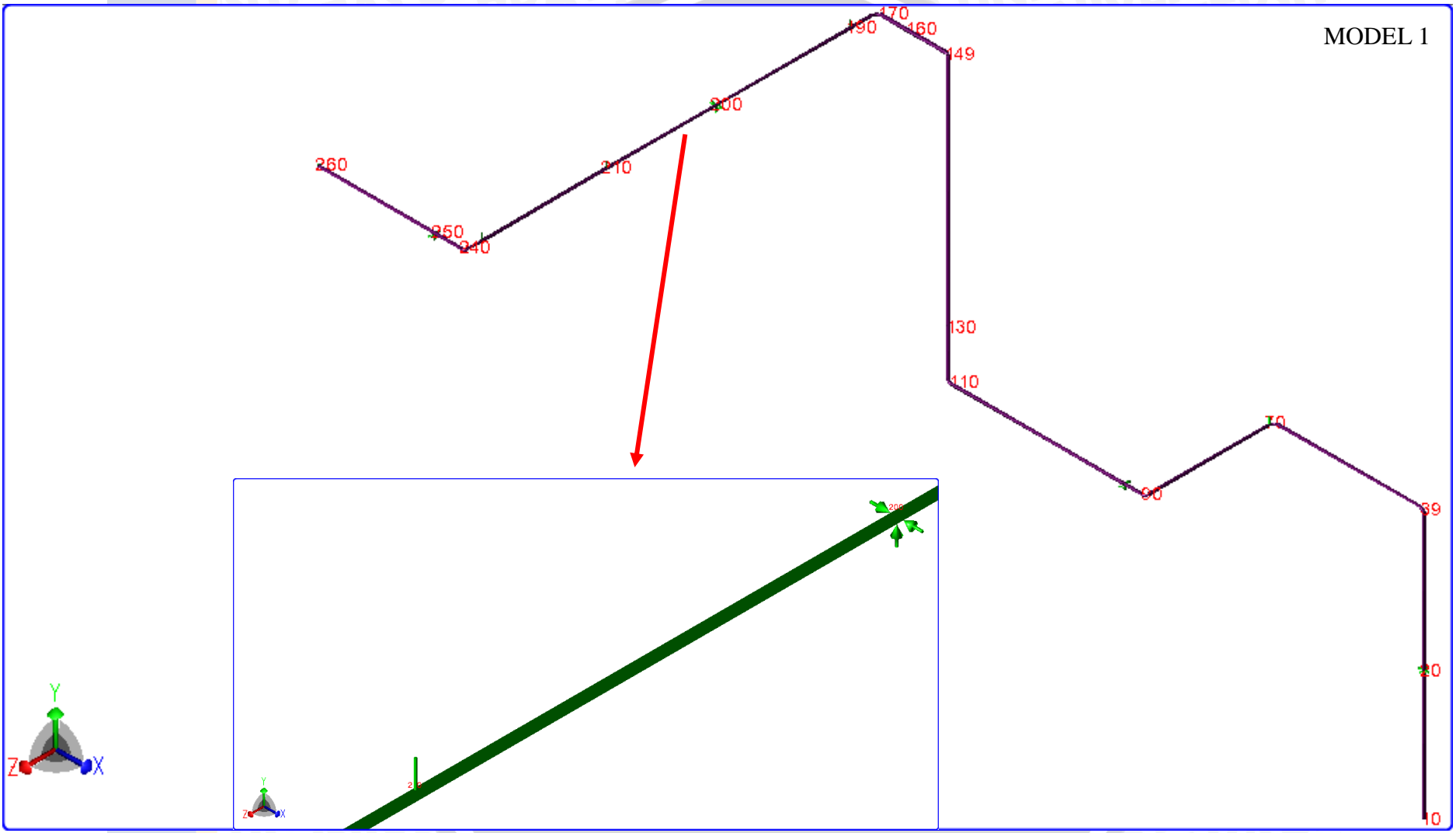
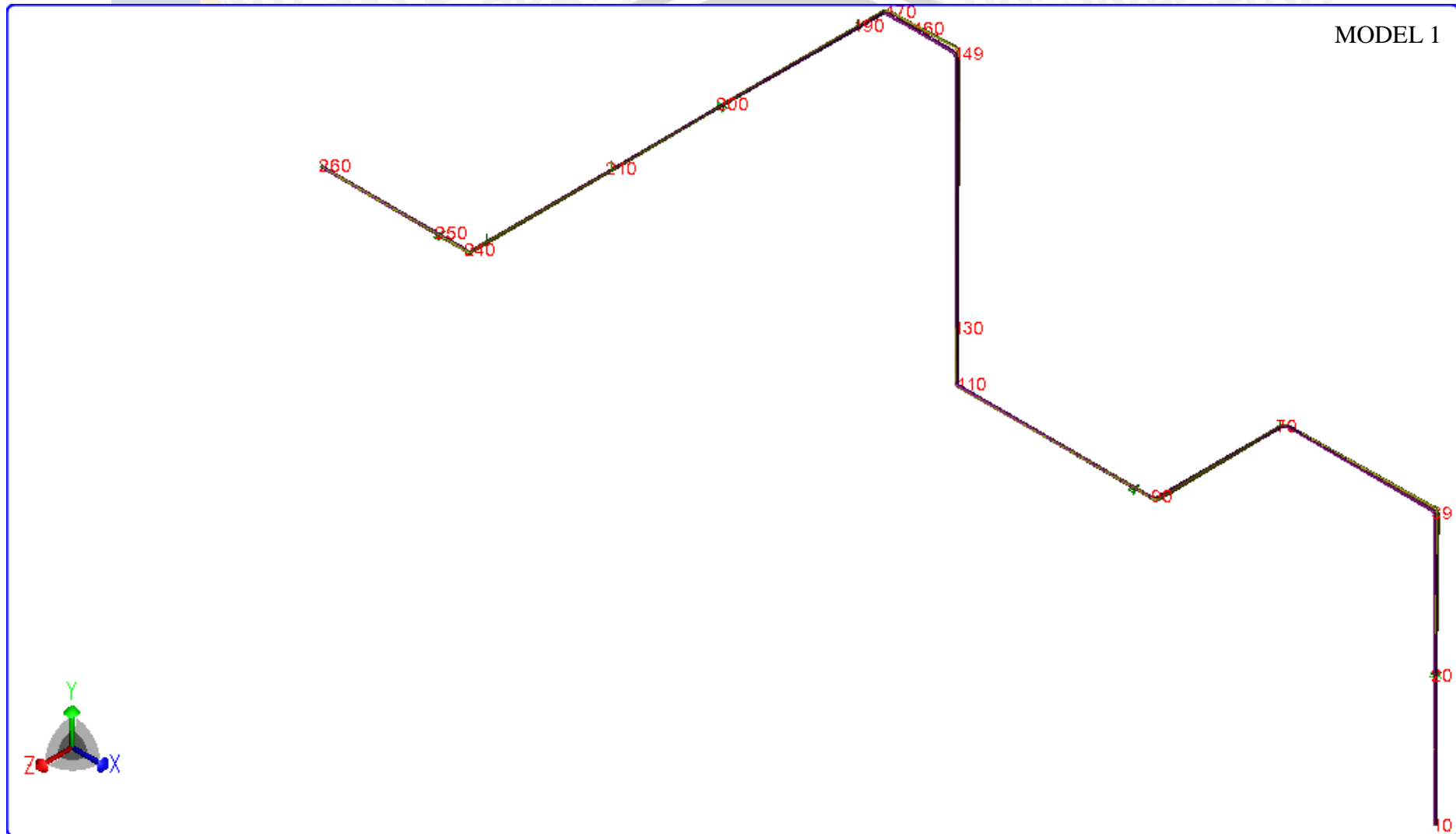
