.UBAfiuba
FACULTAD DE INGENIERÍA

depto. Ingeniería Mecánica

67.29 Proyecto de Máquinas

TRANSMISIONES MECÁNICAS- CORREAS-

Tipo De Transmisiones

- Transmisiones Por Correas : Planas , Trapezoidales, Sincrónicas.
- Transmisiones por Cadenas
- Transmisiones Por Engranajes :

Características de algunos tipos de correas comunes

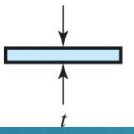
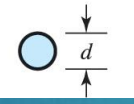
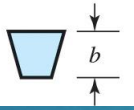
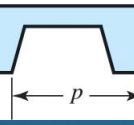
Belt Type	Figure	Joint	Size Range	Center Distance
Flat		Yes	$t = \begin{cases} 0.03 \text{ to } 0.20 \text{ in} \\ 0.75 \text{ to } 5 \text{ mm} \end{cases}$	No upper limit
Round		Yes	$d = \frac{1}{8}$ to $\frac{3}{4}$ in	No upper limit
V		None	$b = \begin{cases} 0.31 \text{ to } 0.91 \text{ in} \\ 8 \text{ to } 19 \text{ mm} \end{cases}$	Limited
Timing		None	p = 2 mm and up	Limited

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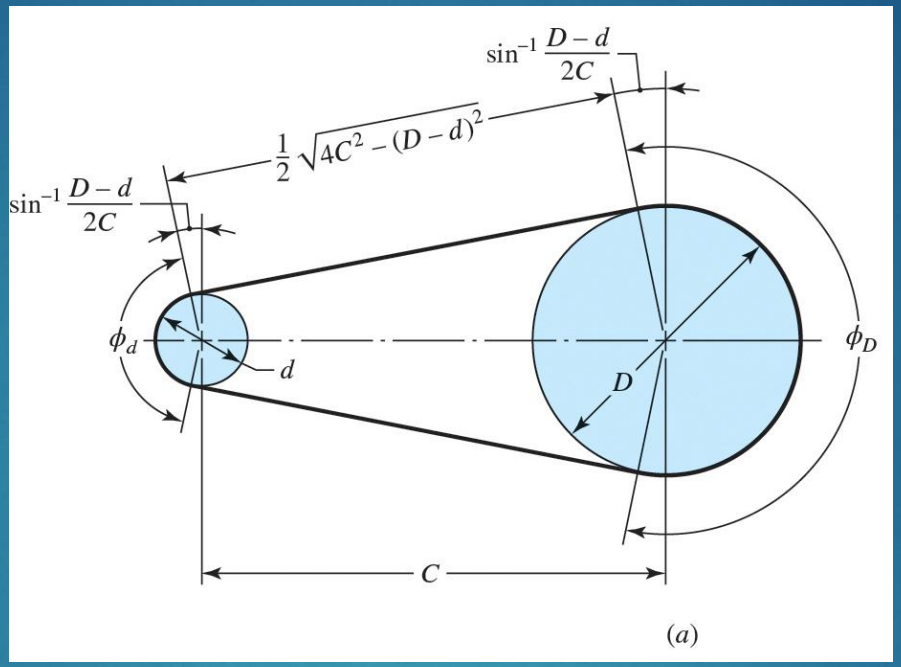
Table 17–1

Geometría de banda plana – Sin Cruce



- Fig.17 –1a

$$\phi_d = \pi - 2\sin^{-1}\frac{D-d}{2C}$$

$$\phi_D = \pi + 2\sin^{-1}\frac{D-d}{2C} \qquad \textbf{(17 - 1)}$$

$$L = \left[4C^2 - (D-d)^2\right]^{1/2} + \frac{1}{2}(D\phi_D + d\phi_d) \qquad \textbf{(17 - 2)}$$

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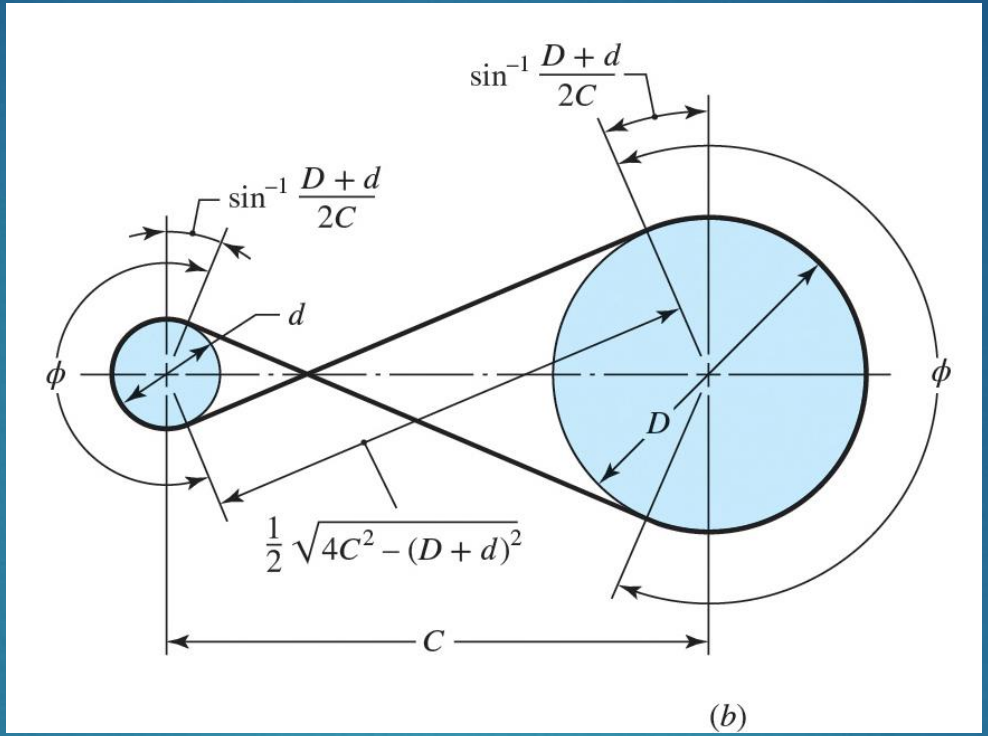
Geometría de cinturón plano – cruzado



