

# 1 PERHITUNGAN BEBAN STRUKTUR/GAYA PADA SAAT OPENING PARASUT SQ-285 PI

input  
Parameter

No	Keterangan	Item		satuan
1	Massa/Load	m	80	Kg
2	Koefisien Drag	Cd	1.8	
3	Densitas Udara		1.225	kgm <sup>3</sup>
4	Luas Area (Flat)	S	26.47761055	m <sup>2</sup>
5	Luas Area (Projected)		23.26653745	
6	Gravity		9.81	kg/m <sup>2</sup>
7	Panjang chord		3.3	m

FT<sup>2</sup>  
285.002628

RUMUS GERAK JATUH DENGAN HAMBATAN Rumus Gaya Drag pada Parasut

I. Diterjunkan dengan freefall.

output

No	Waktu (t)	Luas Area		kecepatan	kecepatan	Drag	Konversi Drag	Drag / Tali Parasut
			m <sup>2</sup>	m/s	km/jam	(Newton)	(Kg)	(Kg)
0	0	ORANG	0.21	58.22	209.60	784.80	80.03	
1	1	Pilot Chute	0.50	37.73	135.83	1868.57	190.54	190.54
3	2	30%	6.98	10.10	36.36	10955.75	1117.18	55.86
6	3	70%	16.29	6.61	23.80	1831.20	186.73	9.34
7	4	100%	23.27	5.53	19.91	1121.14	114.32	5.72

kecepatan turun

$$v_t = \sqrt{\frac{2mg}{\rho A C_d}}$$

II. Diterjunkan dengan STATIC LINE.

Vt = Vo + gt

output

No	Waktu (t)	Luas Area		kecepatan	kecepatan	Drag	Konversi Drag	Drag / Tali Parasut
			m <sup>2</sup>	m/s	km/jam	(Newton)	(Kg)	(Kg)
0	0	ORANG	0.21	0.00	0.00	0.00	0.00	
1	1	opening	1	9.81	35.32	26.53	2.70	2.70
2	2	10% Kanopi	2.33	17.49	62.97	246.86	25.17	1.26
3	3	70%	16.29	6.61	23.80	5493.60	560.19	28.01
4	4	100%	23.27	5.53	19.91	1121.14	114.32	5.72

$$v_t = \sqrt{\frac{2mg}{\rho A C_d}}$$

$$Lift = \frac{1}{2} \rho v^2 A C_l$$

PERBANDINGAN KECEPATAN TURUN DENGAN BEBAN (LOAD) POSISI FULL GLIDE.

No	Beban Kg	kecepatan	kecepatan	kecepatan maju km/jam	resultante	cos	sin
		turun m/s	turun Km/Jam				
1	60	4.79	17.24	25.00	30.37	0.82	0.57
2	70	5.17	18.63	27.00	32.80	0.82	0.57
3	80	5.53	19.91	28.86	35.07	0.82	0.57
4	90	5.87	21.12	30.62	37.19	0.82	0.57
5	100	6.18	22.26	32.27	39.21	0.82	0.57
6	110	6.49	23.35	33.85	41.12	0.82	0.57
7	120	6.77	24.39	35.35	42.95	0.82	0.57
8	130	7.05	25.38	36.79	44.70	0.82	0.57
9	140	7.32	26.34	38.18	46.39	0.82	0.57
9	150	7.57	27.27	39.52	48.02	0.82	0.57

PERBANDINGAN KECEPATAN TURUN DENGAN SIZE PARACHUTE POSISI FULL GLIDE.

