DESENHO TÉCNICO MECÂNICO I (SEM0564)

AULA 9 - ELEMENTOS DE MÁQUINA

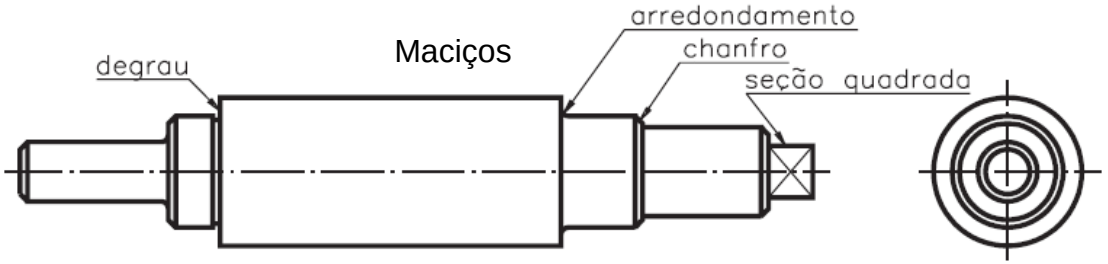
(TRANSMISSÃO)

Notas de Aulas v.2017

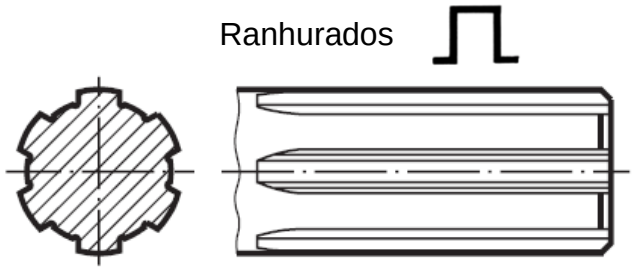
ELEMENTOS DE TRANSMISSÃO

EIXOS

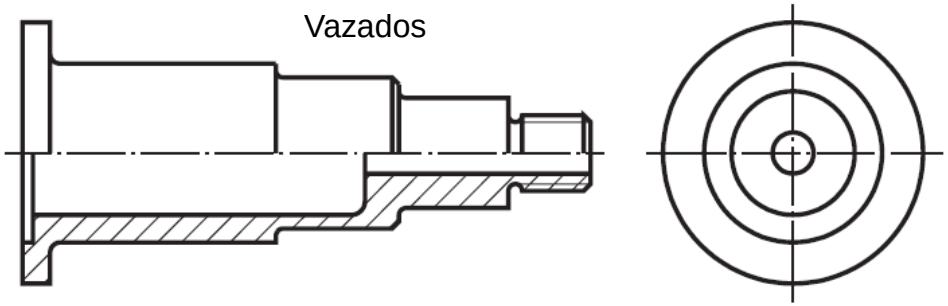
Maciços



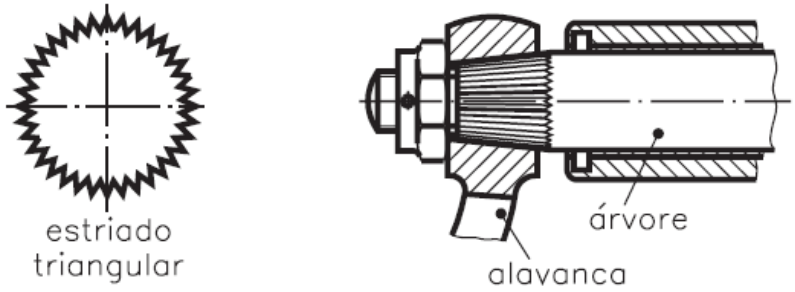
Ranhurados



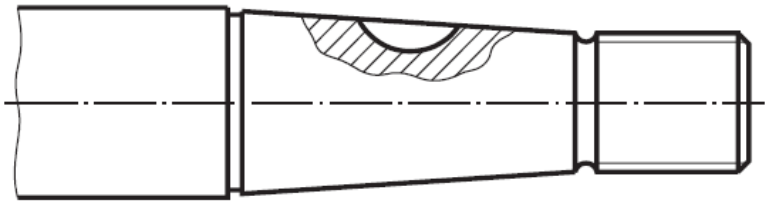
Vazados



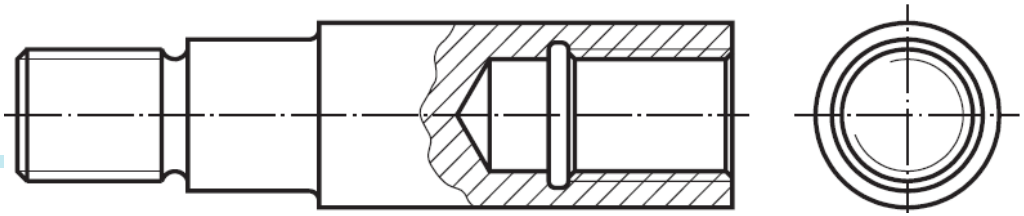
Serilhados



Cônicos

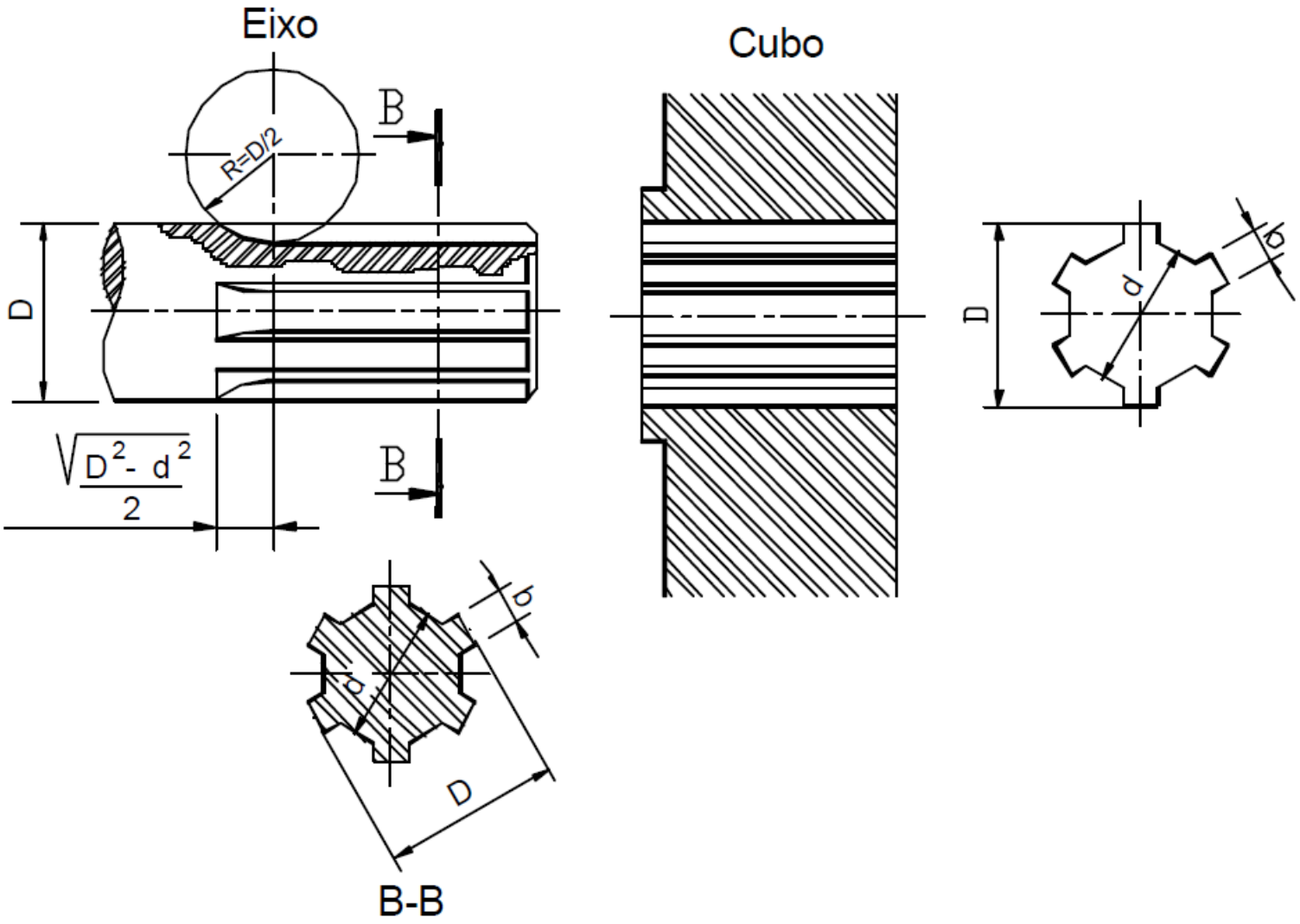


Roscados



ELEMENTOS DE TRANSMISSÃO

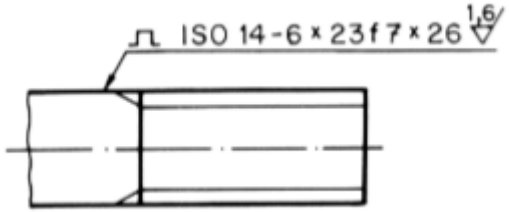
EIXOS

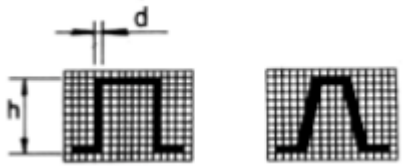


ELEMENTOS DE TRANSMISSÃO

EIXOS

Diâmetro de referência	Diâmetro do eixo	Largura da canaleta	Número de canaletas	Diâmetro do eixo	Largura da canaleta	Número de canaletas
d	**D**	**b**	**Z**	**D**	**b**	**Z**
11	14	4	4	14	3	6
13	16	5	4	16	3,5	6
16	20	6	4	20	4	6
18	22	7	4	22	5	6
21	25	8	4	25	5	6
23	26	6	6	28	6	6
26	30	6	6	32	6	6
28	32	7	6	34	7	8
32	36	6	8	38	6	8
36	40	7	8	42	7	8
42	46	8	8	48	8	8
46	50	9	8	54	9	8
52	58	10	8	60	10	8
56	62	10	8	65	10	8
62	68	12	8	72	12	10
72	78	12	10	82	12	10
82	88	12	10	92	12	10
92	98	14	10	102	14	10
102	108	16	10	112	16	10
112	120	18	10	125	18	10