- Fig.17 –1*b*

$$\phi = \pi + 2\sin^{-1}\frac{D+d}{2C} \qquad \textbf{(17 - 3)}$$

$$L = \left[4C^2 - (D+d)^2\right]^{1/2} + \frac{1}{2}(D+d)\phi \qquad \textbf{(17 - 4)}$$

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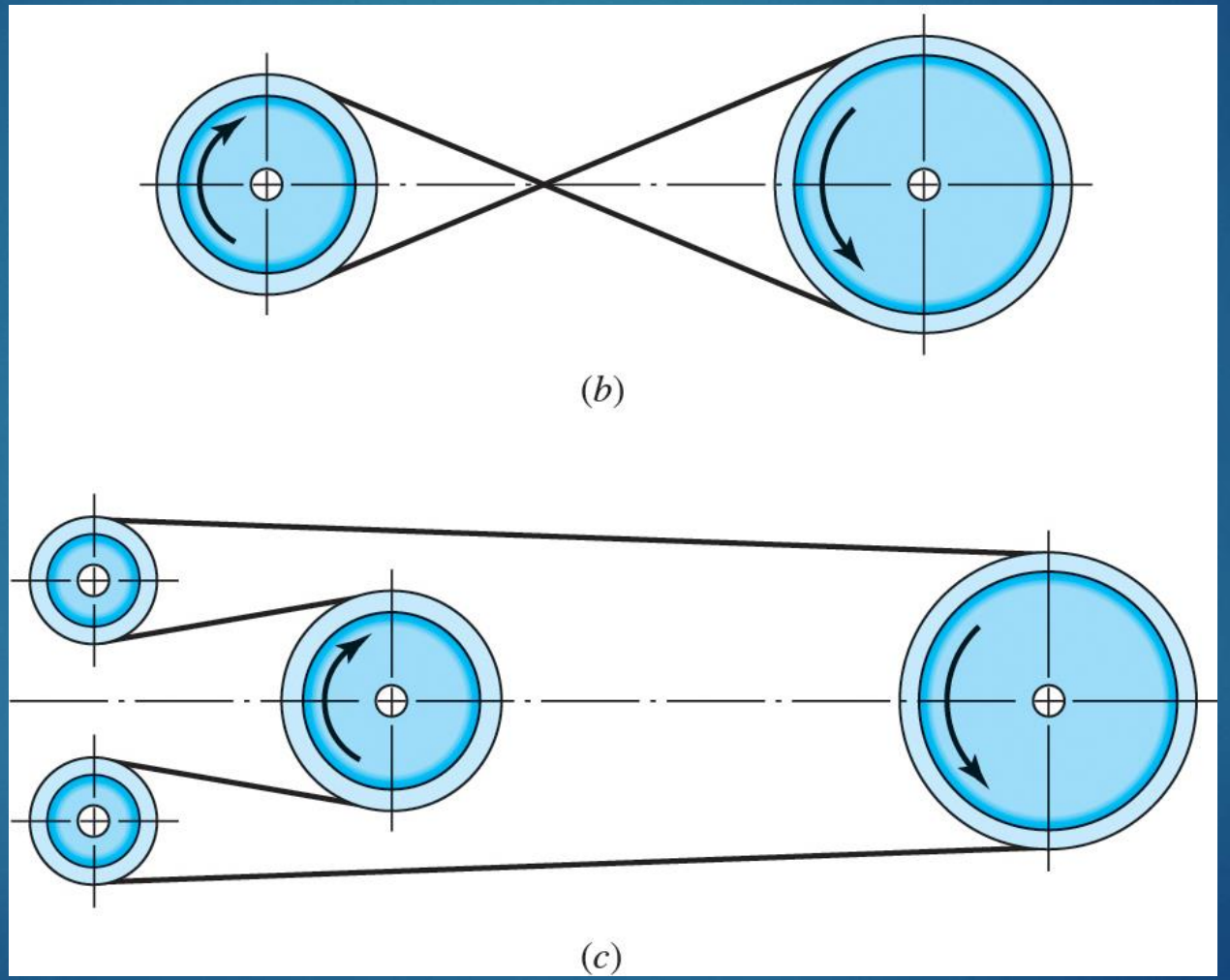
Correas de marcha atrás



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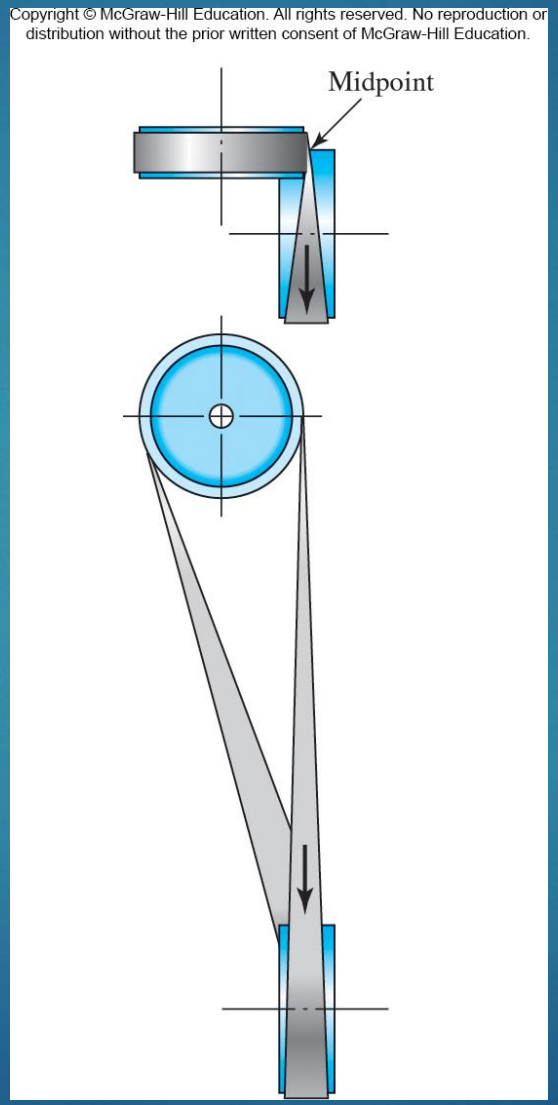
- Fig. 17–2