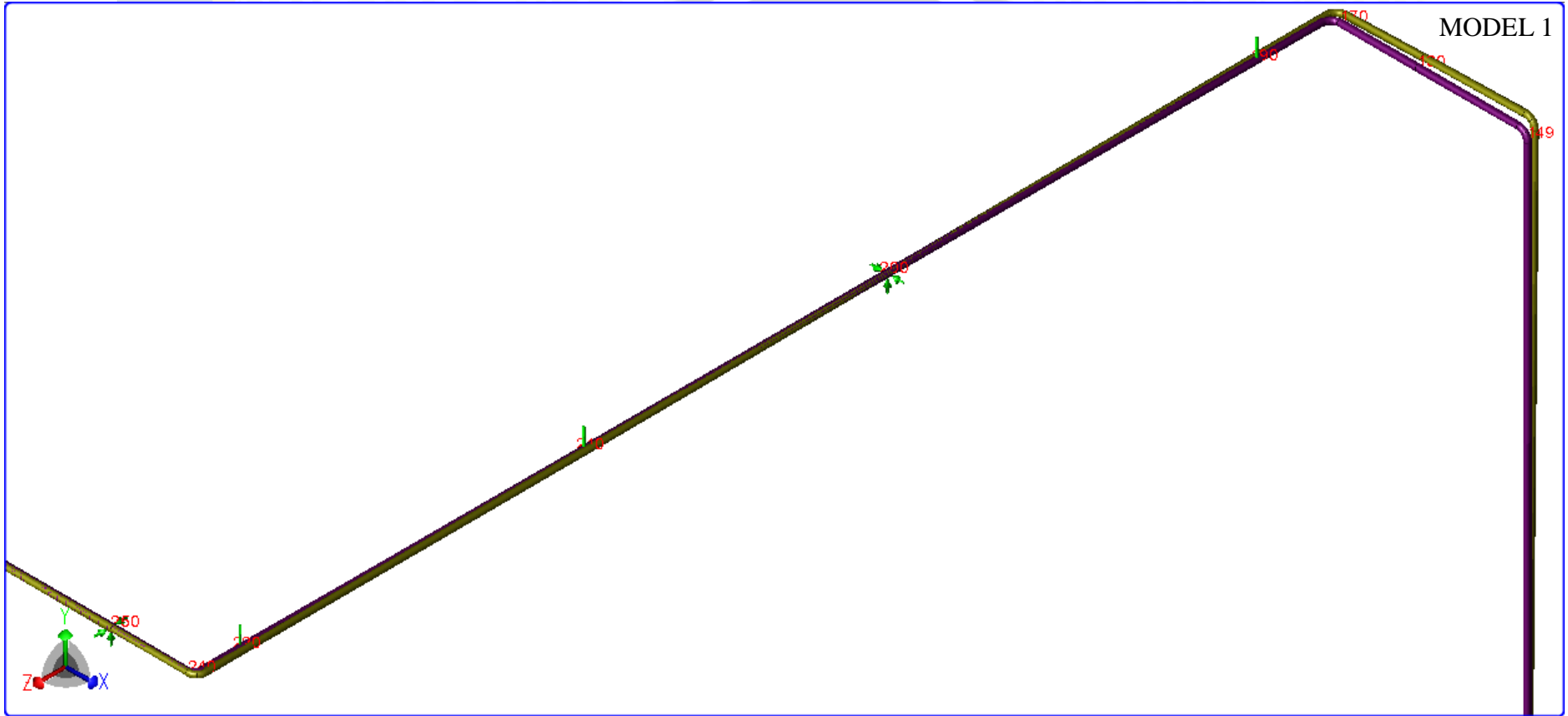


