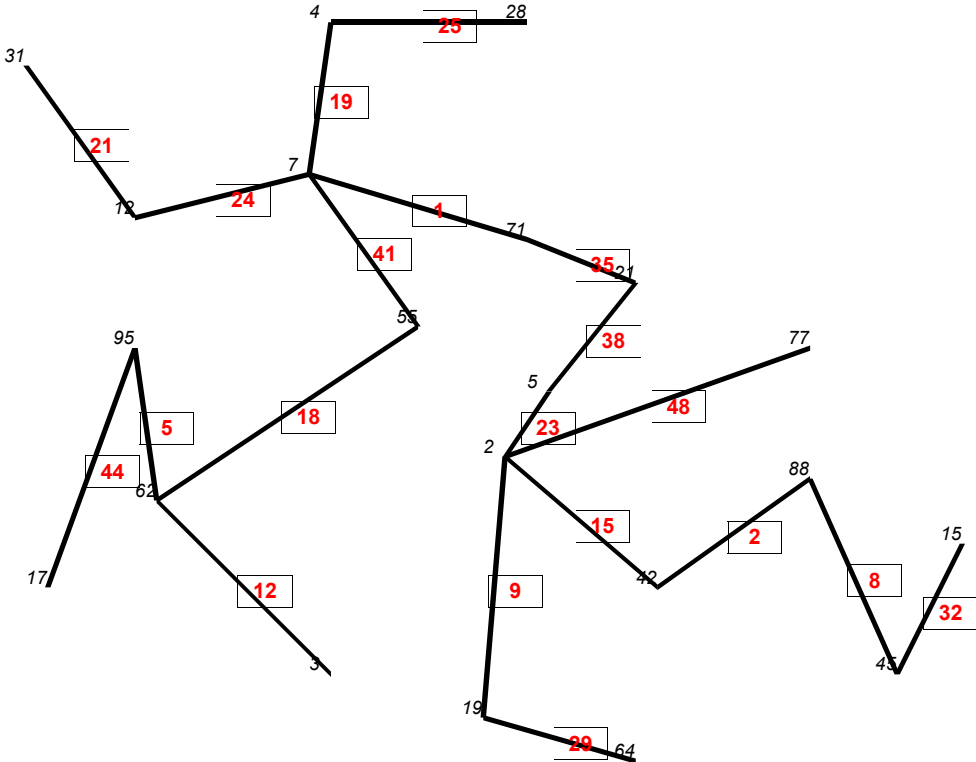


Arbitrary-Shaped Profile



# OPEN SECTION PROPERTIES

## INPUT GEOMETRY

Project ID SDC9991

Preparer John Fong

Prepare Date 10/13/2010

Run ID EX\_1

Reviewer \_\_\_\_\_

Review Date \_\_\_\_\_

Problem Description John Fong arbitrary open section

General Comment

Node ID			
Profile ID	Node ID	Coordinates	
		X	Y
1	12	7.	29.
	15	45.	14.
	17	3.	12.
	19	23.	6.
2	24.	18.	
21	30.	26.	
28	25.	38.	
3	16.	8.	
31	2.	36.	
4	16.	38.	
42	31.	12.	
45	42.	8.	
5	26.	21.	
55	20.	24.	
62	8.	16.	
64	30.	4.	
7	15.	31.	
71	25.	28.	
77	38.	23.	
88	38.	17.	
95	7.	23.	

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Segment ID									
Profile ID	Segment ID	From Node i	To Node j	Thickness [t]	(from to) Coordinates				
					[xf, xi]	[yf, yi]	[xt, xj]	[yt, yj]	
1	1	7	71	1.	15.	31.	25.	28.	
	12	3	62	1.	16.	8.	8.	16.	
	15	42	2	1.	31.	12.	24.	18.	
	18	55	62	1.	20.	24.	8.	16.	
	19	4	7	1.	16.	38.	15.	31.	
	2	88	42	1.	38.	17.	31.	12.	
	21	31	12	1.	2.	36.	7.	29.	
	23	5	2	1.	26.	21.	24.	18.	
	24	7	12	1.	15.	31.	7.	29.	
	25	4	28	1.	16.	38.	25.	38.	
	29	19	64	1.	23.	6.	30.	4.	
	32	15	45	1.	45.	14.	42.	8.	
	35	21	71	1.	30.	26.	25.	28.	
	38	21	5	1.	30.	26.	26.	21.	
	41	55	7	1.	20.	24.	15.	31.	
	44	17	95	1.	3.	12.	7.	23.	
	48	77	2	1.	38.	23.	24.	18.	
	5	95	62	1.	7.	23.	8.	16.	
	8	88	45	1.	38.	17.	42.	8.	
	9	2	19	1.	24.	18.	23.	6.	