Correa plana con poleas en distintos planos



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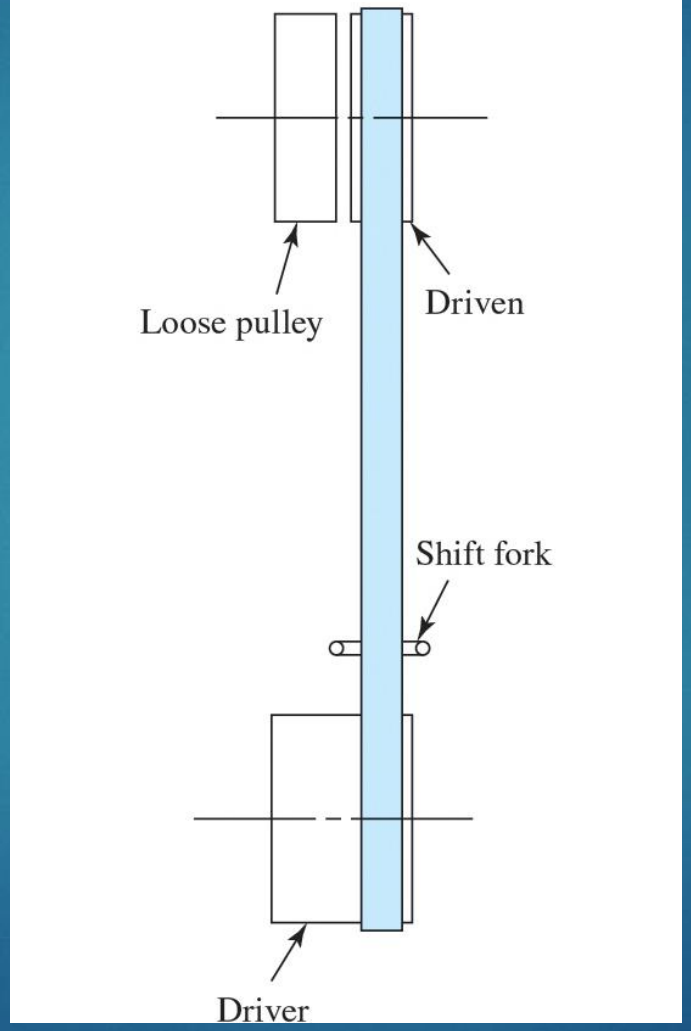
- Fig. 17–3

Cambio de correa plana sin embrague



- Access the text alternative for slide images.

