

# LAMPIRAN

## 1. Perhitungan Gaya Penekanan *Dies Blanking*

### ❖ Perhitungan Gaya Geser

$$\begin{aligned}F_s &= 0,8 \cdot u \cdot s \cdot \sigma_u \\ &= 0,8 \cdot 150 \cdot 1 \cdot 37 \\ &= 4440 \text{ kg atau } 4,44 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

$u$  = keliling *bracket*

$s$  = tebal *bracket*

$\sigma_u$  = tegangan tarik material (ST37)

$$\begin{aligned}u &= 2 (p + 1) && \text{lihat gambar 4.2} \\ &= 2 (30 + 45) \\ &= 150 \text{ mm}\end{aligned}$$

$$s = 1 \text{ m}$$

$\sigma_u$  = tegangan tarik ST37 adalah  $37 \text{ kgf} / \text{mm}^2$

### ❖ Perhitungan *Spring* (Tenaga Jepit)

$$\begin{aligned}\text{Spring} &= 0,5 \cdot F_s \\ &= 0,5 \cdot 4,44 \text{ ton} \\ &= 2,22 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

$F_s = 4,44 \text{ ton}$  berdasarkan perhitungan gaya geser sebelumnya

### ❖ Perhitungan *Tonase*

$$\begin{aligned}\text{Tonase} &= F_s + \text{Spring} \\ &= 4,44 \text{ ton} + 2,22 \text{ ton} \\ &= 6,66 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

*spring* = kekuatan tenaga jepit

## 2. Perhitungan Gaya Penekanan *Dies Piercing*

### ❖ Perhitungan Gaya Geser

$$\begin{aligned}Fs &= \pi \cdot d \cdot s (0,8 \cdot \sigma_u) \\ &= 3,14 \cdot 7 \cdot 1 (0,8 \cdot 37) \\ &= 651,2 \text{ kg atau } 0,651 \text{ ton}\end{aligned}$$

dimana,

$d$  = diameter lubang *bracket*                      lihat gambar 4.2

$s$  = tebal *bracket*

$\sigma_u$  = tegangan tarik material (ST37)

$$\pi = 3,14$$

$$d = 7$$

$$s = 1$$

$\sigma_u$  = tegangan tarik ST37 adalah  $37 \text{ kgf} / \text{mm}^2$

### ❖ Perhitungan *Spring* (Tenaga Jepit)

$$\begin{aligned}\text{Spring} &= 0,5 \cdot Fs \\ &= 0,5 \cdot 0,651 \text{ ton} \\ &= 0,325 \text{ ton}\end{aligned}$$

dimana,

$Fs$  = gaya geser *bracket*

$Fs = 0,651$  ton berdasarkan perhitungan gaya geser sebelumnya

### ❖ Perhitungan *Tonase*

$$\begin{aligned}\text{Tonase} &= Fs + \text{Spring} \\ &= 0,651 \text{ ton} + 0,325 \text{ ton} \\ &= 0,976 \text{ ton}\end{aligned}$$

dimana,

$Fs$  = gaya geser *bracket*

*spring* = kekuatan tenaga jepit

### 3. Perhitungan Gaya Penekanan *Dies Bending*

#### ❖ Perhitungan Gaya Geser

$$\begin{aligned}F_s &= \frac{0,7 \cdot b \cdot s^2 \cdot \sigma_u}{w} \\&= \frac{0,7 \cdot 30 \cdot 1^2 \cdot 37}{30} \\&= 25,9 \text{ kg atau } 0,025 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

$b$  = panjang tekukan *bracket*                      lihat gambar 4.2

$s$  = tebal *bracket*

$\sigma_u$  = tegangan tarik material (ST37)

$b$  = 30 mm

$s$  = 1 mm

$\sigma_u$  = tegangan tarik ST37 adalah 37 kgf / mm<sup>2</sup>

#### ❖ Perhitungan *Spring* (Tenaga Jepit)

$$\begin{aligned}\text{Spring} &= 0,5 \cdot F_s \\&= 0,5 \cdot 0,025 \text{ ton} \\&= 0,013 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

$F_s$  = 0,025 ton berdasarkan perhitungan gaya geser sebelumnya

#### ❖ Perhitungan *Tonase*

$$\begin{aligned}\text{Tonase} &= F_s + \text{Spring} \\&= 0,025 \text{ ton} + 0,013 \text{ ton} \\&= 0,038 \text{ ton}\end{aligned}$$

dimana,

$F_s$  = gaya geser *bracket*

*spring* = kekuatan tenaga jepit