ANALISIS STRUKTUR II

KPTS DENGAN SISI ATAS MIRING

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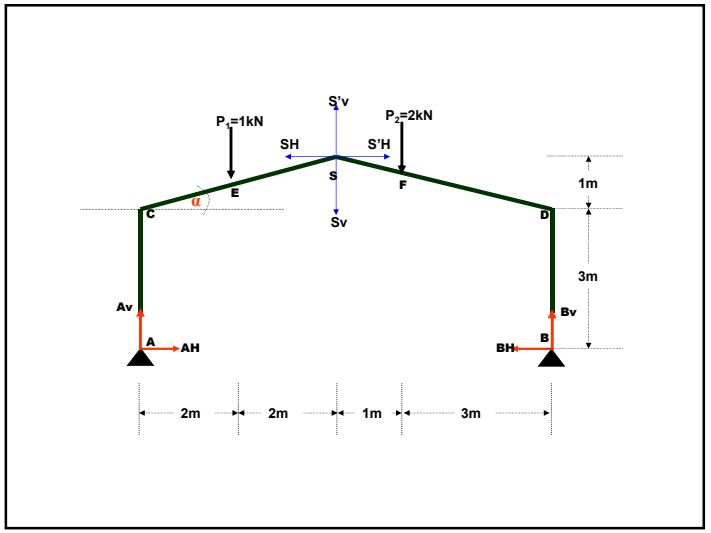


Reaksi ∑MB = 0

AV . 8 – P1 . 6 – P2 . 3= 0 *(AV dimisalkan ke atas)*

$$A_v = \frac{1.6 + 2.3}{8} = 1{,}5\ kN\ \ (ke\ atas)$$

∑MA = 0

– BV . 8 + P1. 2 + P2 . 5 = 0 *(BV dimisalkan ke atas)*

$$B_V = \frac{1.2 + 2.5}{8} = 1{,}5\ kN\ \ (ke\ atas)$$

Bagian kiri (ACES),

∑Ms = 0

AV . 4 – AH . 4 – P1.2 = 0 *(AH dimisalkan ke kanan)*

$$A_H = \frac{(1.5)4 - 1.2}{4} = 1\ kN\ \ (ke\ kanan)$$

∑Mc = 0

$-A_H$. 3 + P_1. 2 + S_V . 4 - S_H . 1 = 0 *(Misal Sv ke bawah dan SH ke kiri)*

4 S_V – S_H = A_H . 3 – P_1 . 2

4 S_V – S_H = 1 . 3 – 1 . 2

4 S_V – S_H = 1 ..... (1)

∑MA = 0

P_1 . 2 – S_H . 4 + S_V . 4= 0

4 S_v – 4 S_H = – 1. 2

4 S_V – 4S_H = –2 ..... (2)

(1) 4 S_V – S_H = 1

(2) 4 S_V – 4S_H = –2 (–)

3 S_H = 3 → S_H = 1 kN (ke kiri)

(1) $4\,Sv - S_H = 1$

$4\,Sv - 1 = 1 \Rightarrow 4 . Sv = 2\ kN$

$\Rightarrow$ **Sv = 0.5 kN** (ke Bawah)

Bagian kanan (SFDB)

∑Ms = 0

$-Bv . 4 + B_H . 4 + P_2 . 1 = 0$ *(Misal BH dimisalkan ke kiri)*

$$B_H = \frac{(1{,}5)4 - 2.1}{4} = 1\ kN\ \ (ke\ kiri)$$

∑MD = 0

$-S_v'.4 + S_H'.1 - P_2.3 + B_H.3 = 0$ (misal Sv' ke atas & SH' ke kanan)

$4\,S_V' + S_H' = P_2 . 3 - B_H . 3$

$4\,S_V' + S_H' = 2 . 3 - 1 . 3$

$4\,S_V' + S_H' = 3$ ..... (1)

∑MB = 0;

$Sv' . 4 + S_H' . 4 - P_2 . 3 = 0$

$4\,S_V' + 4\,S_H' = 2 . 3$

$4\,S_V' - 4\,S_H' = 6$ ..... (2)

(1) $4\,S_V' + S_H' = 3$

(2) $4\,S_V' + 4\,S_H' = 6$ (–)

