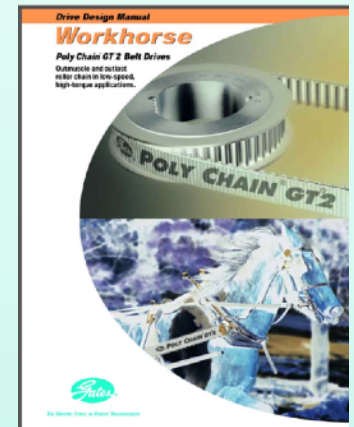


UNIDAD 5: Correas trapezoidales

Trabajo practico A5.B: **DIMENSIONAMIENTO DE TRANSMISIONES POR CORREAS DENTADAS** Problema 1



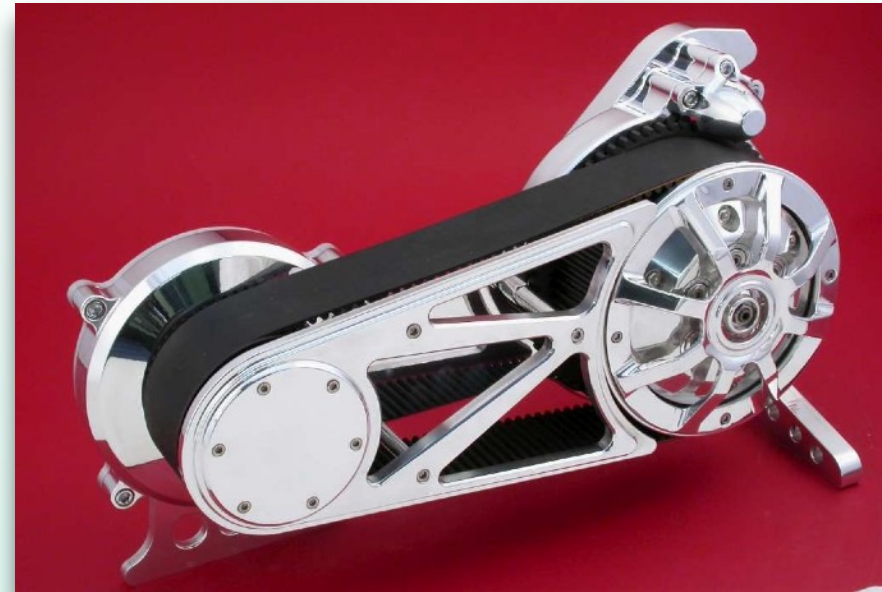
Para la resolución se utiliza el Catalogo técnico del fabricante GATES – versión 2014



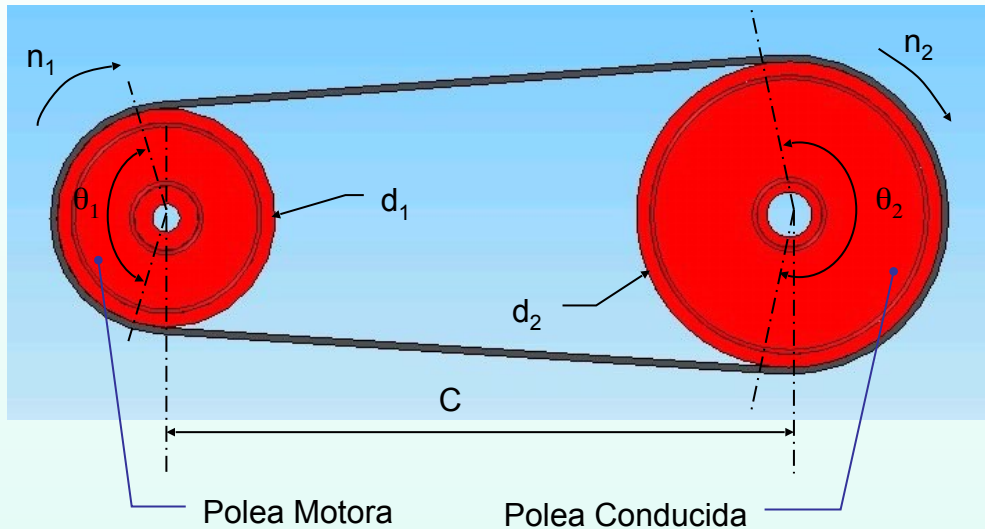
Ejercicio 1

Cátedra: MECANICA APLICADA
MECANICA Y MECANISMOS

Dimensionar la transmisión utilizando correas dentadas para una transmisión primaria de una motocicleta, que parte desde un motor de combustión interna bicilindrico de **22 HP** a una velocidad de **1700 rpm**. La correa dentada se encarga de mover la caja de velocidades, la cual gira con una velocidad de **680 rpm**. La distancia de los ejes es de **420 mm**. Se impone una limitación en el diámetro de las poleas a un máximo de 8 in. Se espera un funcionamiento estacional estimado como promedio en 4 hs/día. Selecciona la correa adecuada y las poleas. Utilizar un factor de servicio de **1,5**.



Ejercicio 1



Variables de entrada:

P : Potencia a transmitir

n_1 : Velocidad del motor

n_2 : Velocidad de la caja reductora

C : distancia entre centros

Tipo de servicio

Variables de salida:

1) Potencia de diseño P_c

(pagina 27- en función del motor, máquina conducida y hs de funcionamiento por día)

2) Paso de la correa

(pagina 25- en función de la velocidad de la polea mas rápida y de potencia de diseño)

3) Poleas y longitud de correa

(desde pág.. 28 a 61 - en función de rel. de velocidad, distancia entre centros, y limitaciones de diámetros de poleas)

4) Verificación velocidad tangencial

(máxima velocidad recomendada por el fabricante: 6500 pie/min)

5) Ancho de la correa

(desde pág. 62 a 70 - en función de diámetro polea menor, velocidad, rel. de velocidad y longitud de correa)

6) Calculo del tensionado

(desde pág. 106 a 108 - en función los parámetros seleccionados anteriormente)

Ejercicio 1

Maquina conducida:

Caja engranajes
Velocidad: 680 rpm
Horas de trabajo: 4 hs/día
Diam. Max de polea: 8 in

Maquina conductora:

Motor comb. interna bicilindrico 22 HP
Velocidad: 1700 rpm
Distancia entre ejes 420 mm
Condición de func: normal.

