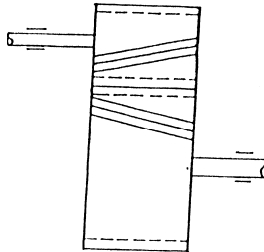


Roda Gigi Miring

Rodagigi miring (gambar 2.5) kriterianya hampir sama dengan rodagigi lurus, tetapi dalam pengoperasiannya rodagigi miring lebih lembut dan tingkat kebisingannya rendah dengan perkontakan antara gigi lebih dari 1.



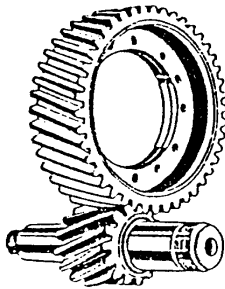
Gambar 2.5 Rodagigi Miring

Ciri-ciri rodagigi miring adalah :

1. Arah gigi membentuk sudut terhadap sumbu poros.
2. Distribusi beban sepanjang garis kontak tidak uniform.
3. Kemampuan pembebanan lebih besar dari pada rodagigi lurus.
4. Gaya aksial lebih besar sehingga memerlukan bantalan aksial dan rodagigi yang kokoh.

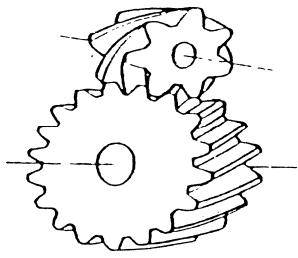
Jenis-jenis rodagigi miring antara lain :

1. Rodagigi miring biasa



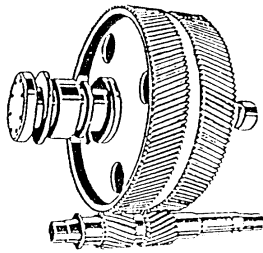
Gambar 2.6 Rodagigi Miring Biasa

2. Rodagigi miring silang



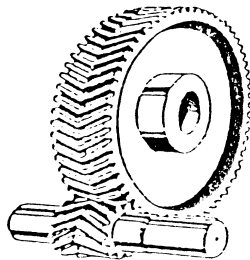
Gambar 2.7 Rodagigi Miring Silang

3. Rodagigi miring ganda



Gambar 2.8 Rodagigi Miring Ganda

4. Rodagigi ganda bersambung



Gambar 2.9 Rodagigi Ganda Bersambung

Contoh Perhitungan Roda Gigi Miring

3.1 Menentukan Ukuran Roda Gigi

Untuk merancang roda gigi yang mampu mentransmisikan daya maksimum sebesar 103 kW pada putaran 6300 rpm. Pada mobil Honda New Civic 1.8L MT dan direncanakan menggunakan roda gigi miring.

Hal-hal yang direncanakan antara lain :

- Sudut miring , $\alpha = 25^\circ$
- Sudut tekanan , $\beta = 20^\circ$

- Jarak sumbu poros , $a = 100 \text{ mm}$

- Perbandingan transmisi seperti pada brosur, (i)

- $i_1 = 3,142$
- $i_2 = 1,869$
- $i_3 = 1,235$
- $i_4 = 1$ (tertera 0,948 karena terjadi kehilangan daya 0.9%)
- $i_5 = 0,727$
- $i_r = 3,307$
- $i_{fg} = 4,294$

- Modul (m) = 3

Karena dasar dalam perencanaan roda gigi yaitu perbandingan kecepatan atau perbandingan transmisi (i) yaitu perbandingan diameter lingkaran jarak bagi roda gigi atau jumlah gigi satu dengan jumlah gigi yang kedua.