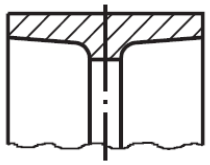




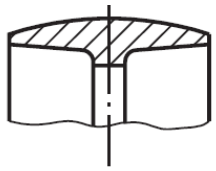
Dimensões [mm]						
Altura do símbolo, dos algarismos e letras, h	3,5	5	7	10	14	20
Espessura da linha para símbolos e letra, d	0,35	0,5	0,7	1	1,4	2

ELEMENTOS DE TRANSMISSÃO

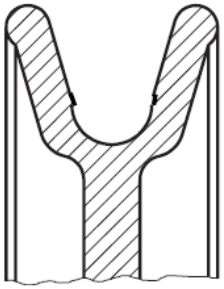
POLIAS



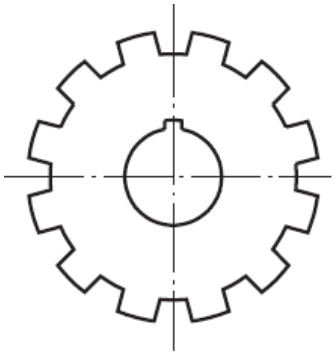
polia plana



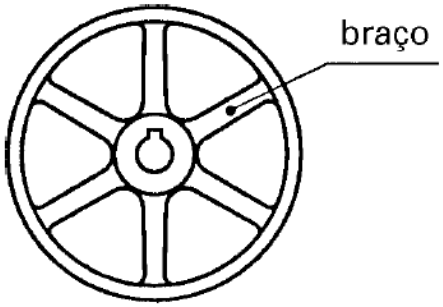
polia abaulada

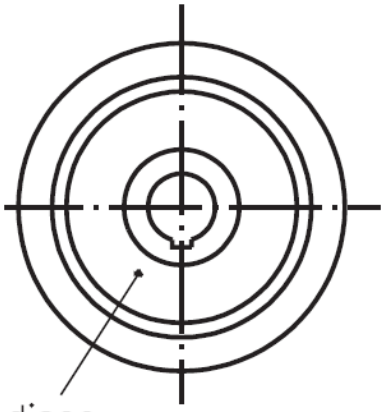


polia para correia e cabo de aço redondos



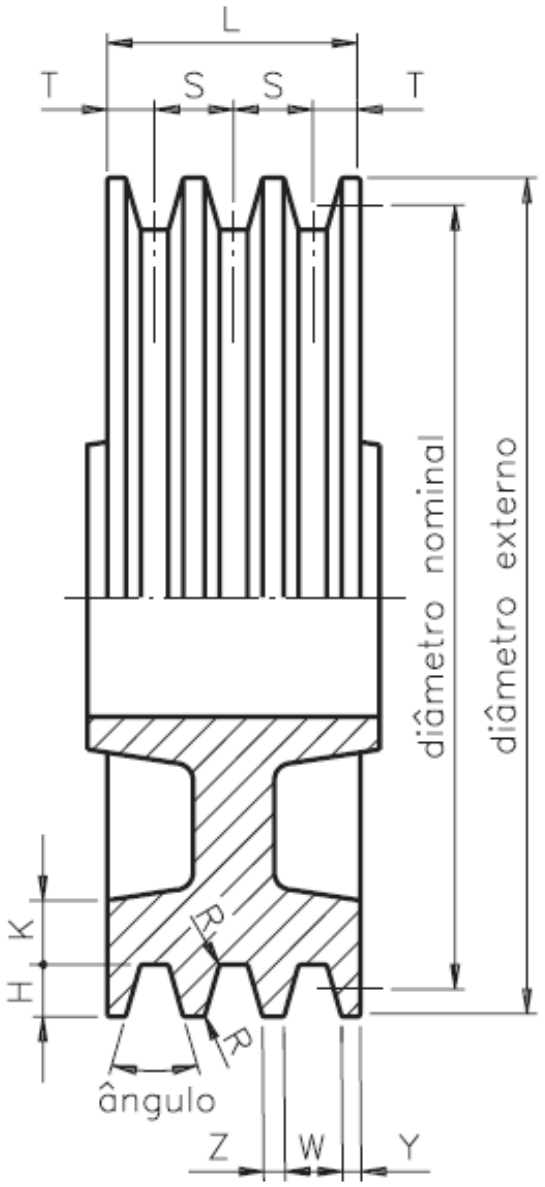
polia para correia dentada





ELEMENTOS DE TRANSMISSÃO

POLIAS



ELEMENTOS DE TRANSMISSÃO

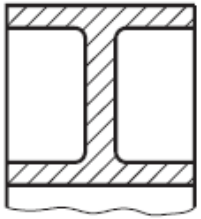
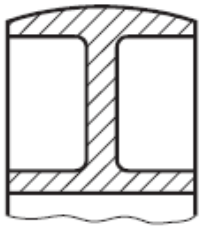
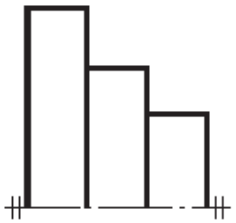
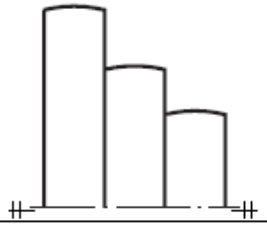
POLIAS

Perfil	Ângulo do canal		t	s	w	y	z	h	k	x	R^4
	Diâmetro externo (mm)	Graus									
A	de 75 a 170 acima de 170	34° 38°	9,5	15	13	3	2	13	5	5	1
B	de 130 a 240 acima de 240	34° 38°	11,5	19	17	3	2	17	6,5	6,25	1
C	de 200 a 350 acima de 350	34° 38°	15,25	25,5	22,5	4	3	22	9,5	8,25	1,5
D	de 300 a 450 acima de 450	36° 38°	22	36,5	32	6	4,5	28	12,5	11	1,5
E	de 485 a 630 acima de 630	36° 38°	27,25	44,5	38,5	8	6	33	16	13	1,5

Largura $L = 2\,t + s\,(n-1)$
n = número de canais

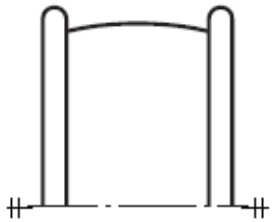
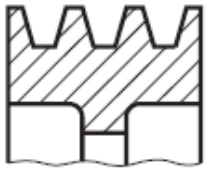
ELEMENTOS DE TRANSMISSÃO

POLIAS

		polia de aro plano
		polia de aro abaulado
		polia escalonada de aro plano
		polia escalonada de aro abaulado

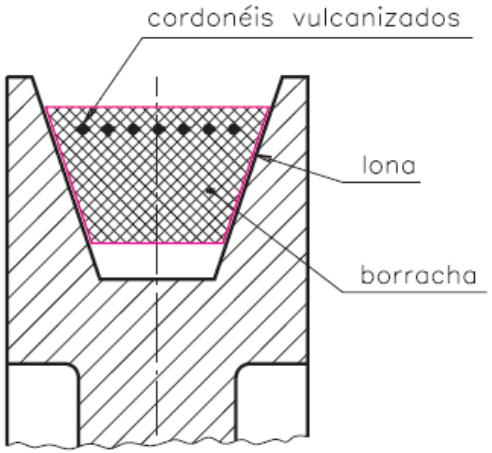
ELEMENTOS DE TRANSMISSÃO

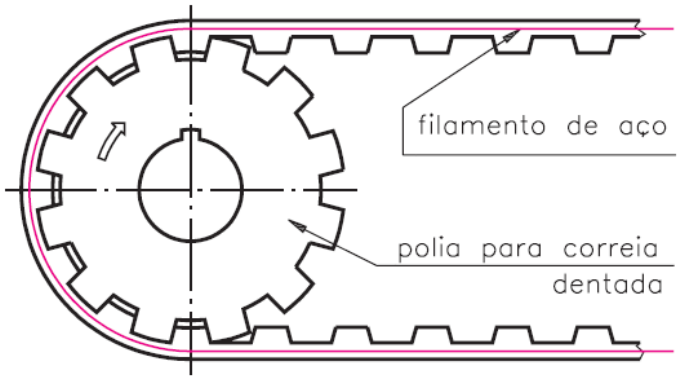
POLIAS

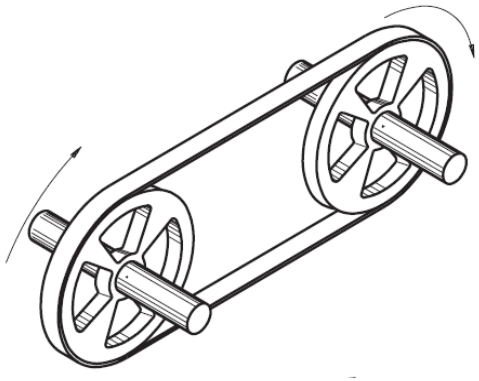
		polia com guia
		polia em "V" simples
		polia em "V" múltipla