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## FLEXURAL PROPERTIES

Setup for Centroid									
Segment ID	[Lx] Length X Projection	[Ly] Length Y Projection	Length [L]= srss([Lx],[Ly])	Full Area [A]=[L]*[t]	x-centroid [xc] =([xf]+[xt])/2	y-centroid [yc] =([yf]+[yt])/2	[AX] =[A]*[xc]	[AY] =[A]*[yc]	
1	10.	-3.	10.4403	10.4403	20.	29.5	208.8061	307.989	
12	-8.	8.	11.3137	11.3137	12.	12.	135.7645	135.7645	
15	-7.	6.	9.2195	9.2195	27.5	15.	253.5375	138.2932	

18	-12.	-8.	14.4222	14.4222	14.	20.	201.9109	288.4441
19	-1.	-7.	7.0711	7.0711	15.5	34.5	109.6016	243.9518
2	-7.	-5.	8.6023	8.6023	34.5	14.5	296.7802	124.7337
21	5.	-7.	8.6023	8.6023	4.5	32.5	38.7105	279.5756
23	-2.	-3.	3.6056	3.6056	25.	19.5	90.1388	70.3082
24	-8.	-2.	8.2462	8.2462	11.	30.	90.7083	247.3863
25	9.	0.	9.	9.	20.5	38.	184.5	342.
29	7.	-2.	7.2801	7.2801	26.5	5.	192.9229	36.4005
32	-3.	-6.	6.7082	6.7082	43.5	11.	291.8069	73.7902
35	-5.	2.	5.3852	5.3852	27.5	27.	148.092	145.3994
38	-4.	-5.	6.4031	6.4031	28.	23.5	179.2875	150.4734
41	-5.	7.	8.6023	8.6023	17.5	27.5	150.5407	236.5639
44	4.	11.	11.7047	11.7047	5.	17.5	58.5235	204.8322
48	-14.	-5.	14.8661	14.8661	31.	20.5	460.8481	304.7544
5	1.	-7.	7.0711	7.0711	7.5	19.5	53.033	137.8858
8	4.	-9.	9.8489	9.8489	40.	12.5	393.9543	123.1107
9	-1.	-12.	12.0416	12.0416	23.5	12.	282.9775	144.4991

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#### Location of Centroid / Plastic Center

Area sum [SA]=sum([A])	[SAX]= Sum([AX])	[SAY]= Sum([AY])	Centroid (c.g.) [cx]=[SAX]/[SA] [cy]=[SAY]/[SA]		Plastic Center w.r.t. c.g. along principal axis [cpx] [cpy]		Plastic Modulus [Zx] [Zy]	
180.4345	3822.4447	3736.1565	21.1847	20.7064	-2.3106	1.1767	997.8567	1765.1048

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#### Segment Moment of Inertia

Segment ID	Segment Moment of Inertia			+clockws normal distance to centroid [rho]	Segment length [L] or [b]	Double sectorial area [rho]*[b]
	Ixx	Iyy	Ixy			
1	815.1435	101.655	-134.8623	-8.0823	10.4403	-84.3815
12	917.9438	1014.7437	844.3705	-12.6509	11.3137	-143.1289
15	327.8795	405.3531	-364.5231	-0.2227	9.2195	-2.0531
18	84.1161	917.5334	188.5787	3.3975	14.4222	49.
19	1374.2299	229.0942	-550.3305	7.5782	7.0711	53.5863
2	349.2829	1560.3011	-685.8135	-12.7898	8.6023	-110.0218
21	1231.6056	2412.6217	-1717.7831	6.722	8.6023	57.8249
23	7.9521	53.6869	-14.7935	-3.8438	3.6056	-13.8589
24	714.9752	899.3389	-769.5237	11.4862	8.2462	94.7178
25	2691.6031	64.969	-106.5636	-17.2936	9.	-155.642
29	1798.3748	235.41	-616.2729	13.6419	7.2801	99.3145
32	652.1387	3345.5417	-1442.9517	-24.3003	6.7082	-163.0113
35	215.0951	225.9977	209.5504	8.1889	5.3852	44.0984
38	63.3095	305.9544	132.5809	-3.5768	6.4031	-22.9024
41	432.1439	134.7136	-240.4236	0.9503	8.6023	8.1751

44	238.3619	3081.5772	650.3359	-14.1145	11.7047	-165.2056
48	31.6046	1675.0197	56.5951	-3.4957	14.8661	-51.9669
5	39.1656	1324.7897	112.6173	13.7178	7.0711	96.9991
8	729.7586	3499.791	-1550.279	-13.8607	9.8489	-136.5122
9	1057.2785	65.5554	-230.6963	-3.0304	12.0416	-36.4904

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Principal Moment of Inertia							
User Axis Gross Moment of Inertia			$[z]=\text{sqr}((I_{xx})-(I_{yy})^2/4+[I_{xy}]^2)$	Principal Axis Moment of Inertia		Angle between user axis and principal axis	
$I_{xx}$	$I_{yy}$	$I_{xy}$		$[I_{xp}]=(I_{xx}+[I_{yy}])/2+[z]$	$[I_{yp}]=(I_{xx}+[I_{yy}])/2-[z]$	Radians	Degrees
13771.9628	21553.6473	-6230.1883	7345.3318	25008.1368	10317.4732	-0.5063	-29.0073