Size	Flat area	Projected area	Load	kecepatan turun km/jam	kecepatan turun m/s	kecepatan maju km/jam	resultante	cos	sin
300	27.87102	24.466817	80	5.39	19.42	28.86	34.79	0.83	0.56
280	26.01274	22.865937	80	5.58	20.09	29.86	35.99	0.83	0.56
285	26.47761	23.266537	80	5.53	19.91	29.60	35.67	0.83	0.56
260	24.15653	21.265476	80	5.79	20.83	30.96	37.31	0.83	0.56
240	22.305	19.667523	80	6.02	21.66	32.19	38.80	0.83	0.56
220	20.44271	18.058557	80	6.28	22.60	33.60	40.49	0.83	0.56
200	18.58599	16.452433	80	6.58	23.68	35.20	42.42	0.83	0.56

Size	Flat area	Projected area	Load	kecepatan turun km/jam	kecepatan turun m/s	kecepatan maju km/jam	resultante	cos	sin
300	27.87102	24.466817	90	5.72	20.60	30.62	36.90	0.83	0.56
280	26.01274	22.865937	90	5.92	21.30	31.67	38.17	0.83	0.56
285	26.47761	23.266537	90	5.87	21.12	31.39	37.84	0.83	0.56
260	24.15653	21.265476	90	6.14	22.09	32.84	39.58	0.83	0.56
240	22.305	19.667523	90	6.38	22.97	34.15	41.15	0.83	0.56
220	20.44271	18.058557	90	6.66	23.97	35.64	42.95	0.83	0.56
200	18.58599	16.452433	90	6.98	25.12	37.33	45.00	0.83	0.56

Size	Flat area	Projected area	Load	kecepatan turun km/jam	kecepatan turun m/s	kecepatan maju km/jam	resultante	cos	sin
300	27.87102	24.466817	100	6.03	21.71	32.27	38.89	0.83	0.56
280	26.01274	22.865937	100	6.24	22.46	33.38	40.23	0.83	0.56
285	26.47761	23.266537	100	6.18	22.26	33.09	39.88	0.83	0.56
260	24.15653	21.265476	100	6.47	23.29	34.62	41.72	0.83	0.56
240	22.305	19.667523	100	6.73	24.21	35.99	43.38	0.83	0.56
220	20.44271	18.058557	100	7.02	25.27	37.56	45.27	0.83	0.56
200	18.58599	16.452433	100	7.35	26.47	39.35	47.43	0.83	0.56