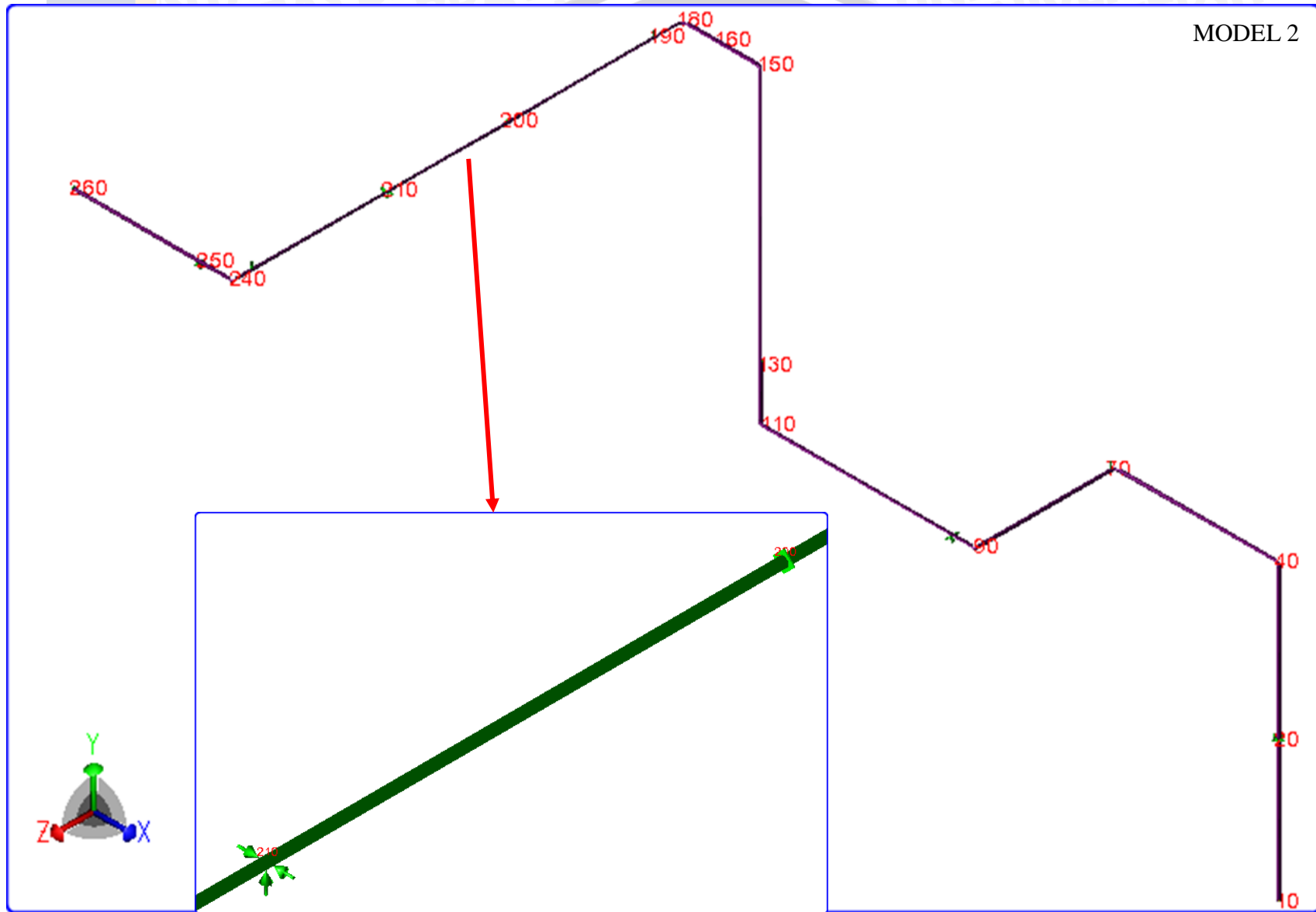


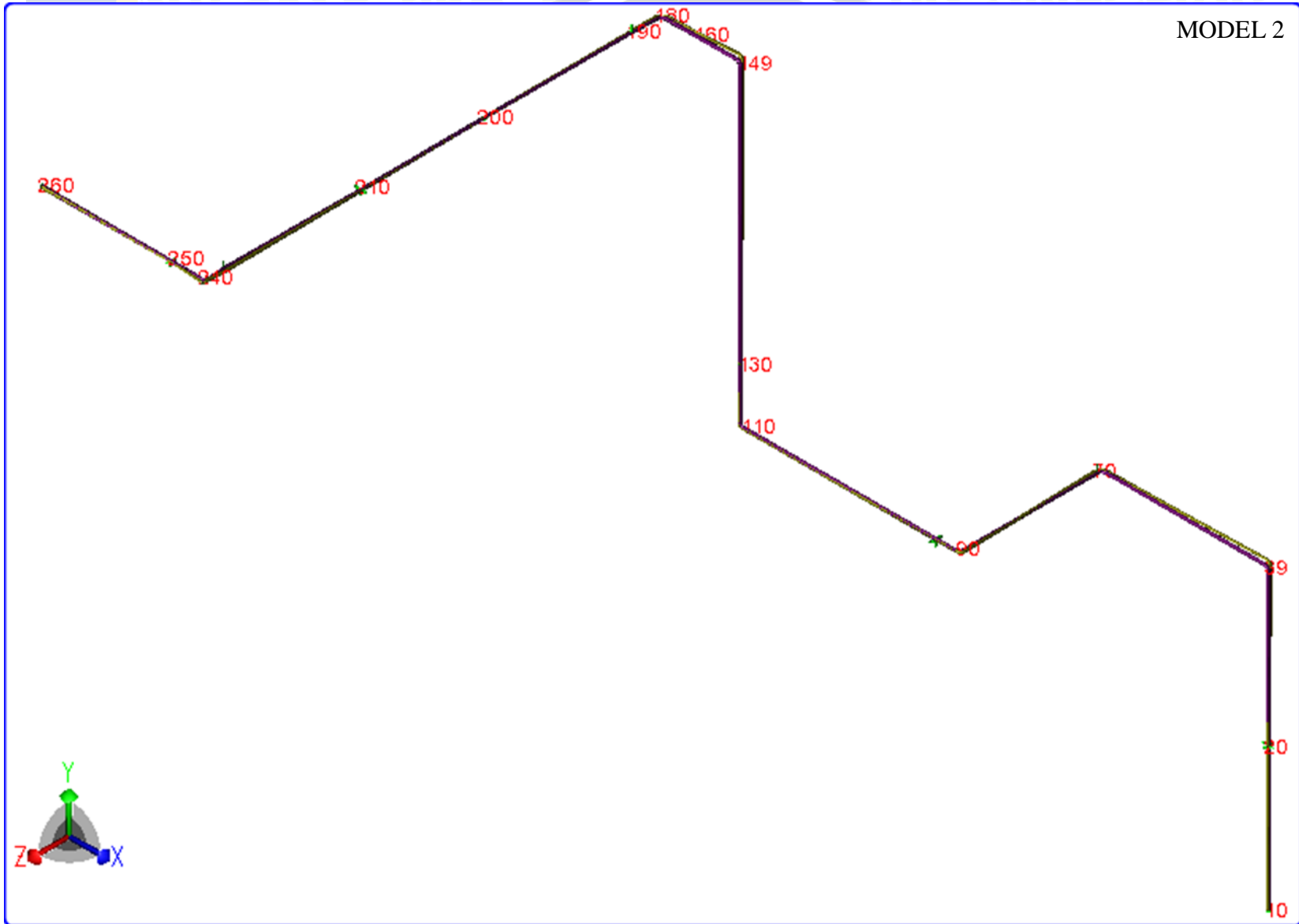
MODEL 1

