	Three equal length roll troughing 20° Idlers h and a_1 values in inches (mm) based on cross section loads from Tables 4.41 through 4.48 and troughed belt profile 12.85 (1/2 standard edge distance)									
	Surcharge Angle			0°	5°	10°	15°	20°	25°	30°
Belt Width	18	500	a_1	0.50 (12.7)	0.6 (15.2)	0.69 (17.60	0.80 (20.4)	0.91 (23.2)	1.01 (25.7)	1.12 (28.5)
			h	1.20 (30.4)	1.45 (36.8)	1.70 (43.2)	1.96 (49.8)	2.22 (56.4)	2.48 (63.0)	2.74 (69.6)
	24	600	a_1	0.71 (18.0)	0.85 (21.6)	0.98 (24.9)	1.13 (28.8)	1.28 (32.6)	1.43 (36.4)	1.58 (40.2)
			h	1.72 (43.7)	2.07 (52.6)	2.42 (61.5)	2.77 (70.4)	3.14 (79.8)	3.49 (88.7)	3.87 (98.3)
	30	800	a_1	0.92 (23.4)	1.09 (27.7)	1.28 (32.6)	1.46 (37.1)	1.65 (42.0)	1.84 (46.8)	2.04 (51.9)
			h	2.23 (56.6)	2.68 (68.1)	3.13 (79.6)	3.59 (91.2)	4.05 (102.9)	4.51 (114.6)	4.99 (126.8)
	36	1000	a_1	1.12 (28.4)	1.34 (34.0)	1.57 (39.9)	1.8 (45.8)	2.02 (51.4)	2.26 (57.5)	2.50 (63.5)
			h	2.75 (69.9)	3.3 (83.8)	3.85 (97.8)	4.41 (112.1)	4.96 (126.0)	5.53 (140.5)	6.11 (155.2)
	42		a_1	1.35 (34.3)	1.57 (39.9)	1.87 (47.5)	2.15 (54.7)	2.42 (61.5)	2.68 (68.1)	2.96 (75.2)
			h	3.26 (82.8)	3.91 (99.3)	4.57 (116.1)	5.23 (132.9)	5.89 (149.7)	6.55 (166.4)	7.23 (183.7)
	48	1200	a_1	1.55 (39.4)	1.84 (46.7)	2.15 (54.7)	2.46 (62.5)	2.77 (70.4)	3.09 (78.5)	3.41 (86.7)
			h	3.78 (96.0)	4.53 (115.1)	5.28 (134.2)	6.04 (153.5)	6.8 (172.8)	7.57 (192.3)	8.35 (212.1)
	54	1400	a_1	1.73 (43.9)	2.08 (52.8)	2.43 (61.8)	2.79 (70.9)	3.16 (80.3)	3.5 (88.9)	3.88 (98.6)
			h	4.29 (109.0)	5.15 (130.8)	6.00 (152.4)	6.85 (174)	7.72 (196.1)	8.59 (218.2)	9.48 (240.8)
	60	1600	a_1	1.97 (50.0)	2.34 (59.4)	2.75 (69.9)	3.14 (79.8)	3.52 (89.5)	3.92 (99.6)	4.34 (110.3)
			h	4.81 (122.2)	5.76 (146.3)	6.72 (170.7)	7.67 (194.9)	8.63 (219.3)	9.61 (244.1)	10.6 (269.3)
	72	1800	a_1	2.39 (60.7)	2.86 (72.6)	3.33 (84.6)	3.79 (96.3)	4.28 (108.8)	4.76 (121.0)	5.25 (133.4)
			h	5.85 (148.6)	7.00 (177.8)	8.15 (207.1)	9.3 (236.3)	10.47 (266.0)	11.65 (296.0)	12.85 (326.4)
	84	2000	a_1	2.80 (71.1)	3.35 (85.1)	3.91 (99.4)	4.46 (113.3)	5.02 (127.6)	5.58 (141.8)	6.17 (156.8)
			h	6.88 (174.8)	8.23 (209.0)	9.58 (243.4)	10.94 (277.9)	12.3 (312.5)	13.68 (347.5)	15.09 (383.3)
	96	2400	a_1	3.22 (81.8)	3.85 (97.8)	4.49 (114.1)	5.12 (130.1)	5.77 (146.6)	6.42 (163.1)	7.09 (180.1)
			h	7.91 (200.9)	9.46 (240.3)	11.01 (279.7)	12.57 (319.3)	14.14 (359.2)	15.72 (399.3)	17.34 (440.5)
	108	2800	a_1	3.64 (92.5)	4.34 (110.2)	5.07 (128.8)	5.79 (147.1)	6.51 (165.4)	7.25 (184.2)	8.00 (203.2)
			h	8.94 (227.1)	10.7 (271.8)	12.45 (316.3)	14.20 (360.7)	15.97 (405.7)	17.76 (451.2)	19.58 (497.4)
	120	3000	a_1	4.04 (102.6)	4.85 (123.2)	5.66 (143.8)	6.46 (164.1)	7.26 (184.5)	8.08 (205.3)	8.92 (226.6)
			h	9.98 (253.5)	11.93 (303.0)	13.88 (352.6)	15.83 (402.1)	17.8 (452.2)	19.8 (503.0)	21.83 (554.5)

