nutech
San Jose, California

08·164·0102

PROJECT GENSAP VERIFICATION FILE NO.
OWNER NUTECH
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GENSAP PROGRAM VERIFICATION

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PREPARED BY / DATE	AM 10/22/82					OF 82
CHECKED BY / DATE	RV 10/23/82					

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1. REFERENCES :

1. GENSAP User Information Manual Publication No. 86619900, Control Data Corporation; Rev. C; JUNE 1977.

2. STARDYNE User Information Manual, Publication No: 76079900, Control Data Corporation; Rev. C: April 1980.

3. STARDYNE Theoretical Manual, Static and Dynamic Analysis System; Publication No: 86616300; Control Data Corporation; Rev. A; JANUARY, 1974.

4. Computer Runs associated with Verification process. (Refer Pg. 30, 34/34)

5. Project Files associated with Verification process (Refer Pg 54/34)

2. GENSAP PROGRAM VERIFICATION

2.1 SCOPE:
- Verification of GENSAP Ver. 3.1 Computer Program using a verified version of STARDYNE
- Verification of GENSAP Ver. 2.4 and Ver. 3.0 against Ver. 3.1

2.2 DESCRIPTION: GENSAP VER. 3.1

GENSAP analysis was performed on four example problems presented in Section 3 of the GENSAP User Information Manual (Ref. 1). These examples were selected for verification as they were representative of the major options of the GENSAP Program. Same problems were analysed using STARDYNE Computer Program. The results based on GENSAP Ver. 3.1 were compared against those based on STARDYNE. The description of the problems

and the analysis results are summarized in the subsequent pages.

GENSAP ver. 2.4 & 3.0

GENSAP analysis was performed to verify 2-D Frame and 3-D Frame analysis options of the Computer program. Four problems which had been analyzed using Versions 2.4 and 3.0 were re-analyzed using Version 3.1. The results obtained from the Version 3.1 runs were compared against the results obtained from the actual (production) runs using Versions 2.4 and 3.0, and were found to be identical. The analysis results are summarized in the subsequent pages.

The verification of the other options of the Versions 2.4 & 3.0 are not performed, since, the older versions namely 2.4 and 3.0 are not currently

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accessible to the User. Also, previous production problems using ver. 2.4 and 3.0 that are available for verification are only 2-D and 3-D Frames.

A table giving references for the sample production problems of version 2.4 and 3.0 selected for verification are given in page. 52/82.

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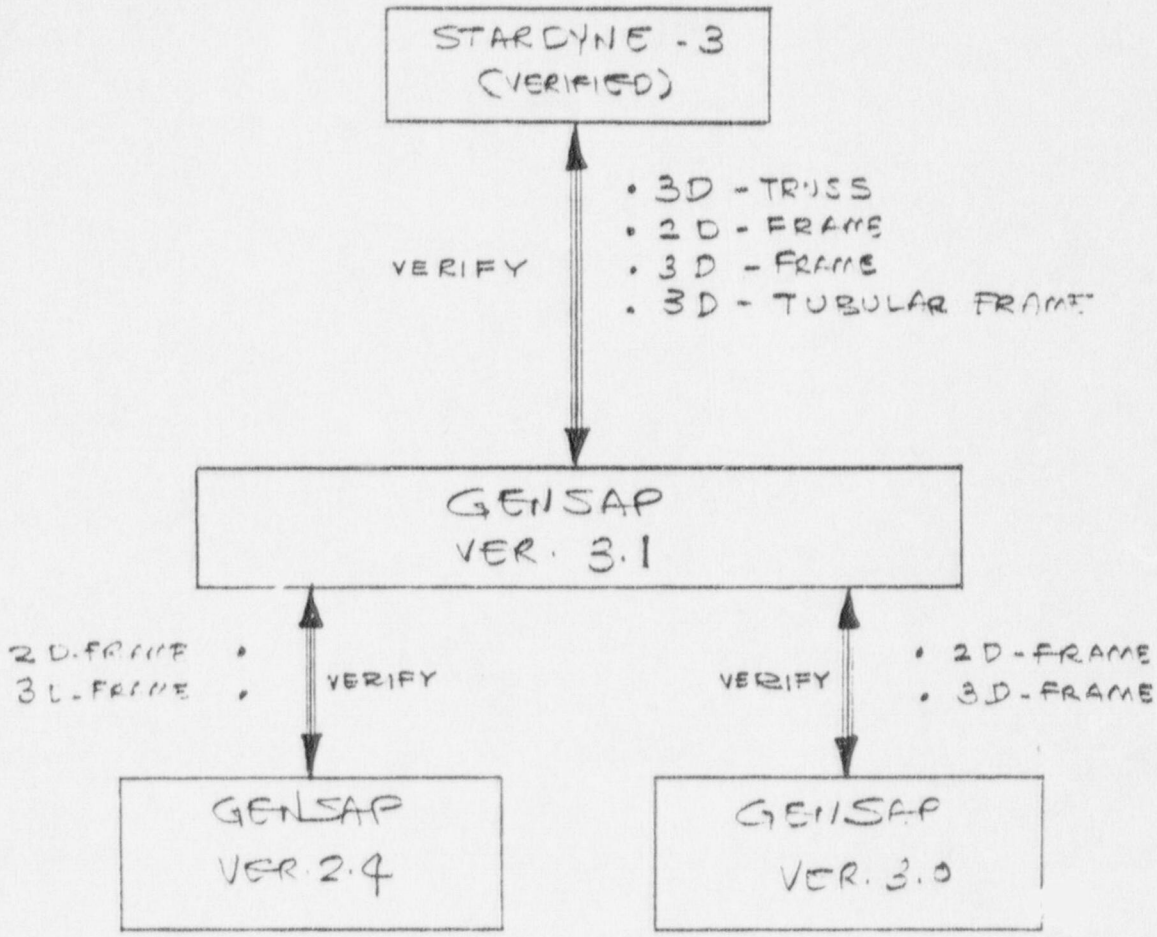