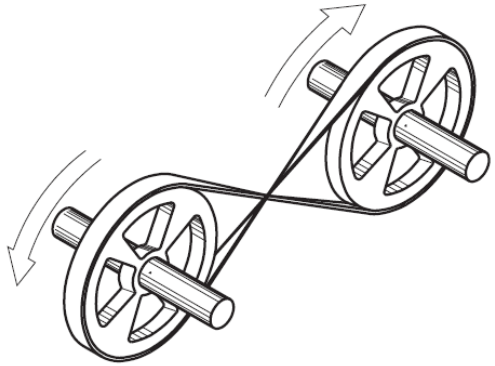
ELEMENTOS DE TRANSMISSÃO

CORREIAS



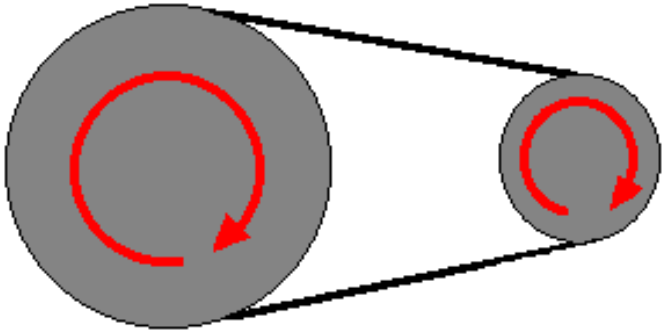


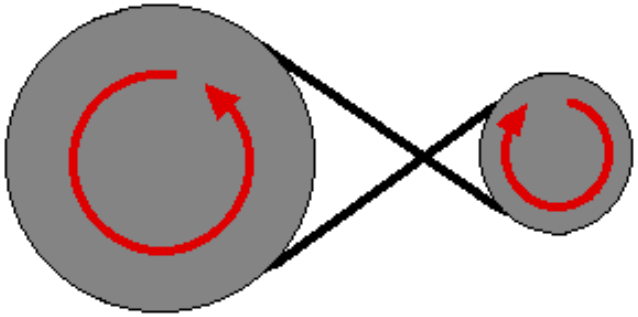


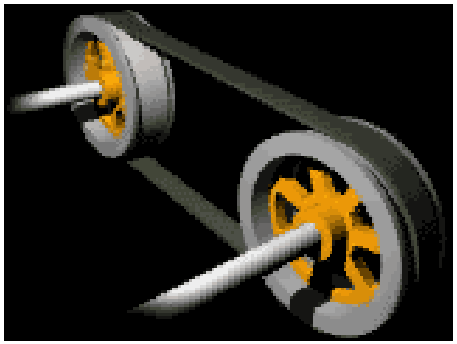


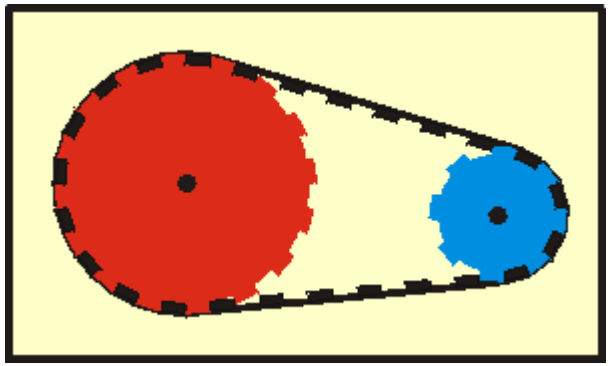
ELEMENTOS DE TRANSMISSÃO

CORREIAS



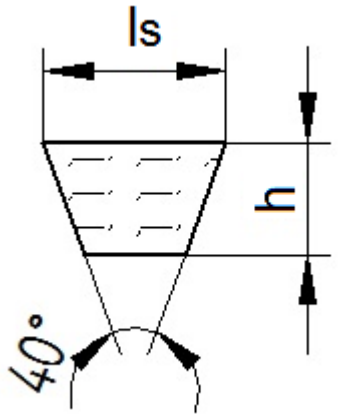






ELEMENTOS DE TRANSMISSÃO

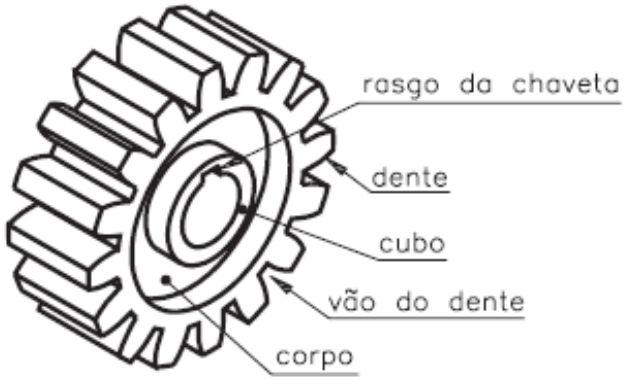
CORREIAS

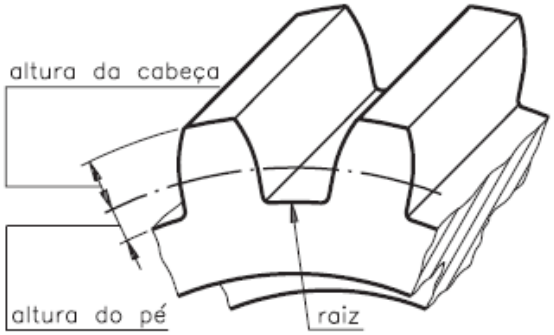


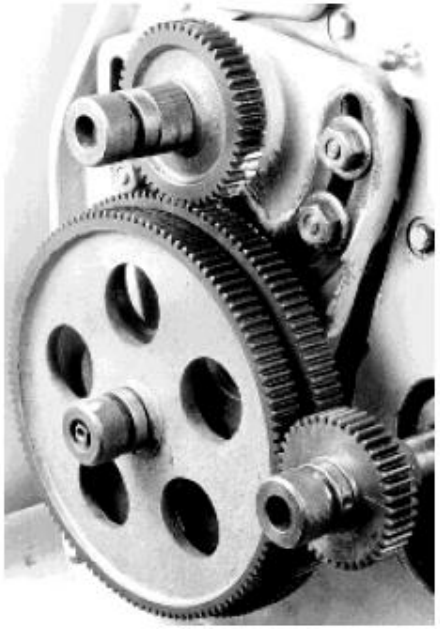
Seção		Largura superior (ls) (mm)	Altura (h) (mm)	Ângulo (°)
Designação	Largura primitiva (mm)			
A	11	13	8	40 ± 1
B	14	17	11	40 ± 1
C	19	22	14	40 ± 1
D	27	32	19	40 ± 1