Table 12.88

a_1 and h_1, at discharge pulley for 20° troughing carrying idlers

Belt Width			Three equal length roll troughing 35° Idlers h and a_1 values in inches (mm) based on cross section loads from Tables 4.41 through 4.48 and troughed belt profile 12.85 (1/2 standard edge distance)						
Surcharge Angle			0°	5°	10°	15°	20°	25°	30°
18	500	a_1	0.78 (19.9)	0.89 (22.7)	0.98 (24.9	1.06 (27	1.02 (26	1.22 (31	1.34 (34.1)
		h	1.91 (48.6)	2.13 (54.2)	2.35 (59.7)	2.57 (65.3	2.78 (70.7	3.01 (76.5)	3.24 (82.3)
24	600	a_1	1.11 (28.2)	1.26 (32.1)	1.34 (34.1)	1.50 (38.1)	1.59 (40.4)	1.74 (44.2)	1.88 (47.8)
		h	2.73 (69.4)	3.03 (77.0)	3.32 (84.4)	3.63 (92.3)	3.93 (99.9)	4.24 (107.7)	4.56 (115.9)
30	800	a_1	1.47 (37.4)	1.62 (41.2)	1.77 (45.0)	1.93 (49.1)	2.09 (53.1)	2.24 (56.9)	2.41 (61.3)
		h	3.54 (90.0)	3.93 (99.9)	4.31 (109.5)	4.70 (119.4	5.09 (129.3)	5.48 (139.2)	5.88 (149.4)
36	1000	a_1	1.75 (44.5)	1.95 (49.6)	2.16 (54.9)	2.35 (59.7)	2.55 (64.8)	2.75 (69.9)	2.95 (75.0)
		h	4.35 (110.5)	4.82 (122.5)	5.29 (134.4)	5.76 (146.4)	6.23 (158.3)	6.71 (170.5)	7.20 (182.9)
42		a_1	2.12 (53.9)	2.32 (59.0)	2.57 (65.3)	2.78 (70.7)	3.03 (77.0)	3.26 (82.9)	3.48 (88.4)
		h	4.35 (110.5)	5.72 (145.3)	6.28 (159.6)	6.82 (173.3)	7.38 (187.5)	7.95 (202)	8.52 (216.5)
48	1200	a_1	2.46 (62.5)	2.69 (68.4)	2.96 (75.2)	3.21 (81.6)	3.48 (88.4)	3.76 (95.6)	4.03 (102.4)
		h	5.99 (152.2)	6.62 (168.2)	7.25 (184.2)	7.89 (200.5)	8.53 (216.7)	9.18 (233.2)	9.84 (250.0)
54	1400	a_1	2.78 (70.7)	3.06 (77.8)	3.36 (85.4)	3.66 (93.0)	3.95 (100.4)	4.26 (108.3)	4.57 (116.1)
		h	6.8 0 (172.8)	7.52 (191.1)	8.24 (209.3)	8.96 (227.6)	9.68 (245.9)	10.41 (264.5)	11.16 (283.5)
60	1600	a_1	3.09 (78.5)	3.42 (86.9)	3.76 (95.6)	4.09 (103.9)	4.42 (112.3)	4.77 (121.2)	5.11 (129.8)
		h	7.61 (193.3)	8.42 (213.9)	9.22 (234.2)	10.02 (254.6)	10.83 (275.1)	11.65 (296.0)	12.48 (317.0)
72	1800	a_1	3.77 (95.8)	4.17 (106.0)	4.57 (116.1)	4.96 (126.0)	5.37 (136.4)	5.78 (146.9)	6.19 (157.3)
		h	9.24 (234.7)	10.21 (259.4)	11.18 (284.0)	12.15 (308.7)	13.13 (333.6)	14.12 (358.7)	15.12 (384.1)
84	2000	a_1	4.43 (112.6)	4.89 (124.3)	5.37 (136.4)	5.83 (148.1)	6.30 (160.1)	6.79 (172.5)	7.28 (185.0)
		h	10.87 (276.1)	12.01 (305.1)	13.14 (333.8)	14.28 (362.8)	15.42 (391.7)	16.58 (421.2)	17.76 (451.2)
96	2400	a_1	5.09 (129.3)	5.63 (143.1)	6.16 (156.5)	6.71 (170.5)	7.25 (184.2)	7.80 (198.2)	8.36 (212.4)
		h	12.5 (317.5)	13.81 (350.8)	15.11 (383.8)	16.41 (416.9)	17.72 (450.1)	19.05 (483.9)	20.40 (518.2)
108	2800	a_1	5.76 (146.4)	6.36 (161.6)	6.97 (177.1)	7.57 (192.3)	8.19 (208.1)	8.81 (223.8)	9.44 (239.8)
		h	14.13 (359)	15.6 (396.3)	17.07 (433.6)	18.54 (471.0)	20.02 (508.6)	21.52 (546.7)	23.04 (585.3)
120	3000	a_1	6.42 (163.1)	7.10 (180.4)	7.77 (197.4)	8.45 (214.7)	9.13 (232.0)	9.82 (249.5)	10.53 (267.5)
		h	15.76 (400.4)	17.4 (442.0)	19.03 (483.4)	20.67 (525.1)	22.32 (567.0)	23.99 (609.4)	25.69 (652.6)