2 AERODIAMIKA SAAT MELAYANG DAN LANDING DENGAN PERUBAHAN ANGEL OF ATTACK.

OUTPUT PERHITUNGAN KECEPATAN RAM AIR & DAYA ANGKAT SAAT LANDING																				
LOAD		Kecepatan turun parasut (dengan beban dalam Kg)																		
NO	AoA (1)	Sudut sel bawah (2)	sin α (3)	cos α (4)	Dlm kg Beban (5)	(Dlm kg) TRUST (6)	(Dlm N) TRUST (7)	dlm km/jam VELOCITY (8)	dalam m/s VELOCITY (8)	(Derajat) TOGEL (9)	(panjang) m TOGGLE (10)	cl (11)	dlm newton Daya Angkat (12)	dalam kg Daya Angkat (13)	(Beban parasut - daya angkat) (1)	cos α x Cd (7)	kecepatan turun parasut (8) m/s	kecepatan turun parasut (8) X (1) Dalam N	Tinggi dlm m	
					(3) x (4)	H x 9.81	(En/E\$68)*K\$8													
1	-7	-10	0.174	0.985	80	13.89	136.28	28.86	8.02	0	0	0	0.00	0	80	1.79	5.20	416.36		
2	-6	-9	0.156	0.988	80	12.51	122.77	26.00	7.23	9.5	0.06	0.08	73.41	7.48	72.52	1.79	4.95	358.99		
3	-5	-8	0.139	0.990	80	11.13	109.22	23.13	6.43	18.9	0.12	0.09	82.58	8.42	71.58	1.79	4.91	351.78		
4	-4	-7	0.122	0.993	80	9.75	95.64	20.26	5.63	28.4	0.17	0.12	110.11	11.22	68.78	1.80	4.81	331.07		
5	-3	-6	0.105	0.995	80	8.36	82.03	17.37	4.83	37.9	0.23	0.2	183.52	18.70	61.30	1.80	4.54	278.41		
6	-2	-5	0.087	0.996	80	6.97	68.40	14.49	4.03	47.4	0.29	0.27	247.75	25.25	54.75	1.80	4.29	234.95		
7	-1	-4	0.070	0.998	80	5.58	54.74	11.60	3.22	56.8	0.35	0.39	357.86	36.47	43.53	1.80	3.83	166.53		
8	0	-3	0.052	0.999	80	4.19	41.07	8.70	2.42	66.3	0.40	0.48	440.44	44.88	35.12	1.80	3.44	120.65		
9	1	-2	0.035	0.999	80	2.79	27.39	5.80	1.61	75.8	0.46	0.53	486.32	49.56	30.44	1.80	3.20	97.38		
10	2	-1	0.017	1.000	80	1.40	13.70	2.90	0.81	85.3	0.52	0.57	523.02	53.30	26.70	1.80	3.00	80.02		
11	3	0	0.000	1.000	80	0.00	0.00	0.00	0.00	94.7	0.58	0.6	550.55	56.10	23.90	1.80	2.84	67.77		
12	4	1	-0.017	1.000	80	-1.40	-13.70	-2.90	-0.81	104.2	0.63	0.75	688.19	70.13	9.87	1.80	1.82	18.01	0.17	
13	5	2	-0.035	0.999	80	-2.79	-27.39	-5.80	-1.61	113.7	0.69	0.98	899.23	91.63	-11.63	1.79	-1.98	23.04	0.20	
14	6	3	-0.052	0.999	80	-4.19	-41.07	-8.70	-2.42	123.2	0.75	1.098	1007.51	102.67	-22.67	1.79	-2.77	62.72	0.39	
15	7	4	-0.070	0.998	80	-5.58	-54.74	-11.60	-3.22	132.6	0.81	1.1	1009.34	102.85	-22.85	1.79	-2.78	63.57	0.39	
16	8	5	-0.087	0.996	80	-6.97	-68.40	-14.49	-4.03	142.1	0.86	1.12	1027.70	104.72	-24.72	1.78	-2.90	71.61	0.43	
17	9	6	-0.105	0.995	80	-8.36	-82.03	-17.37	-4.83	151.6	0.92	1.15	1055.22	107.53	-27.53	1.78	-3.06	84.24	0.48	
18	10	7	-0.122	0.993	80	-9.75	-95.64	-20.26	-5.63	161.1	0.98	1.19	1091.93	111.27	-31.27	1.77	-3.27	102.13	0.54	
19	11	8	-0.139	0.990	80	-11.13	-109.22	-23.13	-6.43	170.5	1.04	1.21	1110.28	113.14	-33.14	1.77	-3.37	111.61	0.58	
20	12	9	-0.156	0.988	80	-12.51	-122.77	-26.00	-7.23	180.0	1.09	1.29	1183.69	120.62	-40.62	1.76	-3.74	151.73	0.71	