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Node Coordinates Transformation per Principal Axes						
Node ID	Transformed Coordinates				Principal Axis Section Modulus	
	Translation only		Translation + rotation		$[S_{xx}]=[I_{xp}]/[I_{yp}]$	$[S_{yy}]=[I_{yp}]/[I_{xp}]$
	$[tx]=[X]-[cx]$	$[ty]=[Y]-[cy]$	$[xp]= [ty]*\text{Sin}(\alpha)+ [tx]*\text{Cos}(\alpha)$	$[yp]= [ty]*\text{Cos}(\alpha)- [tx]*\text{Sin}(\alpha)$		
12	-14.1847	8.2936	-16.427	0.3747	66733.99	-628.08
15	23.8153	-6.7064	24.08	5.6834	4400.22	428.47
17	-18.1847	-8.7064	-11.6816	-16.4324	-1521.88	-883.22
19	1.8153	-14.7064	8.7191	-11.9813	-2087.26	1183.32
2	2.8153	-2.7064	3.7746	-1.0017	-24964.93	2733.41
21	8.8153	5.2936	5.1426	8.9043	2808.56	2006.29
28	3.8153	17.2936	-5.0493	16.9743	1473.29	-2043.35
3	-5.1847	-12.7064	1.6273	-13.6267	-1835.23	6340.12
31	-19.1847	15.2936	-24.1943	4.072	6141.42	-426.44
4	-5.1847	17.2936	-12.9203	12.6101	1983.19	-798.55
42	9.8153	-8.7064	12.806	-2.8546	-8760.56	805.67
45	20.8153	-12.7064	24.3658	-1.0187	-24548.45	423.44
5	4.8153	0.2936	4.0689	2.5918	9649.	2535.67
55	-1.1847	3.2936	-2.6332	2.3059	10845.14	-3918.26
62	-13.1847	-4.7064	-9.2485	-10.5096	-2379.55	-1115.58
64	8.8153	-16.7064	15.8108	-10.336	-2419.51	652.56
7	-6.1847	10.2936	-10.4004	6.0032	4165.78	-992.03
71	3.8153	7.2936	-0.2001	8.2288	3039.11	-51568.37
77	16.8153	2.2936	13.5938	10.16	2461.44	758.98
88	16.8153	-3.7064	16.5033	4.9126	5090.6	625.18
95	-14.1847	2.2936	-13.5175	-4.8726	-5132.4	-763.27

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Segmental Summary of Transformed Nodal Coordinates										
Segment ID	Node		Transformed Coordinates				Segment Centroid		Full Segment first Moment	
	From i	To j	$X_i$	$Y_i$	$X_j$	$Y_j$	$[SegCx]$	$[segCy]$	$Q_x$	$Q_y$
32	15	45	24.08	5.6834	24.3658	-1.0187	24.2229	2.3323	15.6457	162.4922
44	17	95	-11.6816	-16.4324	-13.5175	-4.8726	-12.5996	-10.6525	-124.6845	-147.474

29	19	64	8.7191	-11.9813	15.8108	-10.336	12.265	-11.1587	-81.2364	89.2902
9	2	19	3.7746	-1.0017	8.7191	-11.9813	6.2468	-6.4915	-78.1685	75.2218
35	21	71	5.1426	8.9043	-0.2001	8.2288	2.4712	8.5665	46.1321	13.308
38	21	5	5.1426	8.9043	4.0689	2.5918	4.6057	5.748	36.8053	29.4912
12	3	62	1.6273	-13.6267	-9.2485	-10.5096	-3.8106	-12.0681	-136.5353	-43.1118
21	31	12	-24.1943	4.072	-16.427	0.3747	-20.3107	2.2234	19.1263	-174.7189
19	4	7	-12.9203	12.6101	-10.4004	6.0032	-11.6604	9.3066	65.8079	-82.4512
25	4	28	-12.9203	12.6101	-5.0493	16.9743	-8.9848	14.7922	133.1298	-80.8632
15	42	2	12.806	-2.8546	3.7746	-1.0017	8.2903	-1.9282	-17.7769	76.4328
23	5	2	4.0689	2.5918	3.7746	-1.0017	3.9218	0.795	2.8665	14.1401
18	55	62	-2.6332	2.3059	-9.2485	-10.5096	-5.9408	-4.1018	-59.1574	-85.68
41	55	7	-2.6332	2.3059	-10.4004	6.0032	-6.5168	4.1546	35.7391	-56.0596
1	7	71	-10.4004	6.0032	-0.2001	8.2288	-5.3002	7.116	74.2932	-55.3362
24	7	12	-10.4004	6.0032	-16.427	0.3747	-13.4137	3.189	26.2971	-110.6124
48	77	2	13.5938	10.16	3.7746	-1.0017	8.6842	4.5791	68.0734	129.0997
2	88	42	16.5033	4.9126	12.806	-2.8546	14.6547	1.029	8.8517	126.0642
8	88	45	16.5033	4.9126	24.3658	-1.0187	20.4346	1.9469	19.1752	201.2572
5	95	62	-13.5175	-4.8726	-9.2485	-10.5096	-11.383	-7.6911	-54.3843	-80.49