Table 12.89
a_1 and h_1, at discharge pulley for 35° troughing carrying idlers

Belt Width			Three equal length roll troughing 45° Idlers h and a_1 values in inches (mm) based on cross section loads from Tables 4.41 through 4.48 and troughed belt profile 12.85 (1/2 standard edge distance)						
Surcharge Angle			0°	5°	10°	15°	20°	25°	30°
18	500	a_1	0.90 (22.9)	1.00 (25.4)	1.08 (27.5)	1.16 (29.5)	1.22 (31.0)	1.31 (33.3)	1.39 (35.4)
		h	2.25 (57.2)	2.44 (62.0)	2.63 (66.9)	2.82 (71.7)	3.01 (76.5)	3.2 (81.3)	3.4 (86.4)
24	600	a_1	1.31 (33.3)	1.39 (35.4)	1.51 (38.4)	1.62 (41.2)	1.74 (44.2)	1.84 (46.8)	1.95 (49.6)
		h	3.20 (81.3)	3.46 (87.9)	3.72 (94.5)	3.98 (101.1)	4.24 (107.7)	4.51 (114.6)	4.78 (121.5)
30	800	a_1	1.67 (42.5)	1.84 (46.8)	1.95 (49.6)	2.11 (53.6)	2.25 (57.2)	2.39 (60.8)	2.52 (64.1)
		h	4.15 (105.5)	4.48 (113.8)	4.81 (122.2)	5.14 (130.6)	5.48 (139.2)	5.82 (147.9)	6.16 (156.5)
36	1000	a_1	2.09 (53.1)	2.25 (57.2)	2.4 (61.0)	2.59 (65.8)	2.74 (69.6)	2.91 (74.0)	3.10 (78.8)
		h	5.10 (129.6)	5.5 (139.7)	5.90 (149.9)	6.31 (160.3)	6.71 (170.5)	7.12 (180.9)	7.54 (191.6)
42		a_1	2.46 (62.5)	2.67 (67.9)	2.85 (72.4)	3.06 (77.8)	3.25 (82.6)	3.44 (87.4)	3.66 (93.0)
		h	6.05 (153.7)	6.52 (165.7)	6.99 (177.6)	7.47 (189.8)	7.94 (201.7)	8.42 (213.9)	8.92 (226.6)
48	1200	a_1	2.85 (72.4)	3.08 (78.3)	3.30 (83.9)	3.54 (90.0)	3.75 (95.3)	3.98 (101.1)	4.22 (107.2)
		h	7.00 (177.8)	7.54 (191.6)	8.08 (205.3)	8.63 (219.3)	9.17 (233.0)	9.73 (247.2)	10.29 (261.4)
54	1400	a_1	3.23 (82.1)	3.49 (88.7)	3.74 (95.0)	4.00 (101.6)	4.26 (108.3)	4.53 (115.1)	4.78 (121.5)
		h	7.95 (202.0)	8.56 (217.5)	9.17 (233.0)	9.79 (248.7)	10.41 (264.5)	11.04 (280.5)	11.67 (296.5)
60	1600	a_1	3.62 (92.0)	3.91 (99.4)	4.20 (106.7)	4.48 (113.8)	4.76 (121.0)	5.05 (128.3)	5.35 (135.9)
		h	8.90 (226.1)	9.58 (243.4)	10.27 (260.9)	10.95 (278.2)	11.64 (295.7)	12.34 (313.5)	13.05 (331.5)
72	1800	a_1	4.41 (112.1)	4.74 (120.4)	5.09 (129.3)	5.43 (138.0)	5.78 (146.9)	6.12 (155.5)	6.48 (164.6)
		h	10.8 (274.4)	11.62 (295.2)	12.45 (316.3)	13.27 (337.1)	14.1 (358.2)	14.95 (379.8)	15.81 (401.6)
84	2000	a_1	5.18 (131.6)	5.57 (141.5)	5.97 (151.7)	6.38 (162.1)	6.78 (172.3)	7.19 (182.7)	7.61 (193.3)
		h	12.7 (322.6)	13.66 (347.0)	14.63 (371.7)	15.59 (396.0)	16.57 (420.9)	17.56 (446.1)	18.56 (471.5)
96	2400	a_1	5.95 (151.2)	6.41 (162.9)	6.87 (174.5)	7.33 (186.2)	7.79 (197.9)	8.26 (209.9)	8.74 (222.0)
		h	14.59 (370.6)	15.7 (398.8)	16.81 (427.0)	17.92 (455.2)	19.03 (483.4)	20.16 (512.1)	21.32 (541.6)
108	2800	a_1	6.73 (171.0)	7.24 (183.9)	7.76 (197.2)	8.28 (210.4)	8.8 (223.6)	9.33 (237.0)	9.87 (250.7)
		h	16.49 (418.9)	17.74 (450.6)	18.99 (482.4)	20.24 (514.1)	21.5 (546.1)	22.77 (578.4)	24.08 (611.7)
120	3000	a_1	7.51 (190.8)	8.08 (205.3)	8.65 (219.8)	9.23 (234.5)	9.81 (249.2)	10.40 (264.2)	11 (279.4)
		h	18.39 (467.2)	19.78 (502.5)	21.17 (537.8)	22.56 (573.1)	23.96 (608.6)	25.38 (644.7)	26.83 (681.5)

Table 12.90

a_1 and h_1, at discharge pulley for 45° troughing carrying idlers

Belt Width			Surcharge Angle: 0°	5°	10°	15°	20°	25°	30°
			Flat Idlers h and a_1 values in inches (mm) based on cross section loads from Tables 4.41 through 4.48 and troughed belt profile 12.85 (1/2 standard edge distance)						
18	500	a_1	N/A	0.12 (3.1)	0.25 (6.4)	0.46 (11.7)	0.49 (12.5	0.67 (17.1	0.76 (19.4
		h	N/A	0.30 (7.7)	0.62 (15.8)	0.94 (23.9)	1.25 (31.8	1.58 (40.2	1.90 (48.3
24	600	a_1	N/A	0.18 (4.6)	0.63 (16.1)	0.53 (13.5)	0.68 (17.3)	0.86 (21.9	1.10 (28.0
		h	N/A	0.43 (11.0)	0.86 (21.9)	1.29 (32.8)	1.72 (43.7)	2.17 (55.2	2.63 (66.9
30	800	a_1	N/A	0.22 (5.6)	0.55 (14.0)	0.77 (19.6)	0.94 (23.9)	1.10 (28.0	1.36 (34.6)
		h	N/A	0.55 (14.0)	1.09 (27.7)	1.64 (41.7)	2.20 (55.9)	2.76 (70.2)	3.34 (84.9)
36	1000	a_1	N/A	0.25 (6.4)	0.34 (8.7)	0.90 (22.9)	1.13 (28.8)	1.38 (35.1)	1.64 (41.7)
		h	N/A	0.66 (16.8)	1.32 (33.6)	1.99 (50.6)	2.67 (67.9)	3.36 (85.4)	4.05 (102.9)
42		a_1	N/A	0.31 (7.9)	0.73 (18.6)	0.94 (23.9)	1.29 (32.8)	1.61 (40.9)	1.93 (49.1)
		h	N/A	0.78 (19.9)	1.56 (39.7	2.34 (59.5)	3.14 (79.8)	3.95 (100.4)	4.77 (121.2)
48	1200	a_1	N/A	0.35 (8.9)	0.85 (21.6)	1.09 (27.7)	1.50 (38.1)	1.87 (47.5)	2.22 (56.4)
		h	N/A	0.89 (22.7)	1.79 (45.5)	2.69 (68.4)	3.61 (91.7)	4.54 (115.4)	5.48 (139.2)
54	1400	a_1	N/A	0.39 (10.0)	0.84 (21.4)	1.19 (30.3)	1.66 (42.2)	2.09 (53.1)	2.52 (64.1)
		h	N/A	1.01 (25.7)	2.02 (51.4)	3.04 (77.3)	4.08 (103.7)	5.13 (130.4)	6.20 (157.5)
60	1600	a_1	N/A	0.43 (11.0)	0.89 (22.7)	1.34 (34.1)	1.82 (46.3)	2.34 (59.5)	2.82 (71.7)
		h	N/A	1.13 (28.8)	2.26 (57.5)	3.40 (86.4)	4.55 (115.6)	5.72 (145.3)	6.92 (175.8)
72	1800	a_1	N/A	0.53 (13.5)	1.20 (30.5)	1.65 (42.0)	2.24 (56.9)	2.81 (71.4)	3.4 (86.4)
		h	N/A	1.36 (34.6)	2.73 (69.4)	4.10 (104.2)	5.49 (139.5)	6.91 (175.6)	8.35 (212.1)
84	2000	a_1	N/A	0.62 (15.8)	1.37 (34.8)	1.96 (49.8)	2.61 (66.3)	3.29 (83.6)	3.99 (101.4)
		h	N/A	1.59 (40.4)	3.19 (81.1)	4.80 (122.0)	6.43 (163.4)	8.09 (205.5)	9.78 (248.5)
96	2400	a_1	N/A	0.71 (18.1)	1.47 (37.4)	2.24 (56.9)	2.99 (76.0)	3.78 (96.1)	4.57 (116.1)
		h	N/A	1.83 (46.5)	3.66 (93.0)	5.51 (140.0)	7.38 (187.5)	9.28 (235.8)	11.21 (284.8)
108	2800	a_1	N/A	0.8 (20.4)	1.59 (40.4)	2.55 (64.08)	3.39 (86.2)	4.26 (108.3)	5.15 (130.9)
		h	N/A	2.06 (52.4)	4.13 (105.0)	6.21 (157.8)	8.32 (211.4)	10.46 (265.7)	12.65 (321.4)
120	3000	a_1	N/A	0.89 (22.7)	1.83 (46.5)	2.78 (70.7)	3.78 (96.1)	4.74 (120.4)	5.73 (145.6)
		h	N/A	2.29 (58.2)	4.59 (116.6)	6.91 (175.6)	9.26 (235.3)	11.65 (296.0	14.08 (357.7)