LOAD 90																				
LOAD		Kecepatan turun parasut (dengan beban dalam Kg)																		
NO	AoA (1)	Sudut sel bawah (2)	sin α (3)	cos α (4)	Dlm kg Beban (5)	(Dlm kg) TRUST (6)	(Dlm N) TRUST (7)	dlm km/jam VELOCITY (8)	dalam m/s VELOCITY (8)	(Derajat) TOGEL (9)	(panjang) m TOGGLE (10)	cl (11)	dlm newton Daya Angkat (12)	dalam kg Daya Angkat (13)	(Beban parasut - daya angkat) (1)	cos α x Cd (7)	kecepatan turun parasut (8) m/s	kecepatan turun parasut (8) X (1) Dalam N	Tinggi dlm m	
					(3) x (4)	H x 9.81	(En/E\$68)*K\$8													
1	-7	-10	0.174	0.985	90	15.63	153.31	30.62	8.51	0	0	0	0.00	0	90	1.79	5.52	496.81		
2	-6	-9	0.156	0.988	90	14.08	138.12	27.58	7.67	9.5	0.06	0.08	82.58	8.42	81.58	1.79	5.25	428.36		
3	-5	-8	0.139	0.990	90	12.53	122.88	24.54	6.82	18.9	0.12	0.09	92.91	9.47	80.53	1.79	5.21	419.75		
4	-4	-7	0.122	0.993	90	10.97	107.60	21.49	5.97	28.4	0.17	0.12	123.87	12.62	77.38	1.80	5.11	395.05		
5	-3	-6	0.105	0.995	90	9.41	92.29	18.43	5.12	37.9	0.23	0.2	206.46	21.04	68.96	1.80	4.82	332.21		
6	-2	-5	0.087	0.996	90	7.84	76.95	15.37	4.27	47.4	0.29	0.27	278.72	28.40	61.60	1.80	4.55	280.35		
7	-1	-4	0.070	0.998	90	6.28	61.59	12.30	3.42	56.8	0.35	0.39	402.59	41.02	48.98	1.80	4.06	198.71		
8	0	-3	0.052	0.999	90	4.71	46.21	9.23	2.57	66.3	0.40	0.48	495.50	50.49	39.51	1.80	3.64	143.96		
9	1	-2	0.035	0.999	90	3.14	30.81	6.15	1.71	75.8	0.46	0.53	547.11	55.75	34.25	1.80	3.39	116.20		
10	2	-1	0.017	1.000	90	1.57	15.41	3.08	0.86	85.3	0.52	0.57	588.40	59.96	30.04	1.80	3.18	95.48		
11	3	0	0.000	1.000	90	0.00	0.00	0.00	0.00	94.7	0.58	0.6	619.37	63.11	26.89	1.80	3.01	80.87		
12	4	1	-0.017	1.000	90	-1.57	-15.41	-3.08	-0.86	104.2	0.63	0.75	774.21	78.89	11.11	1.80	1.93	21.49		
13	5	2	-0.035	0.999	90	-3.14	-30.81	-6.15	-1.71	113.7	0.69	0.98	1011.64	103.09	-13.09	1.79	-2.10	27.49	0.22	
14	6	3	-0.052	0.999	90	-4.71	-46.21	-9.23	-2.57	123.2	0.75	1.098	1133.45	115.50	-25.50	1.79	-2.94	74.85	0.44	
15	7	4	-0.070	0.998	90	-6.28	-61.59	-12.30	-3.42	132.6	0.81	1.1	1135.51	115.71	-25.71	1.79	-2.95	75.85	0.44	
16	8	5	-0.087	0.996	90	-7.84	-76.95	-15.37	-4.27	142.1	0.86	1.12	1156.16	117.81	-27.81	1.78	-3.07	85.45	0.48	
17	9	6	-0.105	0.995	90	-9.41	-92.29	-18.43	-5.12	151.6	0.92	1.15	1187.13	120.97	-30.97	1.78	-3.25	100.52	0.54	
18	10	7	-0.122	0.993	90	-10.97	-107.60	-21.49	-5.97	161.1	0.98	1.19	1228.42	125.18	-35.18	1.77	-3.46	121.87	0.61	
19	11	8	-0.139	0.990	90	-12.53	-122.88	-24.54	-6.82	170.5	1.04	1.21	1249.06	127.28	-37.28	1.77	-3.57	133.18	0.65	
20	12	9	-0.156	0.988	90	-14.08	-138.12	-27.58	-7.67	180.0	1.09	1.29	1331.65	135.69	-45.69	1.76	-3.96	181.05	0.80	