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**Segmental First Moment Qx Qy**

Branch ID	Node ID	Node Serial	Segment ID	Flow sense + out - in	Sum([Qx]) of all segments at current node = [Qxa]	Full Segment [Qxs]	[Qx] at other end of segment = [Qxa]+[Qxs]	Medium or Maximum [Qx] at/ near mid-span of segment	Sum([Qy]) of all segments at current node = [Qya]	Full Segment [Qys]	[Qy] at other end of segment = [Qya]+[Qys]	Medium or Maximum [Qy] at/near mid-span of segment
1	28			-1		133.1298		71.4747		-80.8632		-31.5767
1	25				0.		133.1298		0.		-80.8632	
4				1		133.1298		71.4747		-80.8632		-31.5767
2					133.1298		0.		-80.8632		0.	
7				-1		65.8079		171.8734		-82.4512		-124.3161
3	19				198.9377		133.1298		-163.3144		-80.8632	
2	31			1		19.1263		13.5388		-174.7189		-95.7115
1	21				0.		19.1263		0.		-174.7189	
12				-1		19.1263		13.5388		-174.7189		-95.7115
2					19.1263		0.		-174.7189		0.	
7				1		26.2971		26.4732		-110.6124		-236.2372
3	24				45.4234		19.1263		-285.3313		-174.7189	
3	17			1		-124.6845		-79.2553		-147.474		-71.0509
1	44				0.		-124.6845		0.		-147.474	
95				-1		-124.6845		-79.2553		-147.474		-71.0509
2					-124.6845		0.		-147.474		0.	
62				-1		-54.3843		-146.8942		-80.49		-191.4923
3	5				-179.0687		-124.6845		-227.964		-147.474	
4	64			-1		-81.2364		-39.1209		89.2902		51.0987
1	29				0.		-81.2364		0.		89.2902	

19	1		-81.2364		-39.1209		89.2902		51.0987
2			-81.2364		0.		89.2902		0.
2	1		-78.1685		-136.8472		75.2218		134.3436
3	9		-159.4049		-81.2364		164.512		89.2902
5	77	1	68.0734		54.778		129.0997		82.7964
1	48		0.		68.0734		0.		129.0997
2		-1	68.0734		54.778		129.0997		82.7964
2			68.0734		0.		129.0997		0.
6	3	1	-136.5353		-72.6759		-43.1118		-6.1752
1	12		0.		-136.5353		0.		-43.1118
62		-1	-136.5353		-72.6759		-43.1118		-6.1752
2			-136.5353		0.		-43.1118		0.
55	1		-59.1574		-368.2863		-85.68		-325.8418
3	18		-374.7615		-315.6041		-356.7559		-271.0759
7		-1	35.7391		-360.8676		-56.0596		-376.4336
4	41		-339.0224		-374.7615		-412.8155		-356.7559
71		-1	74.2932		-60.4191		-55.3362		-902.441
5	1		-20.3681		-94.6613		-916.7973		-861.4611
21	1		46.1321		2.2432		13.308		-913.7396
6	35		25.764		-20.3681		-903.4893		-916.7973
5		-1	36.8053		49.2191		29.4912		-887.8844
7	38		62.5693		25.764		-873.9981		-903.4893
2		-1	2.8665		65.6221		14.1401		-866.7954
8	23		65.4358		62.5693		-859.858		-873.9981
42	1		-17.7769		-32.6488		76.4328		-538.4382
9	15		-43.6726		-25.8957		-489.8136		-566.2463
88	1		8.8517		-47.5988		126.0642		-430.7572
10	2		-34.8209		-43.6726		-363.7494		-489.8136
45		-1	19.1752		-17.9312		201.2572		-272.8004
11	8		-15.6457		-34.8209		-162.4922		-363.7494
15	1		15.6457		-13.4428		162.4922		-81.0064
12	32		0.		-15.6457		0.		-162.4922

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## TORSIONAL PROPERTIES

Integration for Double Sectorial Area w.r.t. Centroid									
Shear flow Branch ID	Node Serial	Node ID	Flow sense + out - in	Segment Seg ID	Length [L]	+ clockwise segment normal distance to centroid (rho)	Double sectorial area w.r.t. centroid rho ds = [rho]*[L]	* Integration of [rho ds] from branch's start node = [Omega]	
1	1	15	1	32	6.7082	-24.3003	-163.0113	0.	
	2	45	-1	8	9.8489	-13.8607	-136.5122	-163.0113	
	3	88	1	2	8.6023	-12.7898	-110.0218	-26.4991	
	4	42	1	15	9.2195	-0.2227	-2.0531	-136.5209	
	5	2	-1	23	3.6056	-3.8438	-13.8589	-138.5741	