Table 12.91
a_1 and h_1, at discharge pulley for flat idlers

Horizontal, Inclined and Declined Conveyor Belt Trajectories

Angular Tangent Direction

The angular direction of the trajectory is determined by the forces acting on the material at its center of mass. Were it not for the effect of gravity, the median line of the trajectory would be a straight line. It is this straight line tangent to a circle, the radius of which is the distance from the pulley center to the center of gravity of the material load-shape cross section, that determines what angular direction the trajectory will take.

Fundamental Force-Velocity Relationships

Fundamentally, if the tangential velocity is V_s, and if g is the acceleration due to gravity; r_s is the radial distance from the center of the pulley to the center of mass (i.e., the cross-sectional center of gravity of the material load shape); and W is the gravity weight force of the material acting at the center of mass, then the centrifugal force acting at the center of mass of the material is as follows:

$$\boxed{\text{Centrifugal Force} = \frac{W \times V_s^2}{g \times r_s}}$$

Equation 12.92
Centrifugal force

When this centrifugal force equals the radial component of the material weight force, W, the material will no longer be supported by the belt and will commence its trajectory. At just what angular position around the pulley this will occur is governed by the slope of the conveyor at the discharge and pulley is described for the following three conditions: horizontal, inclined and declined conveyor trajectories. Equation 12.92 can be re-written to provide and expression used to determine where the material will start its trajectory.

$$\boxed{\frac{\text{Centrifugal Force}}{W} = \frac{V_s^2}{g \times r_s}}$$

Equation 12.93
Relationship used to determine trajectory starting point, e_t

$$\boxed{\text{If } \frac{V_{belt}^2}{g \times r_s} > 1.0 \text{ then } V_s = V,\ \text{If no then : If } \frac{V_{cg}^2}{g \times r_s} < 1.0 \text{ then}: V_s = V_{cg},\ \text{If no then: } V_s = \sqrt{g \times r_s}}$$

Figure 12.94
Test used to determine the tangential velocity, V_s, used for plotting the trajectory

Belt Trajectory Nomenclature

a_1	= Distance from the belt to the center of gravity of the load shape
cg	= Center of gravity of the cross section of the load shape
e_t	= Point where the material leaves the belt
g	= Acceleration due to gravity
h	= Distance from the belt to the top of the load shape
r_p	= Radius of the pulley
r_s	= Radius from the center of pulley to the cross-sectional center of gravity of the load shape
t	= Thickness of the belt
V	= Belt speed
V_s	= Tangential velocity, fps, of the cross-sectional area center of gravity of the load shape
W	= Weight of bulk material acting at center of gravity
γ	= Angle between pulley vertical centerline and point e_t (degrees)
ϕ	= Angle of incline of the belt conveyor to the horizontal (degrees)

Figure 12.95
Discharge trajectory nomenclature

Horizontal Belt Conveyor Trajectories

If the belt conveyor is horizontal to the discharge pulley, there are two cases to consider:

Horizontal Belt Conveyor Discharge Trajectory Case 1

If the tangential speed is sufficiently high, when the centrifugal force is equal to or greater than W, the material will leave the belt at the initial point of tangency of the belt with the pulley. Belt speed, V, is used to plot the trajectory.