VERIFICATION PLAN

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2.3 VERIFICATION OF GENSAP VER. 3.1 AGAINST STARDYNE

DESCRIPTION OF EXAMPLE PROBLEMS:

2.3.1 3-DIMENSIONAL TRUSS: (GENSAP Example prob. # 1)

The description of the structure and the loadings imposed are given in page 7/82. Specimen comparison of the results based on GENSAP ver. 3.1 and STARDYNE are given in pages 8-11/82.

Inference & Comments: The GENSAP 3.1 analysis results are identical to STARDYNE results

Note: In all the analysis result comparisons, difference of the order of upto 5% is assumed tolerable

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3. Example Problems

The example problems presented in this section are designed to familiarize the user with the input procedures for as many program features as is practical within the design of this instruction guide. In addition to the examples shown in this section, Appendix A demonstrates how to set up a batch execution, and Appendix B demonstrates how to use the EDITOR to scan an output file for selected items.

One example problem is provided for each of the five structure types.

3.1 EXAMPLE PROBLEM 1

The joint displacements and member forces of the tr shown in Figure 14 are to be calculated for two load

The joint and member numbering, truss dimensions, and global coordinate system are as shown. This example illustrates input procedures for a three-dimensional truss, and also highlights a common instability problem often encountered when attempting to model a truss. (See joint 3 in Z direction Figure 14). All members are 5.9 square inches in area.

The joint displacements and member loads are to be determined for the following 2 loading conditions:

1) An external force of 50,000 lb in the negative Y direction at joint 5.

2) A temperature increase of 100°F in members 5, 6, and 7.