1. Potencia de diseño P_c

Se obtiene de afectar la potencia de la transmisión (de la erogada por el motor o la consumida por la maquina) por el factor de servicio:

$$P_c = P \cdot f_{cp}$$

$$P_c = 22HP \cdot 1,5 = 33HP$$

El factor de servicio deberá seleccionarse de tabla pag. 27

Ejercicio 1

Tabla pag. 27

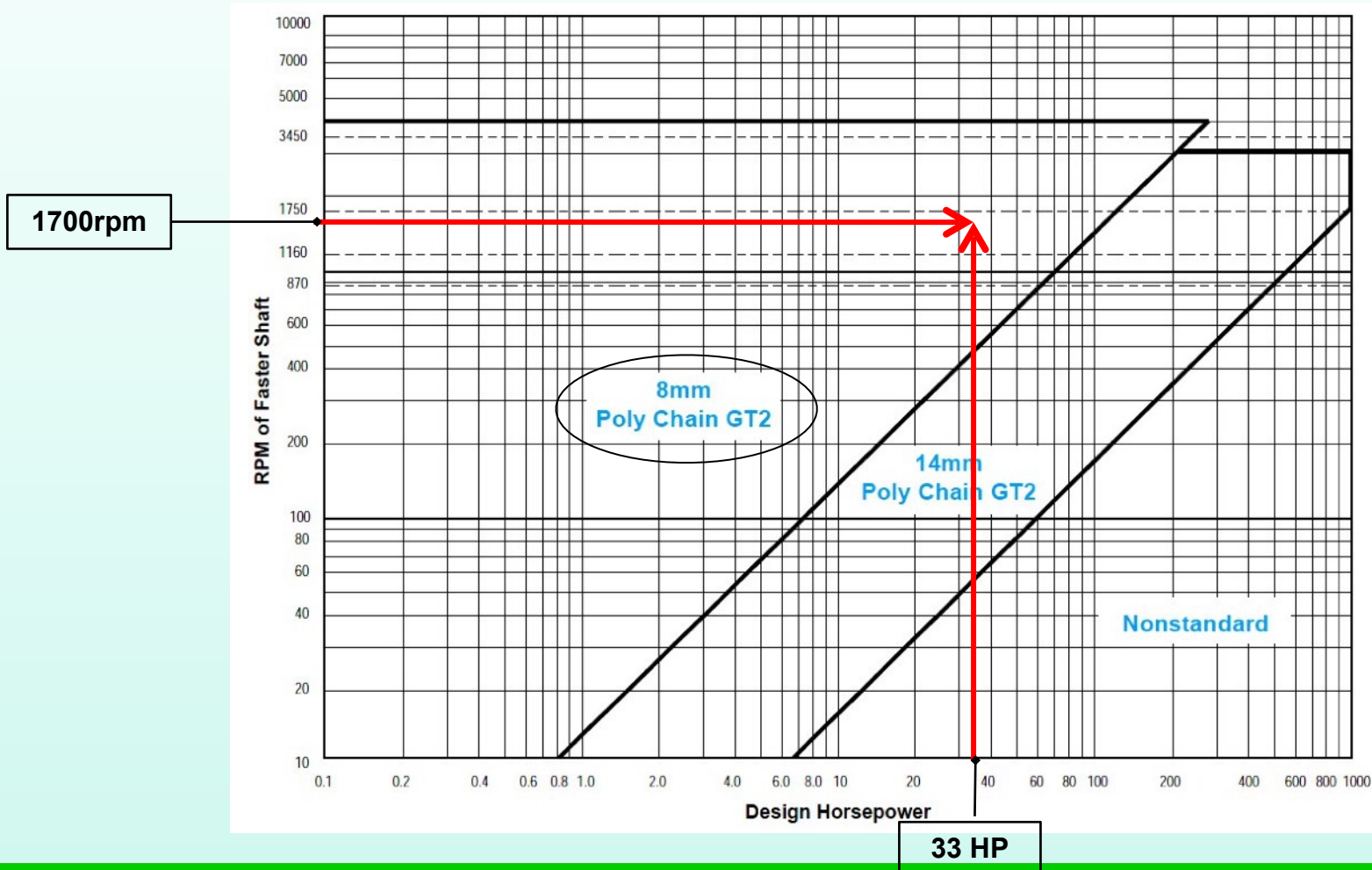
f_{cp} →

<div>DriveN Machine</div> <p>The driveN machines listed below are representative samples only. Select a driveN machine whose load characteristics most closely approximate those of the machine being considered.</p>	DriveR					
	AC Motors: Normal Torque, Squirrel Cage, Synchronous, Split Phase, Inverter Controlled DC Motors: Shunt Wound, Stepper Motors Engines: Multiple Cylinder Internal Combustion.			AC Motors: High Torque, High Slip, Repulsion-Induction, Single Phase, Series Wound, Slip Ring. DC Motors: Series Wound, Compound Wound, Servo Motors. Engines: Single Cylinder Internal Combustion. Line shafts Clutches		
	Intermittent Service	Normal Service	Continuous Service	Intermittent Service	Normal Service	Continuous Service
	Up to 8 Hours Daily or Seasonal	8-16 Hours Daily	16-24 Hours Daily	Up to 8 Hours Daily or Seasonal	8-16 Hours Daily	16-24 Hours Daily
Display, Dispensing Equipment Instrumentation Measuring Equipment Medical Equipment Office, Projection Equipment	1.0	1.2	1.4	1.2	1.4	1.6
Appliances, Sweepers, Sewing Machines Screens, Oven Screens, Drum, Conical Woodworking Equipment: (Light) Band Saws, Drills, Lathes	1.1	1.3	1.5	1.3	1.5	1.7
Agitators for Liquids Conveyors: Belt, Light Package Drill Press, Lathes, Saws Laundry Machinery Woodworking Equipment: (Heavy) Circular Saws, Joiners, Planers	1.2	1.4	1.6	1.6	1.8	2.0

Ejercicio 1

2. Paso de la correa

Gráfica pag. 25.