$$\frac{V_s^2}{g \times r_s} > 1.0$$

Equation 12.96

Discharge trajectory velocity test for case 1

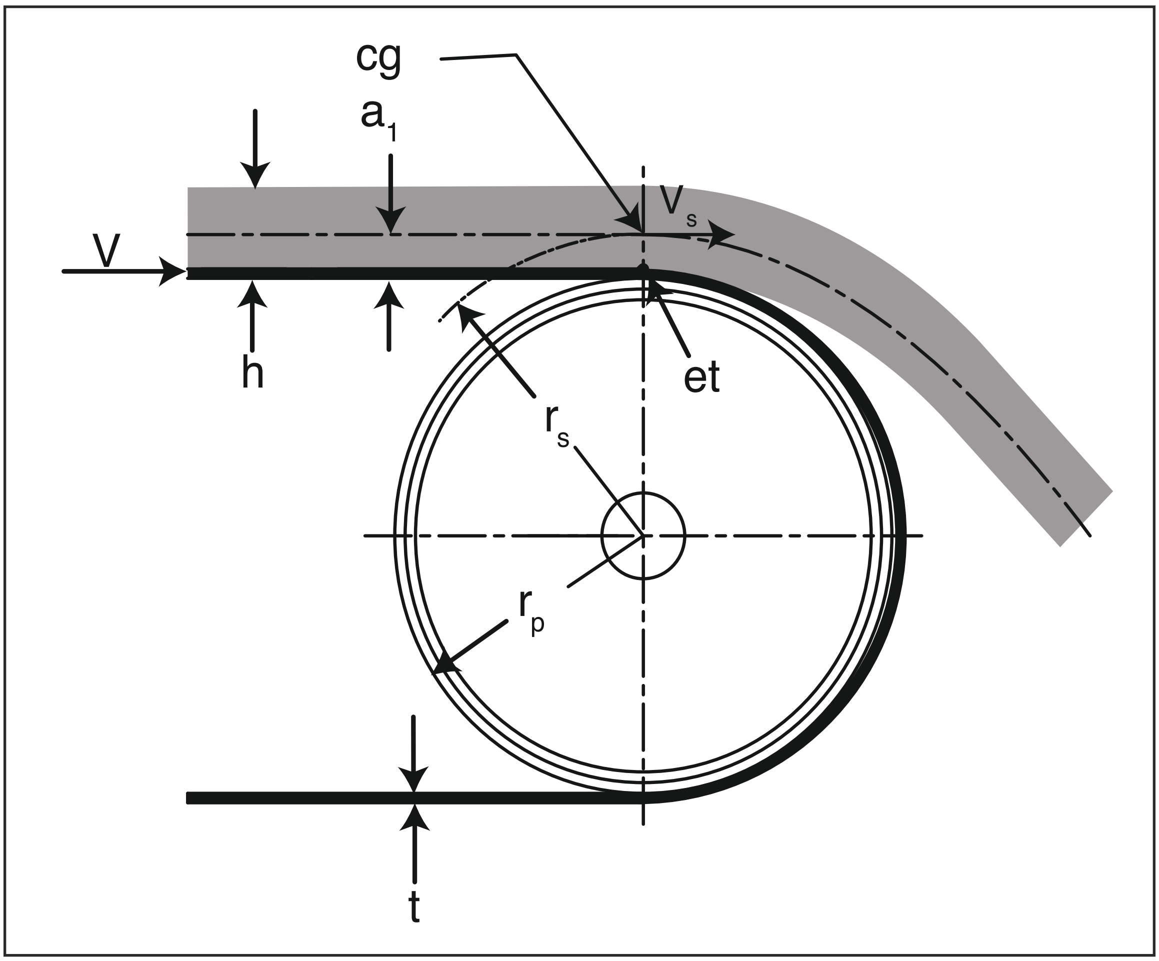

Figure 12.97

Discharge trajectory case 1

Horizontal Belt Conveyor Discharge Trajectory Case 2

If the tangential speed is not high enough for the material to leave the belt at the initial point of tangency, then the material will follow part way around the pulley for an angular distance. Tangential velocity, V_s, is used for plotting the trajectory.

$$\boxed{\frac{V_s^2}{g \times r_s} < 1.0}$$

Equation 12.98
Discharge trajectory velocity test for case 2

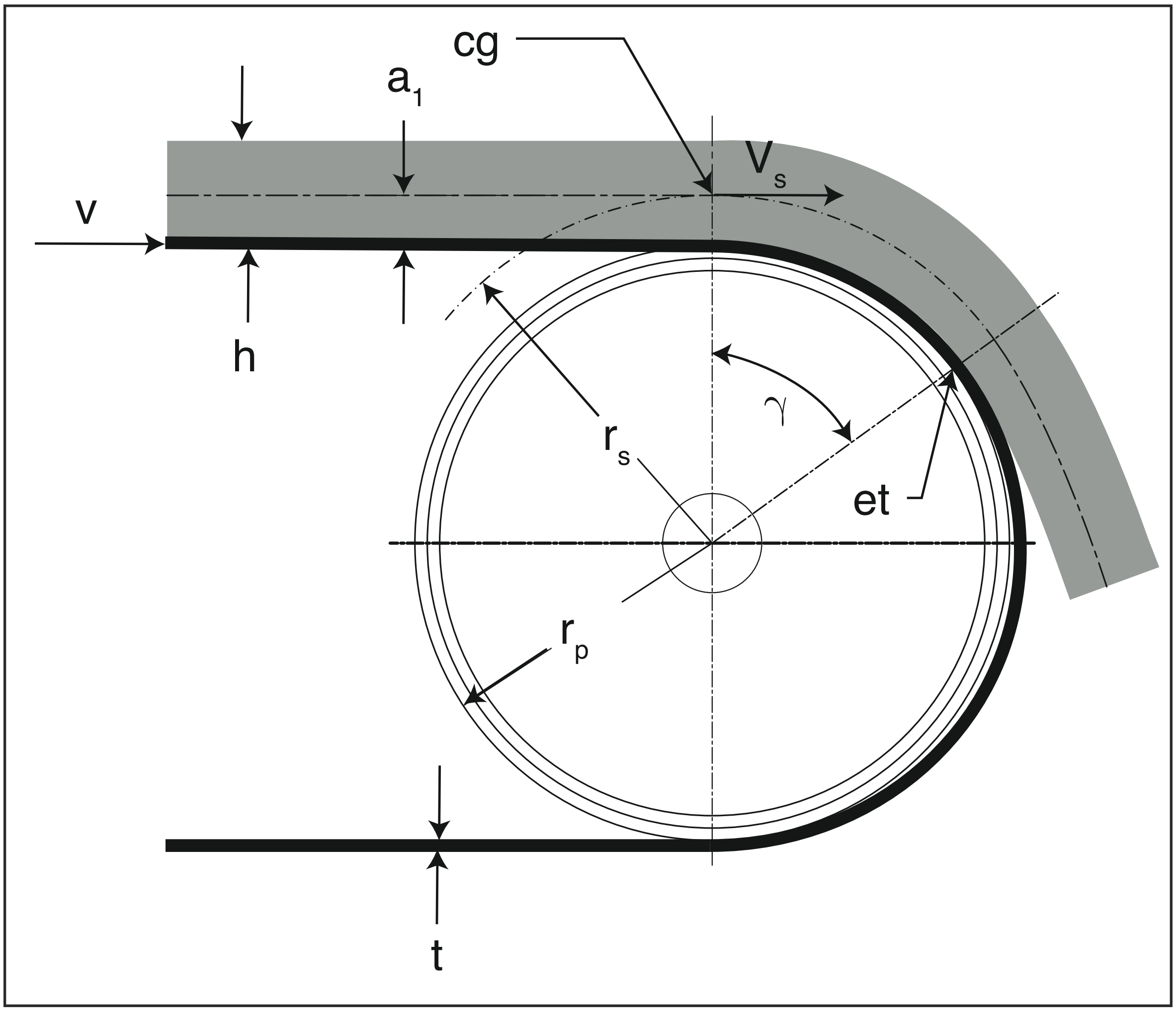

Figure 12.99
Discharge trajectory case 2

Inclined Belt Conveyor Trajectories

For a belt inclined to the discharge pulley, there are four conditions to consider.