- Fig. 17–4

Transmisiones por correa de velocidad variable

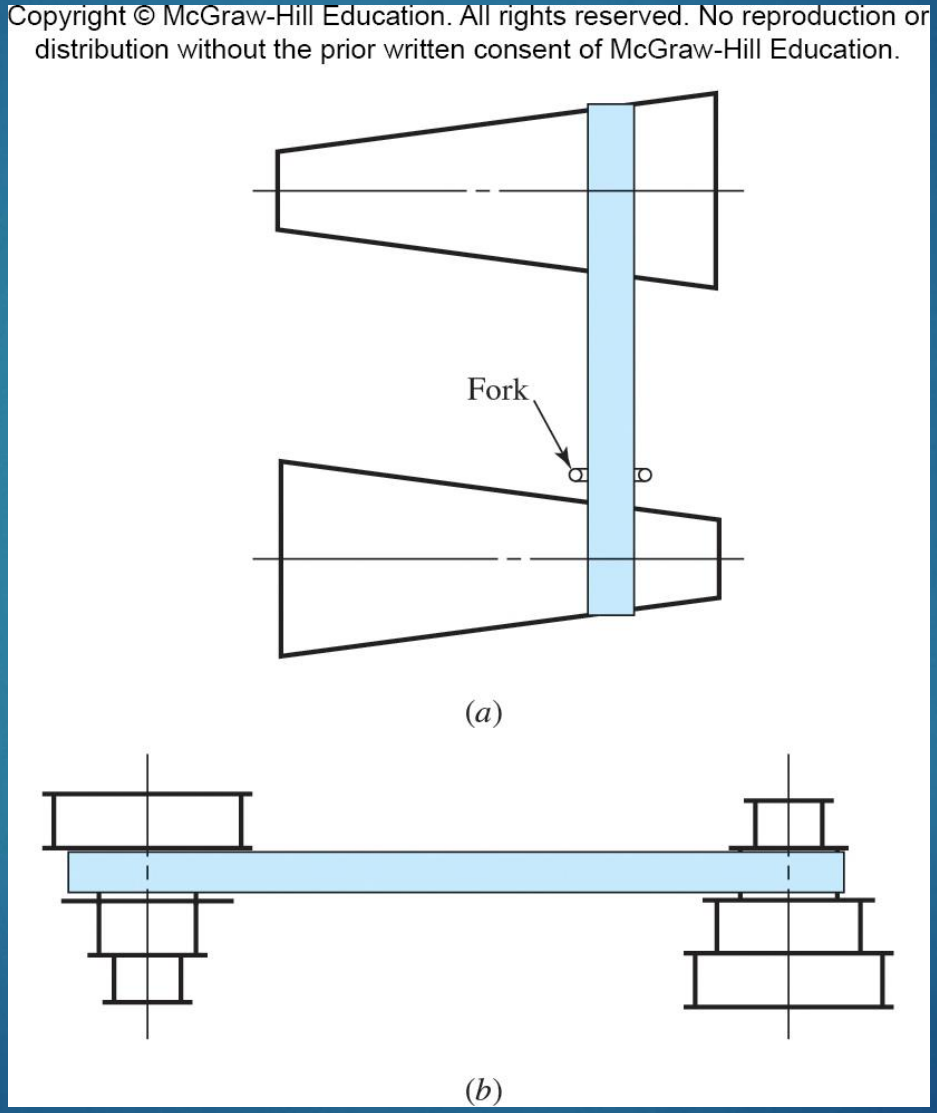


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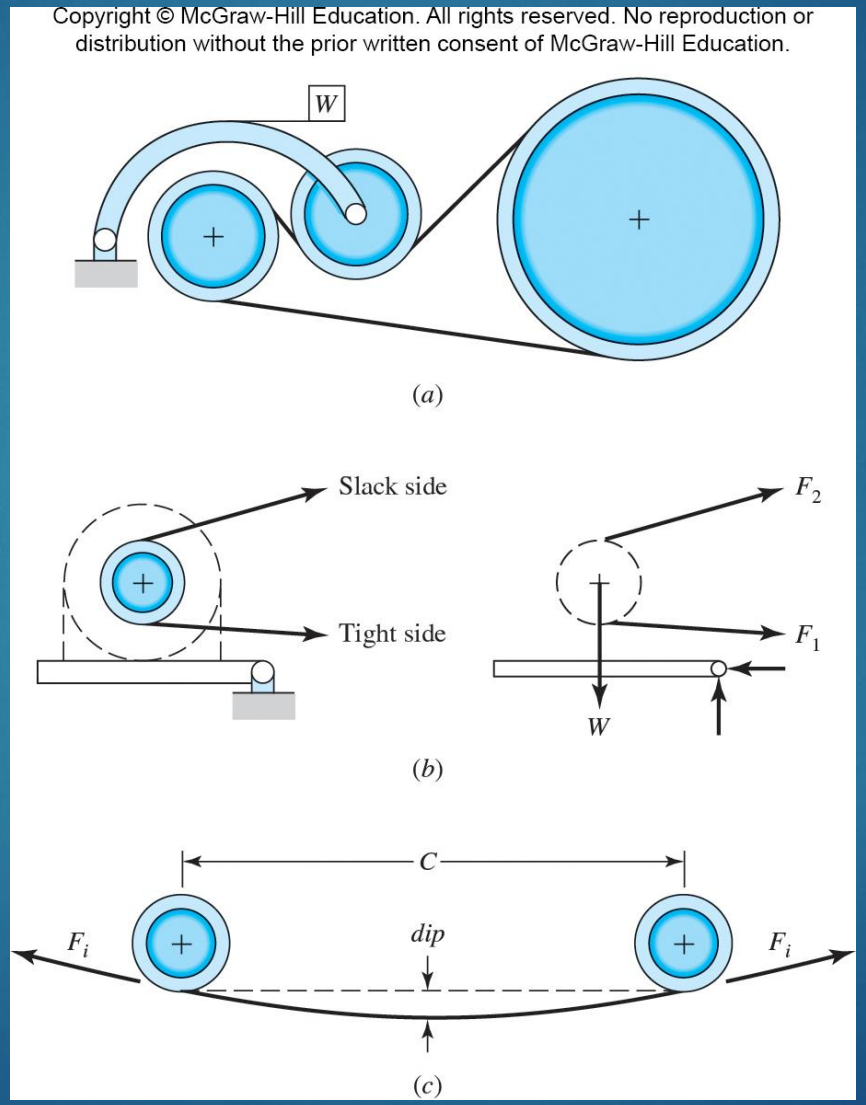
Fig. 17–5