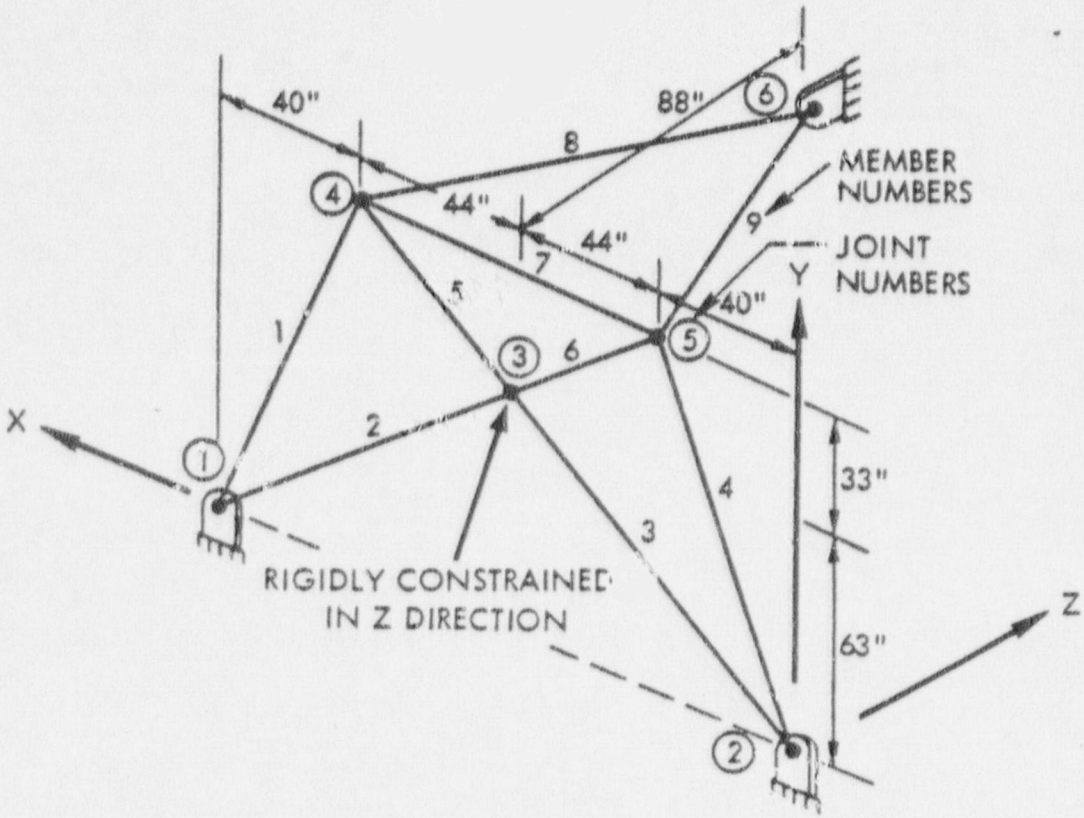


Figure 14. Three-Dimensional Truss for Example Problem 1

7/82

*

EXTRACT FROM GENSAP USER INFORMATION MANUAL, REV. C, JUNE 1977

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-TRUSS

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		FROM L. CASE # 1			
3	X-TRAN	0.0073564	0.0073564	100 %	
	Y-TRAN	-0.0090551	-0.0090551		
	Z-TRAN	0.00	0.00		
4	X-TRAN	0.0008362	0.0008362		
	Y-TRAN	0.0000331	0.0000331		
	Z-TRAN	0.0004181	0.0004181		
5	X-TRAN	0.0012341	0.0012341		
	Y-TRAN	-0.0270992	-0.0270992		
	Z-TRAN	-0.0006170	-0.0006170		
		FROM L. CASE #2			
3	X-TRAN	0.00	0.0		
	Y-TRAN	-0.0039651	-0.0039651		
	Z-TRAN	0.00	0.0		
4	X-TRAN	0.0296468	0.0296468		
	Y-TRAN	0.0140121	0.0140121		
	Z-TRAN	0.0148234	0.0148234		
5	X-TRAN	-0.0296468	-0.0296468		
	Y-TRAN	0.0140121	0.0140121		
	Z-TRAN	0.0148234	0.0148234		

NOTES:

Revision	0					8/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1
Subject: AND STARDYNE

STRUCTURE TYPE: 3D TRUSS

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			FROM L. CASE-1			
2		AXIAL FORCE	-19079.2142	-19079.214	100%	
4		"	-41765.1775	-41765.177		
6		"	-19079.2142	-19079.214		
8		"	0.0	0.0		
			FROM L. CASE-2			
1		AXIAL FORCE	2606.7774	2606.777		
3		"	-4010.4575	-4010.458		
5		"	-4010.4575	-4010.458		
7		"	4210.9804	4210.980		
9		"	0.0	0.0		

NOTES:

Revision	0					9/92
Prepared By/Date	AM/10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND STARDYNE

STRUCTURE TYPE: 3D-TRUSS

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3·1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L·CASE: 1			
1	1	fa	−83.9553	−83.955	100%	
2	1	"	−3233.7651	−3233.800		
3	2	"	129.1620	129.160		
4	2	"	−7078.8436	−7078.800		
5	3	"	129.1620	129.160		
6	3	"	−3233.7651	−3233.800		
7	4	"	−135.6201	−135.620		
8	4	"	0.0	0.0		
9	5	"	0.0	0.0		
			L·CASE: 2			
1		fa	441.8301	441.830		
2		"	−679.7386	−679.740		
3		"	−679.7386	−679.740		
4		"	441.8301	441.830		
5		"	−679.7386	−679.740		
6		"	−679.7386	−679.740		
7		"	713.7255	713.730		
8		"	0.00	0.0		
9		"	0.00	0.0		

NOTES:

Revision	0					10/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-TRUSS

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE-1			
1	Fx	-15453.8853	-15453.885	100%	
	Fy	11904.7619	11904.762		
2	Fx	15453.8853	15453.885		
	Fy	38095.2381	38095.238		
		L. CASE-2			
1	Fx	-2205.7516	-2205.752		
	Fy	0.0	0.0		
2	Fx	2205.7516	2205.752		
	Fy	0.0	0.0		