Inclined Belt Conveyor Discharge Trajectory Case 3

If the tangential speed is sufficiently high, the material leaves the belt at the initial point of tangency of the belt and pulley. Belt speed, V, is used for plotting the trajectory.

$$\boxed{\frac{V_s^{\,2}}{g \times r_s} > 1.0}$$

Equation 12.100
Discharge trajectory velocity test for case 3

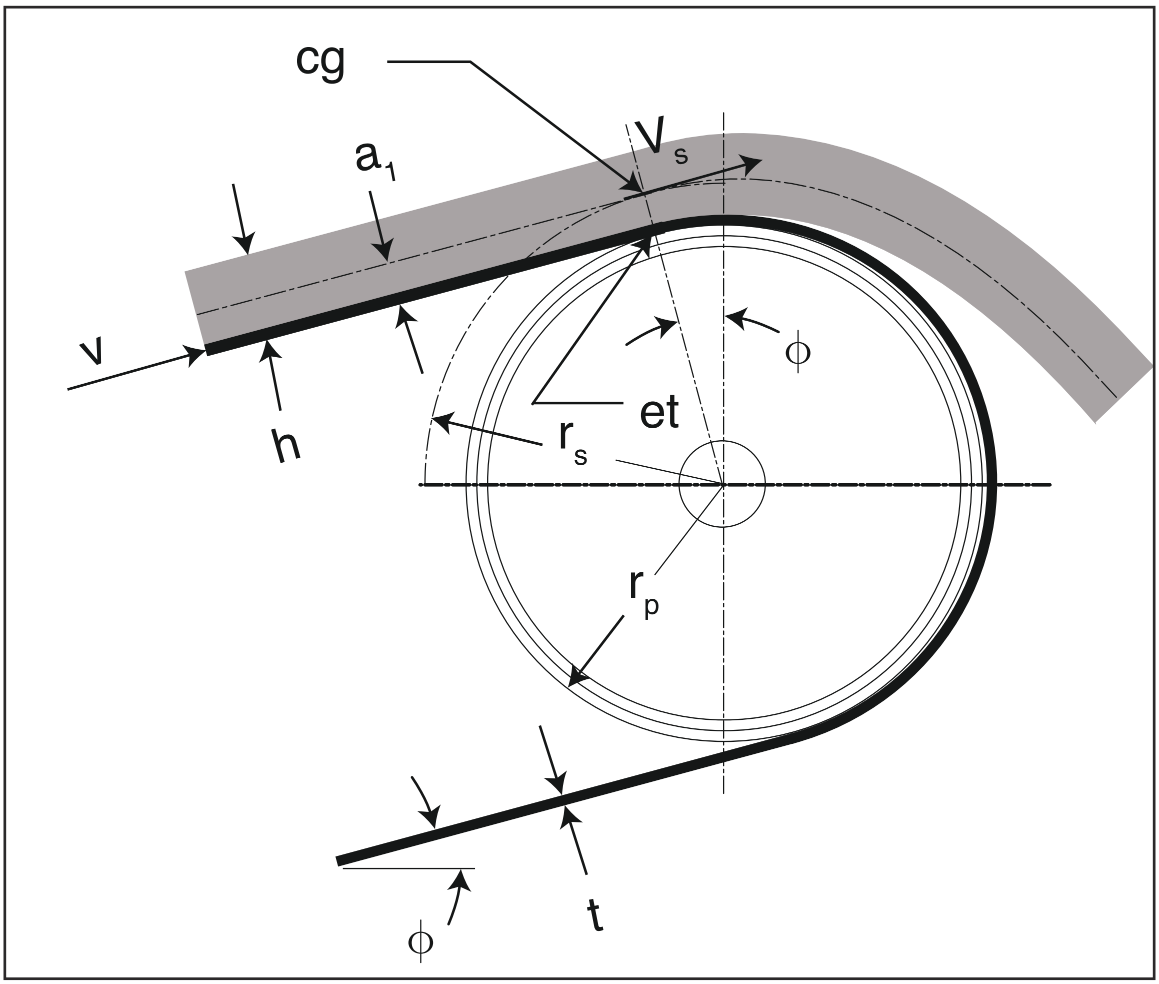

Figure 12.101
Discharge trajectory case 3

Inclined Belt Conveyor Discharge Trajectory Case 4

If the tangential speed is such that the centrifugal force is 1.0, the material will leave the belt at the vertical center line through the pulley. This is a special case and tangential velocity, $V_s = (r_s \times g)^{1/2}$, is used for plotting the trajectory.