Ejercicio 1

Cátedra: MECANICA APLICADA MECANICA Y MECANISMOS

3. Poleas y longitud de correa (desde pág. 28 a 61)

$$i = \frac{n_1}{n_2} = \frac{d_2}{d_1} \quad i = \frac{1700 \text{ rpm}}{680 \text{ rpm}} = 2,5$$

$$C_{in} = \frac{C}{25,4} = \frac{420 \text{ mm}}{25,4} = 16,53 \text{ in}$$

8mm PITCH BELTS

Drive Selection Table

Sprocket Combinations				Speed Ratio	Center Distance, Inches								
DriveR		DriveN			8MGT-640 P.L 25.20 80 teeth	8MGT-720 P.L 28.35 90 teeth	8MGT-800 P.L 31.50 100 teeth	8MGT-896 P.L 35.28 112 teeth	8MGT-1000 P.L 39.37 125 teeth	8MGT-1120 P.L 44.09 140 teeth	8MGT-1200 P.L 47.24 150 teeth	8MGT-1280 P.L 50.39 160 teeth	8MGT-1440 P.L 56.69 180 teeth
No. of Grooves	Pitch Diameter (Inches)	No. of Grooves	Pitch Diameter (Inches)										
30	3.008	60	6.015	2.000	5.30	6.92	8.53	10.44	12.51	14.88	17.46	19.05	21.21
40	4.010	80	8.020	2.000				7.94	10.04	12.43	14.03	15.62	18.79
45	4.511	90	9.023	2.000					8.76	11.19	12.79	14.39	17.57
56	5.614	140	14.036	2.500									
22	2.206	53	5.314	2.409	6.51	8.12	9.72	11.63	13.69	16.06	17.65	19.23	22.38
45	4.511	112	11.229	2.439						9.05	10.73	12.37	15.62
30	3.008	75	7.519	2.500			7.12	8.00	11.10	12.50	15.18	16.78	19.95
32	3.208	80	8.020	2.500			6.48	8.48	10.59	13.00	14.60	16.20	19.38
36	3.609	90	9.023	2.500				7.20	9.37	11.81	13.43	15.03	18.22
56	5.614	140	14.036	2.500									12.18
25	2.506	63	6.316	2.520	5.33	6.98	8.61	10.54	12.61	15.00	16.58	18.17	21.33
71	7.118	180	18.046	2.535									

- En función de la limitación impuesta, selecciono 2 alternativas que tienen los diámetros de las poleas por debajo de 8 in

Ejercicio 1

3. Poleas y longitud de correa (desde pág. 28 a 61)

Resumen de las alternativas:

	Alt A	Alt B
z_1 (num dientes polea motora)	30	25
d_1 (dia primitivo polea motora)	3,008 in	2,506 in
z_2 (num dientes polea conducida)	75	63
d_2 (dia primitivo polea conducida)	7,515 in	6,316 in
C (dist centros)	16,78 in	16,58 in
Denom correa	8MGT-1280	8MGT-1200

Ejercicio 1

4. Velocidad tangencial de la correa

Se deberá verificar que la velocidad tangencial de la correa no supere el valor:

$$V_t = \frac{\pi \cdot d \cdot N}{12} = \frac{\pi \cdot D \cdot n}{12} \leq 6500 \text{ ft} / \text{min}$$

$$V_{t_A} = \frac{\pi \cdot 3,008 \text{ in} \cdot 1700 \text{ rpm}}{12} = 1338 \text{ ft} / \text{min}$$

$$V_{t_B} = \frac{\pi \cdot 2,506 \text{ in} \cdot 1700 \text{ rpm}}{12} = 1115 \text{ ft} / \text{min}$$

Ejercicio 1

Cátedra: MECANICA APLICADA MECANICA Y MECANISMOS

5. Ancho de la correa (desde pag. 62 a 70)

$$Pe = (Pb + \Delta pi) \cdot fcl$$

Pe = Potencia efectiva de la correa

Es la capacidad de transmisión de la correa en las condiciones seleccionadas: velocidad, paso, número de dientes de las poleas y longitud de la correa

Pb = Potencia base

Es la capacidad de transmisión de la correa en las condiciones de ensayo del fabricante: paso, **relación de velocidad = 1**, longitud de referencia.

ΔPi = Incremento de la potencia por relación de velocidad

Incremento de la velocidad para mandos con relaciones de velocidad distinta de 1.

fcl = Factor de modificación de potencia por longitud.

Este factor considera la diferencia entre la longitud seleccionada y la longitud con la que el fabricante hace el ensayo.