NOTES:

Revision	0					11/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

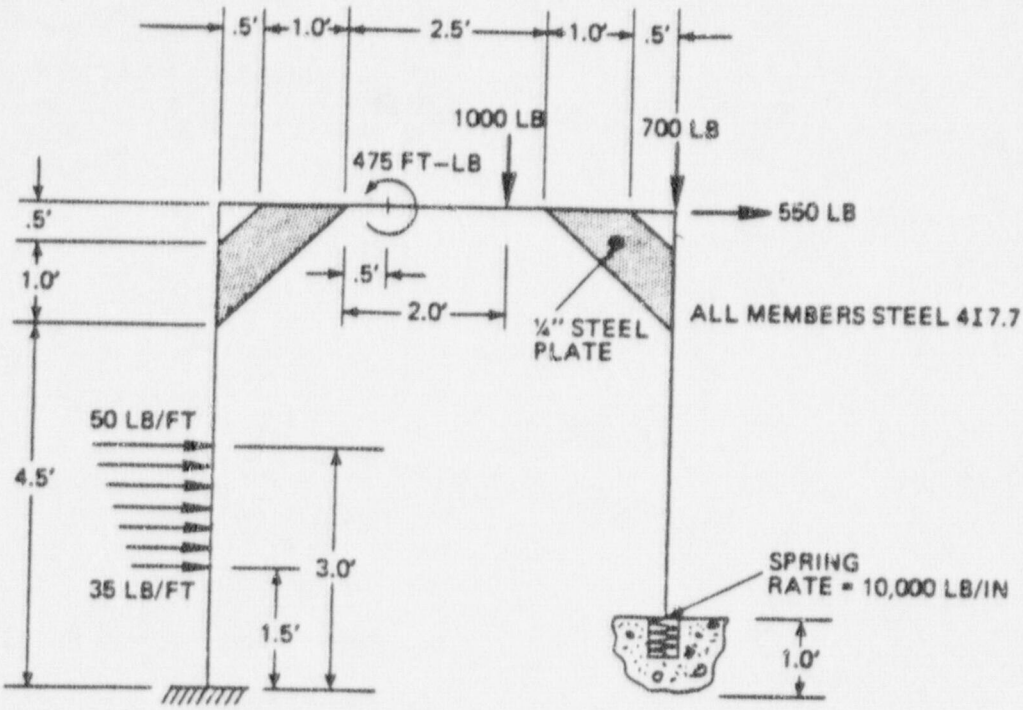
2.3.2. 2-DIMENSIONAL FRAME : (GENSAP Example Prob. # 2)

The description of the structure and the loadings imposed are given in Page 13/82. Specimen comparison of the results based on GENSAP Ver. 3.1 and STARDYNE are given in pages 13-19/82.

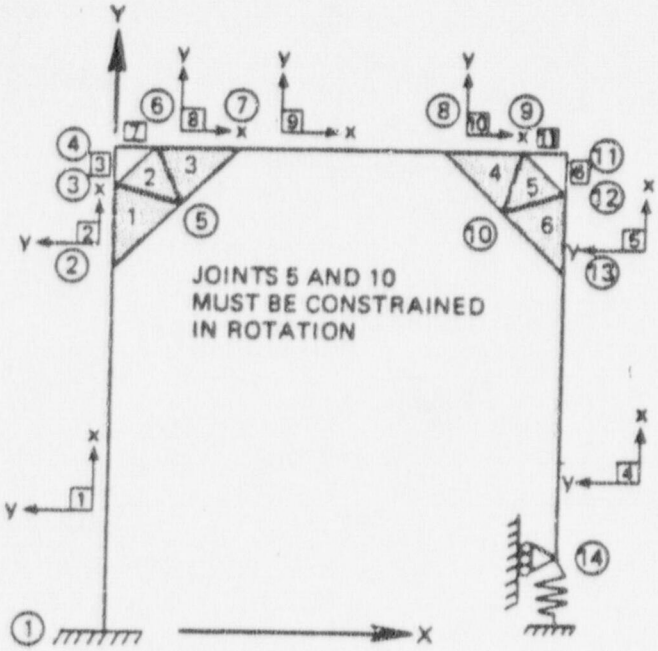
Inference & Comments: The GENSAP 3.1 analysis results concur with STARDYNE results.