$$\boxed{\frac{V_s^2}{r_s \times g} = 1.0}$$

Equation 12.102
Discharge trajectory velocity test for case 4

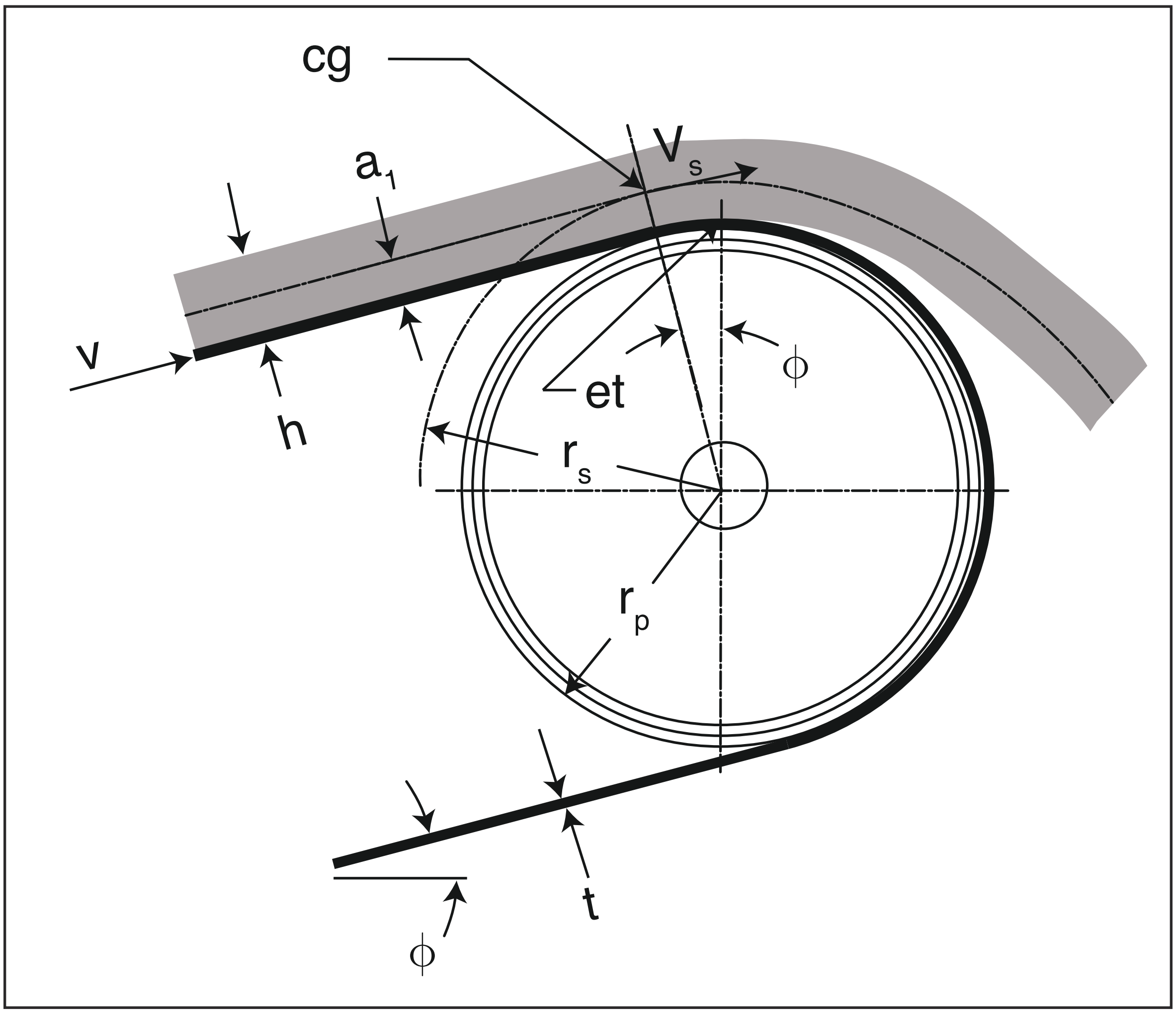

Figure 12.103
Discharge trajectory case 4

Inclined Belt Conveyor Discharge Case 5

If the tangential speed is sufficiently low, or when the centrifugal force is less than cos(ϕ), the material will travel partially around the pulley an angular distance, beyond its top center to the point where the centrifugal force equals the cos(γ). Tangential velocity, V_s, is used to plot the trajectory.

