Elemen Mesin I
TKM4113

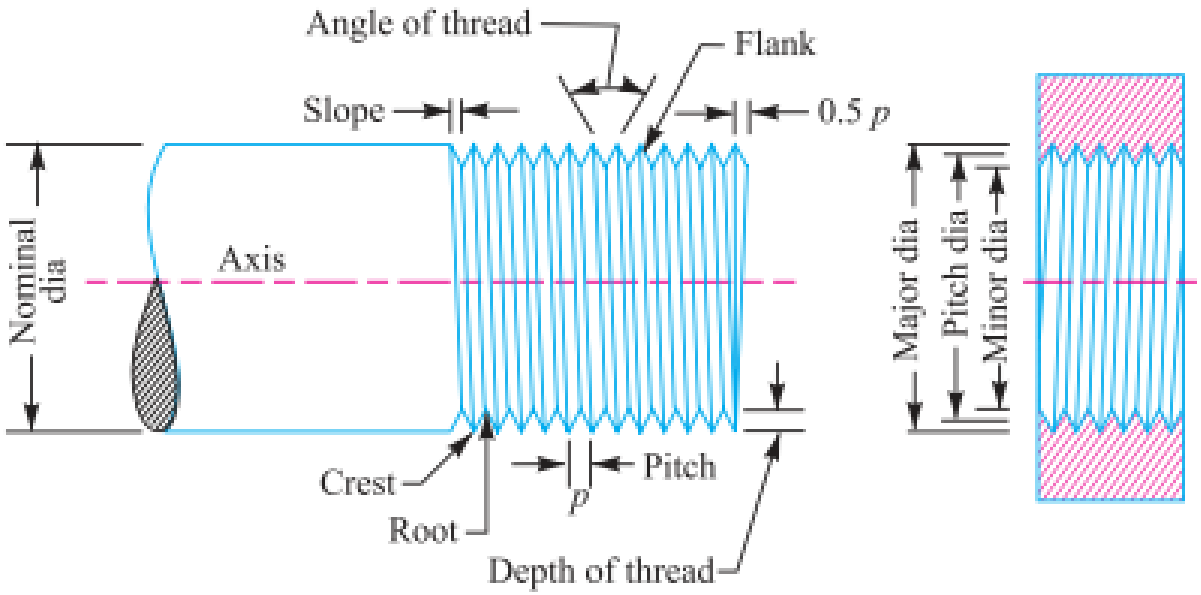
Kamis 07.30 – 10.00

Sambungan Mur-Baut

- Keuntungan
  - Sangat cocok penggunaannya di berbagai operasi
  - Mudah dipasang dan dilepas
  - Relatif murah dan proses produksinya sangat efisien
- Kelemahan
  - Konsentrasi tegangan yang relatif tingi pada alur

Sambungan Mur-Baut

- Bagian-bagian pada baut

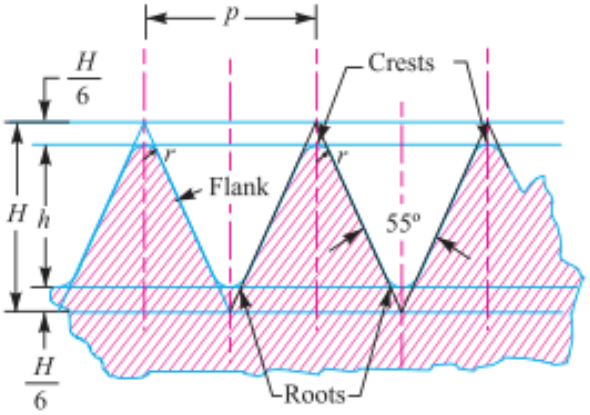


Macam-macam mur-baut

- British standard whitworth (BSW)
- British association
- American national standard
- Unified standard
- Square
- Acme
- Knuckle
- Buttress
- Metric