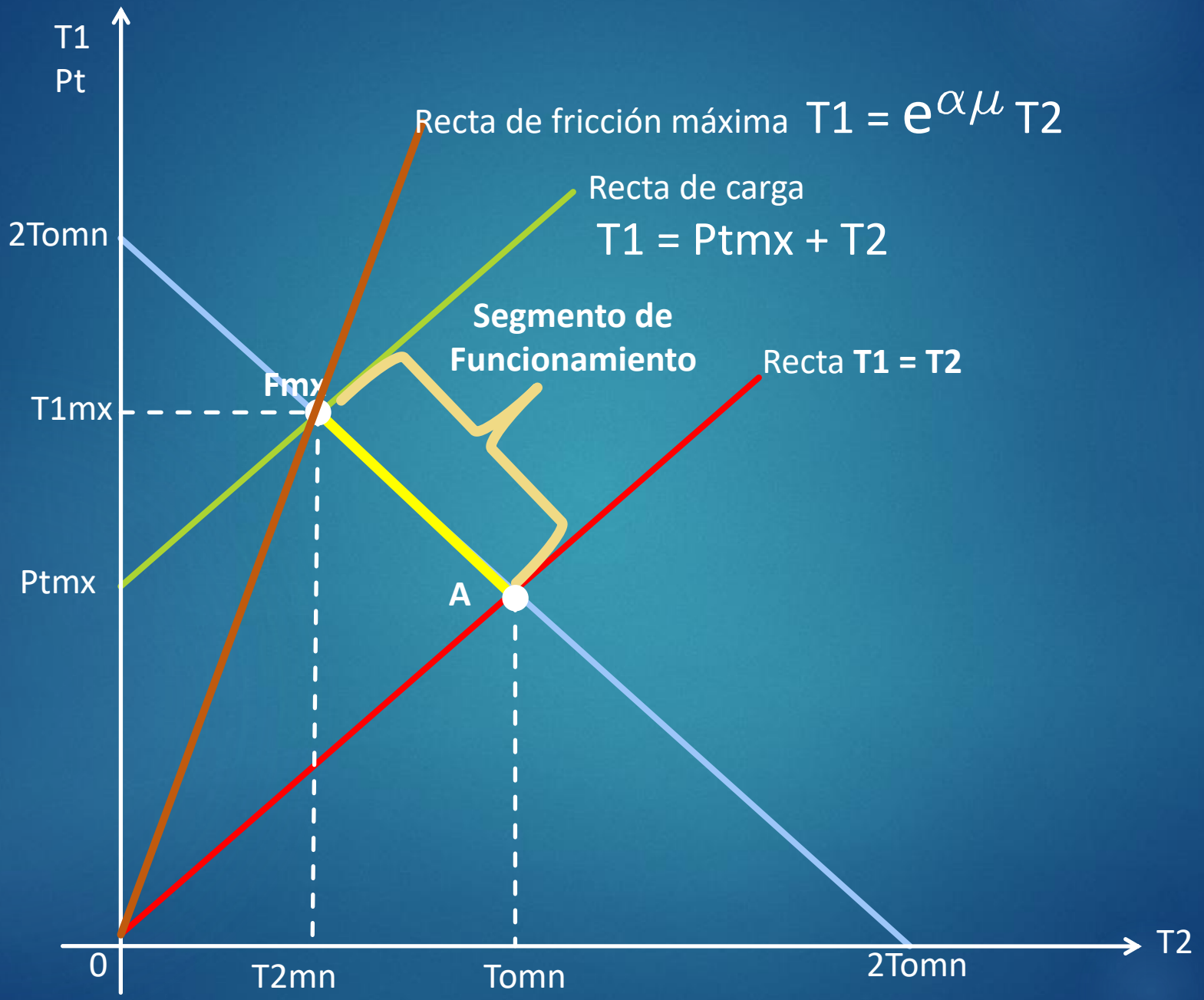
Análisis de la correa plana 2

- Eq. (17–7) se conoce como la ecuación de Correa.
- $$\frac{F_1 - mr^2\omega^2}{F_2 - mr^2\omega^2} = \frac{F_1 - F_c}{F_2 - F_c} = \exp(f\phi) \qquad \textbf{(17 - 7)}$$
- También se puede escribir como
- $$F_1 - F_2 = (F_1 - F_c)\frac{\exp(f\phi) - 1}{\exp(f\phi)} \qquad \textbf{(17 - 8)}$$
- Tenga en cuenta que Fc es
- $F_c = mr^2\omega^2$

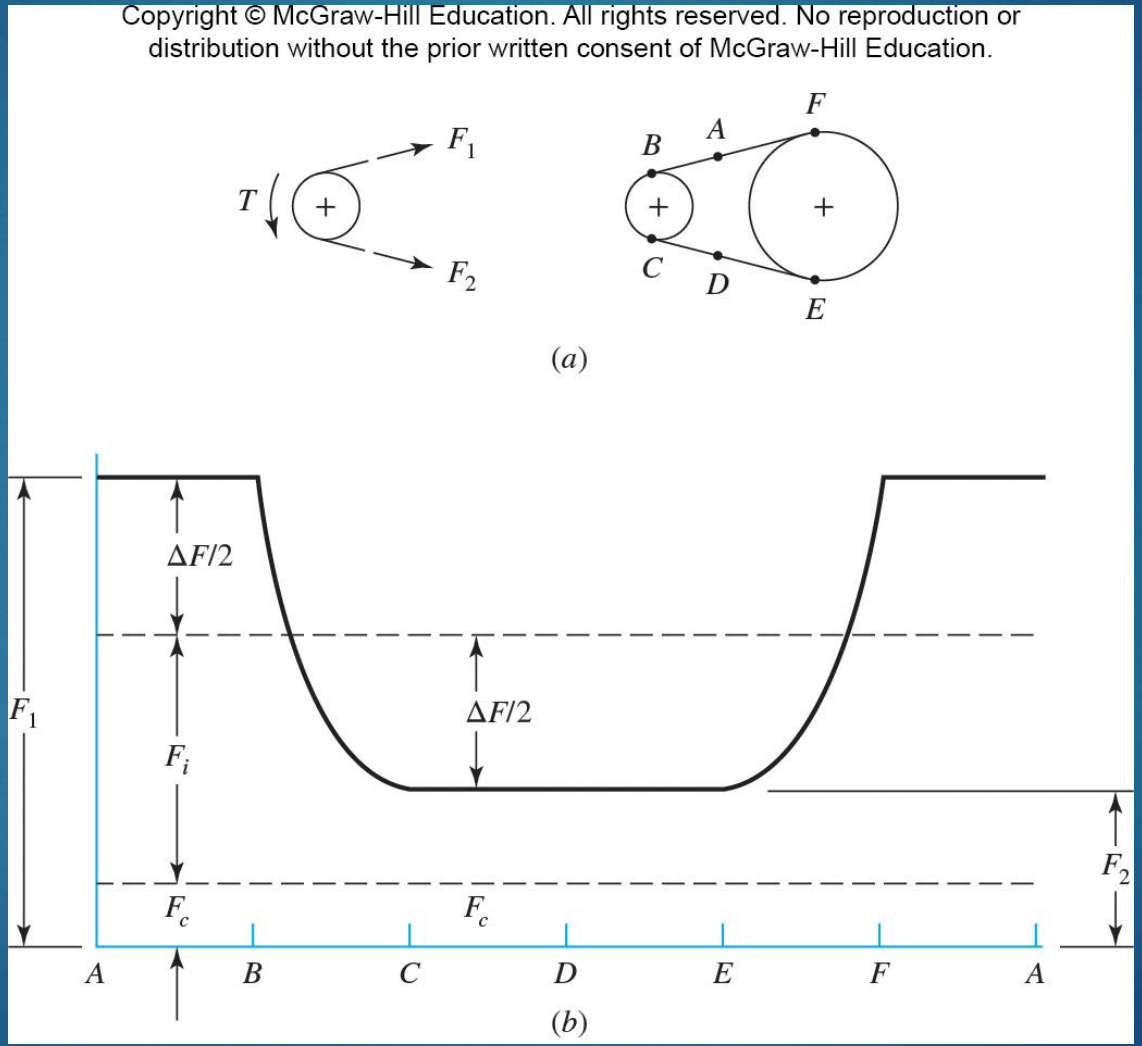
Esquemas de tensado de bandas



- Fig. 17–11
- Access the text alternative for slide images.