ELEMENTOS DE TRANSMISSÃO

ENGRENAGENS

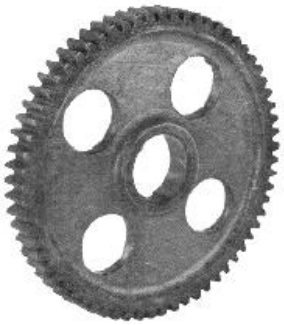






corpo em forma de disco
com furo central

corpo em forma de disco
com cubo e furo central



corpo com 4 furos,
cubo e furo central

corpo com braços,
cubo e furo central

ELEMENTOS DE TRANSMISSÃO

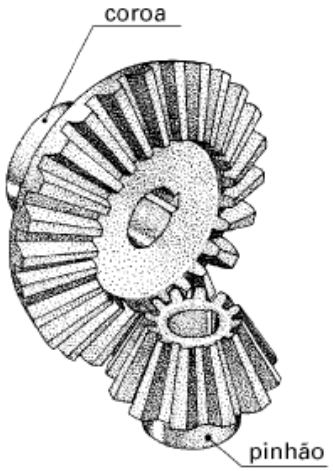
ENGRENAGENS

Engrenagens Cilíndricas

Dente Reto

Dente Helicoidal

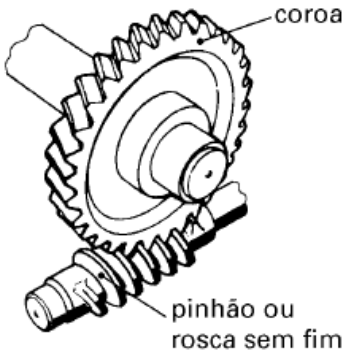
Engrenagens Cônicas



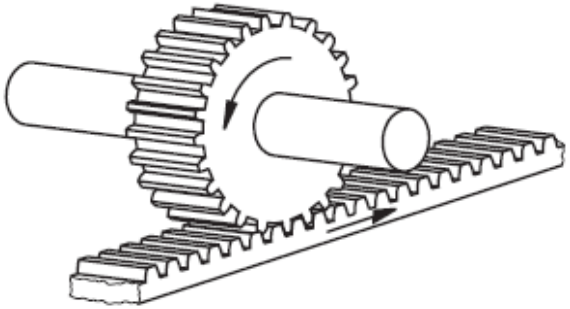
Dente Reto

Dente Helicoidal

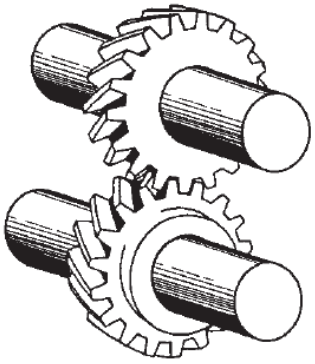
Coroa-Pinhão



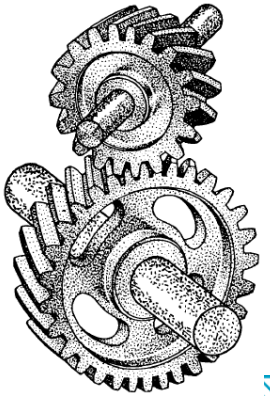
Cremalheira



Montagens



Eixos Paralelos



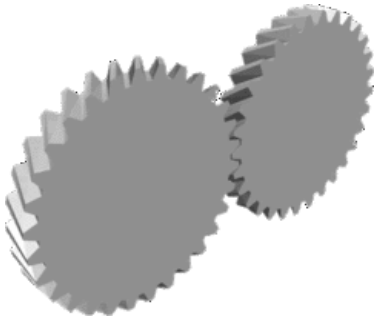
Eixos Reversos

ELEMENTOS DE TRANSMISSÃO

ENGRENAGENS

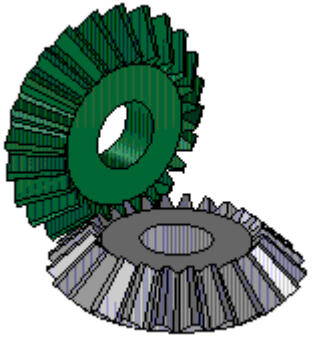
Engrenagens Cilíndricas

Dente Reto



Dente Helicoidal

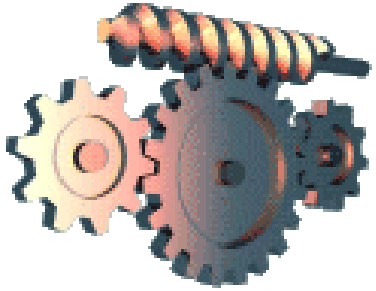
Engrenagens Cônicas



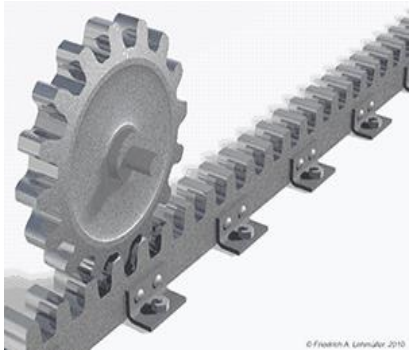
Dente Reto

Dente Helicoidal

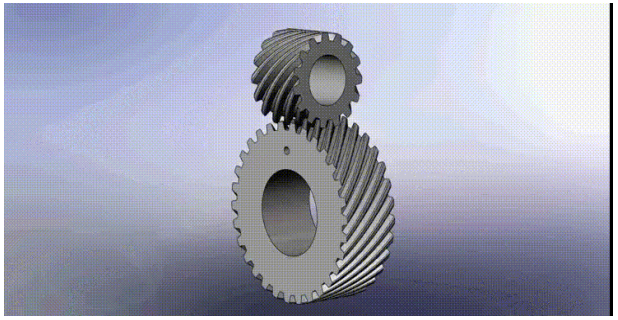
Coroa-Pinhão



Cremalheira



Montagens



ELEMENTOS DE TRANSMISSÃO

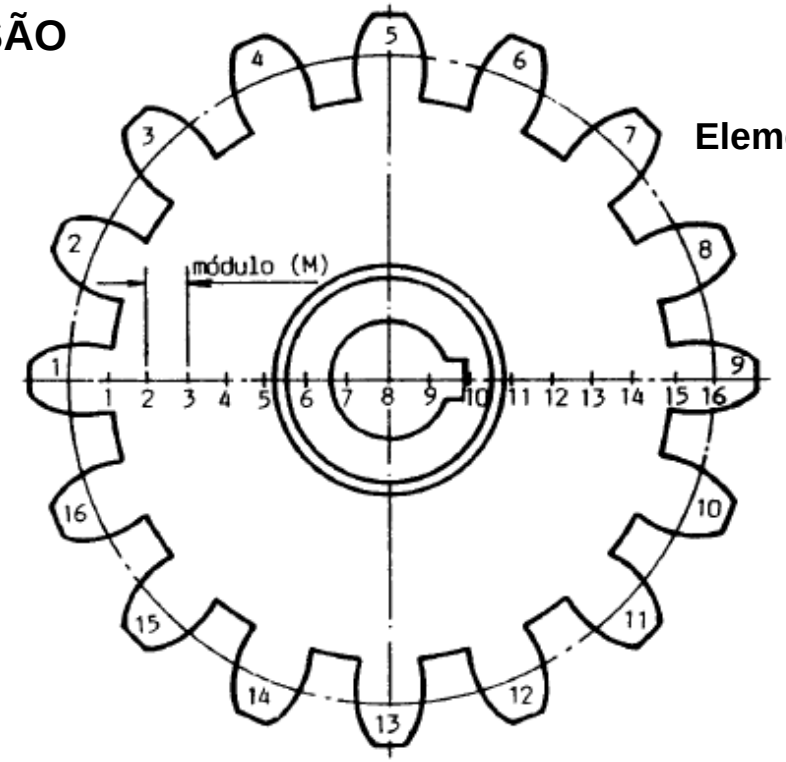
ENGRENAGENS - Simbologia

Sistema de dentes	Símbolo
Helicoidal à direita	
Helicoidal à esquerda	
Dupla helicoidal (espinha de peixe)	
Espiral	

ELEMENTOS DE TRANSMISSÃO

ENGRENAGENS

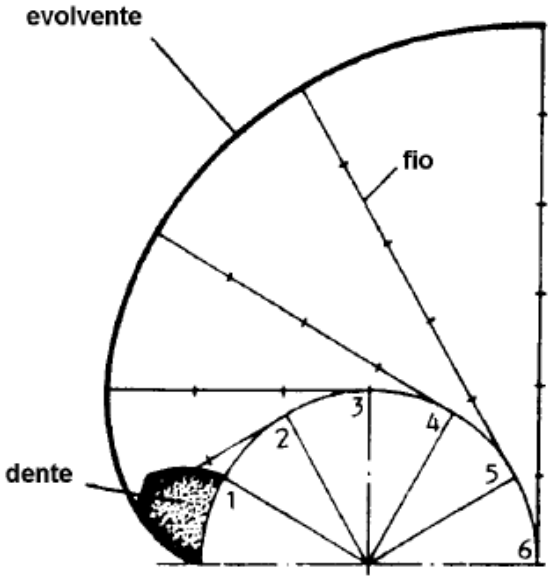
Elementos de uma engrenagem

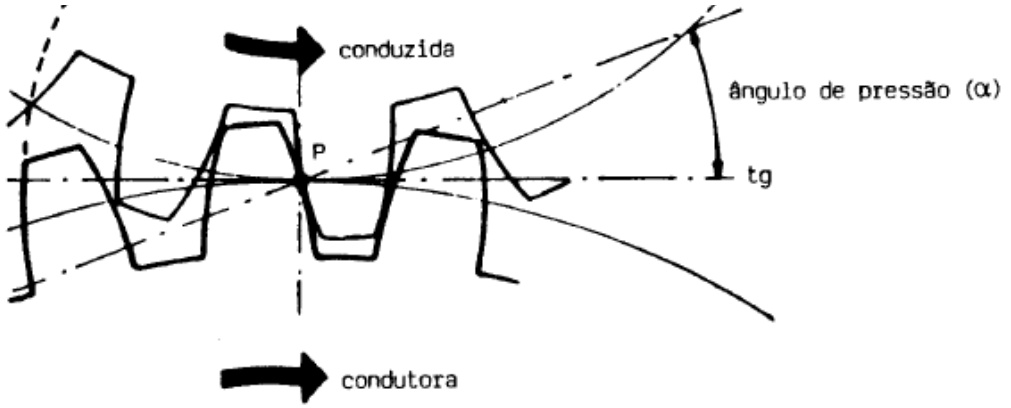


número de dentes (Z) = 16

Módulo (M) = $\frac{Dp}{Z}$ ou $\frac{P}{\pi}$

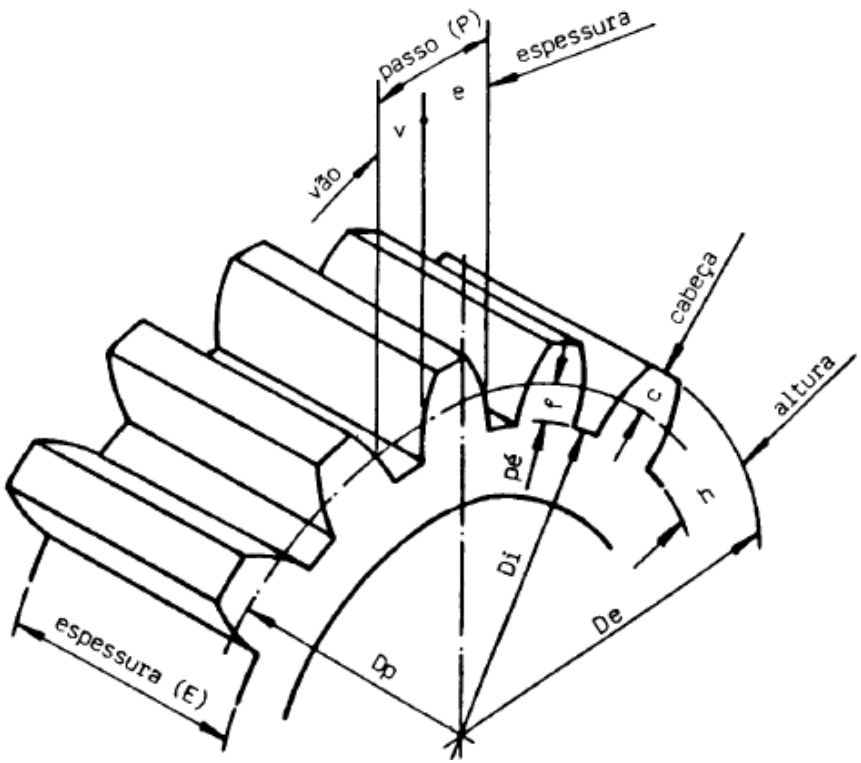
Perfil do dente





ELEMENTOS DE TRANSMISSÃO

ENGRENAGENS



Formulações

- (**De**) Diâmetro externo

É o diâmetro máximo da engrenagem De = m (z + 2).

- (**Di**) Diâmetro interno

É o diâmetro menor da engrenagem.

- (**Dp**) Diâmetro primitivo

É o diâmetro intermediário entre De e Di. Seu cálculo exato é Dp = De - 2m.

- (**C**) Cabeça do dente

É a parte do dente que fica entre Dp e De.

- (**f**) Pé do dente

É a parte do dente que fica entre Dp e Di.

- (**h**) Altura do dente

É a altura total do dente $\frac{De - Di}{2}$ ou h = 2,166 . m

- (**e**) Espessura de dente

É a distância entre os dois pontos extremos de um dente, medida à altura do Dp.

- (**V**) Vão do dente

É o espaço entre dois dentes consecutivos. Não é a mesma medida de **e**.