$$Pe \geq Pc$$

Potencia efectiva de la correa \geq Potencia de diseño

Horsepower Rating for 12mm Wide 8mm Pitch Poly Chain® GT² Belts

RPM OF FASTER SHAFT	Rated Base Horsepower for Small Sprocket (Number of Grooves and Pitch Diameter, inches)															
	22	25	28	30	32	34	36	38	40	42	45	48	50	53	56	60
	2206	2505	2807	3008	3210	3409	3598	3796	4011	4241	4484	4740	5000	5274	5560	6066
10	0.07	0.088	0.100	0.11	0.12	0.12	0.13	0.14	0.15	0.15	0.16	0.18	0.19	0.20	0.22	0.23
20	0.14	0.17	0.19	0.20	0.22	0.23	0.25	0.26	0.27	0.29	0.31	0.33	0.34	0.36	0.38	0.41
30	0.24	0.27	0.31	0.34	0.36	0.38	0.41	0.43	0.45	0.48	0.51	0.55	0.57	0.61	0.64	0.68
40	0.29	0.34	0.38	0.41	0.44	0.47	0.50	0.53	0.56	0.59	0.63	0.67	0.70	0.74	0.79	0.84
50	0.37	0.43	0.49	0.53	0.57	0.61	0.64	0.68	0.72	0.75	0.81	0.86	0.90	0.95	1.01	1.08
60	0.44	0.51	0.58	0.63	0.67	0.72	0.76	0.81	0.85	0.89	0.96	1.02	1.07	1.13	1.19	1.27
70	0.54	0.63	0.71	0.77	0.82	0.88	0.93	0.99	1.04	1.10	1.18	1.25	1.31	1.39	1.47	1.57
80	0.61	0.70	0.80	0.86	0.92	0.99	1.05	1.11	1.17	1.23	1.32	1.41	1.47	1.56	1.64	1.76
90	0.70	0.81	0.92	0.99	1.06	1.13	1.20	1.27	1.34	1.41	1.52	1.62	1.69	1.79	1.89	2.03
100	0.80	0.92	1.04	1.12	1.20	1.28	1.36	1.44	1.52	1.61	1.72	1.83	1.94	2.05	2.16	2.32
112	0.91	1.04	1.17	1.26	1.35	1.44	1.53	1.62	1.72	1.82	1.93	2.04	2.15	2.26	2.38	2.56
125	1.04	1.19	1.34	1.44	1.54	1.64	1.75	1.86	1.97	2.09	2.21	2.34	2.46	2.59	2.71	2.89
140	1.12	1.30	1.48	1.59	1.71	1.83	1.94	2.05	2.17	2.29	2.44	2.61	2.72	2.89	3.05	3.26
150	1.28	1.49	1.69	1.82	1.95	2.09	2.22	2.35	2.48	2.61	2.80	2.99	3.11	3.30	3.49	3.74
160	1.40	1.61	1.81	1.95	2.10	2.24	2.39	2.53	2.68	2.83	3.00	3.17	3.34	3.51	3.69	3.94
175	1.50	1.76	1.99	2.14	2.29	2.44	2.59	2.74	2.89	3.05	3.25	3.45	3.64	3.84	4.04	4.30
190	1.61	1.91	2.13	2.29	2.46	2.63	2.80	2.97	3.14	3.31	3.50	3.69	3.89	4.12	4.37	4.60
200	1.75	2.09	2.32	2.49	2.66	2.83	3.00	3.17	3.35	3.53	3.73	3.92	4.13	4.34	4.55	4.80
225	1.98	2.37	2.61	2.80	2.99	3.17	3.36	3.55	3.74	3.93	4.15	4.36	4.58	4.79	4.99	5.26
240	2.16	2.59	2.84	3.04	3.24	3.43	3.62	3.81	3.99	4.19	4.40	4.62	4.83	5.05	5.26	5.53
250	2.30	2.80	3.05	3.26	3.47	3.68	3.89	4.10	4.31	4.53	4.75	4.96	5.18	5.39	5.60	5.88
275	2.57	3.21	3.47	3.69	3.91	4.13	4.35	4.57	4.79	5.00	5.23	5.45	5.67	5.89	6.10	6.38
280	2.60	3.29	3.56	3.77	3.98	4.19	4.40	4.61	4.82	5.03	5.25	5.46	5.67	5.89	6.10	6.38
300	2.83	3.58	3.86	4.07	4.28	4.49	4.70	4.91	5.12	5.33	5.54	5.75	5.96	6.17	6.38	6.65
320	3.08	3.93	4.21	4.42	4.63	4.84	5.05	5.26	5.47	5.68	5.89	6.10	6.31	6.52	6.73	7.00
350	3.43	4.44	4.72	4.93	5.14	5.35	5.56	5.77	5.98	6.19	6.40	6.61	6.82	7.03	7.24	7.51
375	3.71	4.84	5.12	5.33	5.54	5.75	5.96	6.17	6.38	6.59	6.80	7.01	7.22	7.43	7.64	7.91
400	4.00	5.28	5.56	5.77	5.98	6.19	6.40	6.61	6.82	7.03	7.24	7.45	7.66	7.87	8.08	8.35
425	4.25	5.68	5.96	6.17	6.38	6.59	6.80	7.01	7.22	7.43	7.64	7.85	8.06	8.27	8.48	8.74
450	4.50	6.08	6.36	6.57	6.78	6.99	7.20	7.41	7.62	7.83	8.04	8.25	8.46	8.67	8.88	9.14
475	4.75	6.48	6.76	6.97	7.18	7.39	7.60	7.81	8.02	8.23	8.44	8.65	8.86	9.07	9.28	9.54
500	5.00	6.84	7.12	7.33	7.54	7.75	7.96	8.17	8.38	8.59	8.80	9.01	9.22	9.43	9.64	9.90
525	5.25	7.24	7.52	7.73	7.94	8.15	8.36	8.57	8.78	8.99	9.20	9.41	9.62	9.83	10.04	10.30
550	5.50	7.64	7.92	8.13	8.34	8.55	8.76	8.97	9.18	9.39	9.60	9.81	10.02	10.23	10.44	10.70
575	5.75	8.16	8.44	8.65	8.86	9.07	9.28	9.49	9.70	9.91	10.12	10.33	10.54	10.75	10.96	11.22
600	6.00	8.60	8.88	9.09	9.30	9.51	9.72	9.93	10.14	10.35	10.56	10.77	10.98	11.19	11.40	11.66
625	6.25	9.04	9.32	9.53	9.74	9.95	10.16	10.37	10.58	10.79	11.00	11.21	11.42	11.63	11.84	12.10