	6	5	-1	38	6.4031	-3.5768	-22.9024	-124.7152
	7	21	1	35	5.3852	8.1889	44.0984	-101.8127
	8	71	-1	1	10.4403	-8.0823	-84.3815	-57.7143
	9	7	-1	41	8.6023	0.9503	8.1751	26.6672
	10	55	1	18	14.4222	3.3975	49.	18.4921
	11	62	-1	12	11.3137	-12.6509	-143.1289	67.4922
	12	3	1	12	11.3137	-12.6509		210.6211
2	1	2	-1	48	14.8661	-3.4957	-51.9669	-138.5741
	2	77	1	48	14.8661	-3.4957		-86.6072
3	1	2	1	9	12.0416	-3.0304	-36.4904	-138.5741
	2	19	1	29	7.2801	13.6419	99.3145	-175.0644
	3	64	-1	29	7.2801	13.6419		-75.75
4	1	62	-1	5	7.0711	13.7178	96.9991	67.4922
	2	95	-1	44	11.7047	-14.1145	-165.2056	-29.507
	3	17	1	44	11.7047	-14.1145		135.6986
5	1	7	1	24	8.2462	11.4862	94.7178	26.6672
	2	12	-1	21	8.6023	6.722	57.8249	121.385
	3	31	1	21	8.6023	6.722		63.5601
6	1	7	-1	19	7.0711	7.5782	53.5863	26.6672
	2	4	1	25	9.	-17.2936	-155.642	-26.919
	3	28	-1	25	9.	-17.2936		-182.561

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\* At each node, [Current Omega] = [Last Omega] + [rho]\*[L

### Segmental Parameter for Shear Center

Segment ID	From Node i				From Node j			
	Node ID	Omega [wi]	Principal axes coordinates		Node ID	Omega [wj]	Principal axes coordinates	
			[xi]	[yi]			[xj]	[yj]
1	7	26.6672	-6.1847	10.2936	71	-57.7143	3.8153	7.2936
12	3	210.6211	-5.1847	-12.7064	62	67.4922	-13.1847	-4.7064
15	42	-136.5209	9.8153	-8.7064	2	-138.5741	2.8153	-2.7064
18	55	18.4921	-1.1847	3.2936	62	67.4922	-13.1847	-4.7064
19	4	-26.919	-5.1847	17.2936	7	26.6672	-6.1847	10.2936
2	88	-26.4991	16.8153	-3.7064	42	-136.5209	9.8153	-8.7064
21	31	63.5601	-19.1847	15.2936	12	121.385	-14.1847	8.2936
23	5	-124.7152	4.8153	0.2936	2	-138.5741	2.8153	-2.7064
24	7	26.6672	-6.1847	10.2936	12	121.385	-14.1847	8.2936

25	4	-26.919	-5.1847	17.2936	28	-182.561	3.8153	17.2936
29	19	-175.0644	1.8153	-14.7064	64	-75.75	8.8153	-16.7064
32	15	0.	23.8153	-6.7064	45	-163.0113	20.8153	-12.7064
35	21	-101.8127	8.8153	5.2936	71	-57.7143	3.8153	7.2936
38	21	-101.8127	8.8153	5.2936	5	-124.7152	4.8153	0.2936
41	55	18.4921	-1.1847	3.2936	7	26.6672	-6.1847	10.2936
44	17	135.6986	-18.1847	-8.7064	95	-29.507	-14.1847	2.2936
48	77	-86.6072	16.8153	2.2936	2	-138.5741	2.8153	-2.7064
5	95	-29.507	-14.1847	2.2936	62	67.4922	-13.1847	-4.7064
8	88	-26.4991	16.8153	-3.7064	45	-163.0113	20.8153	-12.7064
9	2	-138.5741	2.8153	-2.7064	19	-175.0644	1.8153	-14.7064

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### Segmental Warping Product of Inertia

Segment ID	Segment Area [A]	Integration about X'		X segment warping product of inertia [Iwx]	Integration about Y'		Y segment warping product of inertia [Iwy]
		x part A (xpA) (wi*xi+wj*xj)*A	x part B (xpB) (wi*xj+wj*xi)*A		y part A (ypA) (wi*yi+wj*yj)*A	y part B (ypB) (wi*yj+wj*yi)*A	
1	10.440307	-4020.8441	4788.8458	-542.1404	-1528.9006	-4171.8076	-1204.9348
12	11.313708	-22422.2189	-35376.7715	-13370.2015	-33872.0405	-20917.4879	-14776.9282
15	9.219544	-15951.0024	-16083.5061	-7997.5851	14416.1876	14529.7622	7227.0229
18	14.422205	-13149.7184	-4669.4592	-5161.4827	-3702.8049	1950.7012	-909.1514
19	7.071068	-179.3332	199.5788	-26.5146	-1350.7546	1301.6295	-233.3133
2	8.602325	-15360.2197	-21985.3209	-8784.2934	11069.726	6337.5108	4746.1605
21	8.602325	-25301.0282	-27788.1724	-13065.0381	17022.0405	20504.0424	9091.3539
23	3.605551	-3571.9336	-3671.8714	-1802.6231	1220.236	1070.3293	585.1336
24	8.246211	-15558.4068	-9309.9047	-6737.7864	10565.1551	12127.2807	5542.9318
25	9.	-5012.676	7594.3248	-405.1712	-32603.8937	-32603.8937	-16301.9468
29	7.28011	-7174.9892	-12236.1307	-4431.0182	27956.2686	29402.309	14219.141
32	6.708204	-22761.8354	-26042.3748	-11927.6743	13894.6656	7333.5868	5853.8197
35	5.385165	-6019.063	-4831.6765	-2811.6337	-5169.1859	-5644.1405	-2663.7521
38	6.403124	-9592.2478	-10178.8362	-4893.8886	-3685.3942	-4418.6297	-1964.903
41	8.602325	-1607.2156	-1255.5924	-745.0039	2885.2647	2392.9923	1360.5869
44	11.7047	-23983.9547	-16249.227	-10702.8561	-14620.6739	6649.8274	-3765.2534
48	14.866069	-27449.5933	-38265.2004	-15527.3979	2622.449	-1240.2678	667.4384
5	7.071068	-3332.6993	-4018.5868	-1780.6642	-2724.6525	2076.5601	-562.1241
8	9.848858	-37807.0643	-32429.1082	-18007.2061	21367.2159	9266.8148	8666.8744
9	12.041595	-8524.6194	-8964.0219	-4335.5434	35518.1167	30245.2864	16880.2533