3.2 EXAMPLE PROBLEM 2

The joint displacements and the stresses and forces in the elements of the two dimensional frame shown in Figure 15 are to be calculated neglecting shear deformations. This example demonstrates some of the complex loading features of the program as well as the use of matrix alterations to model spring supports. It also illustrates the procedure for stabilizing joints where only plate elements are attached. (See joints 5 and 10 in Figure 15 (b).)



a) GEOMETRY AND APPLIED LOADS



b) COMPUTER MODEL

Figure 15. Two-Dimensional Frame for Example Problem 2

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* EXTRACT FROM GENSAP USER INFORMATION MANUAL, REV. C, JUNE 1977

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FILE #:

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 2D-FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
2	X-TRAN	0.1054361	0.1054412	100%	
	Y-TRAN	-0.0001340	-0.0001339		
	Z-ROT	-0.0029565	-0.00295657		
4	X-TRAN	0.1588204	0.1588259		
	Y-TRAN	-0.0001700	-0.0001700		
	Z-ROTA	-0.0029656	-0.0029656		
8	X-TRAN	0.1589581	0.1589636		
	Y-TRAN	-0.1208617	-0.1208625		
	Z-ROT	-0.0018811	-0.0018811		
10	X-TRAN	0.1419037	0.1419087		
	Y-TRAN	-0.1375115	-0.1375128		
	Z-ROT	0.00	0.0		
14	X-TRAN	0.0	0.0		
	Y-TRAN	-0.1536073	-0.1536079		
	Z-ROT	-0.0033336	-0.0033337		

NOTES:

Revision	0					14/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 2D. FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	1	Fx	163.9270	163.910	100 %	
		Fy	381.0865	381.208		
		Mz	19682.2188	19684.676		
2	2	Fx	199.5849	199.586		
		Fy	112.6687	112.613		
		Mz	791.0484	790.421		
3	3	Fx	-1.7768	-1.761		
		Fy	-200.3565	-200.360		
		Mz	-560.9772	-560.930		
4	14	Fx	1536.0730	1536.090		
		Fy	232.6635	232.676		
		Mz	0.0	0.0		
	13	Fx	-1536.0730	-1536.090		
		Fy	-232.6635	-232.676		
		Mz	9771.8676	9772.322		
9	7	Fx	-317.3365	-317.324		
		Fy	163.9270	163.910		
		Mz	-7871.6940	-7871.793		
11	11	Fx	564.1079	564.120		
		Fy	-341.5741	-341.587		
		Mz	663.8496	663.932		

NOTES:

Revision	0					15/82
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Checked By/Date	CV 10/23/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 2D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	1	f_a	-74.1751	-74.17	100%	
		f_z	6560.7395	6487.0		
		f_{comb}	-6634.9146	-6635.7		
4	14	f_a	-695.0557	-695.1		
		f_z	0.0	0.0		
		f_{comb}	-695.0557	-695.1		
	13	f_a	-695.0557	-695.1		
		f_z	3257.2891	-3953.0		
		f_{comb}	-3952.3448	-3952.5		
5	13	f_a	-320.3759	-320.4		
		f_z	-3257.2891	-3578.0		
		f_{comb}	-3577.6650	-3577.8		
7	4	f_a	-90.6591	-90.66		
		f_z	213.7208	123.10		
		f_{comb}	-304.3798	304.60		
9	7	f_a	143.5912	143.6		
		f_z	-2623.3981	-2480.0		
		f_{comb}	2767.4893	-2767.5		

NOTES:

Revision	0					16/32
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Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND STARDYNE

STRUCTURE TYPE: 2D-FRAME

PLATE CORNER FORCES (LBS.) (LOCAL COORD)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	3	Fx	74.7994	74.831	100%	
		Fy	-282.6312	-282.614		
	2	Fx	35.6579	35.676		
		Fy	-204.6677	-204.712		
	5	Fx	-110.4574	-110.507		
		Fy	487.2989	487.325		
3	7	Fx	-252.0938	-252.097		
		Fy	-546.3662	-546.389		
	6	Fx	-389.9004	-389.913		
		Fy	286.8840	286.867		
	5	Fx	641.9942	642.012		
		Fy	259.4821	259.522		
5	10	Fx	-135.0975	-135.098		
		Fy	279.0071	279.009		
	12	Fx	439.4265	439.445		
		Fy	-190.1472	-190.179		
	9	Fx	-304.3289	-304.347		
		Fy	-88.8599	-88.830		
6	13	Fx	828.0423	828.065		
		Fy	1095.2527	1095.308		
	12	Fx	391.0354	391.069		
		Fy	-371.6749	-371.678		
	10	Fx	-1219.0777	-1219.136		
		Fy	-723.7778	-723.830		