LOAD		150															Kecepatan turun parasut (dengan beban dalam Kg)			
N0	AoA (1)	Sudut sel bawah (2)	sin α (3)	cos α (4)	Dlm kg Beban (5) (3) x (4)	(Dlm kg) TRUST (6)	(Dlm N) TRUST (7) H x 9.81	dlm km/jam VELOCITY (8) (En/E\$68)*K\$8	dalam m/s VELOCITY (8)	(Derajat) TOGEL (9)	(panjang) m TOGGLE (10)	cl (11)	dlm newton Daya Angkat (12)	dalam kg Daya Angkat (13) (10) x 0.1019	(Beban parasut - daya angkat) (1)	cos α x Cd (7)	kecepatan turun parasut (8) m/s	kecepatan turun parasut (8) X (1) Dalam N	Tinggi dlm m	
1	-7	-10	0.174	0.985	150	26.05	255.52	39.52	10.99	0	0	0	0.00	0	150.000000	1.79	7.13	1068.97		
2	-6	-9	0.156	0.988	150	23.47	230.19	35.61	9.90	9.5	0.06	0.08	137.64	14.03	135.9746936	1.79	6.78	921.69		
3	-5	-8	0.139	0.990	150	20.88	204.79	31.68	8.81	18.9	0.12	0.09	154.84	15.78	134.2215302	1.79	6.73	903.16		
4	-4	-7	0.122	0.993	150	18.28	179.33	27.74	7.71	28.4	0.17	0.12	206.46	21.04	128.9620403	1.80	6.59	850.02		
5	-3	-6	0.105	0.995	150	15.68	153.81	23.79	6.61	37.9	0.23	0.2	344.09	35.06	114.9367339	1.80	6.22	714.81		
6	-2	-5	0.087	0.996	150	13.07	128.25	19.84	5.51	47.4	0.29	0.27	464.53	47.34	102.6645907	1.80	5.88	603.21		
7	-1	-4	0.070	0.998	150	10.46	102.65	15.88	4.41	56.8	0.35	0.39	670.98	68.37	81.6266311	1.80	5.24	427.55		
8	0	-3	0.052	0.999	150	7.85	77.01	11.91	3.31	66.3	0.40	0.48	825.83	84.15	65.8481613	1.80	4.70	309.76		
9	1	-2	0.035	0.999	150	5.23	51.35	7.94	2.21	75.8	0.46	0.53	911.85	92.92	57.0823448	1.80	4.38	250.03		
10	2	-1	0.017	1.000	150	2.62	25.68	3.97	1.10	85.3	0.52	0.57	980.67	99.93	50.0696916	1.80	4.10	205.45		
11	3	0	0.000	1.000	150	0.00	0.00	0.00	0.00	94.7	0.58	0.6	1032.28	105.19	44.8102016	1.80	3.88	174.01		
12	4	1	-0.017	1.000	150	-2.62	-25.68	-3.97	-1.10	104.2	0.63	0.75	1290.36	131.49	18.5127521	1.80	2.50	46.23		
13	5	2	-0.035	0.999	150	-5.23	-51.35	-7.94	-2.21	113.7	0.69	0.98	1686.06	171.81	-21.8100040	1.79	-2.71	59.16	0.37	
14	6	3	-0.052	0.999	150	-7.85	-77.01	-11.91	-3.31	123.2	0.75	1.098	1889.08	192.50	-42.4973310	1.79	-3.79	161.04	0.73	
15	7	4	-0.070	0.998	150	-10.46	-102.65	-15.88	-4.41	132.6	0.81	1.1	1892.52	192.85	-42.8479636	1.79	-3.81	163.20	0.74	
16	8	5	-0.087	0.996	150	-13.07	-128.25	-19.84	-5.51	142.1	0.86	1.12	1926.93	196.35	-46.3542903	1.78	-3.97	183.85	0.80	
17	9	6	-0.105	0.995	150	-15.68	-153.81	-23.79	-6.61	151.6	0.92	1.15	1978.55	201.61	-51.6137802	1.78	-4.19	216.29	0.90	
18	10	7	-0.122	0.993	150	-18.28	-179.33	-27.74	-7.71	161.1	0.98	1.19	2047.36	208.63	-58.6264334	1.77	-4.47	262.22	1.02	
19	11	8	-0.139	0.990	150	-20.88	-204.79	-31.68	-8.81	170.5	1.04	1.21	2081.77	212.13	-62.1327600	1.77	-4.61	286.56	1.08	
20	12	9	-0.156	0.988	150	-23.47	-230.19	-35.61	-9.90	180.0	1.09	1.29	2219.41	226.16	-76.1580665	1.76	-5.12	389.56	1.33	