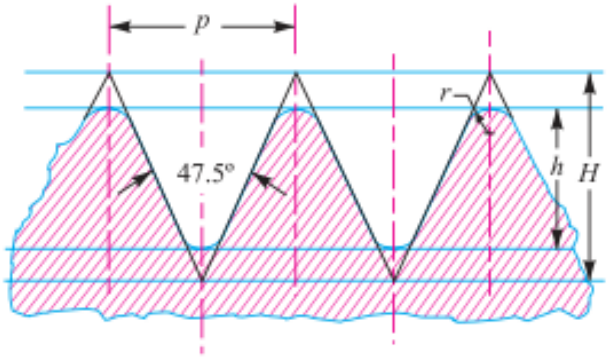
Macam-macam mur-baut

- British standard whitworth (BSW)



$H = 0.96\,p$; $h = 0.64\,p$; $r = 0.1373\,p$

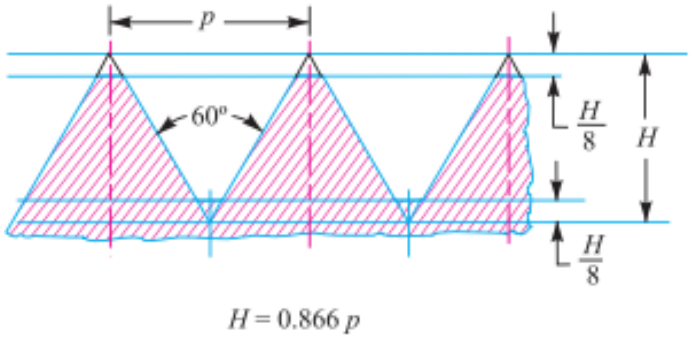
- British association



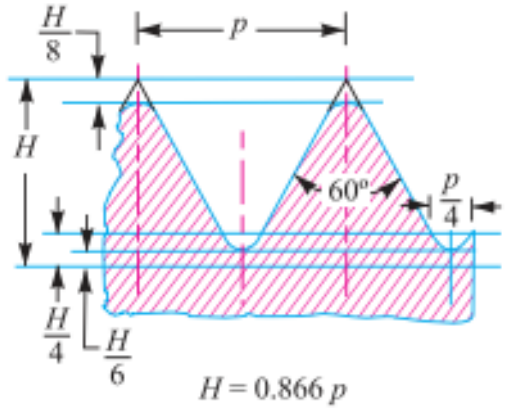
$H = 1.13634\,p$; $h = 0.6\,p$; $r = 0.18083\,p$