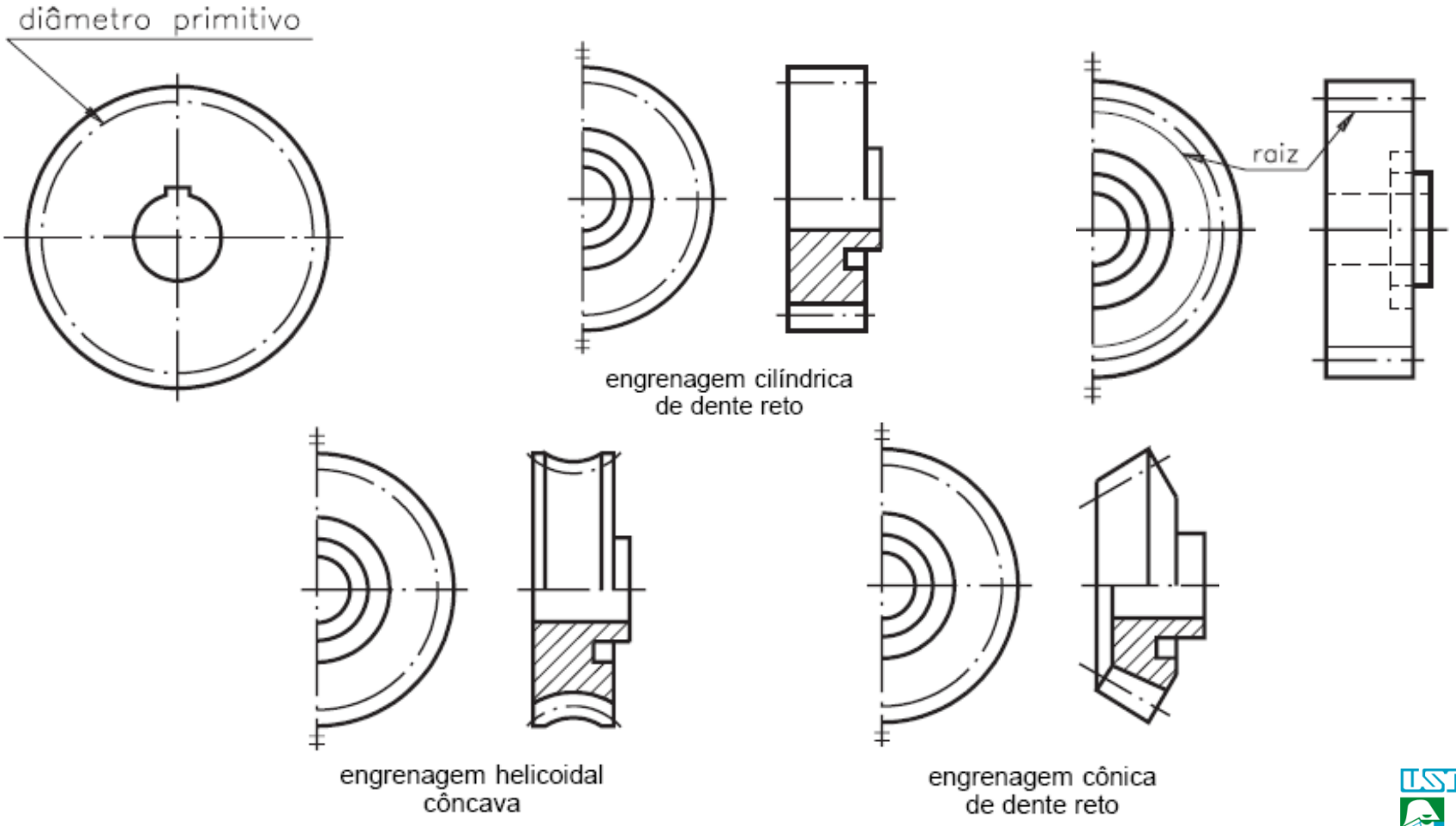
- (**P**) Passo

Medida que corresponde a distância entre dois dentes consecutivos, medida à altura do Dp.

ELEMENTOS DE TRANSMISSÃO

ENGRENAGENS

Representação Gráfica



ELEMENTOS DE TRANSMISSÃO

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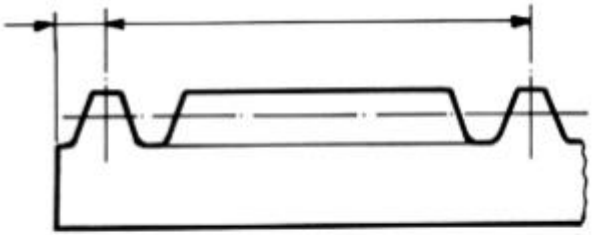

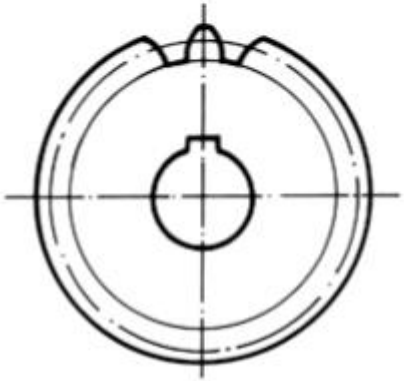

ELEMENTOS DE TRANSMISSÃO

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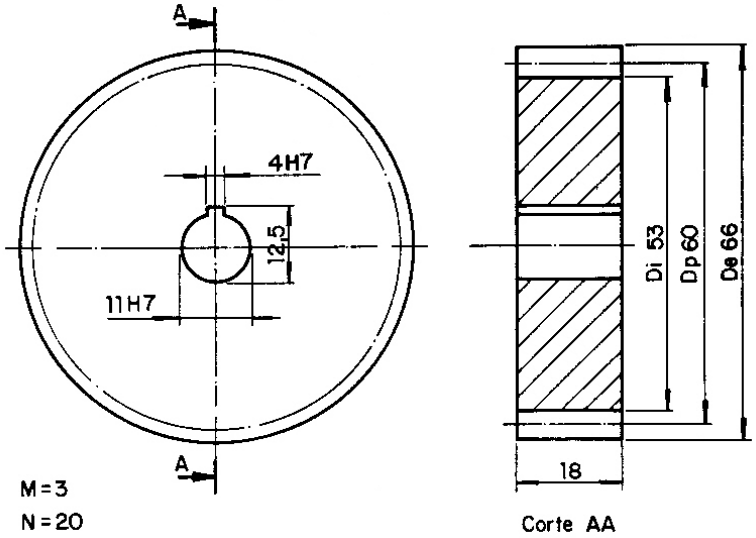

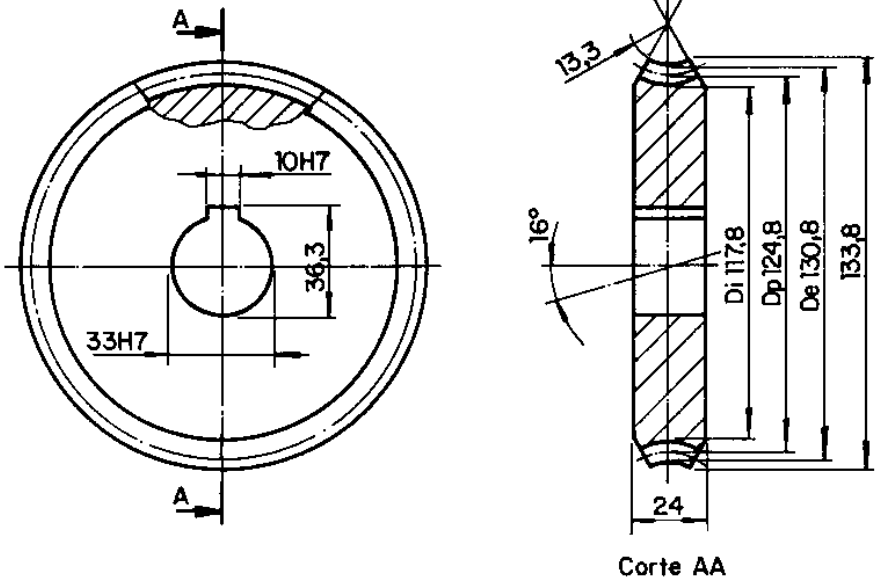

ELEMENTOS DE TRANSMISSÃO

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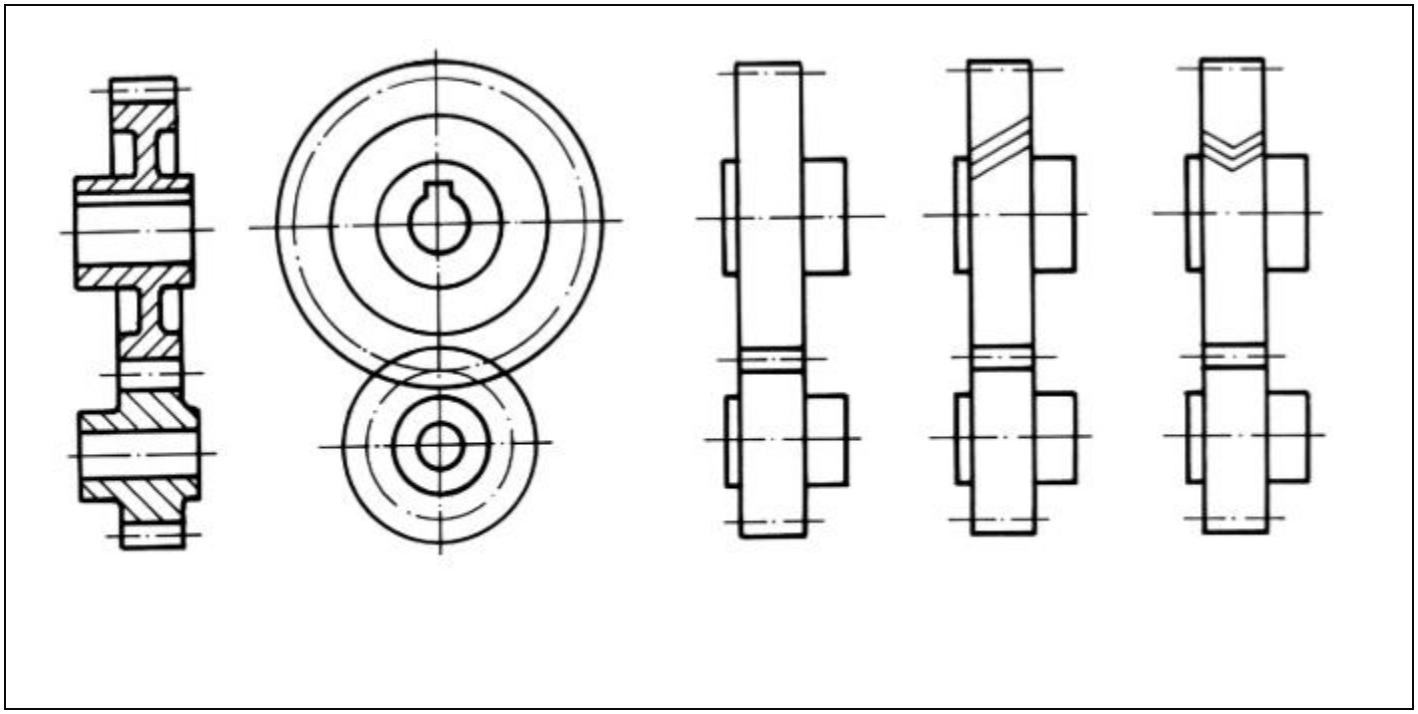