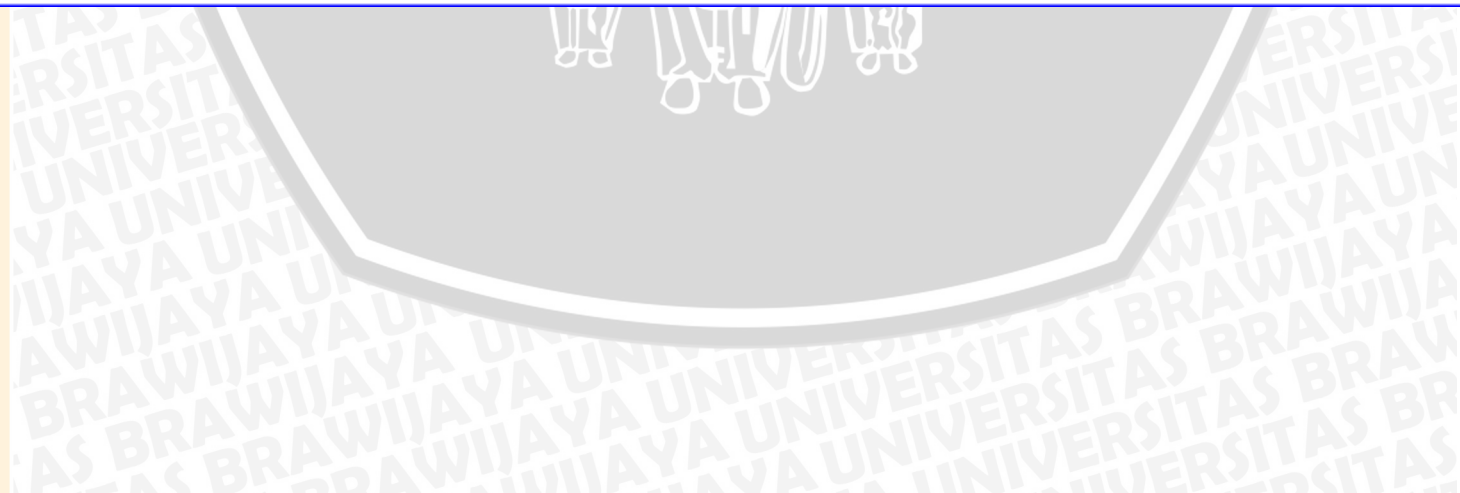
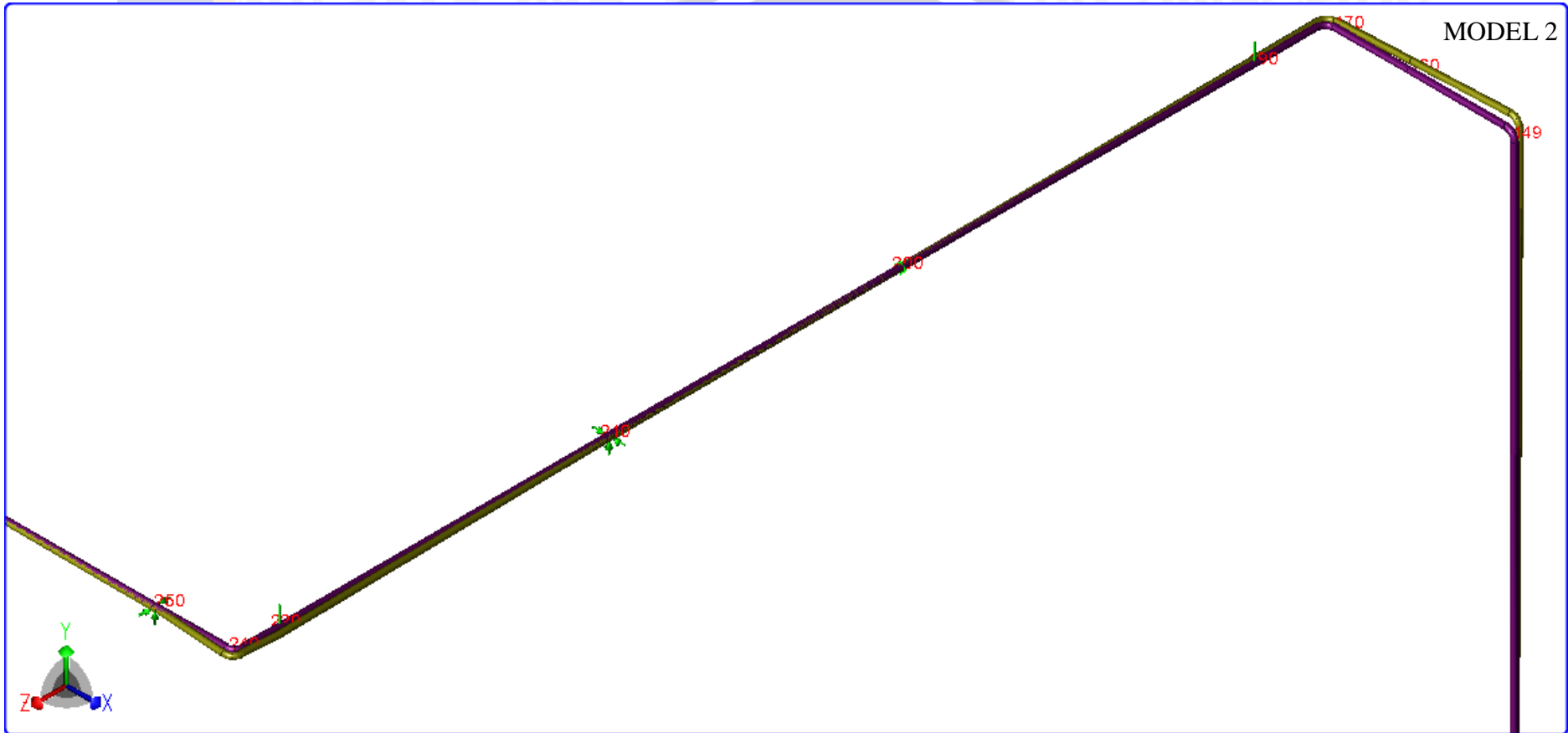