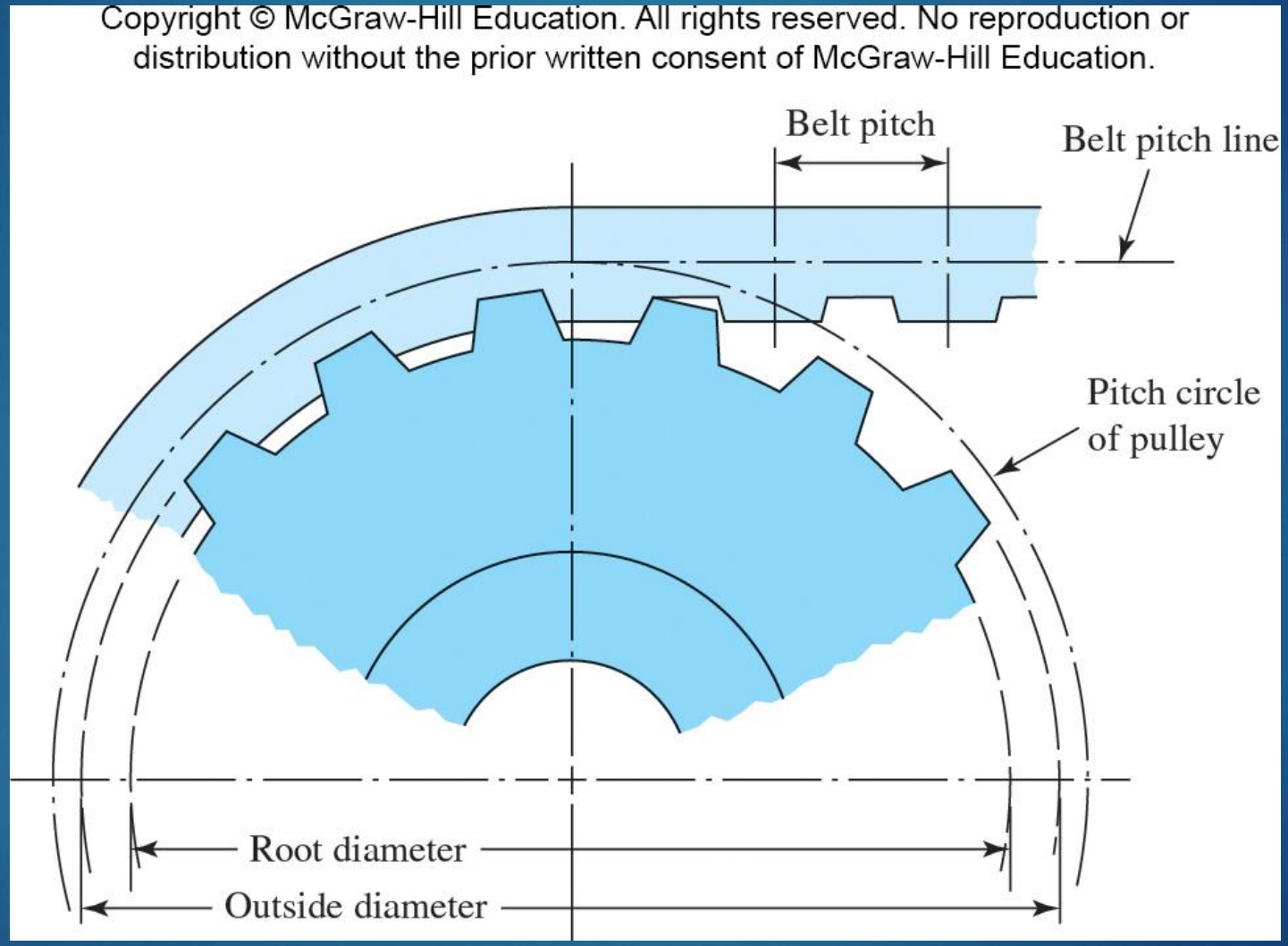

T1
Pt
Recta de fricción máxima $T1 = e^{\alpha\mu} T2$
Recta de carga
T1 = Ptmx + T2
2Tomn
Segmento de
Funcionamiento
Recta T1 = T2
Fmx
T1mx
Ptmx
A
0
T2mn
Tomn
2Tomn
T2

Variación de las tensiones del cinturón plano en algunos puntos cardinales



- Fig. 17–12
- Access the text alternative for slide images.

Correas Sincrónicas



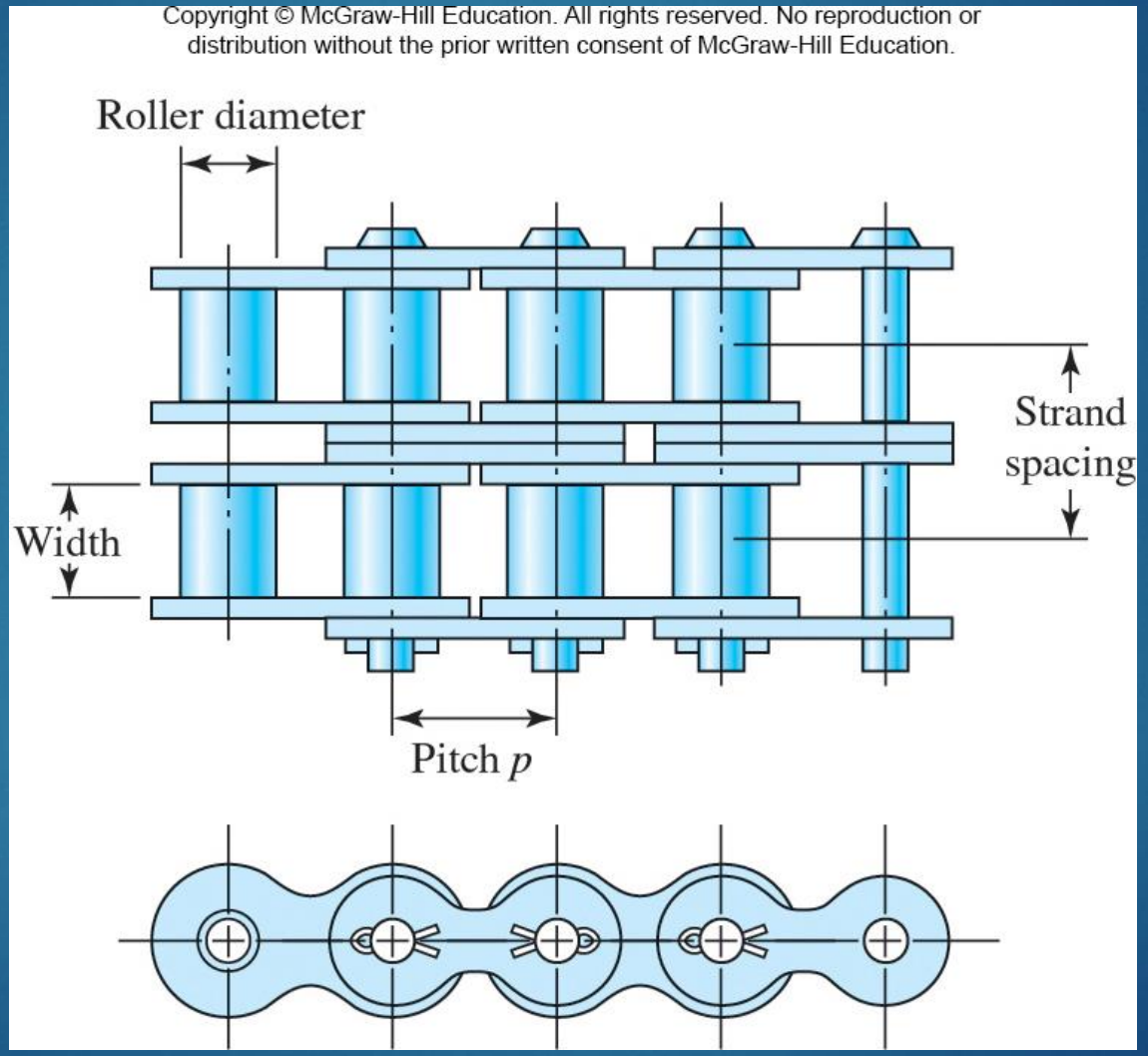
- Fig. 17–15
- Access the text alternative for slide images.