$-3\,S_H' = -3 \rightarrow S_H' = 1$ kN (ke kanan)

(1) $4\,S_V' + S_H' = 3$

$4\,S_V' + 1 = 3$

$S_V' = 1/4 . 2 = 0{,}5$ KN (ke atas)

BENDING MOMENT DIAGRAM

$Mc = -AH. 3 = -1.3 = -3kNm$

$M_E = -AH. (3,5) + Av. 2$

$= -1. (3,5) + (1,5).2 = -0,5kNm$

$M_D = -BH. 3$

$= -1. 3 = -3kNm$

$M_F = -B_H. (3,75) + Bv.3$

$= -1. (3,75) + 1,5.3 = 0,75kNm$

Bila M_E dan M_F dihitung dari sendi S

$M_E = -S_v. 2 + S_H.0,5 = -0,5.2 + 1. 0,5 = -0,5KNm$

$M_F = Sv'. 1 + S'_H. 0,25 = 0,5.1 + 1. 0,25 = 0,75\ kNm$

BIDANG D DAN N

Gaya Melintang dan Gaya Normal

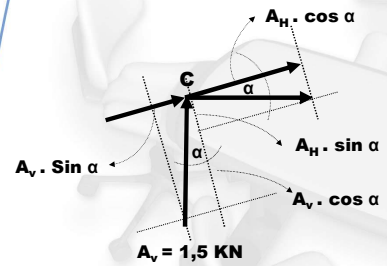
Pada TITIK A

$D_A = -A_H = 1$ KN, $N_A = -A_v = -1,5$ KN

Pada TITIK C (Batang AC),

$D_C = -S_H = -1$ KN, $N_C = -P_1 - S_v = -1 - 0,5 = -1,5$ KN

Pada TITIK C (Batang CS),



Tg α = 1/4

α = 14 2' 10"

$Dc = A_v . Cos α – A_H . Sin α$

Dc = (1,5) . Cos α – (1). Sin α

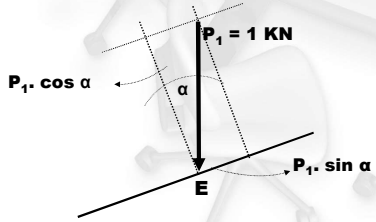
Dc = 1,455 – 0,242 = 1,213 KN

$Nc = -A_v . Sin α – A_H . Cos α$

Nc = (-1,5) . Sin α – (1). Cos α

Nc = – 0,364 – 0,970 = -1,334 KN

Pada TITIK E



BIDANG D DAN N

D_E kiri = D_C batang CS = 1,213 KN

D_E kn = D_E kiri – P1. Cos α

= 1,213-0,970 = 0,243kN

N_E kr = N_C balok CS = -1,334 KN

N_E kn = N_E kr + P1. Sin α

= -1,334 + 0,242 = -1,092 KN

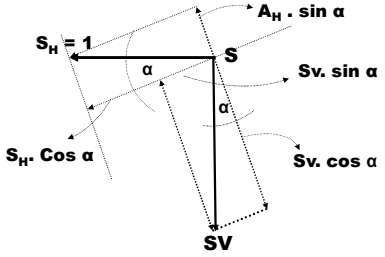
Pada Titik S

D_S kr = D_E kn = 0,243 KN ;

Ns kr = N_E kn = -1,092 KN

Dapat juga dihitung dari gaya yang bekerja pada sendi S:

Pada TITIK S



D_S kr = $S_V . Cos α – S_H . Sin α$

D_S kr = (0,5) Cos α – (1) . Sin α

D_S kr = 0,485 – 0,242 = 0,243 KN

GAYA NORMAL (N)

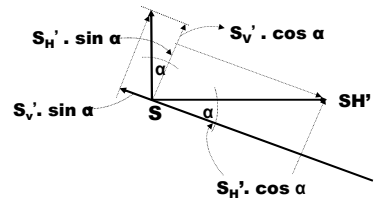
N_S kr $= - S_v \cdot \sin \alpha - S_H \cdot \cos \alpha$

N_S kr $= - (0,5) \sin \alpha - (1) \cos \alpha$

N_S kr $= - 0,121 - 0,970 = - 1,091$ KN

Ada sedikit perbedaan dari hasil hitungan D dan N pada titik S, tapi perbedaan ini kecil, yang diakibatkan oleh pembulatan dalam hitungan