Macam-macam mur-baut

- American national standard

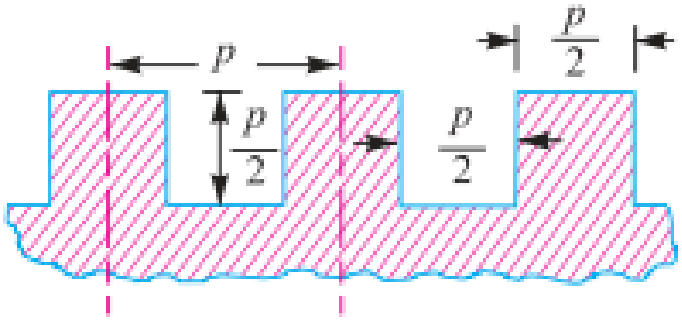


- Unified standard

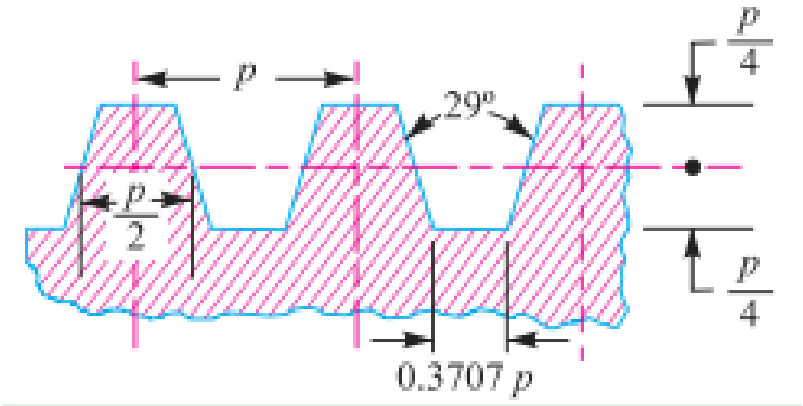


Macam-macam mur-baut

- Square

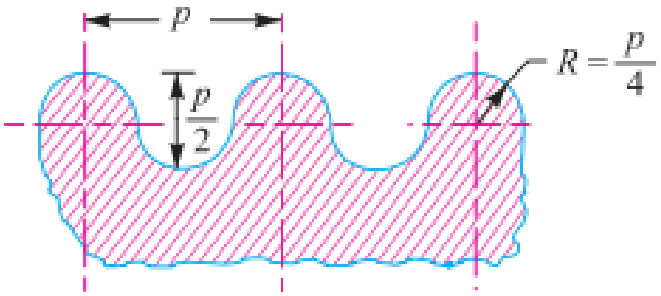


- Acme

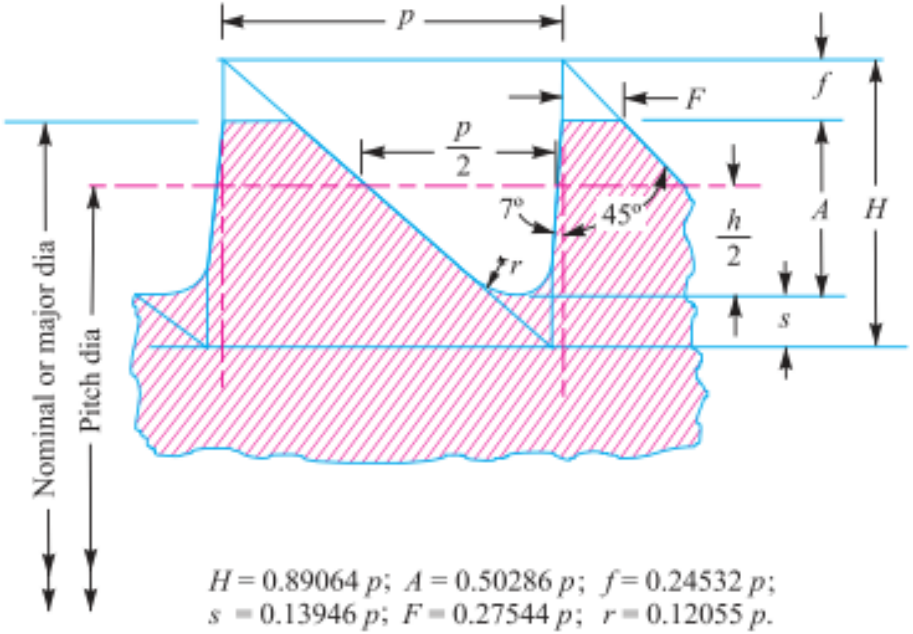


Macam-macam mur-baut

- Knuckle



- Buttress



MACAM-MACAM MUR-BAUT

- Metric

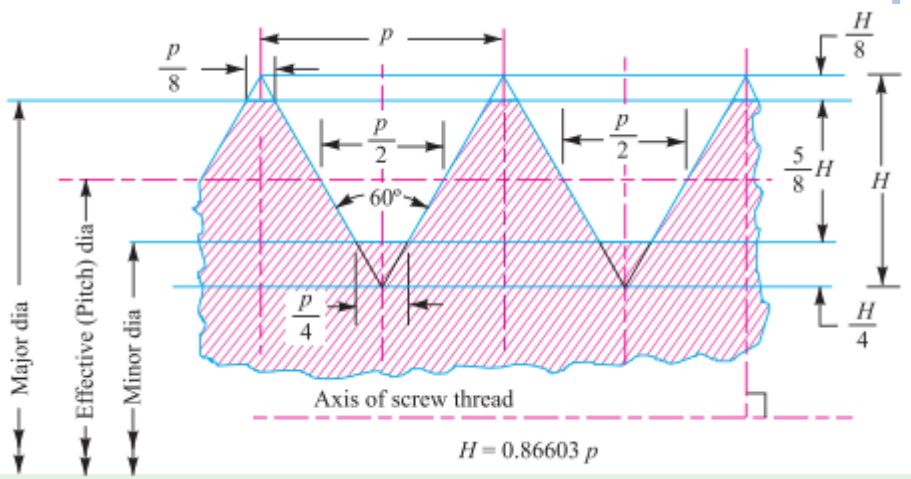


Fig. 11.10. Basic profile of the thread.