3.1.1 Perhitungan Transmisi

- Diameter jarak bagi lingkaran sementara, d'

➤ Perhitungan transmisi 1

Jumlah roda gigi (Z) :

$$Z_1 = \frac{2a}{(1+i_1).m} = \frac{2.100}{(1+3.142).3} = 16$$

$$Z_2 = \frac{2ai_1}{(1+i_1).m} = \frac{2.100.3.142}{(1+3.142).3} = 51$$

Dimensi Roda Gigi :

Diameter Tusuk , Dt

$$Dt_1 = m \times Z_1$$

$$= 3 \times 16$$

$$= 48 \text{ mm}$$

$$Dt_2 = m \times Z_2$$

$$= 3 \times 51$$

$$= 153 \text{ mm}$$

Diameter Kepala , Dk

$$Dk_1 = m(z_1 + 2)$$

$$= 3 (16 + 2)$$

$$= 54 \text{ mm}$$

$$Dk_2 = m(z_2 + 2)$$

$$= 3 (51 + 2)$$

$$= 159 \text{ mm}$$

Diameter Kaki , Df

$$Df_1 = m(z_1 - 2)$$

$$= 3 (16 - 2)$$

$$= 42 \text{ mm}$$

$$Df_2 = m(z_2 - 2)$$

$$= 3 (51 - 2)$$

$$= 147 \text{ mm}$$

Jarak Sumbu Poros pada Roda Gigi

$$a = \frac{dt_1 + dt_2}{2}$$

$$= \frac{39 + 162}{2} = 100.5 = 101$$

➤ **Perhitungan transmisi 2**

Jumlah roda gigi (Z) :

$$Z_1 = \frac{2a}{(1+i_2).m} = \frac{2.100}{(1+1.869).3} = 23$$

$$Z_2 = \frac{2ai_2}{(1+i_2).m} = \frac{2.100.1,869}{(1+1,869).3} = 43$$

Dimensi Roda Gigi :

Diameter Tusuk , Dt

$$Dt_1 = m \times Z_1$$

$$= 3 \times 23$$

$$= 69 \text{ mm}$$

$$Dt_2 = m \times Z_2$$

$$= 3 \times 43$$

$$= 129 \text{ mm}$$

Diameter Kepala , Dk

$$Dk_1 = m(z_1 + 2)$$

$$= 3 (23 + 2)$$

$$= 75 \text{ mm}$$

$$Dk_2 = m(z_2 + 2)$$

$$= 3 (43 + 2)$$

$$= 135 \text{ mm}$$

Diameter Kaki , Df

$$Df_1 = m(z_1 - 2)$$

$$= 3 (23 - 2)$$

$$= 63 \text{ mm}$$

$$Df_2 = m(z_2 - 2)$$

$$= 3 (43 - 2)$$

$$= 123 \text{ mm}$$

Jarak Sumbu Poros pada Roda Gigi

$$a = \frac{dt_1 + dt_2}{2}$$
$$= \frac{69 + 129}{2} = 99$$

➤ **Perhitungan transmisi 3**

Jumlah roda gigi (Z) :

$$Z_1 = \frac{2a}{(1+i_3).m} = \frac{2.100}{(1+1,235).3} = 30$$

$$Z_2 = \frac{2ai_3}{(1+i_3).m} = \frac{2.100.1,235}{(1+1,235).3} = 37$$

Dimensi Roda Gigi :

Diameter Tusuk , Dt

$$Dt_1 = m \times Z_1$$
$$= 3 \times 30$$
$$= 90 \text{ mm}$$

$$Dt_2 = m \times Z_2$$
$$= 3 \times 37$$
$$= 111 \text{ mm}$$

Diameter Kepala , Dk

$$Dk_1 = m(z_1 + 2)$$
$$= 3 (30 + 2)$$

$$= 96 \text{ mm}$$

$$= 3 (37 + 2)$$

$$Dk_2 = m(z_2 + 2)$$

$$= 117 \text{ mm}$$

Diameter Kaki , Df

$$Df_1 = m(z_1 - 2)$$

$$Df_2 = m(z_2 - 2)$$

$$= 3 (30 - 2)$$

$$= 3 (37 - 2)$$

$$= 84 \text{ mm}$$

$$= 105 \text{ mm}$$

Jarak Sumbu Poros pada Roda Gigi

$$a = \frac{dt_1 + dt_2}{2}$$

$$= \frac{90 + 111}{2} = 100.5 = 101$$

➤ Perhitungan transmisi 4

Jumlah roda gigi (Z) :