Pada TITIK S (batang SD),



D_S kn $= S_V' \cdot \text{Cos } \alpha + S_H' \cdot \text{Sin } \alpha$

D_S kn $= (0,5) \text{ Cos } \alpha + (1) \cdot \text{Sin } \alpha$

D_S kn $= 0,485 + 0,242 = 0,727$ KN

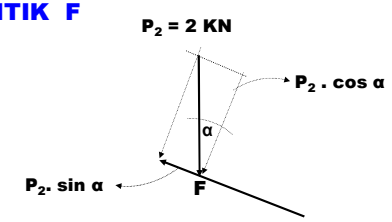
GAYA NORMAL (N)

N_S kn $= - S_v' \cdot \cos \alpha + S_H' \cdot \sin \alpha$

N_S kn $= - (1) \cos \alpha + (0,5) \sin \alpha$

N_S kn $= - 0,970 + (0,121) = -0,849$ KN

Pada TITIK F



BIDANG D DAN N

D_F kr $= D_S$ kn $= 0,727$ KN

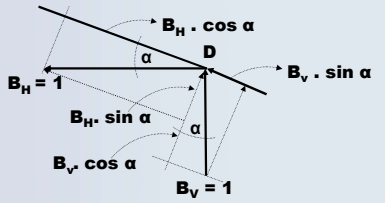
D_F kn $= DF$ kr $- P_2 \cdot \text{Cos } \alpha$

D_F kn $= 0,727 - 1,940 = - 1,213$ KN

N_F kr $= N_S$ kn $= - 0,849$ KN

N_F kn $= NF$ kr $- P_2 \sin \alpha$

$= - 0,849 - 0,485 = -1,334$ KN



D_D kr $= -B_v \cos \alpha + BH \sin \alpha$

D_D kr $= -(1{,}5) \cos \alpha + (1) \sin \alpha$

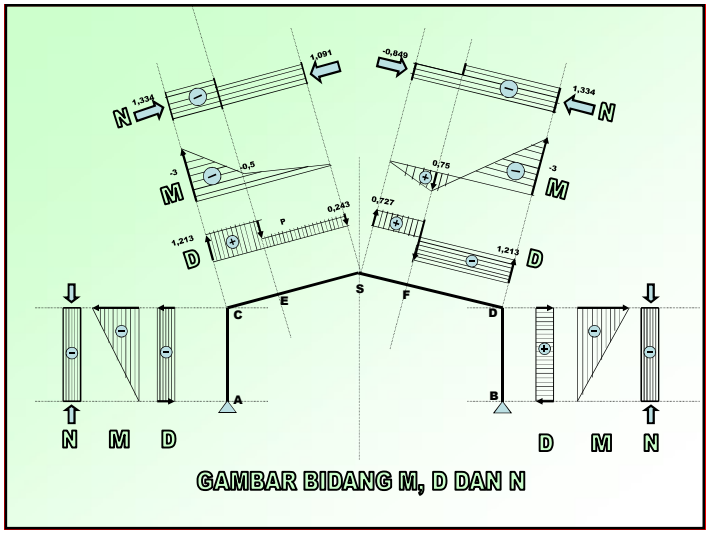
D_D kr $= -1{,}445 + 0{,}242 = -1{,}212$ KN

N_D kr $= -B_v \sin \alpha - B_H \cos \alpha$

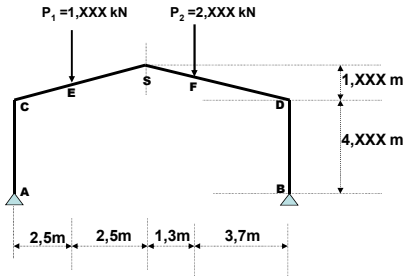
N_F kn $= -(1{,}5) \sin \alpha - (1) \cos \alpha$

$= -0{,}364 - 0{,}970 = -1{,}334$ KN

PENGGAMBARAN BIDANG D, M DAN N



GAMBAR BIDANG M, D DAN N



HITUNG DAN GAMBARKAN BMD, SFD, NFD, deformed shaped, geometri
Output excel.
Manual

SOAL

SEE YOU

TERIMA KASIH

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