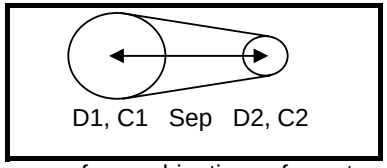
Belt Drive Belt Length Calculations Nigel Lawton October 2007

Enter your pulley root diameters and seperation in the yellow rows of the table.
Read off any acceptable belt lengths on left opposite a green highlighted cell.
Other belt lengths may be set in the yellow column of the table.
The formula used to calulate belt length (complex) is:
"BL=(2 x SQRT(C12 + (.5 * D1 - .5 * D2))) + (0.5 x 3.1415 x (D1+D2))"
Target stretch is 7-11%



Current available belt lengths:		
5.5mm	6.5mm	7.5mm
Please tell me what sizes you would like to see added!		

Values within the thick bordered box are for combinations of my standard items

Pulley 1 root diameter		**D1**	**3.0**	**3.0**	**3.0**	**5.0**	**5.0**	**5.0**	**1.1**	**3.0**	**5.0**	**5.0**
Required seperation		**Sep**	**6.3**	**8.0**	**9.7**	**4.5**	**6.3**	**8.1**	**11.3**	**8.3**	**5.0**	**6.6**
Pulley 2 root diameter		**D2**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**3.0**	**3.0**	**3.0**
Reduction ratio		(D2+0.42)/(D1+0.42)	1:2.3	1:2.3	1:2.3	1:3.6	1:3.6	1:3.6	1:1.0	1:1.0	1:1.6	1:1.6
Combined reduction with 14:1 worm & gear			1:31.5	1:31.5	1:31.5	1:49.9	1:49.9	1:49.9	1:14.0	1:14.0	1:22.2	1:22.2
Minimum seperation		Min Sep	3.1	3.1	3.1	4.1	4.1	4.1	2.1	4.0	5.0	5.0
Half circumference		0.5 C1	4.7	4.7	4.7	7.9	7.9	7.9	1.7	4.7	7.9	7.9
Half circumference		0.5 C2	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total length simple calc		(BL)	19.0	22.4	25.8	18.6	22.2	25.8	26.0	23.0	19.6	22.8
Belt Length complex calc		BL	19.2	22.6	25.9	19.0	22.5	26.0	26.1	26.0	22.8	25.9
Belt stretched 10%		C3	17.4	20.5	23.6	17.3	20.4	23.7	23.7	23.7	20.7	23.6
Equivalent sized belt for correct length.		D3	5.6	6.5	7.5	5.5	6.5	7.5	7.5	7.5	6.6	7.5
	Diam	Belt Length										
Actual stretch 5mm belt.	**5**	15.70796327	22.2%	43.6%	65.1%	21.0%	43.2%	65.7%	65.9%	65.7%	44.9%	65.0%
Actual stretch 5.5mm belt.	**5.5**	17.27875959	11.1%	30.6%	50.1%	10.0%	30.1%	50.6%	50.8%	50.6%	31.7%	50.0%
Actual stretch 6mm belt.	**6**	18.84955592	1.8%	19.7%	37.6%	0.8%	19.3%	38.0%	38.2%	38.1%	20.8%	37.5%
Actual stretch 6.5mm belt.	**6.5**	20.42035225		10.5%	27.0%		10.1%	27.4%	27.6%	27.4%	11.5%	26.9%
Actual stretch 7mm belt.	**7**	21.99114858		2.6%	17.9%		2.3%	18.3%	18.5%	18.3%	3.5%	17.9%
Actual stretch 7.5mm belt.	**7.5**	23.5619449			10.1%			10.4%	10.6%	10.5%		10.0%
Actual stretch 8mm belt.	**8**	25.13274123			3.2%			3.5%	3.7%	3.5%		3.1%
Actual stretch 9mm belt.	**9**	28.27433388										
Actual stretch 10mm belt.	**10**	31.41592654										

Please use this area to experiment with your own values

3.0	**5.0**	**3.0**	**5.0**	**5.0**	**5.0**	**3.0**	**5.0**	**3.0**	**3.0**	**3.5**	**5.0**	**3.0**	**3.0**	**5.0**
7.9	**7.9**	**7.8**	**7.8**	**8.0**	**7.9**	**7.9**	**6.2**	**6.2**	**7.5**	**7.5**	**8.1**	**8.1**	**9.5**	**6.5**
1.1	**1.1**	**1.2**	**1.2**	**1.2**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**1.1**	**2.0**	**3.0**	**3.0**
1:2.3	1:3.6	1:2.1	1:3.3	1:3.3	1:3.6	1:2.3	1:3.6	1:2.3	1:2.3	1:2.6	1:3.6	1:1.4	1:1.0	1:1.6
1:31.5	1:49.9	1:29.6	1:46.8	1:46.8	1:49.9	1:31.5	1:49.9	1:31.5	1:31.5	1:36.1	1:49.9	1:19.8	1:14.0	1:22.2
3.1	4.1	3.1	4.1	4.1	4.1	3.1	4.1	3.1	3.1	3.3	4.1	3.5	4.0	5.0
4.7	7.9	4.7	7.9	7.9	7.9	4.7	7.9	4.7	4.7	5.5	7.9	4.7	4.7	7.9
1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
22.2	25.4	22.0	25.2	25.6	25.4	22.2	22.0	18.8	21.4	22.2	25.8	22.6	25.4	22.6
22.4	25.6	22.3	25.6	26.0	25.6	22.4	22.3	19.0	21.6	22.4	26.0	24.1	28.4	25.7
20.3	23.3	20.3	23.3	23.6	23.3	20.3	20.3	17.3	19.6	20.3	23.7	21.9	25.8	23.4
6.5	7.4	6.5	7.4	7.5	7.4	6.5	6.5	5.5	6.2	6.5	7.5	7.0	8.2	7.4
42.3%	63.1%	42.0%	62.9%	65.4%	63.1%	42.3%	41.9%	20.9%	37.3%	42.5%	65.7%	53.5%	81.0%	63.7%
29.4%	48.3%	29.1%	48.0%	50.3%	48.3%	29.4%	29.0%	9.9%	24.8%	29.6%	50.6%	39.6%	64.5%	48.8%
18.6%	36.0%	18.4%	35.7%	37.8%	36.0%	18.6%	18.3%	0.8%	14.4%	18.8%	38.0%	27.9%	50.8%	36.4%
9.5%	25.5%	9.3%	25.3%	27.2%	25.5%	9.5%	9.2%		5.6%	9.6%	27.4%	18.1%	39.2%	25.9%
1.7%	16.5%	1.5%	16.3%	18.1%	16.5%	1.7%	1.4%			1.8%	18.3%	9.7%	29.3%	17.0%
	8.8%		8.6%	10.2%	8.8%						10.4%	2.3%	20.6%	9.2%
	2.0%		1.8%	3.4%	2.0%						3.5%		13.1%	2.3%
													0.5%	