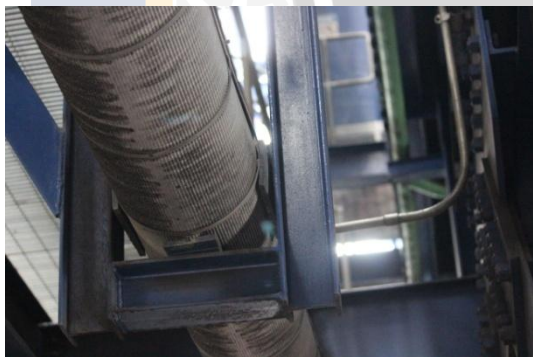




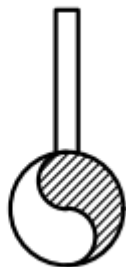
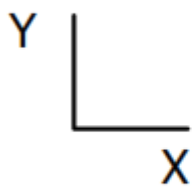




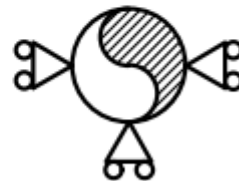
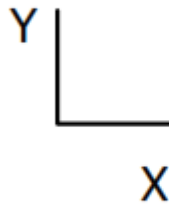




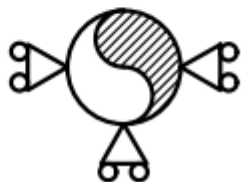
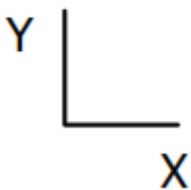
H-3



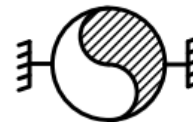
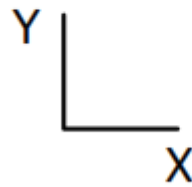
S-8