650	6.50	9.56	9.84	10.05	10.26	10.47	10.68	10.89	11.10	11.31	11.52	11.73	11.94	12.15	12.36	12.62
675	6.75	10.12	10.40	10.61	10.82	11.03	11.24	11.45	11.66	11.87	12.08	12.29	12.50	12.71	12.92	13.18
700	7.00	10.72	11.00	11.21	11.42	11.63	11.84	12.05	12.26	12.47	12.68	12.89	13.10	13.31	13.52	13.78
725	7.25	11.36	11.64	11.85	12.06	12.27	12.48	12.69	12.90	13.11	13.32	13.53	13.74	13.95	14.16	14.42
750	7.50	12.04	12.32	12.53	12.74	12.95	13.16	13.37	13.58	13.79	14.00	14.21	14.42	14.63	14.84	15.10
775	7.75	12.76	13.04	13.25	13.46	13.67	13.88	14.09	14.30	14.51	14.72	14.93	15.14	15.35	15.56	15.82
800	8.00	13.52	13.80	14.01	14.22	14.43	14.64	14.85	15.06	15.27	15.48	15.69	15.90	16.11	16.32	16.58
825	8.25	14.32	14.60	14.81	15.02	15.23	15.44	15.65	15.86	16.07	16.28	16.49	16.70	16.91	17.12	17.38
850	8.50	15.16	15.44	15.65	15.86	16.07	16.28	16.49	16.70	16.91	17.12	17.33	17.54	17.75	17.96	18.22
875	8.75	16.04	16.32	16.53	16.74	16.95	17.16	17.37	17.58	17.79	18.00	18.21	18.42	18.63	18.84	19.10
900	9.00	16.96	17.24	17.45	17.66	17.87	18.08	18.29	18.50	18.71	18.92	19.13	19.34	19.55	19.76	20.02
925	9.25	17.92	18.20	18.41	18.62	18.83	19.04	19.25	19.46	19.67	19.88	20.09	20.30	20.51	20.72	21.08
950	9.50	18.92	19.20	19.41	19.62	19.83	20.04	20.25	20.46	20.67	20.88	21.09	21.30	21.51	21.72	22.08
975	9.75	20.00	20.28	20.49	20.70	20.91	21.12	21.33	21.54	21.75	21.96	22.17	22.38	22.59	22.80	23.16
1000	10.00	21.12	21.40	21.61	21.82	22.03	22.24	22.45	22.66	22.87	23.08	23.29	23.50	23.71	23.92	24.28
1025	10.25	22.28	22.56	22.77	22.98	23.19	23.40	23.61	23.82	24.03	24.24	24.45	24.66	24.87	25.08	25.44
1050	10.50	23.48	23.76	23.97	24.18	24.39	24.60	24.81	25.02	25.23	25.44	25.65	25.86	26.07	26.28	26.64
1075	10.75	24.72	25.00	25.21	25.42	25.63	25.84	26.05	26.26	26.47	26.68	26.89	27.10	27.31	27.52	27.88
1100	11.00	26.00	26.28	26.49	26.70	26.91	27.12	27.33	27.54	27.75	27.96	28.17	28.38	28.59	28.80	29.16
1125	11.25	27.32	27.60	27.81	28.02	28.23	28.44	28.65	28.86	29.07	29.28	29.49	29.70	29.91	30.12	30.48
1150	11.50	28.68	28.96	29.17	29.38	29.59	29.80	30.01	30.22	30.43	30.64	30.85	31.06	31.27	31.48	31.84
1175	11.75	30.08	30.36	30.57	30.78	30.99	31.20	31.41	31.62	31.83	32.04	32.25	32.46	32.67	32.88	33.24
1200	12.00	31.52	31.80	32.01	32.22	32.43	32.64	32.85	33.06	33.27	33.48	33.69	33.90	34.11	34.32	34.68
1225	12.25	33.00	33.28	33.49	33.70	33.91	34.12	34.33	34.54	34.75	34.96	35.17	35.38	35.59	35.80	36.16
1250	12.50	34.52	34.80	35.01	35.22	35.43	35.64	35.85	36.06	36.27	36.48	36.69	36.90	37.11	37.32	37.68
1275	12.75	36.08	36.36	36.57	36.78	36.99	37.20	37.41	37.62	37.83	38.04	38.25	38.46	38.67	38.88	39.24
1300	13.00	37.68	37.96	38.17	38.38	38.59	38.80	39.01	39.22	39.43	39.64	39.85	40.06	40.27	40.48	40.84
1325	13.25	39.32	39.60	39.81	40.02	40.23	40.44	40.65	40.86	41.07	41.28	41.49	41.70	41.91	42.12	42.48
1350	13.50	41.00	41.28	41.49	41.70	41.91	42.12	42.33	42.54	42.75	42.96	43.17	43.38	43.59	43.80	44.16
1375	13.75	42.72	43.00	43.21	43.42	43.63	43.84	44.05	44.26	44.47	44.68	44.89	45.10	45.31	45.52	45.88
1400	14.00	44.48	44.76	44.97	45.18	45.39	45.60	45.81	46.02	46.23	46.44	46.65	46.86	47.07	47.28	47.64
1425	14.25	46.28	46.56	46.77	46.98	47.19	47.40	47.61	47.82	48.03	48.24	48.45	48.66	48.87	49.08	49.44
1450	14.50	48.12	48.40	48.61	48.82	49.03	49.24	49.45	49.66	49.87	50.08	50.29	50.50	50.71	50.92	51.28
1475	14.75	49.96	50.24	50.45	50.66	50.87	51.08	51.29	51.50	51.71	51.92	52.13	52.34	52.55	52.76	53.12
1500	15.00	51.80	52.08	52.29	52.50	52.71	52.92	53.13	53.34	53.55	53.76	53.97	54.18	54.39	54.60	54.96