ELEMENTOS DE TRANSMISSÃO

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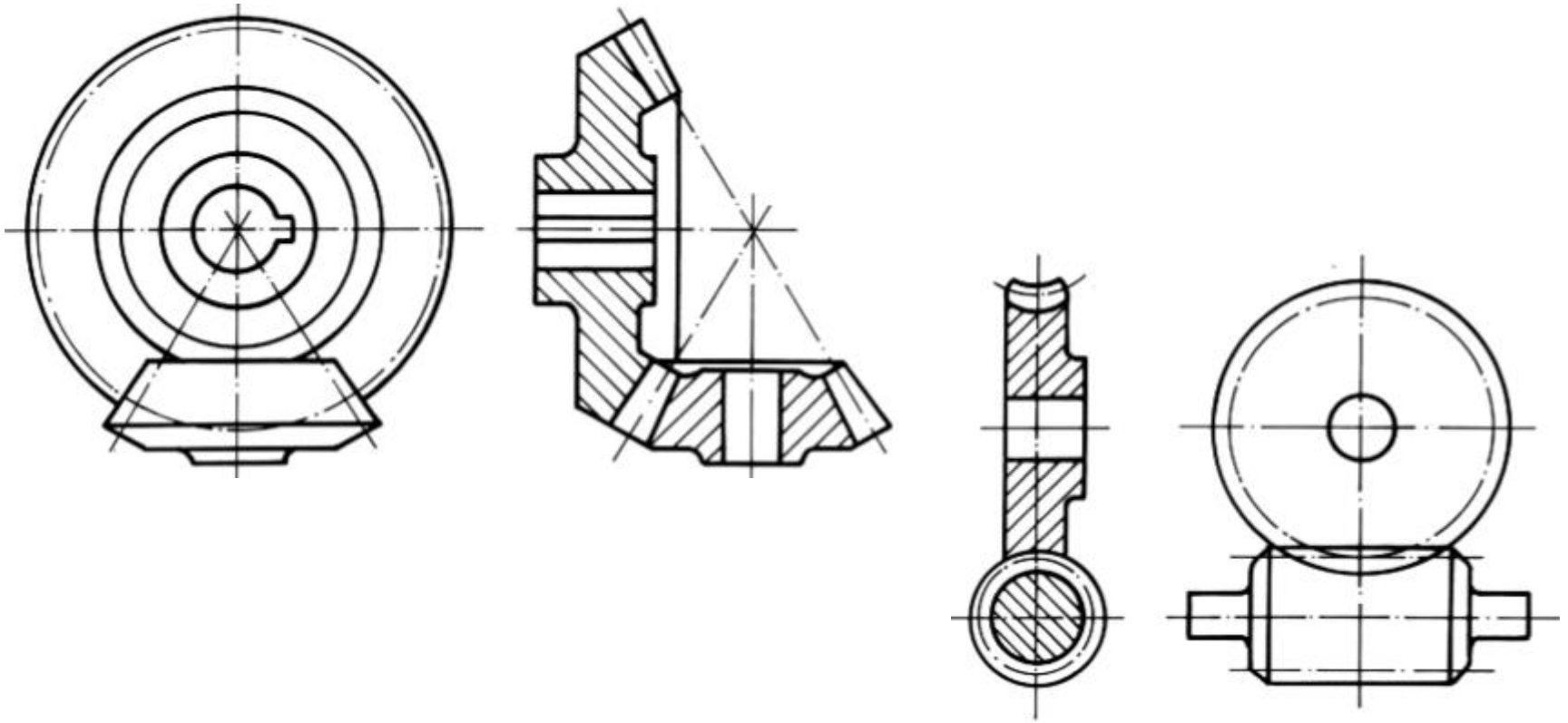
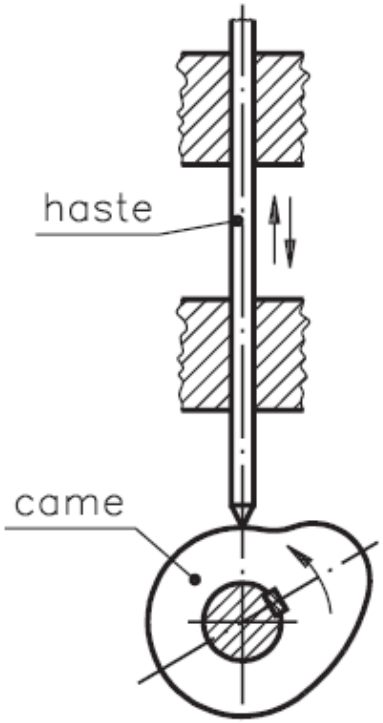