$$\boxed{\frac{V_s^2}{g \times r_s} < \cos(\phi)}$$

Equation 12.104
Discharge trajectory velocity test for case 5

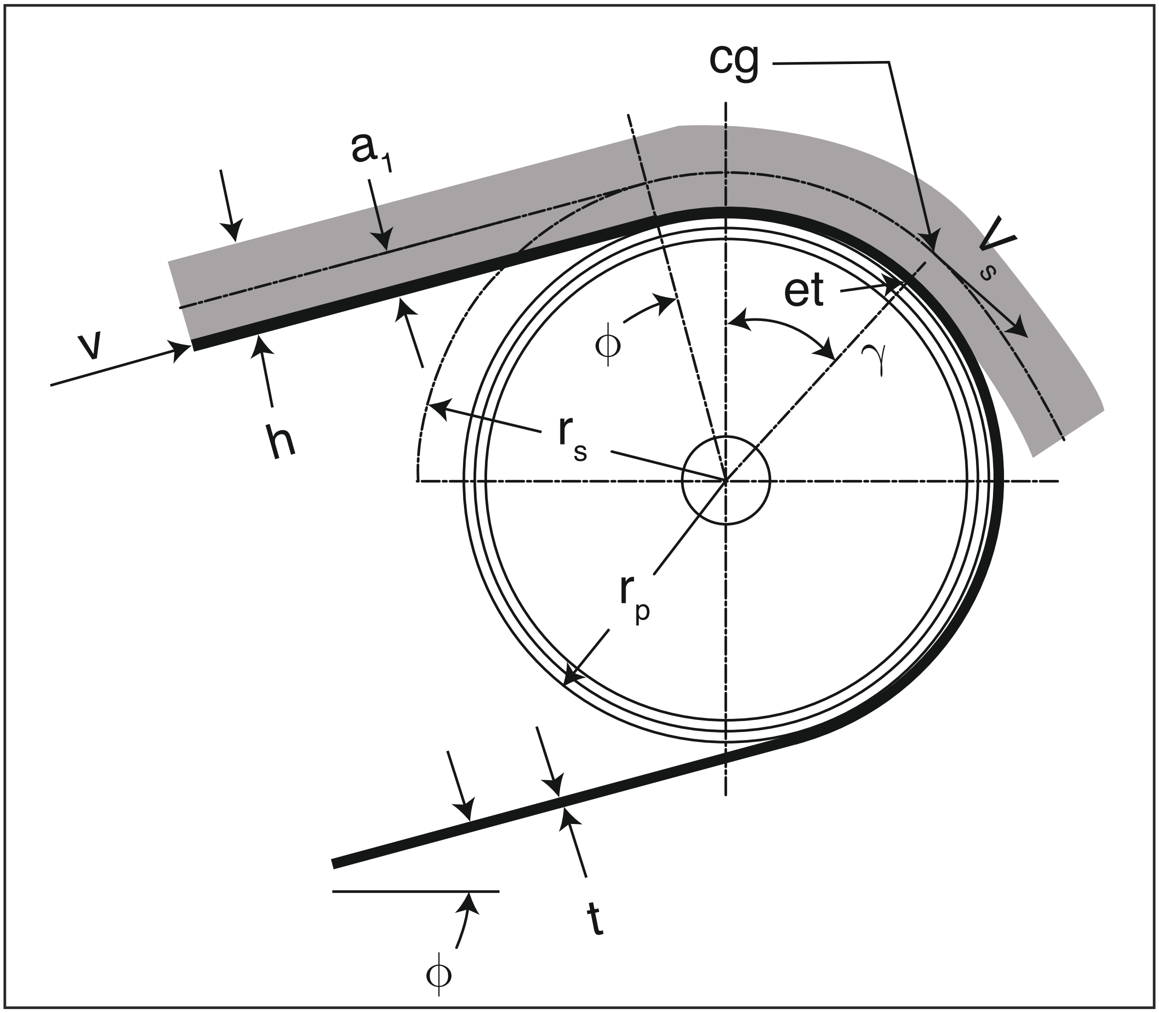

Figure 12.105
Discharge trajectory case 5

Note:
If the combination of the belt incline, the pulley diameter, the load depth, and the tangential belt speed is such that the centrifugal force is greater than the cos(ϕ) but is still less than 1.0, the material may leave the belt at the initial point of tangency of the belt and the pulley. However, the curved surface of the belt on the pulley may interfere with the theoretical trajectory path of the material. The material may then re-engage the belt and be carried farther around the pulley before it assumes its final trajectory.

Declined Belt Conveyor Trajectories

If the belt conveyor is declined toward the discharge pulley, there are two conditions to consider:

Declined Belt Conveyor Discharge Case 6

If the tangential speed is sufficiently high, or when, the material will leave the belt at the initial point of tangency of the belt and pulley. Belt velocity, V, is used to plot the trajectory.

$$\boxed{\frac{V_s^2}{g \times r_s} > 1.0}$$

Equation 12.106
Discharge trajectory velocity test for case 6

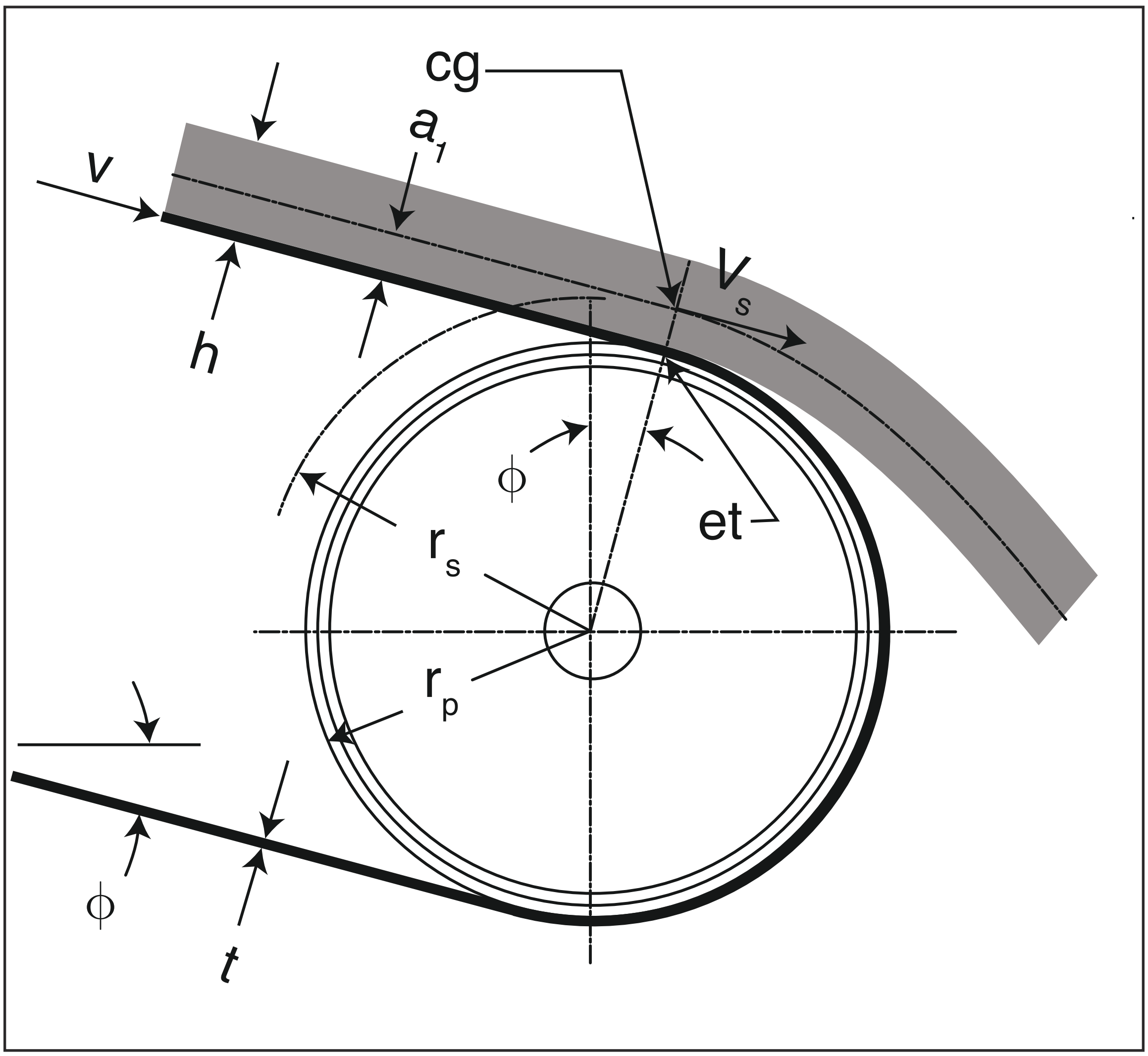

Figure 12.107
Discharge trajectory case 6