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### Preparation for Shear Center

Segmental Warping Product of Inertia		User Axes Moment of Inertia		Denominator [Dnom]=Ixy*Ixy - Ixx*Iyy
[Iwx]	[Iwy]	[Ixx]	[Iyy]	



-133055.723      32458.4093      13771.9628      21553.6473      -6230.1883      -258020781.9184

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**Location of Shear Center**

Numeritors		Shear center w.r.t. c.g.		Centroid (c.g.) Location		Shear center w.r.t. user origin	
[Nx]	[Ny]	[xref]=[Nx]/[Dm]	[yref]=[Ny]/[Dm]	[cx]	[cy]	[xo]=[xref]+[cx]	[yo]=[yref]+[cy]
9365102.7888	30216464.8709	-0.5014	6.3182	21.1847	20.7064	20.6833	27.0246

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**Integration for Double Sectorial Area w.r.t. Shear Center**

Shear flow Branch ID	Node Serial	Node ID	Flow sense + out - in	Segment		+ clockwise segment normal distance to shear center (rhoO)	Double sectorial area w.r.t. shear center = rhoO ds = [rhoO]*[L]	Integration of [rho ds] from branch's start node = [Omega o]
				Seg ID	Length [L]			
1	1	15	1	32	6.7082	-27.5743	-184.974	0.
	2	45	-1	8	9.8489	-11.7528	-115.7519	-184.974
	3	88	1	2	8.6023	-18.2225	-156.7558	-69.2221
	4	42	1	15	9.2195	-4.6935	-43.272	-225.9779
	5	2	-1	23	3.6056	-7.7656	-27.9993	-269.2499
	6	5	-1	38	6.4031	-7.9152	-50.6819	-241.2506
	7	21	1	35	5.3852	2.5088	13.5104	-190.5686
	8	71	-1	1	10.4403	-2.1747	-22.7041	-177.0583
	9	7	-1	41	8.6023	-2.314	-19.9061	-154.3542
	10	55	1	18	14.4222	-2.1376	-30.8289	-134.4481
	11	62	-1	12	11.3137	-16.764	-189.6632	-165.277
	12	3	1	12	11.3137	-16.764		24.3862
2	1	2	-1	48	14.8661	-9.6144	-142.928	-269.2499
	2	77	1	48	14.8661	-9.6144		-126.3219
3	1	2	1	9	12.0416	-4.0547	-48.8251	-269.2499
	2	19	1	29	7.2801	19.5792	142.5388	-318.075
	3	64	-1	29	7.2801	19.5792		-175.5361
4	1	62	-1	5	7.0711	14.1149	99.8077	-165.277
	2	95	-1	44	11.7047	-11.4841	-134.4178	-265.0847
	3	17	1	44	11.7047	-11.4841		-130.6668
5	1	7	1	24	8.2462	5.2351	43.1697	-154.3542
	2	12	-1	21	8.6023	9.9864	85.9061	-111.1845
	3	31	1	21	8.6023	9.9864		-197.0906
6	1	7	-1	19	7.0711	6.1884	43.7585	-154.3542
	2	4	1	25	9.	-10.9754	-98.7785	-198.1127
	3	28	-1	25	9.	-10.9754		-296.8912