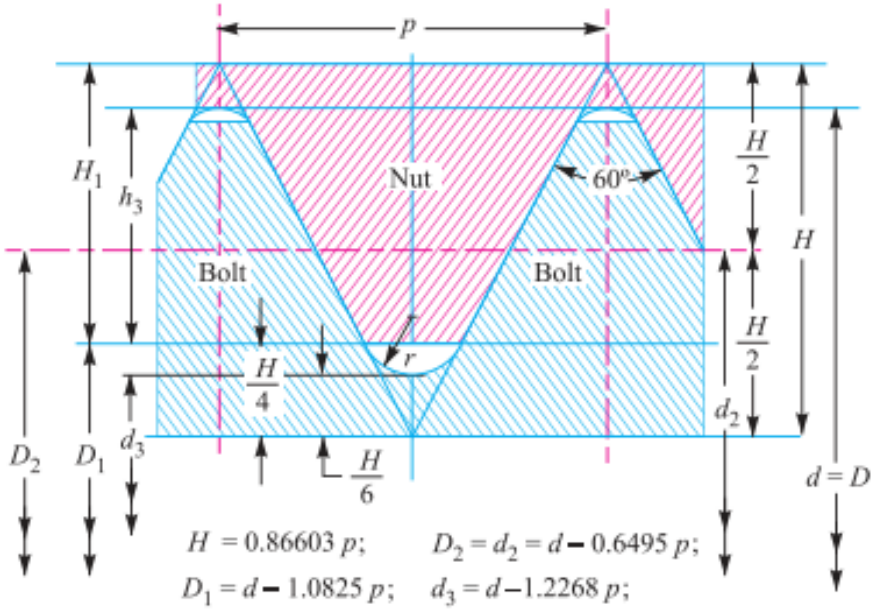
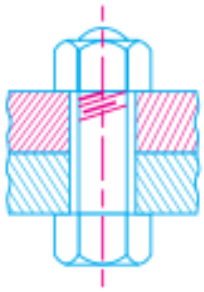
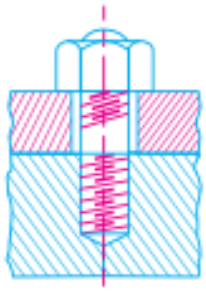


Fig. 11.11. Design profile of the nut and bolt.

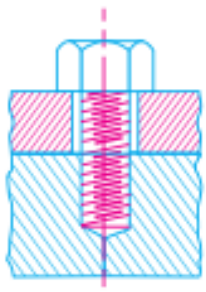
TIPE PEMASANGAN MUR-BAUT



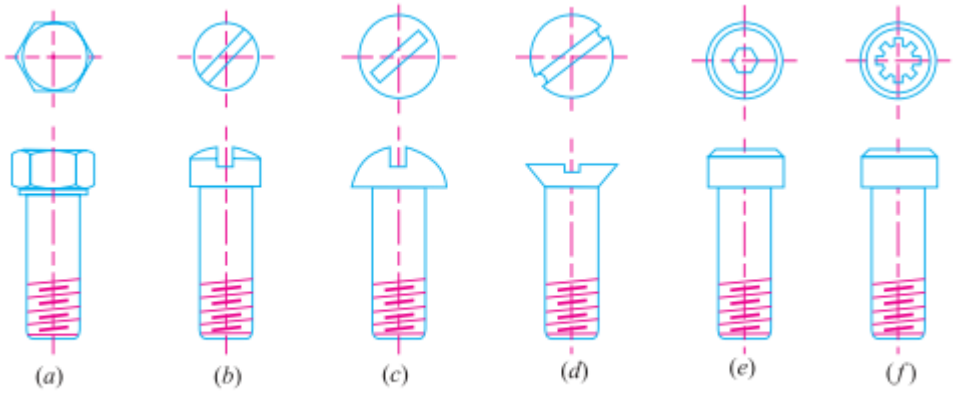
(*a*) Through bolt.



(*b*) Tap bolt.