NOTES:

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Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 2D-FRAME

PLATE STRESSES (psi)

PLT #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	σ_1	-77.57	-77.561	100 %	
	σ_2	341.1035	341.1		
	τ_{max}	-9.0872	-9.096		
		175.0956	175.10		
2	σ_1	1.64	1.642		
	σ_2	112.3916	112.40		
	τ_{max}	-373.6960	-373.70		
		243.0438	243.0		
3	σ_1	48.05	48.054		
	σ_2	557.6411	557.70		
	τ_{max}	-303.2350	-303.20		
		430.4381	430.50		
4	σ_1	22.73	22.730		
	σ_2	142.7345	142.710		
	τ_{max}	-806.6370	-806.50		
		474.5957	474.60		
5	σ_1	-28.02	-28.022		
	σ_2	407.2963	407.30		
	τ_{max}	-211.5079	-211.50		
		309.4021	309.40		
6	σ_1	-44.69	-44.673		
	σ_2	338.9400	339.00		
	τ_{max}	-1286.5899	-1287.0		
		812.7649	812.80		

NOTES:

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Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 2D-FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	Fx	-381.0865	-381.208	100%	
	Fy	163.9270	163.910		
	Mz	19682.2188	19684.676		
14	Fx	-232.6635	-232.676		
	Fy	1536.0730	1536.090		
	Mz	0.0	0.0		

NOTES:

Revision	0					19/32
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Checked By/Date	CV 10/22/82					

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2.3.3 3-DIMENSIONAL FRAME (GENSAP Example prob # 3)

The description of the structure and the loadings imposed are given in pgs. 21/82. Specimen comparison of the results based on GENSAP Ver. 3.1 and STARDYNE are given in pages 22-41/82.

Inference & Comments: The GENSAP 3.1 analysis results concur with STARDYNE results.

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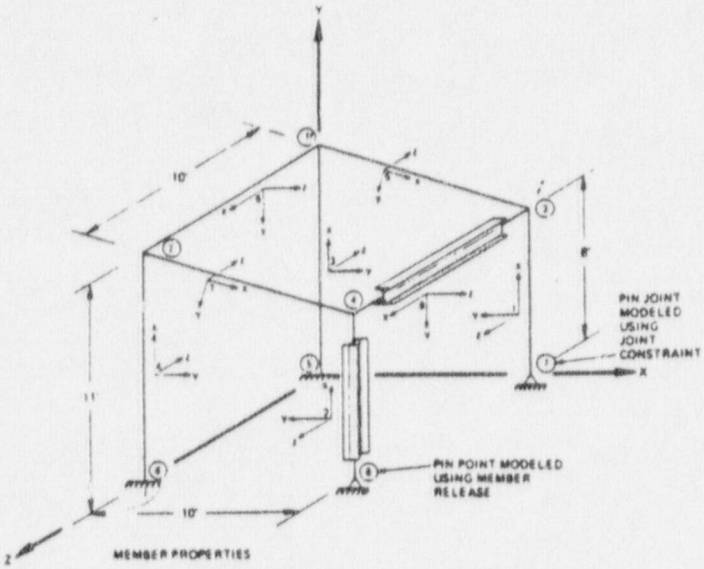
3.3 EXAMPLE PROBLEM 3

The joint displacements including shear deformations, member forces, and member stresses are to be determined for the 3-dimensional frame shown in Figure 16. The example demonstrates mechanical and inertial loads, temperature loads, member distortion loads, and combined load case capabilities. It also demonstrates how to direct output to a file for later printing. Appendix B shows how the EDITOR can be used to selectively list the results of this example problem.