$$Z_1 = \frac{2a}{(1+i_4).m} = \frac{2.100}{(1+1).3} = 33$$

$$Z_2 = \frac{2ai_4}{(1+i_4).m} = \frac{2.100.1}{(1+1).3} = 33$$

Dimensi Roda Gigi :

Diameter Tusuk , Dt

$$Dt_1 = m \times Z_1$$

$$= 3 \times 33$$

$$= 99 \text{ mm}$$

$$= 3 \times 33$$

$$Dt_2 = m \times Z_2$$

$$= 99 \text{ mm}$$

Diameter Kepala , Dk

$$Dk_1 = m(z_1 + 2)$$

$$Dk_2 = m(z_2 + 2)$$

$$= 3 (33 + 2)$$

$$= 3 (33 + 2)$$

$$= 105 \text{ mm}$$

$$= 105 \text{ mm}$$

Diameter Kaki , Df

$$Df_1 = m(z_1 - 2)$$

$$Df_2 = m(z_2 - 2)$$

$$= 3 (33 - 2)$$

$$= 3 (33 - 2)$$

$$= 93 \text{ mm}$$

$$= 93 \text{ mm}$$

Jarak Sumbu Poros pada Roda Gigi

$$a = \frac{dt_1 + dt_2}{2}$$

$$= \frac{99 + 99}{2} = 99$$

➤ Perhitungan transmisi 5

Jumlah roda gigi (Z) :

$$Z_1 = \frac{2a}{(1+i_5).m} = \frac{2.100}{(1+0.727).3} = 39$$

$$Z_2 = \frac{2ai_5}{(1+i_5).m} = \frac{2.100.0,727}{(1+0,727).3} = 28$$

Dimensi Roda Gigi :

Diameter Tusuk , Dt

$$Dt_1 = m \times Z_1$$

$$= 3 \times 39$$

$$= 117 \text{ mm}$$

$$Dt_2 = m \times Z_2$$

$$= 3 \times 28$$

$$= 84 \text{ mm}$$

Diameter Kepala , Dk

$$Dk_1 = m(z_1 + 2)$$

$$= 3 (39 + 2)$$

$$= 123 \text{ mm}$$

$$Dk_2 = m(z_2 + 2)$$

$$= 3 (28 + 2)$$

$$= 90 \text{ mm}$$

Diameter Kaki , Df

$$Df_1 = m(z_1 - 2)$$

$$= 3 (39 - 2)$$

$$= 111 \text{ mm}$$

$$Df_2 = m(z_2 - 2)$$

$$= 3 (28 - 2)$$

$$= 78 \text{ mm.}$$

Jarak Sumbu Poros pada Roda Gigi

$$a = \frac{dt_1 + dt_2}{2} = \frac{117 + 84}{2} = 100.5 = 101$$

Tabel 3.1 Dimensi Roda Gigi

| Transmisi | Z ₁ | Z ₂ | Dt ₁ | Dt ₂ | Dk ₁ | Dk ₂ | Df ₁ | Df ₂ | a |
|-----------|----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----|
| 1 | 16 | 51 | 48 | 153 | 54 | 159 | 42 | 147 | 101 |
| 2 | 23 | 43 | 69 | 129 | 75 | 135 | 63 | 123 | 99 |
| 3 | 30 | 37 | 90 | 111 | 96 | 117 | 84 | 105 | 101 |
| 4 | 33 | 33 | 99 | 99 | 105 | 105 | 93 | 93 | 99 |
| 5 | 39 | 28 | 117 | 84 | 123 | 90 | 111 | 78 | 101 |