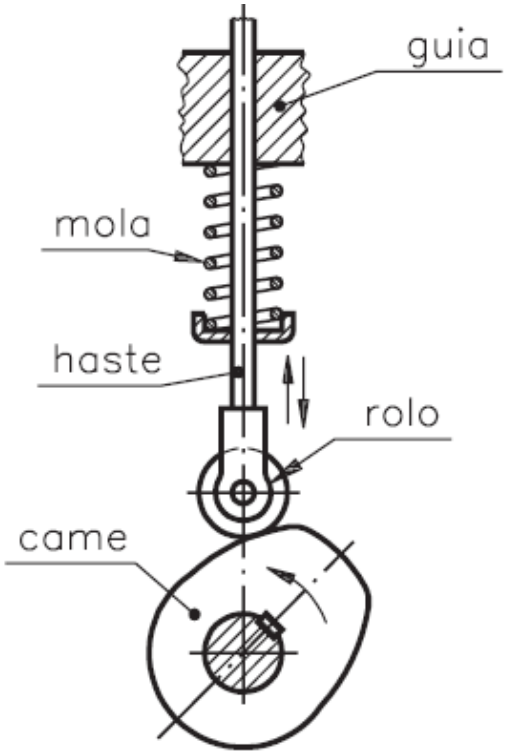
ELEMENTOS DE TRANSMISSÃO

CAMES

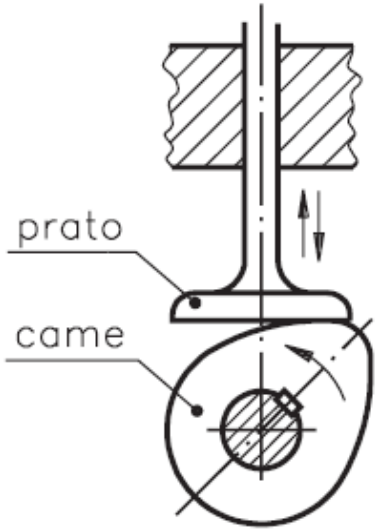
Came de Disco



extremidade de ponta



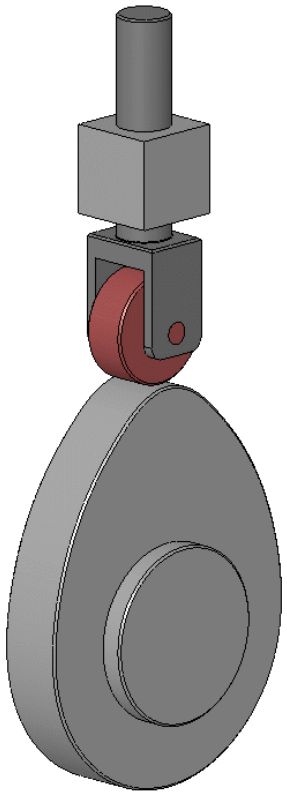
extremidade de rolo

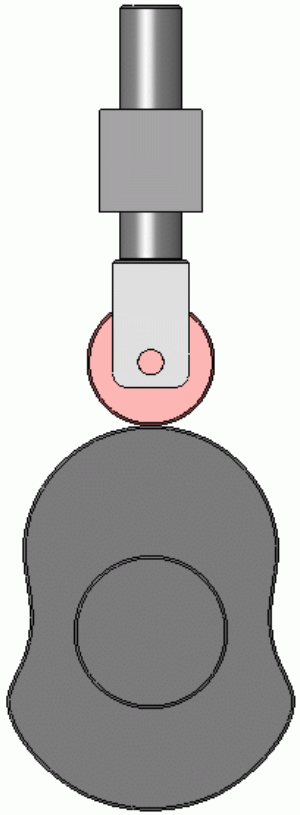


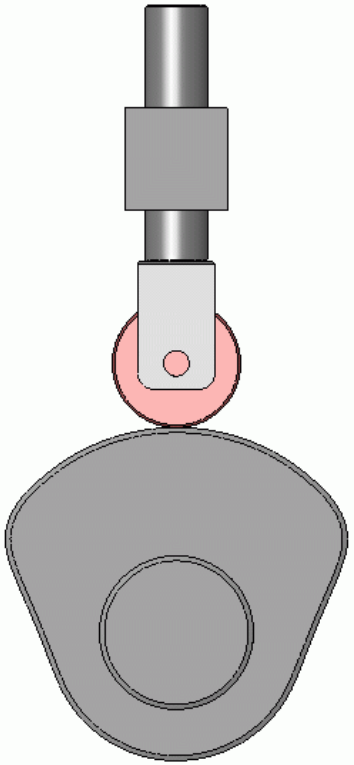
extremidade de prato

ELEMENTOS DE TRANSMISSÃO

CAMES



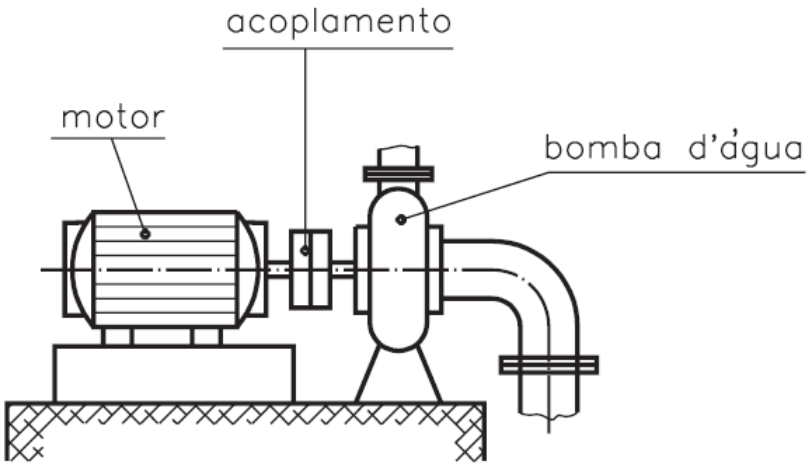




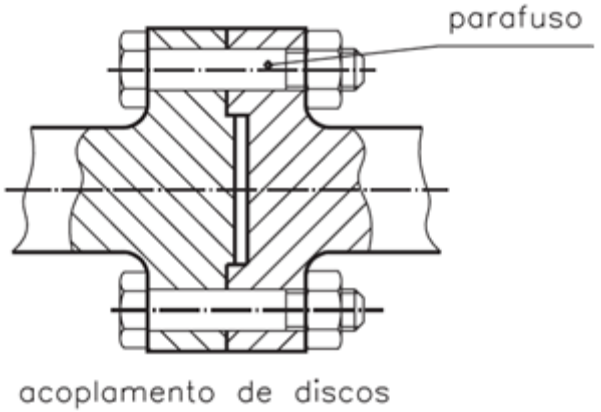
ELEMENTOS DE TRANSMISSÃO

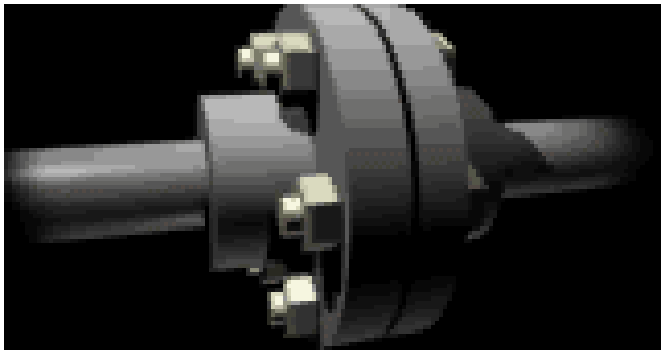
ACOPLAMENTOS

Exemplo de Aplicação



Acoplamentos Fixos

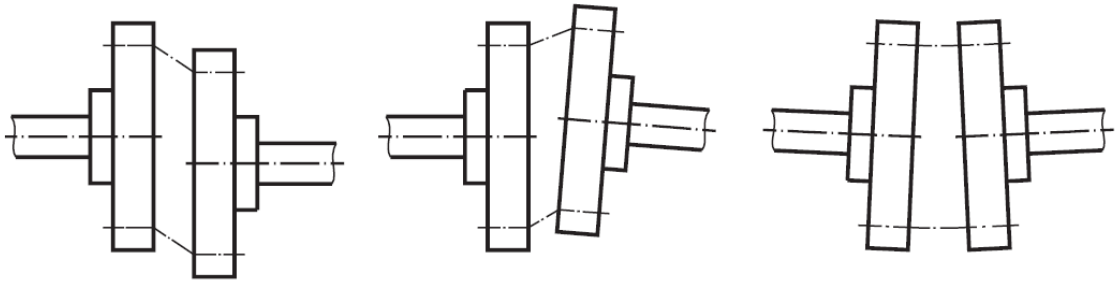




ELEMENTOS DE TRANSMISSÃO

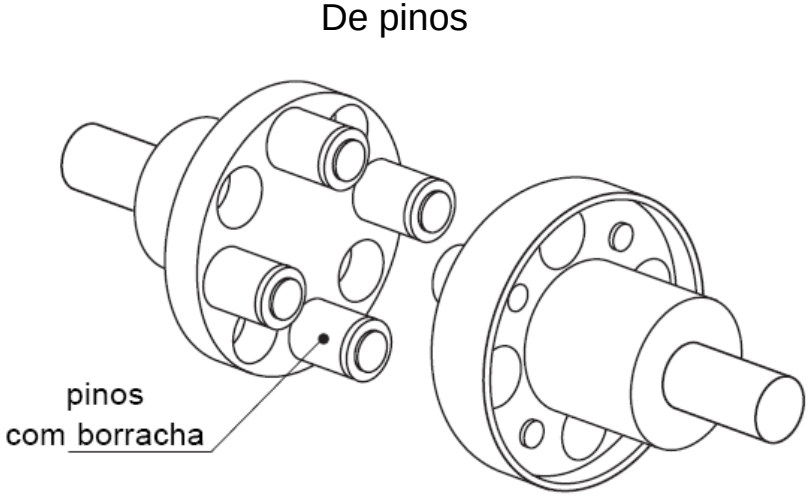
ACOPLAMENTOS

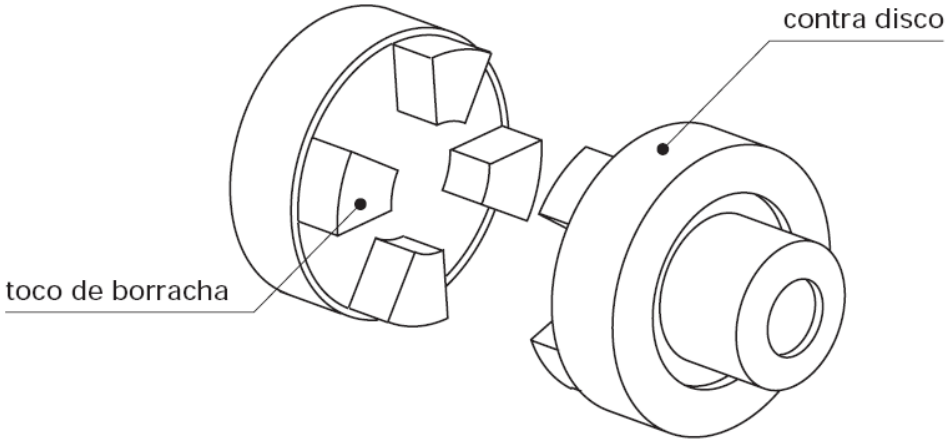
Acoplamentos Elásticos



De garras

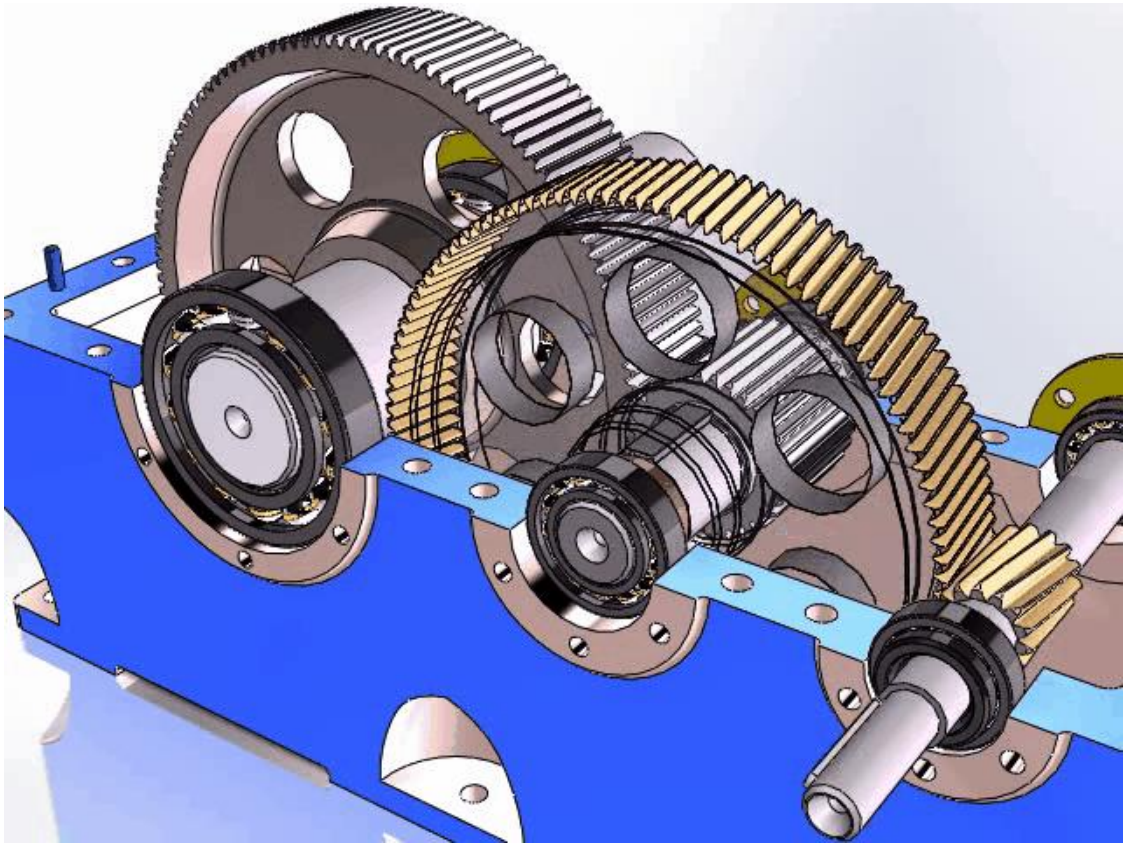
De pinos





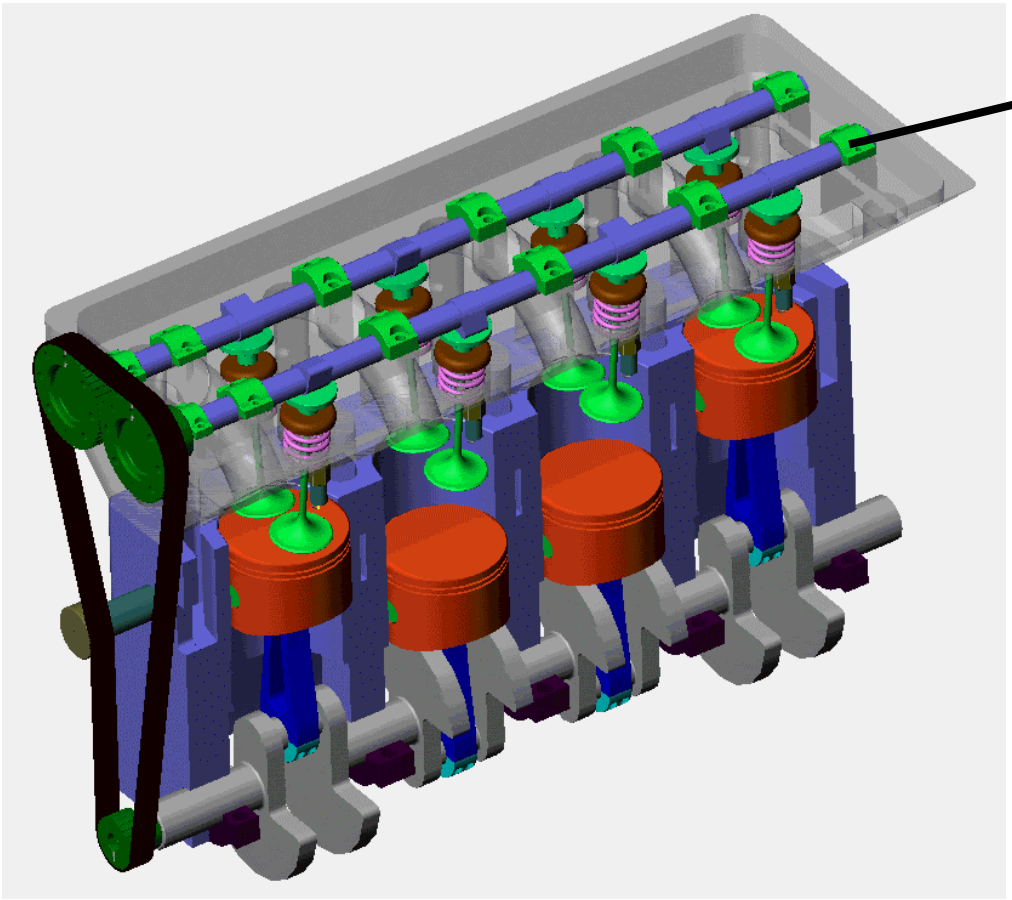
ELEMENTOS DE TRANSMISSÃO

EXEMPLOS

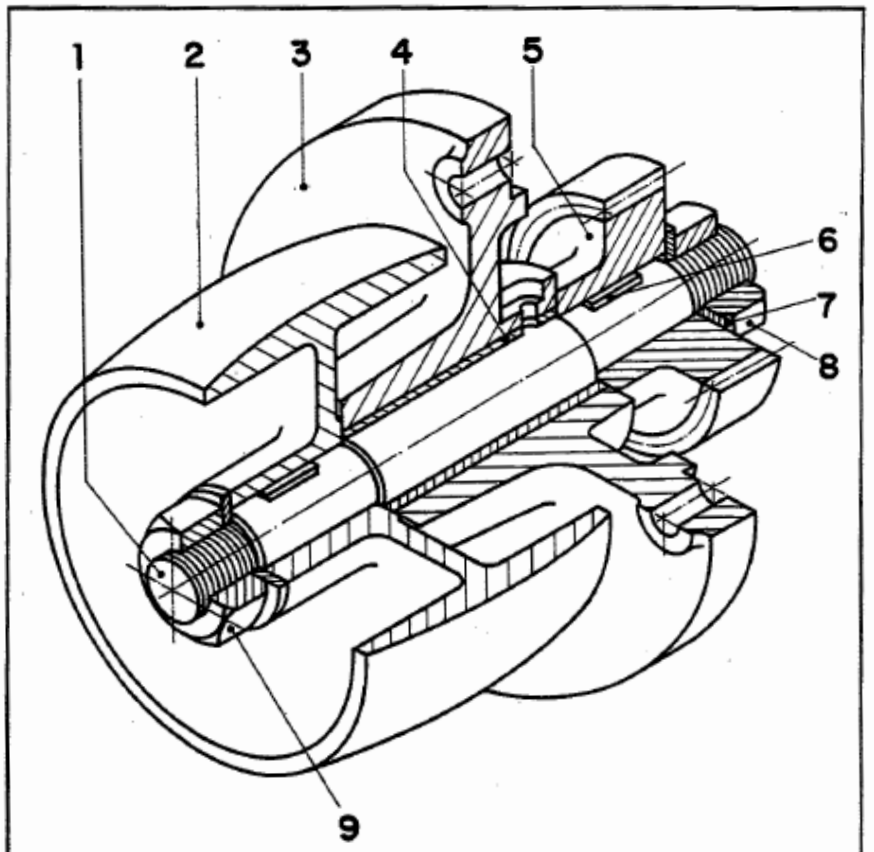


ELEMENTOS DE TRANSMISSÃO

EXEMPLOS