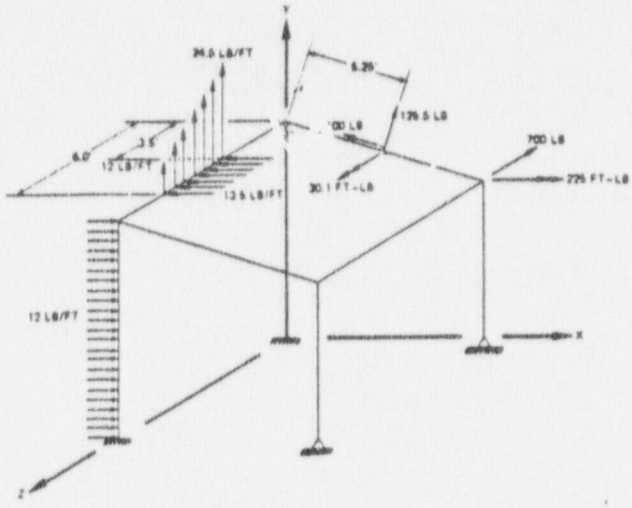


MEMBER PROPERTIES

MEMBER NO	AX (IN^2)	ASY* (IN^2)	ASZ* (IN^2)	I-YY (IN^4)	I-ZZ (IN^4)	J (IN^4)	S-Y (IN^4)	S-Z (IN^3)	MAT
1, 2	2.21	1.64	0.75	6.00	0.77	0.074	3.00	0.58	ALUM
3, 4	3.61	2.53	1.50	21.80	1.80	0.170	7.20	1.10	STEEL
5 THRU 8	1.64	0.56	1.19	0.46	2.60	0.045	0.40	1.70	STEEL

* EFFECTIVE SHEAR AREA IS TAKEN AS THE APPROXIMATE AREA OF THE WEB OR OF THE FLANGES WHICH ACT IN THE DIRECTION OF THE SHEAR

a) FRAME GEOMETRY AND COMPUTER MODEL



LOAD CASE 1 - LIVE LOADS AS SHOWN
LOAD CASE 2 - DEAD LOAD (i.e. 1G ACTING IN -Y DIRECTION)
LOAD CASE 3 - MEMBER TEMPERATURE LOADS MEMBERS 5 THRU 8 ARE SUBJECTED TO AN AVERAGE TEMPERATURE INCREASE OF 83°F AND THE (+y) SURFACES ARE 8°F HOTTER THAN THE BOTTOM (-y) SURFACES
LOAD CASE 4 - MEMBER DISTORTION LOAD MEMBER NUMBER 2 IS MANUFACTURED 0.25 TOO SHORT
LOAD CASE 5 - 1.5 x LOAD CASE 1 PLUS 1.25 x LOAD CASE 2

b) LOAD CASES

21/32

*

Figure 16. Three-Dimensional Frame for Example Problem 3

EXTRACT FROM GENSAP USER INFORMATION MANUAL, REV. C, JUNE 1977

FILE # 08:164 ·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE-1	(MECHANICAL LOADS)		
1	X-TRAN	-.781132	-.7811588	100 %	
	Y-TRAN	.000021	.00002127		
	Z-TRAN	-.029412	-.02941193		
	X-ROT	-.000279	-.00027911		
	Y-ROT	.013560	.01356071		
	Z-ROT	.004690	.004687652		
2	X-TRAN	.5675562	.5675562		
	Y-TRAN	.000102	.00010171		
	Z-TRAN	.029390	-.02939020		
	X-ROT	-.000223	-.00069815		
	Y-ROT	.015273	.01535214		
	Z-ROT	-.002399	-.00212799		
3	X-TRAN	-.781589	-.7816198		
	Y-TRAN	-.001311	-.00131105		
	Z-TRAN	-2.1741262	-2.174281		
	X-ROT	-.000691	-0.00069815		
	Y-ROT	.015357	.01535214		
	Z-ROT	-.002128	-.00212799		
4	X-TRAN	0.0	0.0		
	Y-TRAN	0.0	0.0		
	Z-TRAN	0.0	0.0		
	X-ROT	-0.000324	0.00032416		
	Y-ROT	0.015357	0.01535214		
	Z-ROT	0.013270	0.01327026		

NOTES:

Revision	0					22/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	SV 10/23/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1

Subject: AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE #	1		
1	7	Fx	313.88	313.878	100%	
		Fy	-26.76	-26.761		
		Fz	316.10	316.098		
		Mx	0.0	0.0		
		My	0.0	-0.0		
		Mz	-0.0	-0.0		
4	6	Fx	-83.36	-83.36		
		Fy	-180.77	-180.772		
		Fz	-68.72	-68.723		
		Mx	-226.20	-226.244		
		My	4316.72	4314.898		
		Mz	10005.00	-10004.959		
6	1	Fx	-8.90	-8.90		
		Fy	10.01	10.017		
		Fz	54.52	54.517		
		Mx	30.60	30.569		
		My	-2505.60	-2505.677		
		Mz	244.20	-244.100		
7	4	Fx	13.10	13.104		
		Fy	-53.78	-53.780		
		Fz	37.82	37.823		
		Mx	-29.76	-29.736		
		My	2767.80	2767.716		
		Mz	1623.48	1623.461		

NOTES:

