# X-Roll Study

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Rev. 0 8/26/08
Rev. 1 9/7/08 minor clean-ups
Rev. 2 9/20/08 fix error in aZDP formula

given:
L = Locus point
C = X = Y = zero
S = line CD
B = line DP
C = center of circle of radius Q
D = center of circle of radius R
then:
aZDP = aWCD(1+ (Q/R))
Xp = sin(aWCD)*S + sin(aZDP)*B
Yp = -cos(aWCD)*S - cos(aZDP)*B
when aWCD = 0 then
LP = eff locus beam len = CL + S + B
so then
aWLP = asin (Xp/LP)
locus Xp = sin(aWLP) * LP
locus Yp = -(cos(aWLP) * LP) + CL

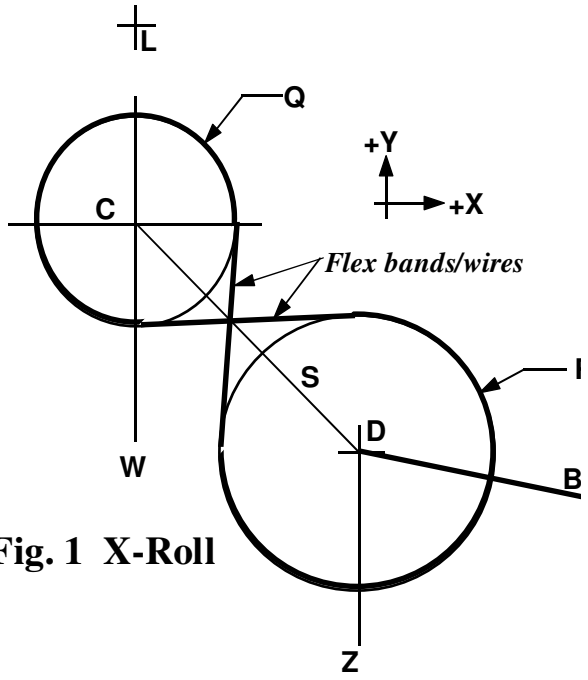



**Fig. 1 X-Roll**

## Input Values

| | |
|---|---|
| -0.3953 | **LOCUS** Y value |
| 1.0000 | **Q radius** |
| 1.5000 | **R radius** |
| 3.0000 | S roll center **spacing** |
| 5.0000 | B **beam** length |

derived:
7.6047 **LP**

| some solutions | | |
|---|---|---|
| | -0.3953 | -0.6990 |
| | 1.0000 | 1.0000 |
| | 1.5000 | 1.0000 |
| | 3.0000 | 3.0000 |
| | 5.0000 | 10.0000 |
| ERROR uin | 1 | 5 |

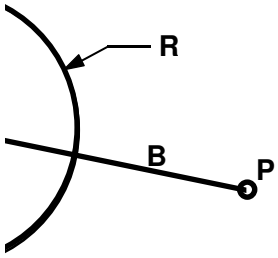
error causes bob rise--

| Locus angle (aWLP) | Locus Xp | Locus Yp | Err Diff (YP-locusYp) | aWCD (radians) | aWCD (degrees) | aZDP | Xp |
|---|---|---|---|---|---|---|---|
| 0.1341 | 1.0168 | -7.931713 | 0.000000 | 0.0900 | 5.1566 | 0.1500 | 1.0168 |
| 0.0000 | 0.0000 | -8.000000 | 0.000000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| | | | | | | | |
| 0.1341 | 1.0168 | -7.931713 | 0.000000 | 0.0900 | 5.1566 | 0.1500 | 1.0168 |
| 0.1267 | 0.9607 | -7.939079 | 0.000001 | 0.0850 | 4.8701 | 0.1417 | 0.9607 |
| 0.1192 | 0.9044 | -7.946025 | 0.000001 | 0.0800 | 4.5837 | 0.1333 | 0.9044 |
| 0.1118 | 0.8482 | -7.952554 | 0.000001 | 0.0750 | 4.2972 | 0.1250 | 0.8482 |
| 0.1043 | 0.7918 | -7.958663 | 0.000001 | 0.0700 | 4.0107 | 0.1167 | 0.7918 |
| 0.0969 | 0.7355 | -7.964352 | 0.000001 | 0.0650 | 3.7242 | 0.1083 | 0.7355 |
| 0.0894 | 0.6791 | -7.969621 | 0.000001 | 0.0600 | 3.4377 | 0.1000 | 0.6791 |
| 0.0820 | 0.6226 | -7.974470 | 0.000001 | 0.0550 | 3.1513 | 0.0917 | 0.6226 |
| 0.0745 | 0.5661 | -7.978899 | 0.000001 | 0.0500 | 2.8648 | 0.0833 | 0.5661 |
| 0.0671 | 0.5096 | -7.982906 | 0.000001 | 0.0450 | 2.5783 | 0.0750 | 0.5096 |
| 0.0596 | 0.4531 | -7.986493 | 0.000001 | 0.0400 | 2.2918 | 0.0667 | 0.4531 |
| 0.0522 | 0.3965 | -7.989657 | 0.000001 | 0.0350 | 2.0054 | 0.0583 | 0.3965 |
| 0.0447 | 0.3399 | -7.992401 | 0.000001 | 0.0300 | 1.7189 | 0.0500 | 0.3399 |
| 0.0373 | 0.2833 | -7.994723 | 0.000000 | 0.0250 | 1.4324 | 0.0417 | 0.2833 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.0298 | 0.2266 | -7.996622 | 0.000000 | 0.0200 | 1.1459 | 0.0333 | 0.2266 |
| 0.0224 | 0.1700 | -7.998100 | 0.000000 | 0.0150 | 0.8594 | 0.0250 | 0.1700 |
| 0.0149 | 0.1133 | -7.999156 | 0.000000 | 0.0100 | 0.5730 | 0.0167 | 0.1133 |
| 0.0075 | 0.0567 | -7.999789 | 0.000000 | 0.0050 | 0.2865 | 0.0083 | 0.0567 |
| 0.0000 | 0.0000 | -8.000000 | 0.000000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |

+X

*ıds/wires*




| |
|---|
| -1.1131 |
| 1.0000 |
| 1.0000 |
| 5.0000 |
| 10.0000 |
| 7 |

·more stable

| Yp |
|---|
| -7.931714 |
| -8.000000 |
| |
| -7.931714 |
| -7.939079 |
| -7.946026 |
| -7.952555 |
| -7.958664 |
| -7.964353 |
| -7.969622 |
| -7.974471 |
| -7.978900 |
| -7.982907 |
| -7.986493 |
| -7.989658 |
| -7.992401 |
| -7.994723 |

-7.996622
-7.998100
-7.999156
-7.999789
-8.000000