Modelos estándar de las correas de distribución

Service	Designation	Pitch *p*, in
Extra light	XL	$\frac{1}{5}$
Light	L	$\frac{3}{8}$
Heavy	H	$\frac{1}{2}$
Extra heavy	XH	$\frac{7}{8}$
Double extra heavy	XXH	$1\frac{1}{4}$

- Table 17–18

Cadena de rodillos



- Fig. 17–16

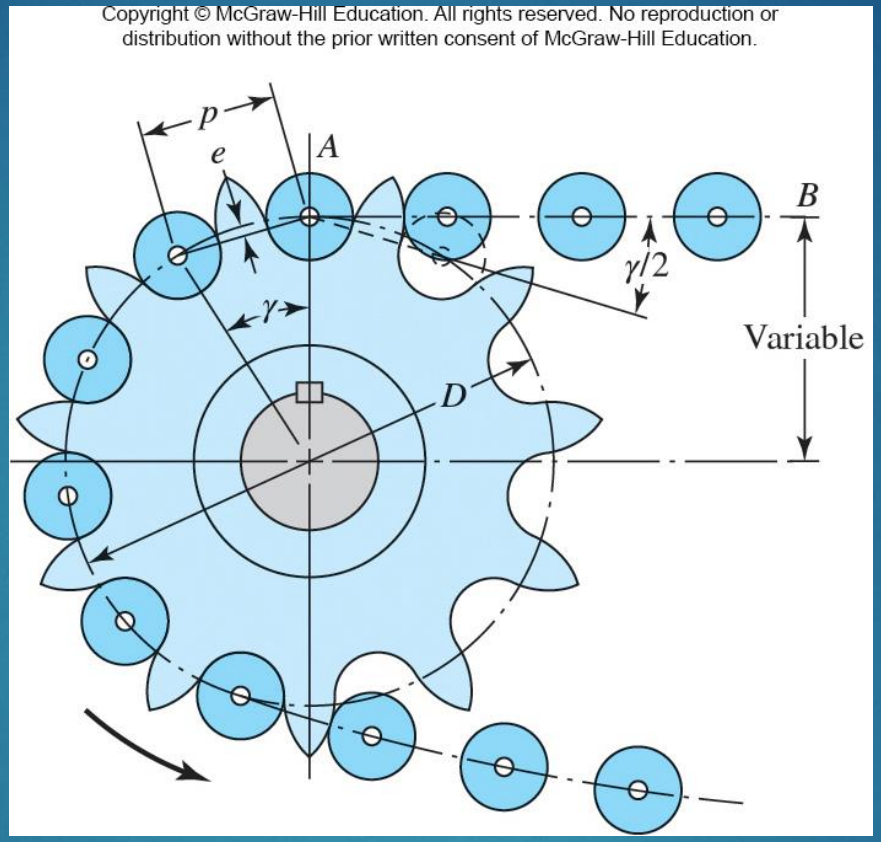
- Access the text alternative for slide images.

Dimensiones de las cadenas de rodillos estándar americanas

ANSI Chain Number	Pitch, in (mm)	Width, in (mm)	Minimum Tensile Strength, lbf (N)	Average Weight, lbf/ft (N/m)	Roller Diameter, in (mm)	Multiple-Strand Spacing, in (mm)
25	0.250 (6.35)	0.125 (3.18)	780 (3 470)	0.09 (1.31)	0.130 (3.30)	0.252 (6.40)
35	0.375 (9.52)	0.188 (4.76)	1 760 (7 830)	0.21 (3.06)	0.200 (5.08)	0.399 (10.13)
41	0.500 (12.70)	0.25 (6.35)	1 500 (6 670)	0.25 (3.65)	0.306 (7.77)	— —
40	0.500 (12.70)	0.312 (7.94)	3 130 (13 920)	0.42 (6.13)	0.312 (7.92)	0.566 (14.38)
50	0.625 (15.88)	0.375 (9.52)	4 880 (21 700)	0.69 (10.1)	0.400 (10.16)	0.713 (18.11)
60	0.750 (19.05)	0.500 (12.7)	7 030 (31 300)	1.00 (14.6)	0.469 (11.91)	0.897 (22.78)
80	1.000 (25.40)	0.625 (15.88)	12 500 (55 600)	1.71 (25.0)	0.625 (15.87)	1.153 (29.29)
100	1.250 (31.75)	0.750 (19.05)	19 500 (86 700)	2.58 (37.7)	0.750 (19.05)	1.409 (35.76)
120	1.500 (38.10)	1.000 (25.40)	28 000 (124 500)	3.87 (56.5)	0.875 (22.22)	1.789 (45.44)
140	1.750 (44.45)	1.000 (25.40)	38 000 (169 000)	4.95 (72.2)	1.000 (25.40)	1.924 (48.87)
160	2.000 (50.80)	1.250 (31.75)	50 000 (222 000)	6.61 (96.5)	1.125 (28.57)	2.305 (58.55)
180	2.250 (57.15)	1.406 (35.71)	63 000 (280 000)	9.06 (132.2)	1.406 (35.71)	2.592 (65.84)
200	2.500 (63.50)	1.500 (38.10)	78 000 (347 000)	10.96 (159.9)	1.562 (39.67)	2.817 (71.55)
240	3.00 (76.70)	1.875 (47.63)	112 000 (498 000)	16.4 (239)	1.875 (47.62)	3.458 (87.83)