Setup for Warping Properties							Nodal Wn	
Segmt ID	From Node i	To Node j	OmegaO=integrate([rhoO]*ds)		Segment Area [tds]	[Ci]= (woi+woj)(tds)	Node ID	Normalized unit warping [wn] = C - [woj]
			woi	woj				
1	7	71	-154.3542	-177.0583	10.4403	-3460.0477	12	-69.7862
12	3	62	24.3862	-165.277	11.3137	-1593.9973	15	-180.9707
15	42	2	-225.9779	-269.2499	9.2195	-4565.7746	17	-50.3038
18	55	62	-134.4481	-165.277	14.4222	-4322.6969	19	137.1043
19	4	7	-198.1127	-154.3542	7.0711	-2492.3172	2	88.2792
2	88	42	-69.2221	-225.9779	8.6023	-2539.4065	21	9.5979
21	31	12	-197.0906	-111.1845	8.6023	-2651.882	28	115.9205
23	5	2	-241.2506	-269.2499	3.6056	-1840.6357	3	-205.3569
24	7	12	-154.3542	-111.1845	8.2462	-2189.6879	31	16.1199
25	4	28	-198.1127	-296.8912	9.	-4455.0351	4	17.142
29	19	64	-318.075	-175.5361	7.2801	-3593.5429	42	45.0072
32	15	45	0.	-184.974	6.7082	-1240.8436	45	4.0033
35	21	71	-190.5686	-177.0583	5.3852	-1979.7314	5	60.2799
38	21	5	-190.5686	-241.2506	6.4031	-2764.9921	55	-46.5226
41	55	7	-134.4481	-154.3542	8.6023	-2484.3714	62	-15.6937
44	17	95	-130.6668	-265.0847	11.7047	-4632.1528	64	-5.4346
48	77	2	-126.3219	-269.2499	14.8661	-5880.5977	7	-26.6165
5	95	62	-265.0847	-165.277	7.0711	-3043.1166	71	-3.9124
8	88	45	-69.2221	-184.974	9.8489	-2503.5419	77	-54.6488
9	2	19	-269.2499	-318.075	12.0416	-7072.3278	88	-111.7486
A = Sum(tds) = 180.4345			Sum(Ci)= -65306.6994		C = Sum(Ci) / 2A = -180.9707		95	84.114

Segment / Profile Warping Constant [Cw]								
Segment ID	Node		Normalized Unit Warping		[Z] = [wni]^2+ [wni]*[wnj]+ [wnj]^2	Segment Area [A]	[Cwi]= [Z]*[A] / 3	[Wntds]= ([Wni]+[Wnj])*[A]
	From i	To j	[wni]	[wnj]				
1	7	71	-26.6165	-3.9124	827.8797	10.4403	2881.1059	-159.3656
12	3	62	-205.3569	-15.6937	45640.5592	11.3137	172121.3274	-1250.451
15	42	2	45.0072	88.2792	13792.066	9.2195	42385.5219	614.42
18	55	62	-46.5226	-15.6937	3140.7544	14.4222	15098.8681	-448.648
19	4	7	17.142	-26.6165	546.0256	7.0711	1286.9946	-33.4974
2	88	42	-111.7486	45.0072	9483.8999	8.6023	27194.5306	-287.0655
21	31	12	16.1199	-69.7862	4005.0237	8.6023	11484.1723	-230.8278
23	5	2	60.2799	88.2792	16748.3449	3.6056	20129.0055	267.8187
24	7	12	-26.6165	-69.7862	7436.0202	8.2462	20439.6646	-397.4786
25	4	28	17.142	115.9205	15718.5246	9.	47155.5737	598.7813
29	19	64	137.1043	-5.4346	18082.01	7.2801	43879.6734	479.2849
32	15	45	-180.9707	4.0033	32041.9302	6.7082	71647.934	-593.5665

35	21	71	9.5979	-3.9124	69.8764	5.3852	125.432	15.3087
38	21	5	9.5979	60.2799	4304.3487	6.4031	9187.0931	223.7182
41	55	7	-46.5226	-26.6165	4111.0565	8.6023	11788.2152	-314.5831
44	17	95	-50.3038	84.114	5374.3829	11.7047	20968.5128	197.8688
48	77	2	-54.6488	88.2792	5955.3572	14.8661	29510.9164	249.9761
5	95	62	84.114	-15.6937	6001.396	7.0711	14145.4259	241.9023
8	88	45	-111.7486	4.0033	12056.4003	9.8489	39580.5907	-530.5837
9	2	19	88.2792	137.1043	38694.2533	12.0416	155313.5037	1356.9882

Profile Warping Constant [Cw] = Sum([Cwi]) = 756324.061

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**Integration for Warping Static Moment [Sw]**