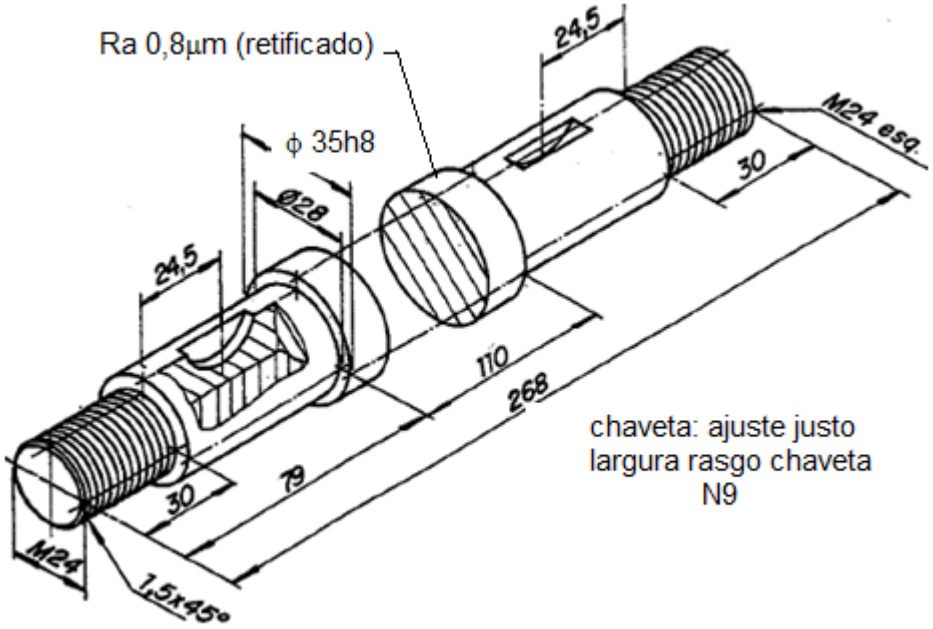


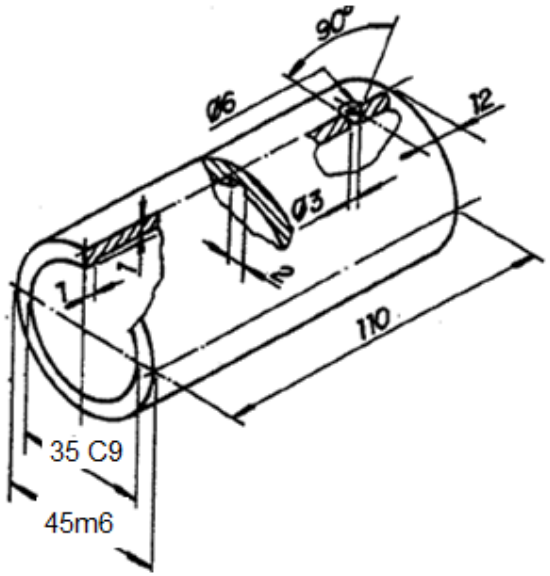
Exercício – Fazer o desenho definitivo dos componentes e do conjunto.



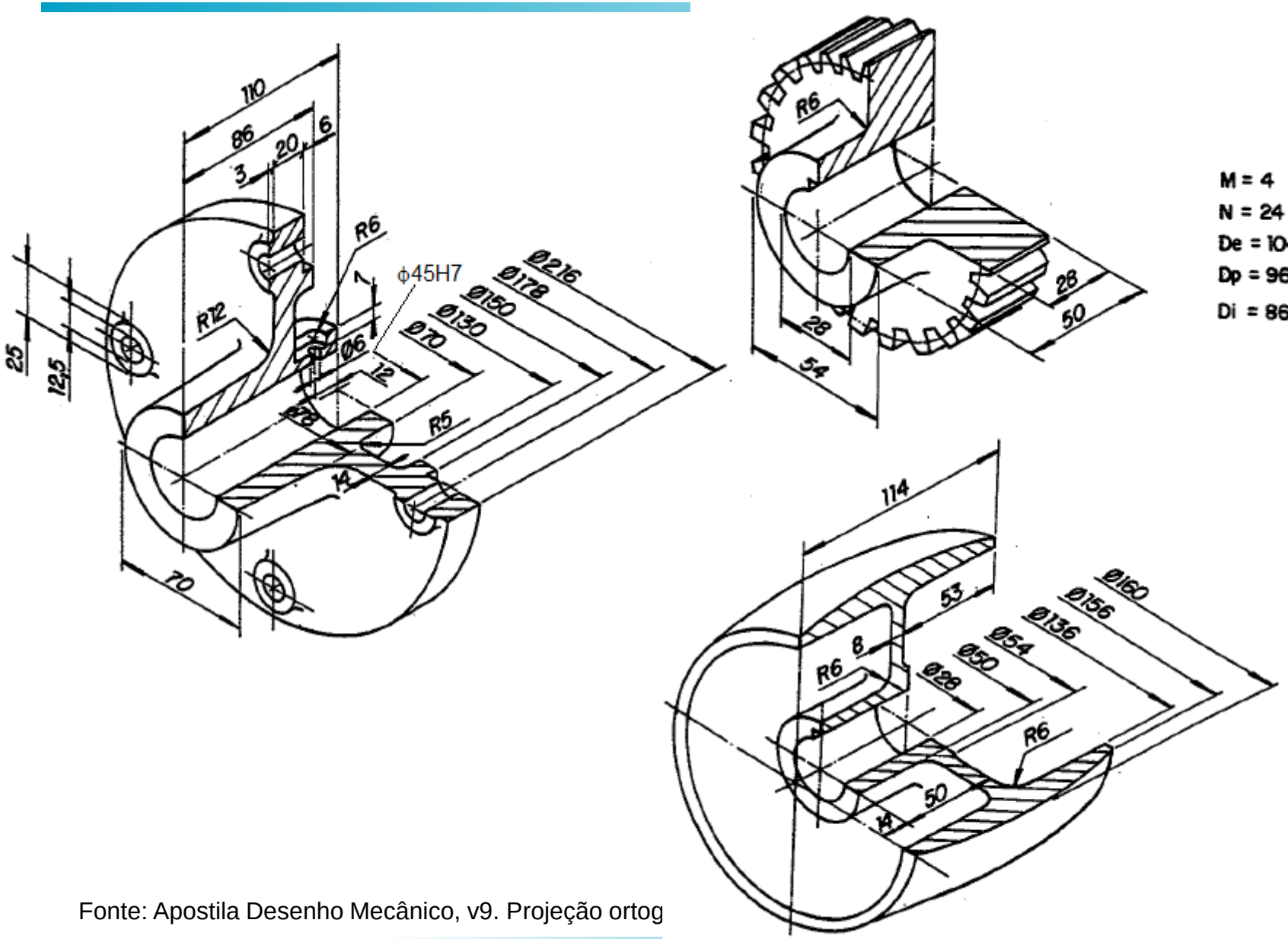
Peça	Denominações e observações	Quant.	Material e dimensões	
9	Porca sextavada	1	Aço ABNT 1020	M24
8	Porca sextavada	1	Aço ABNT 1020	M24 esq.
7	Arruela	2	Aço ABNT 1020	Ø24
6	Chaveta meia-cana	2	Aço ABNT 1020	0 34,92 x 15
5	Engrenagem	1	Aço ABNT 1020	0 114,3 x 55
4	Bucha	1	Bronze	0 50,8 x 120
3	Suporte	1	Ferro fundido	(modelo)
2	Polia	1	Ferro fundido	(modelo)
1	Eixo	1	Aço ABNT 1020	Ø 38 x 272

Fonte: Apostila Desenho Mecânico, v9. Projeção ortogonal. Convênio SENAI/São Paulo





Fonte: Apostila Desenho Mecânico, v9. Projeção ortogonal. Convênio SENAI/São Paulo



Fonte: Apostila Desenho Mecânico, v9. Projeção ortog

REFERÊNCIAS

Gordo, N.; Ferreira, J. **Elementos de Máquina**, Escola SENAI-SP.

Pauli, E. A.; Uliana, F. S. **Noções Básicas de Processos de Soldagem e Corte**, Escola SENAI-ES.