02
3	2.100D+05	2.835D+02

AD CASE #1 : BEBAN TERPUSAT
NODAL FORCE DATA**

DE	1-FORC (N)	2-FORC (N)
10	0.000D+00	-4.000D+04
12	0.000D+00	-4.000D+04



=====

MICROFFAP - P1	DATE: 05-07-2001	<DISP> P.1
OBJECT : OPEN WEB JOIST		FILENAME: bekti
THORITY: PETRA CIVIL ENGINEERING 1986		ENGINEER: bek - aji

=====

* DISPLACEMENTS *

AD CASE #1 : BEBAN TERPUSAT
NODAL DISPLACEMENT <2D-TRUSS SYSTEM>

DE	1-DISP (MM)	2-DISP (MM)
1	0.0000D+00	0.0000D+00
2	1.9429D-16	-7.2785D+00
3	1.0701D-01	-1.4343D+01
4	3.2103D-01	-2.0029D+01
5	5.3505D-01	-1.4343D+01
6	6.4205D-01	-7.2785D+00
7	6.4205D-01	0.0000D+00
8	5.9925D+00	-3.3591D-01
9	5.8855D+00	-7.6144D+00
10	5.6715D+00	-1.4679D+01
11	3.2103D-01	-2.0029D+01
12	-5.0294D+00	-1.4679D+01
13	-5.2434D+00	-7.6144D+00
14	-5.3505D+00	-3.3591D-01

=====

MICROFEAP-P1

 PROJECT : OPEN WEB JOIST

 PRIORITY: PETRA CIVIL ENGINEERING 1986

 =====

DATE: 05-07-2001

<COMB> P.1

 FILENAME: bekti

 ENGINEER: bek - aji

 =====

 *

 * **COMBINATION** *

 *

ESS COMBINATION <2D-TRUSS SYSTEM>

) FACTOR : 1

1	MA	LENGTH (MM)	1-FORCE (N)	2-FORCE (N)	1-STRESS (N/MM ²)	2-STRESS (N/MM ²)
1	1	500.00	7.2625D-11	7.2625D-11	8.1601D-14	8.1601D-14
2	1	500.00	4.0000D+04	4.0000D+04	4.4944D+01	4.4944D+01
3	1	500.00	8.0000D+04	8.0000D+04	8.9888D+01	8.9888D+01
4	1	500.00	8.0000D+04	8.0000D+04	8.9888D+01	8.9888D+01
5	1	500.00	4.0000D+04	4.0000D+04	4.4944D+01	4.4944D+01
6	1	500.00	0.0000D+00	0.0000D+00	0.0000D+00	0.0000D+00
7	1	500.00	-4.0000D+04	-4.0000D+04	-4.4944D+01	-4.4944D+01
8	1	500.00	-8.0000D+04	-8.0000D+04	-8.9888D+01	-8.9888D+01
9	2	500.00	-8.0000D+04	-8.0000D+04	-8.9888D+01	-8.9888D+01
0	2	500.00	-8.0000D+04	-8.0000D+04	-8.9888D+01	-8.9888D+01
1	1	500.00	-8.0000D+04	-8.0000D+04	-8.9888D+01	-8.9888D+01
2	1	500.00	-4.0000D+04	-4.0000D+04	-4.4944D+01	-4.4944D+01
3	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
4	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
5	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
6	3	500.00	0.0000D+00	0.0000D+00	0.0000D+00	0.0000D+00
7	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
8	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
9	3	500.00	-4.0000D+04	-4.0000D+04	-1.4108D+02	-1.4108D+02
0	3	707.11	5.6569D+04	5.6569D+04	1.9952D+02	1.9952D+02
1	3	707.11	5.6569D+04	5.6569D+04	1.9952D+02	1.9952D+02
2	3	707.11	3.1250D-02	3.1250D-02	1.1022D-04	1.1022D-04
3	3	707.11	3.1250D-02	3.1250D-02	1.1022D-04	1.1022D-04
4	3	707.11	5.6569D+04	5.6569D+04	1.9952D+02	1.9952D+02
5	3	707.11	5.6569D+04	5.6569D+04	1.9952D+02	1.9952D+02



LABORATORIUM *Elektronika* 3/5/2021
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