Branch ID	Node Serial	Node ID	Segment ID	Flow sense + out - in	Normalized unit warping [wn] at current node	$t ds / 2 = [I] * [L] / 2 = [Lt2]$	[Sw] at other end of segment = [Swj] + [Lt2] * Sum([Wn] at both segment ends)	Current node [Swj]	Medium/Maximum value of [Sw] at or near mid-span of segment
6	3	28	25	-1	115.9205	4.5	598.7813	0.	38.5695
	2	4	25	1	17.142	4.5	0.	598.7813	38.5695
	1	7	19	-1	-26.6165	3.5355	598.7813	565.2839	622.5232
5	3	31	21	1	16.1199	4.3012	-230.8278	0.	13.0102
	2	12	21	-1	-69.7862	4.3012	0.	-230.8278	13.0102
	1	7	24	1	-26.6165	4.1231	-230.8278	-628.3064	-285.6991
4	3	17	44	1	-50.3038	5.8523	197.8688	0.	-110.1732
	2	95	44	-1	84.114	5.8523	0.	197.8688	-110.1732
	1	62	5	-1	-15.6937	3.5355	197.8688	439.771	448.4956
3	3	64	29	-1	-5.4346	3.6401	479.2849	0.	19.0279
	2	19	29	1	137.1043	3.6401	0.	479.2849	19.0279
	1	2	9	1	88.2792	6.0208	479.2849	1836.2731	745.0405
2	2	77	48	1	-54.6488	7.433	249.9761	0.	-155.3137
	1	2	48	-1	88.2792	7.433	0.	249.9761	-155.3137
1	12	3	12	1	-205.3569	5.6569	-1250.451	0.	-580.837
	11	62	12	-1	-15.6937	5.6569	0.	-1250.451	-580.837
	10	55	18	1	-46.5226	7.2111	-810.68	-1259.328	-978.4196

9	7	41	-1	-26.6165	4.3012	-1259.328	-1573.911	-1359.3786
8	71	1	-1	-3.9124	5.2202	-1636.9335	-1796.2991	-1706.4046
7	21	35	1	9.5979	2.6926	-1796.2991	-1780.9904	-1788.8153
6	5	38	-1	60.2799	3.2016	-1780.9904	-1557.2722	-1765.6262
5	2	23	-1	88.2792	1.8028	-1557.2722	-1289.4535	-1502.9366
4	42	15	1	45.0072	4.6098	796.7957	1411.2157	900.5322
3	88	2	1	-111.7486	4.3012	1411.2157	1124.1502	1273.2134
2	45	8	-1	4.0033	4.9244	1124.1502	593.5665	592.8847
1	15	32	1	-180.9707	3.3541	593.5665	0.	580.4295

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**Summary of Shear Flow Related Segment Properties [Qx] [Qy] [Sw]**

Segment ID	From Node	To Node	Wapring Static Moment [Sw]			First Moment [Qx]			First Moment [Qy]		
			At Start of Segment	Medium or Max. Sw at/ near mid-span	At end of segment	At start of segment	Medium or Max. Qx at/ near mid-span	At end of segment	At start of segment	Medium or Max. Qy at/ near mid-span	At end of segment
1	7	71	-1636.9335	-1706.4046	-1796.2991	-94.6613	-60.4191	-20.3681	-861.4611	-902.441	-916.7973
12	3	62	0.	-580.837	-1250.451	0.	-72.6759	-136.5353	0.	-6.1752	-43.1118
15	4	2	1411.2157	900.5322	796.7957	-43.6726	-32.6488	-25.8957	-489.8136	-538.4382	-566.2463
18	5	62	-1259.328	-978.4196	-810.68	-374.7615	-368.2863	-315.6041	-356.7559	-325.8418	-271.0759
19	4	7	598.7813	622.5232	565.2839	133.1298	171.8734	198.9377	-80.8632	-124.3161	-163.3144
2	8	42	1124.1502	1273.2134	1411.2157	-34.8209	-47.5988	-43.6726	-363.7494	-430.7572	-489.8136
21	3	12	0.	13.0102	-230.8278	0.	13.5388	19.1263	0.	-95.7115	-174.7189
23	5	2	-1557.2722	-1502.9366	-1289.4535	62.5693	65.6221	65.4358	-873.9981	-866.7954	-859.858
24	7	12	-628.3064	-285.6991	-230.8278	45.4234	26.4732	19.1263	-285.3313	-236.2372	-174.7189
25	4	28	598.7813	38.5695	0.	133.1298	71.4747	0.	-80.8632	-31.5767	0.
29	19	64	479.2849	19.0279	0.	-81.2364	-39.1209	0.	89.2902	51.0987	0.
32	15	45	0.	580.4295	593.5665	0.	-13.4428	-15.6457	0.	-81.0064	-162.4922
35	2	71	-1780.9904	-1788.8153	-1796.2991	25.764	2.2432	-20.3681	-903.4893	-913.7396	-916.7973

38	5	-1765.6262	25.764	62.5693	-887.8844
21		-1780.9904	-1557.2722	49.2191	-903.4893
41	7	-1359.3786	-374.7615	-339.0224	-376.4336
55		-1259.328	-1573.911	-360.8676	-356.7559
44	95	-110.1732	0.	-124.6845	-71.0509
17		0.	197.8688	-79.2553	0.
48	2	-155.3137	0.	68.0734	82.7964
77		0.	249.9761	54.778	0.
5	62	448.4956	-124.6845	-179.0687	-191.4923
95		197.8688	439.771	-146.8942	-147.474
8	45	592.8847	-34.8209	-15.6457	-272.8004
88		1124.1502	593.5665	-17.9312	-363.7494
9	19	745.0405	-159.4049	-81.2364	134.3436
2		1836.2731	479.2849	-136.8472	164.512

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