- Table 17–19

Cálculo de cadena y piñón



- Fig. 17–16 **(a)**

$$\sin\frac{\gamma}{2}\frac{p/2}{D/2} \qquad \text{or} \qquad D=\frac{p}{\sin(\gamma/2)}$$

$$D=\frac{p}{\sin(180°/N)} \qquad \textbf{(17 - 29)}$$

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Chain Velocity

$$V = \frac{Npn}{1000} \quad (\frac{m}{\text{min}}) \qquad (17-30)$$

- donde N = número de dientes de piñón
- p = paso de cadena, en
- n = velocidad del piñón, rev/min

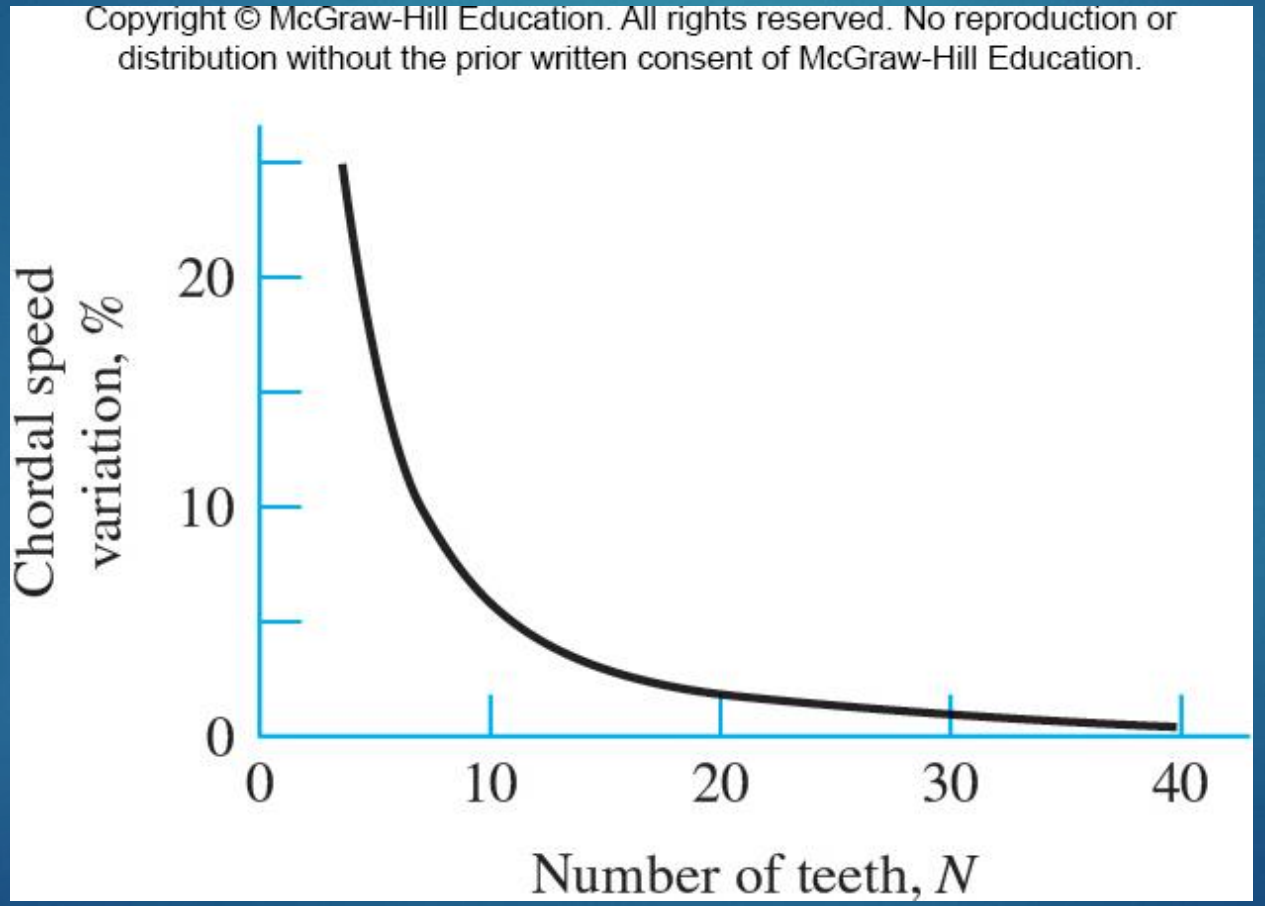
$$v_{\max} = \frac{\pi Dn}{2} = \frac{\pi np}{12\sin(\gamma/2)} \qquad \textbf{(b)}$$

$$d = D\cos\frac{\gamma}{2} \qquad \textbf{(c)}$$

$$v_{\min} = \frac{\pi dn}{12} = \frac{\pi np\cos(\gamma/2)}{12\sin(\gamma/2)} \qquad \textbf{(d)}$$

Variación de la velocidad de los Eslabones

$$\frac{\Delta V}{V} = \frac{v_{\max} - v_{\min}}{V} = \frac{\pi}{N}\left[\frac{1}{\sin(180°/N)} - \frac{1}{\tan(180°/N)}\right] \qquad \textbf{(17 - 31)}$$



Access the text alternative for slide images.

- Fig. 17–18

Clasificaciones de potencia nominal para cadena

- De la publicación de la American Chain Association Chains for Power Transmission and Materials Handling
- Para una sola cadena
- Potencia nominal, placa de enlace limitada
- $$H_1 = 0.004 N_1^{1.08} n_1^{0.9} p^{(3-0.07p)} \quad \text{hp} \qquad \textbf{(17 - 32)}$$
  - Potencia nominal, limitada por rodillos
  - $$H_2 = \frac{1000 K_r N_1^{1.5} p^{0.8}}{n_1^{1.5}} \quad \text{hp} \qquad \textbf{(17 - 33)}$$
  - donde N1 = número de dientes en el piñón más pequeño
  - n1 = velocidad del piñón, rev/min
  - p = paso de la cadena, en
  - Kr = 29 para los números de cadena 25, 35; 3.4 para la cadena 41;
    y 17 para las cadenas 40–240