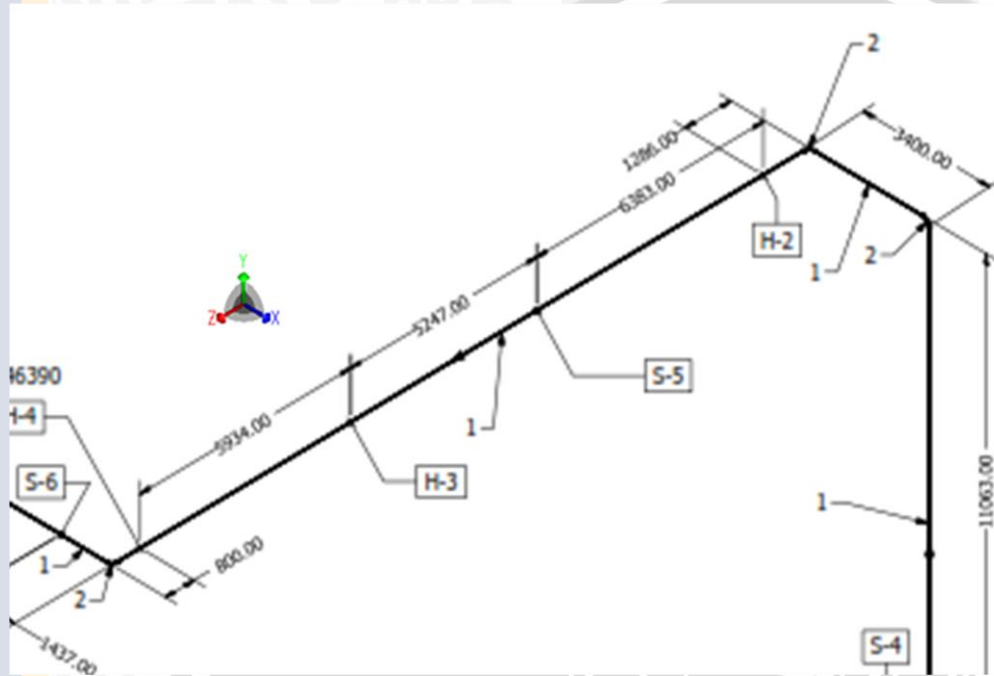


S-5



S-5

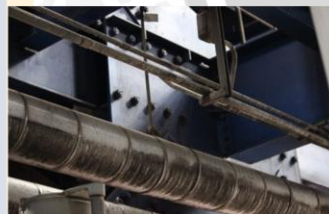




H-2



S-5



H-3



H-4

Titik	Sustained Load									Expansion Load				
	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Z (mm ³)	Hoop Stress (kPa)	Bending +Torsion Stress (kPa)	Pressure Stress (kPa)	Code Stress (kPa)	Allowable Stress (kPa)	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Code Stress (kPa)	Allowable Stress (kPa)
140	115	1	115,00	96666,15	48685,76	1189,71	24342,88	25532,59	137895,14	1279	-13	1279,07	13231,79	206842,71
150	5	-40	40,31	96666,15	48685,76	417,02	24342,88	24759,90	137895,14	1089	-619	1252,63	12958,31	206842,71
160	496	-40	497,61	96666,15	48685,76	5147,72	24342,88	29490,60	137895,14	476	-619	780,86	8077,87	206842,71
170	14	-40	42,38	96666,15	48685,76	438,41	24342,88	24781,29	137895,14	538	-619	820,12	8484,10	206842,71
180	150	109	185,42	96666,15	48685,76	1918,16	24342,88	26261,04	137895,14	758	-237	794,19	8215,77	206842,71
190	1282	109	1286,63	96666,15	48685,76	13309,99	24342,88	37652,87	137895,14	378	-237	446,15	4615,41	206842,71
200	986	109	992,01	96666,15	48685,76	10262,19	24342,88	34605,07	137895,14	109	-237	260,86	2698,61	206842,71
210	1358	109	1362,37	96666,15	48685,76	14093,53	24342,88	38436,41	137895,14	187	-237	301,89	3123,02	206842,71
220	765	109	772,73	96666,15	48685,76	7993,76	24342,88	32336,64	137895,14	318	-237	396,60	4102,80	206842,71
230	170	109	201,94	96666,15	48685,76	2089,08	24342,88	26431,96	137895,14	386	-237	452,95	4685,73	206842,71

Titik	Sustained Load									Expansion Load				
	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Z (mm ³)	Hoop Stress (kPa)	Bending +Torsion Stress (kPa)	Pressure Stress (kPa)	Code Stress (kPa)	Allowable Stress (kPa)	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Code Stress (kPa)	Allowable Stress (kPa)
140	119	16	120,07	96666,15	48685,76	1242,12	24342,88	25585,00	137895,14	1452	51	1452,90	15030,03	206842,71
150	19	24	30,61	96666,15	48685,76	316,66	24342,88	24659,54	137895,14	1331	-422	1396,30	14444,53	206842,71
160	522	24	522,55	96666,15	48685,76	5405,73	24342,88	29748,61	137895,14	363	-422	556,64	5758,42	206842,71
170	48	24	53,67	96666,15	48685,76	555,16	24342,88	24898,04	137895,14	643	-422	769,11	7956,37	206842,71
180	83	56	100,12	96666,15	48685,76	1035,78	24342,88	25378,66	137895,14	481	-622	786,29	8134,03	206842,71
190	1194	56	1195,31	96666,15	48685,76	12365,37	24342,88	36708,25	137895,14	380	-622	728,89	7540,31	206842,71
200	1566	56	1567,00	96666,15	48685,76	16210,44	24342,88	40553,32	137895,14	755	-622	978,22	10119,54	206842,71
200	1242	-148	1250,79	96666,15	48685,76	12939,24	24342,88	37282,12	137895,14	1057	-51	1058,23	10947,26	206842,71
210	925	148	936,77	96666,15	48685,76	9690,73	24342,88	34033,61	137895,14	2607	51	2607,50	26974,27	206842,71
220	918	148	929,85	96666,15	48685,76	9619,23	24342,88	33962,11	137895,14	6149	51	6149,21	63612,87	206842,71
230	236	148	278,57	96666,15	48685,76	2881,75	24342,88	27224,63	137895,14	7214	51	7214,18	74629,85	206842,71