Ejercicio 1

Cátedra: MECANICA APLICADA
MECANICA Y MECANISMOS

5. Ancho de la correa (desde pag. 62 a 70)

$$Pb_A = 31,2HP$$

$$Pb_B = 25,3HP$$

$$\Delta pi \text{ ? ???}$$

Horsepower Rating for 36mm Wide 8mm Pitch Poly Chain® GT®2 Belts

RPM OF FASTER SHAFT	Rated Base Horsepower for Small Sprocket (Number of Grooves and Pitch Diameter, Inches)																				
	22 2.206	25 2.506	28 2.807	30 3.008	32 3.208	34 3.409	36 3.609	38 3.810	40 4.010	42 4.211	45 4.511	48 4.812	50 5.013	53 5.314	56 5.614	60 6.015	63 6.316	67 6.717	71 7.118	75 7.519	80 8.020
10	0.23	0.26	0.30	0.32	0.35	0.37	0.39	0.41	0.44	0.46	0.49	0.53	0.55	0.58	0.61	0.66	0.69	0.73	0.78	0.82	0.87
20	0.43	0.50	0.56	0.61	0.65	0.69	0.74	0.78	0.82	0.86	0.93	0.99	1.03	1.09	1.15	1.24	1.30	1.38	1.46	1.54	1.64
35	0.71	0.82	0.93	1.01	1.08	1.15	1.22	1.29	1.36	1.43	1.54	1.64	1.71	1.82	1.92	2.05	2.16	2.29	2.42	2.56	2.72
44	0.88	1.01	1.15	1.24	1.33	1.42	1.50	1.59	1.68	1.76	1.89	2.02	2.11	2.23	2.36	2.53	2.65	2.82	2.98	3.14	3.35
50	1.12	1.30	1.47	1.59	1.70	1.81	1.92	2.04	2.15	2.26	2.43	2.59	2.70	2.86	3.03	3.24	3.40	3.61	3.82	4.03	4.29
700	9.99	11.6	13.2	14.3	15.3	16.4	17.4	18.4	19.5	20.5	22.0	23.5	24.5	25.9	27.4	29.3	30.8	32.7	34.6	36.4	38.7
800	11.2	13.0	14.8	16.0	17.2	18.4	19.5	20.7	21.8	23.0	24.7	26.3	27.5	29.1	30.8	32.9	34.5	36.7	38.8	40.9	43.5
870	12.0	14.0	15.9	17.2	18.5	19.8	21.0	22.2	23.5	24.7	26.5	28.3	29.5	31.3	33.1	35.4	37.1	39.4	41.7	43.9	46.7
900	12.4	14.4	16.4	17.7	19.0	20.3	21.6	22.9	24.2	25.4	27.3	29.2	30.4	32.2	34.0	36.4	38.2	40.6	42.9	45.2	48.1
1000	13.5	15.8	18.0	19.4	20.8	22.3	23.7	25.1	26.5	27.8	29.9	31.9	33.3	35.3	37.2	39.9	41.8	44.4	46.9	49.4	52.6
1160	15.4	17.9	20.4	22.0	23.7	25.3	26.9	28.5	30.0	31.6	33.9	36.2	37.8	40.0	42.3	45.2	47.4	50.3	53.2	56.1	59.6
1750	21.7	25.3	28.4	31.2	33.5	35.8	38.1	40.3	42.5	44.8	48.0	51.3	53.4	56.6	59.7	63.9	66.9	71.0	75.0	78.9	83.7
2000	24.2	28.3	32.2	34.9	37.5	40.0	42.6	45.1	47.6	50.0	53.7	57.3	59.7	63.2	66.7	71.3	74.7	79.2	83.5	87.9	93.2
3000	33.7	39.4	45.0	48.7	52.3	55.9	59.4	62.9	66.3	69.7	74.7	79.6	82.9	87.6	92.3	98.4	102.9	108.8	114.4	119.9	126.6

Ejercicio 1

5. Ancho de la correa (desde pag. 62 a 70)

$$\Delta p_i = 1,73 \text{ HP}$$

RPM OF FASTER SHAFT	Additional Horsepower for Speed Ratio of Speed-Down Drives									
	1.00 to 1.04	1.05 to 1.11	1.12 to 1.19	1.20 to 1.30	1.31 to 1.45	1.46 to 1.65	1.66 to 1.99	2.00 to 2.63	2.64 to 4.47	4.48 and Over
10	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
20	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.03
35	0.00	0.00	0.01	0.01	0.02	0.02	0.03	0.03	0.04	0.04
44	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.05
55	0.00	0.01	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.06
68	0.00	0.01	0.02	0.02	0.03	0.04	0.05	0.06	0.07	0.07
80	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.08
1000	0.00	0.14	0.28	0.42	0.56	0.70	0.85	0.99	1.13	1.27
1160	0.00	0.16	0.33	0.49	0.65	0.82	0.98	1.14	1.31	1.47
1750	0.00	0.25	0.49	0.74	0.99	1.23	1.48	1.73	1.97	2.22
2000	0.00	0.28	0.56	0.85	1.13	1.41	1.69	1.97	2.25	2.54
3000	0.00	0.42	0.85	1.27	1.69	2.11	2.54	2.96	3.38	3.80
3450	0.00	0.49	0.97	1.46	1.94	2.43	2.92	3.40	3.89	4.38

Ejercicio 1

Cátedra: MECANICA APLICADA
MECANICA Y MECANISMOS

5. Ancho de la correa (desde pag. 62 a 70)

$$fcl_A = 1,05$$

$$fcl_B = 1,03$$

Poly Chain® GT2® Belt Length Correction Factor Table					
Pitch/Length Designation	Number of Teeth	Correction Factor	Pitch/Length Designation	Number of Teeth	Correction Factor
8MGT-640	80	0.79	8MGT-1280	160	1.05
8MGT-720	90	0.83	8MGT-1440	180	1.10
8MGT-800	100	0.87	8MGT-1600	200	1.14
8MGT-896	112	0.91	8MGT-1760	220	1.17
8MGT-960	120	0.94	8MGT-1792	224	1.18
8MGT-1000	125	0.96	8MGT-2000	250	1.22
8MGT-1040	130	0.97	8MGT-2200	275	1.26
8MGT-1120	140	1.00	8MGT-2240	280	1.26
8MGT-1200	150	1.03	8MGT-2400	300	1.29
8MGT-1224	153	1.03	8MGT-2520	315	1.31