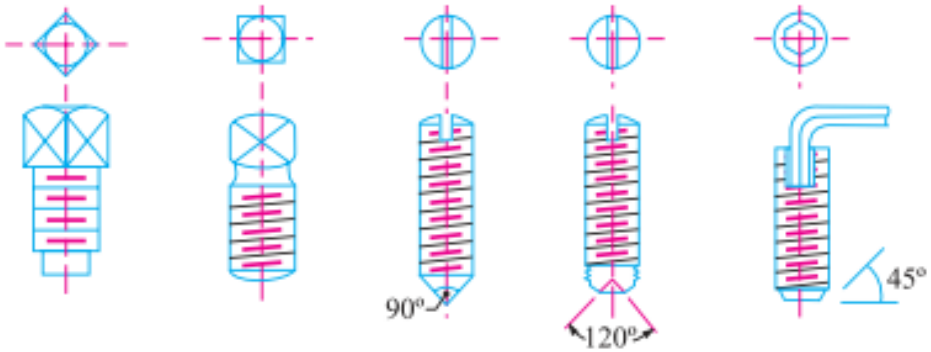


(*c*) Stud.



(*a*) (*b*) (*c*) (*d*) (*e*) (*f*)

(*a*) Hexagonal head; (*b*) Fillister head; (*c*) Round head; (*d*) Flat head; (*e*) Hexagonal socket; (*f*) Fluted socket.



Tegangan pada sambungan mur baut

- Tegangan internal akibat pemasangan
- Tegangan akibat gaya luar
- Tegangan kombinasi dari pemasangan dan gaya luar

TEGANGAN PADA SAMBUNGAN MUR BAUT

- Tegangan internal akibat pemasangan
  - Tegangan tarik akibat pengencangan

P = Permissible stress × Cross-sectional area at bottom of the thread (*i.e.* stress area)

$$\text{Stress area} = \frac{\pi}{4}\left(\frac{d_p + d_c}{2}\right)^2$$

d_p = Pitch diameter, and

d_c = Core or minor diameter.

TEGANGAN PADA SAMBUNGAN MUR BAUT

- Tegangan internal akibat pemasangan
  - Tegangan geser akibat torsi

$$\frac{T}{J} = \frac{\tau}{r}$$

$$\tau = \frac{T}{J} \times r = \frac{T}{\frac{\pi}{32}(d_c)^4} \times \frac{d_c}{2} = \frac{16\,T}{\pi\,(d_c)^3}$$

τ = Torsional shear stress,

T = Torque applied, and

d_c = Minor or core diameter of the thread.

TEGANGAN PADA SAMBUNGAN MUR BAUT

- Tegangan internal akibat pemasangan
  - Tegangan geser pada alur

$$\tau_s = \frac{P}{\pi d_c \times b \times n}$$

b = Width of the thread section at the root.

$$\tau_n = \frac{P}{\pi d \times b \times n}$$

d = Major diameter.

Tegangan pada sambungan mur baut

- Tegangan internal akibat pemasangan
  - Tegangan tekan/crushing

$$\sigma_c = \frac{P}{\pi\,[d^2 - (d_c)^2]\,n}$$

d = Major diameter,

d_c = Minor diameter, and

n = Number of threads in engagement.

TEGANGAN PADA SAMBUNGAN MUR BAUT

- Tegangan akibat gaya luar
  - Tegangan tarik

$$P = \frac{\pi}{4}(d_c)^2 \sigma_t \times n$$

  - Tegangan geser

$$P_s = \frac{\pi}{4} \times d^2 \times \tau \times n \quad \text{or} \quad d = \sqrt{\frac{4\,P_s}{\pi \tau n}}$$

  - Tegangan kombinasi

$$\tau_{max} = \frac{1}{2}\sqrt{(\sigma_t)^2 + 4\tau^2}$$

$$\sigma_{t(max)} = \frac{\sigma_t}{2} + \frac{1}{2}\sqrt{(\sigma_t)^2 + 4\tau^2}$$

Beban eksentris pada sambungan mur baut

- Sejajar dengan sumbu mur
- Tegak lurus dengan sumbu mur
- Sebidang dengan mur