Titik	Sustained Load									Expansion Load				
	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Z (mm ³)	Hoop Stress (kPa)	Bending +Torsion Stress (kPa)	Pressure Stress (kPa)	Code Stress (kPa)	Allowable Stress (kPa)	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Code Stress (kPa)	Allowable Stress (kPa)
140	105	14	105,93	84908,32	64140,40	1247,57	32070,20	33317,77	137895,14	1248	41	1248,67	14706,14	206842,71
150	16	22	27,20	84908,32	64140,40	320,38	32070,20	32390,58	137895,14	1144	-363	1200,21	14135,37	206842,71
160	467	22	467,52	84908,32	64140,40	5506,15	32070,20	37576,35	137895,14	307	-363	475,41	5599,14	206842,71
170	43	22	48,30	84908,32	64140,40	568,86	32070,20	32639,06	137895,14	559	-363	666,52	7849,89	206842,71
180	74	50	89,31	84908,32	64140,40	1051,82	32070,20	33122,02	137895,14	412	-544	682,41	8036,99	206842,71
190	1067	50	1068,17	84908,32	64140,40	12580,29	32070,20	44650,49	137895,14	328	-544	635,23	7481,39	206842,71
200	1398	50	1398,89	84908,32	64140,40	16475,34	32070,20	48545,54	137895,14	646	-544	844,54	9946,52	206842,71
200	1102	-130	1109,64	84908,32	64140,40	13068,70	32070,20	45138,90	137895,14	886	-46	887,19	10448,84	206842,71
210	833	130	843,08	84908,32	64140,40	9929,33	32070,20	41999,53	137895,14	2207	46	2207,48	25998,39	206842,71
220	810	130	820,37	84908,32	64140,40	9661,78	32070,20	41731,98	137895,14	5173	46	5173,20	60926,94	206842,71
230	209	130	246,13	84908,32	64140,40	2898,80	32070,20	34969,00	137895,14	6075	46	6075,17	71549,81	206842,71

Titik	Sustained Load									Expansion Load				
	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Z (mm ³)	Hoop Stress (kPa)	Bending +Torsion Stress (kPa)	Pressure Stress (kPa)	Code Stress (kPa)	Allowable Stress (kPa)	Momen Bending (Nm)	Momen Torsi (Nm)	Momen Resultan (Nm)	Code Stress (kPa)	Allowable Stress (kPa)
140	89	12	89,81	69995,83	90600,54	1283,01	45300,27	46583,28	137895,14	997	28	997,39	14249,32	206842,71
150	13	20	23,85	69995,83	90600,54	340,79	45300,27	45641,06	137895,14	913	-290	957,95	13685,82	206842,71
160	404	20	404,49	69995,83	90600,54	5778,84	45300,27	51079,11	137895,14	238	-290	375,16	5359,73	206842,71
170	37	20	42,06	69995,83	90600,54	600,89	45300,27	45901,16	137895,14	453	-290	537,87	7684,38	206842,71
180	63	43	76,28	69995,83	90600,54	1089,72	45300,27	46389,99	137895,14	327	-446	553,03	7900,94	206842,71
190	921	43	922,00	69995,83	90600,54	13172,26	45300,27	58472,53	137895,14	264	-446	518,28	7404,41	206842,71
200	1207	43	1207,77	69995,83	90600,54	17254,82	45300,27	62555,09	137895,14	508	-446	676,00	9657,76	206842,71
200	935	-108	941,22	69995,83	90600,54	13446,75	45300,27	58747,02	137895,14	681	-40	682,17	9745,92	206842,71
210	737	108	744,87	69995,83	90600,54	10641,65	45300,27	55941,92	137895,14	1720	40	1720,47	24579,54	206842,71
220	678	108	686,55	69995,83	90600,54	9808,41	45300,27	55108,68	137895,14	3993	40	3993,20	57049,12	206842,71
230	177	108	207,35	69995,83	90600,54	2962,28	45300,27	48262,55	137895,14	4696	40	4696,17	67092,14	206842,71

Displacement (mm)

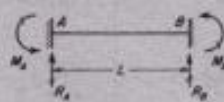
Titik	Sustained Load			Expansion Load			Total		
	Δx	Δy	Δz	Δx	Δy	Δz	Δx	Δy	Δz
140	0,43	-0,04	0,57	-9,35	19,19	-32,10	-8,92	19,15	-31,53
150	0,40	-0,08	0,60	-10,26	18,79	-32,55	-9,86	18,72	-31,95
160	0,40	-0,13	0,63	-13,29	9,70	-32,64	-12,89	9,58	-32,01
170	0,40	0,62	0,68	-15,63	1,90	-32,21	-15,23	2,51	-31,53
180	0,41	0,67	0,68	-15,78	1,07	-31,84	-15,38	1,74	-31,16
190	0,46	-0,02	0,68	-14,60	1,13	-29,87	-14,14	1,11	-29,19
200	0,64	-2,00	0,68	-2,64	0,00	-18,80	-2,00	-2,00	-18,12
210	0,55	0,00	0,68	6,91	0,00	-9,70	7,47	0,00	-9,02
220	0,10	-0,02	0,68	12,07	0,27	0,59	12,16	0,25	1,28
230	0,02	0,35	0,68	12,10	0,35	1,72	12,12	0,70	2,40

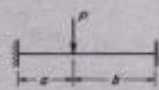
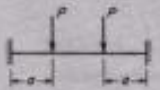

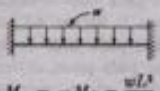
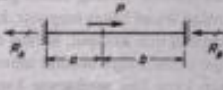
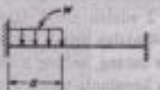


Titik	Sustained Load			Expansion Load			Total		
	Δx	Δy	Δz	Δx	Δy	Δz	Δx	Δy	Δz
140	-1,31	-0,04	-0,75	-3,53	19,19	-16,28	-4,84	19,15	-17,04
150	-1,38	-0,12	-0,75	-4,42	18,80	-16,36	-5,80	18,68	-17,10
160	-1,38	-0,61	-0,36	-7,46	9,60	-14,98	-8,84	8,98	-15,34
170	-1,38	-0,17	-0,04	-9,79	1,83	-13,51	-11,17	1,66	-13,55
180	-1,34	-0,06	0,00	-9,85	0,91	-13,04	-11,19	0,86	-13,04
190	-1,05	0,00	0,00	-8,06	0,22	-11,07	-9,11	0,22	-11,07
200	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
210	0,00	-2,00	0,00	2,00	0,00	9,04	2,00	-2,00	9,04
220	0,00	0,00	0,00	18,63	1,21	19,25	18,63	1,21	19,25
230	0,00	0,64	0,00	13,70	1,14	20,37	13,70	1,78	20,37