Ejercicio 1

5. Ancho de la correa (desde pag. 62 a 70)

$$Pe = (Pb + \Delta pi) \cdot Fcl$$

→

→

$Pe_A = (31,2HP + 1,73HP) \cdot 1,05 = 34,58HP$

→

$Pe_B = (25,3HP + 1,73HP) \cdot 1,03 = 27,84HP$

Recordando de diapositivas anteriores que:

$$Pe \geq Pc$$

Potencia efectiva de la correa \geq Potencia de diseño

Concluimos que la única opción que verifica es la alternativa A:

$$Pe_B \leq Pc$$

$$Pe_A \geq Pc$$

Ejercicio 1

5. Ancho de la correa (desde pag. 62 a 70)

Resumen de la selección:

	Alt A
z_1 (num dientes polea motora)	30
d_1 (dia primitivo polea motora)	3,008 in
z_2 (num dientes polea conducida)	75
d_2 (dia primitivo polea conducida)	7,515 in
C (dist centros)	16,78 in
Denom correa	8MGT-1280
Longitud	1280 mm (50,39in)
Ancho	36 mm

Acciones correctivas para disminuir el ANCHO de la correa:

- A) Aumentar el diámetro de las poleas (efecto reductor medio)
- B) Aumentar el paso de la correa (efecto reductor mayor)

Ejercicio 1

6. Tensionado de la correa

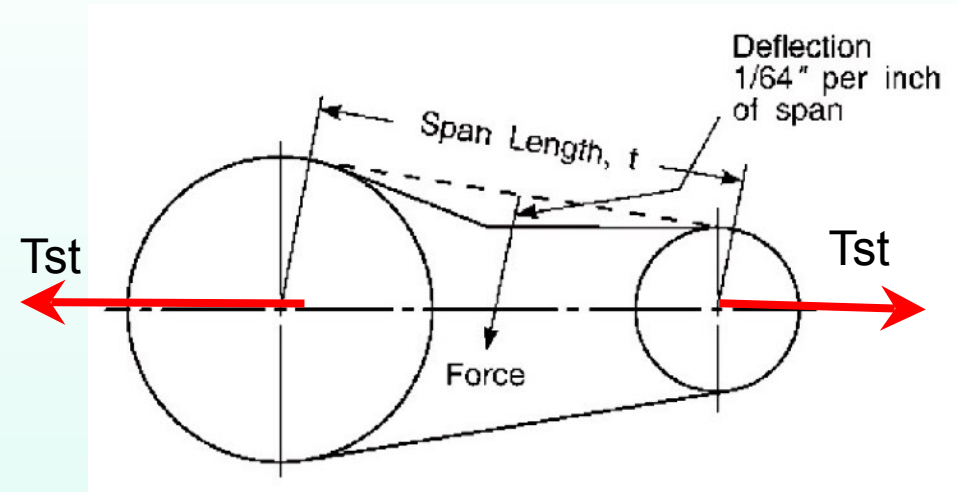
a) Calculo de la Tensión requerida

$$T_{st} = \left[\frac{17,4 \cdot Pc}{S} \right] + \left[m \cdot (S)^2 \right]$$

$$S = \frac{d \cdot N}{3820} = \frac{3,008in \cdot 1700rpm}{3823} = 1,34$$

Table 10

Pitch	Belt Width	m	Y
8mm	12mm	0.33	43.83
	21mm	0.57	76.70
	36mm	0.97	131.49
	62mm	1.68	226.45
14mm	20mm	0.92	134.57
	37mm	1.69	248.95
	68mm	3.11	457.52
	90mm	4.12	605.55
	125mm	5.72	841.04



Tst: tensión estática (lb)

Pc: Potencia de calculo: 33 HP

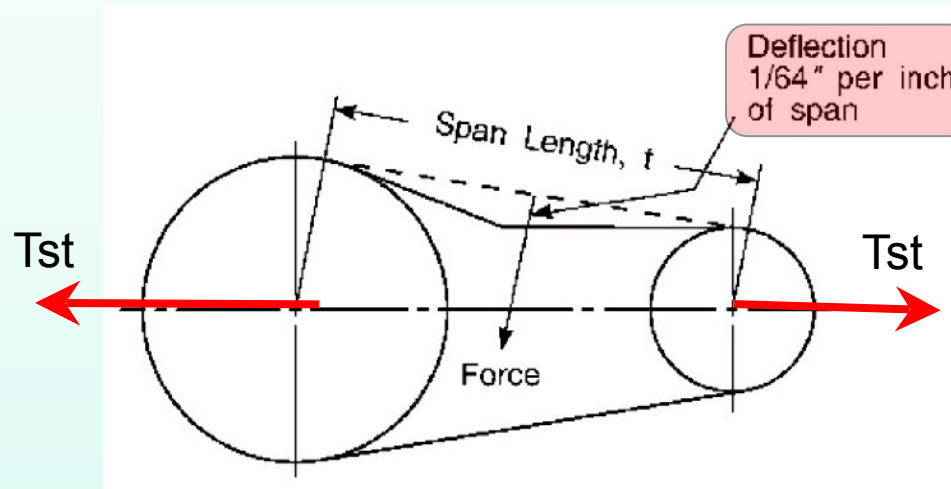
m: 0,97 (tabla 10 pag 107)

S: según formula

$$T_{st} = \left[\frac{17,4 \cdot 33HP}{1,34} \right] + \left[0,97 \cdot (1,34)^2 \right] = 430lb$$

Ejercicio 1

b) Calculo de la deflexión de referencia



$$t = \sqrt{\left(I^2 - \left(\frac{D-d}{2} \right)^2 \right)}$$

$$Ls = \sqrt{\left((16,78in)^2 - \left(\frac{7,515in - 3,008in}{2} \right)^2 \right)} = 16,63in$$

$$def = \left(\frac{1}{64} \right) \frac{in}{in} \cdot t$$

$$def = \left(\frac{1}{64} \right) \frac{in}{in} \cdot 16,63in = 0,26in$$

Ejercicio 1

c) Calculo de la fuerza de deflexión

$$F_{\min} = \frac{1,4 \cdot T_{st} + \frac{t}{L} \cdot Y}{16}$$

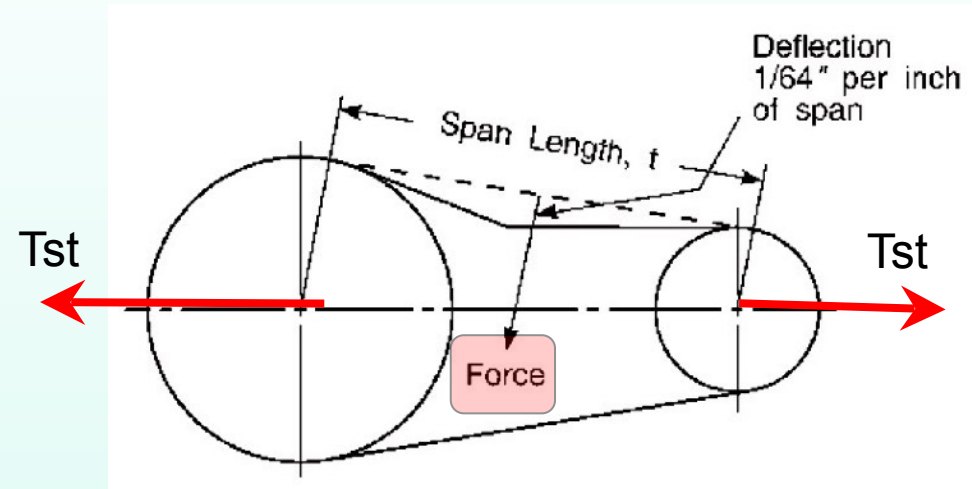
Fuerza de deflexión mínima
Formula 13 – pag. 107

$$F_{\max} = \frac{1,5 \cdot T_{st} + \frac{t}{L} \cdot Y}{16}$$

Fuerza de deflexión máxima
Formula 14 – pag. 107

$$F_{\min} = \frac{1,4 \cdot 430lb + \frac{16,63in}{50,39in} \cdot 131,49}{16} = 40,33lb$$

$$F_{\max} = \frac{1,5 \cdot 430lb + \frac{16,63in}{50,39in} \cdot 131,49}{16} = 43,02lb$$



F: fuerza de deflexión (lb)

Tst: tensión estática (lb) : 430 lb

t: vano recto: 16,63 in

Y: 131,49 (tabla 10 – pag. 107)

L: long de la correa: 50,39 in

Ejercicio 1

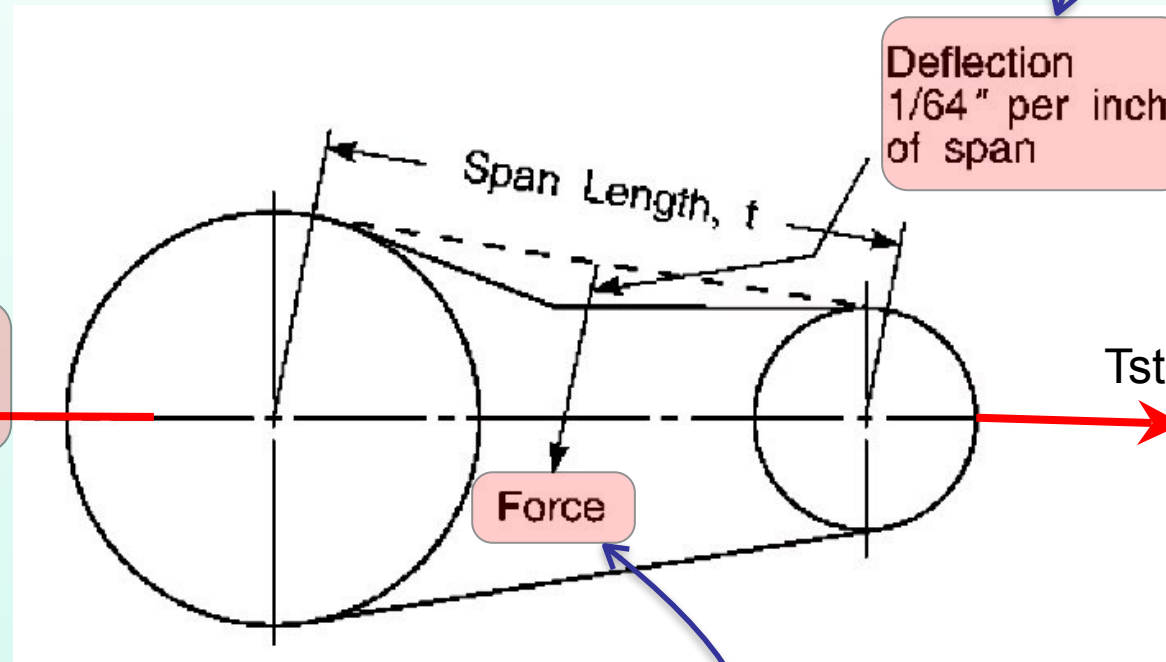
Como se controla en la práctica la tensión T_{st} de la correa ?

Condición 2 ✓

$$def = 0,26in$$

T_{st}

$$T_{st} = 430lb$$



Condición 1 ✓

$$F_{min} = 40,3lb \rightarrow F_{max} = 43,02lb$$