Titik	Sustained Load			Expansion Load			Total		
	Δx	Δy	Δz	Δx	Δy	Δz	Δx	Δy	Δz
140	-1,31	-0,04	-0,76	-3,29	19,19	-16,10	-4,61	19,14	-16,86
150	-1,39	-0,12	-0,75	-4,18	18,80	-16,18	-5,56	18,68	-16,93
160	-1,39	-0,62	-0,36	-7,21	9,57	-14,89	-8,60	8,95	-15,25
170	-1,39	-0,17	-0,04	-9,55	1,82	-13,50	-10,93	1,64	-13,54
180	-1,35	-0,06	0,00	-9,61	0,90	-13,04	-10,96	0,85	-13,04
190	-1,06	0,00	0,00	-7,86	0,21	-11,07	-8,91	0,21	-11,07
200	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
210	0,00	-2,00	0,00	2,00	0,00	9,03	2,00	-2,00	9,03
220	0,00	0,00	0,00	18,33	1,19	19,25	18,33	1,19	19,25
230	0,00	0,66	0,00	13,66	1,10	20,37	13,66	1,76	20,37

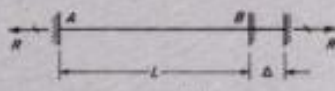


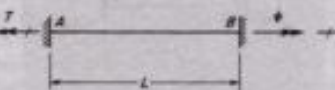
Titik	Sustained Load			Expansion Load			Total		
	Δx	Δy	Δz	Δx	Δy	Δz	Δx	Δy	Δz
140	-1,35	-0,05	-0,78	-2,87	19,19	-15,80	-4,22	19,14	-16,58
150	-1,43	-0,13	-0,77	-3,74	18,81	-15,88	-5,17	18,68	-16,66
160	-1,43	-0,66	-0,37	-6,77	9,54	-14,74	-8,20	8,89	-15,11
170	-1,43	-0,18	-0,04	-9,11	1,79	-13,49	-10,54	1,61	-13,53
180	-1,39	-0,06	0,00	-9,18	0,88	-13,04	-10,57	0,82	-13,04
190	-1,09	0,00	0,00	-7,50	0,20	-11,07	-8,59	0,20	-11,07
200	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
210	0,00	-2,00	0,00	2,00	0,00	9,03	2,00	-2,00	9,03
220	0,00	0,00	0,00	17,89	1,16	19,25	17,89	1,16	19,25
230	0,00	0,71	0,00	13,61	1,05	20,37	13,61	1,76	20,37

Gaya Jepit Ujung Akibat Beban

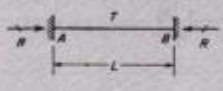
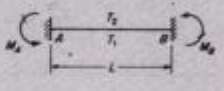


1	 $M_A = \frac{Pa^2}{L^2} \quad M_B = -\frac{Pa^2b}{L^3}$ $R_A = \frac{Pb^2}{L^2} \quad R_B = \frac{Pa^2}{L^2} (a + 3b)$	5	 $M_A = -M_B = \frac{Pa}{L} (L - a)$ $R_A = R_B = P$
2	 $M_A = \frac{Mb}{L^2} (2a - b)$ $M_B = \frac{Ma}{L^2} (2b - a)$ $R_A = -R_B = \frac{6Mab}{L^2}$	6	 $M_A = -M_B = \frac{wL^2}{12}$ $R_A = R_B = \frac{wL}{2}$
3	 $R_A = \frac{Pb}{L} \quad R_B = \frac{Pa}{L}$	7	 $M_A = \frac{wa^3}{12L^2} (6L^2 - 8aL + 3a^2)$ $M_B = -\frac{wa^3}{12L^2} (4L - 3a)$ $R_A = \frac{wa}{2L^2} (2L^2 - 2a^2L + a^2)$ $R_B = \frac{wa^2}{2L^2} (2L - a)$
4	 $T_A = \frac{Tb}{L} \quad T_B = \frac{Ta}{L}$	8	 $M_A = \frac{wL^3}{30} \quad M_B = -\frac{wL^3}{30}$ $R_A = \frac{3wL}{20} \quad R_B = \frac{7wL}{20}$

Gaya Jepit Ujung Akibat Perpindahan Ujung

1	 $R = \frac{EA\Delta}{L}$
2	 $M_A = M_B = \frac{6EI\Delta}{L^2} \quad R = \frac{12EI\Delta}{L^3}$
3	 $M_A = \frac{2EI\theta}{L} \quad M_B = \frac{4EI\theta}{L} \quad R = \frac{6EI\theta}{L^2}$
4	 $T = \frac{GJ\phi}{L}$ <p>G = modulus elastisitas geser J = konstanta puntir</p>

Gaya Jepit Ujung Akibat Perubahan Suhu

1	<p>Kenaikan suhu merata</p>  $R = EA\alpha T$ <p>E = modulus elastisitas A = luas penampang lintang α = koefisien muai suhu T = kenaikan suhu</p>	2	<p>Gradien suhu linear</p>  $M_A = -M_B = \frac{\alpha EI(T_1 - T_2)}{d}$ <p>I = momen inersia T₁ = suhu di sisi bawah balok T₂ = suhu di sisi atas balok d = tinggi balok</p>
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