Revision	0					23/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3·1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE # 1			
NORMAL STRESSES:						
1	3	f_x	−142.0290	−142.03	100%	
		f_y	−10115.1103	−10260.0	99	
		f_z	−4429.1727	4295.0	97%	
		f_{comb}	−14686.3119	−14695.0	100	
4	6	f_x	23.0908	23.09	100%	
		f_y	591.0657	−570.7	99%	
		f_z	−9095.4243	−9065.0	100%	
		f_{comb}	9709.5807	9704.70	100%	
SHEAR STRESS:						
4	6	τ_y	−71.4513	−71.00	100%	
		τ_z	−32.4812	−32.40	100%	
5	9	τ_y	251.3553	−252.0	100%	
		τ_z	38.0931	−39.10	100%	

NOTES:

Revision	0					24/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D. FRAME (L. CASE 1)

SUPPORT REACTIONS (GLOBAL), LBS. & IN. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
5	F_x	132.27	132.270	100%	
	F_y	-17.41	-17.410		
	F_z	36.43	36.431		
	M_x	3782.64	3782.674		
	M_y	-200.88	-200.838		
	M_z	-10641.60	-10641.944		
6	F_x	-180.77	-180.772		
	F_y	-83.36	-83.360		
	F_z	48.72	48.723		
	M_x	4314.72	4314.898		
	M_y	-226.20	-226.244		
	M_z	10005.00	10004.959		
7	F_x	26.76	26.761		
	F_y	313.88	313.876		
	F_z	316.10	316.098		
	M_x	-0.0	0.0		
	M_y	0.0	0.0		
	M_z	-0.0	-0.0		
8	F_x	-16.79	-16.792		
	F_y	-407.68	-407.683		
	F_z	298.75	298.748		
	M_x	0.0	0.0		
	M_y	0.0	-0.0		
	M_z	0.0	0.0		

NOTES:

Revision	0					25/32
Prepared By/Date	AM 10/21/82					
Checked By/Date	CV 10/22/82					

08-F164-0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE #2 (G-load)			
1	δ_x	0.016699	0.016699	100%	
	δ_y	-0.000153	-0.0001525		
	δ_z	0.000007	0.00000073		
	θ_x	0.000027	0.00002707		
	θ_y	-0.000012	-0.00001164		
	θ_z	-0.000327	-0.0003268		
2	δ_x	0.016699	0.016699		
	δ_y	-0.000153	-0.0001525		
	δ_z	-0.000007	-0.00000732		
	θ_x	-0.000027	-0.00002707		
	θ_y	0.000012	0.00001164		
	θ_z	-0.000327	0.0003268		
4	δ_x	0.016657	0.016657		
	δ_y	-0.000281	-0.0002806		
	δ_z	-0.000004	-0.00000419		
	θ_x	-0.000174	-0.00017413		
	θ_y	0.000032	0.00003137		
	θ_z	0.000351	0.0003506		

NOTES:

Revision	0					26/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	DV 10/22/82					

FILE #08-164-2102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE #	2		
1	3	Fx	-56.56	-67.169	100%	*
		Fy	-1.37	-1.366		
		Fz	3.57	-3.512		
		Mx	-0.0	-0.0		
		My	-337.2	-337.183		
		Mz	131.16	131.122		
4	2	Fx	-57.28	-124.707		*
		Fy	-1.37	-1.366		
		Fz	-5.90	-5.899		
		Mx	0.12	0.172		
		My	-522.96	-522.975		
		Mz	223.44	223.394		
6	1	Fx	5.980	5.983		
		Fy	-27.85	-27.867		
		Fz	0.0	0.0		
		Mx	-0.0	-0.0		
		My	2.64	2.668		
		Mz	-523.20	-523.215		
8	4	Fx	-3.43	-3.428		
		Fy	-27.85	-27.847		
		Fz	0.0	0.0		
		Mx	-0.0	-0.0		
		My	-7.32	-7.305		
		Mz	339.96	340.007		

NOTES: * Refer to Description on 3D FRAME for reasoning

Revision	0					27/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	CV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE # 2			
NORMAL STRESSES						
1	3	f_a	−25.5933	−30.39	100%	
		f_y	−112.3948	−142.80		
		f_z	226.0683	−256.90		
		f_{comb}	−364.0563	−369.27		
4	2	f_a	−15.8670	−34.54		
		f_y	−71.6431	−106.50		
		f_z	203.0861	−237.50		
		f_{comb}	−290.5962	−309.43		
SHEAR STRESSES						
1	7	τ_y	0.8328	0.833		
		τ_z	4.6831	4.690		
7	4	τ_y	−48.412	48.50		
		τ_z	0.0710	−0.0710		

NOTES:

Revision	0					28/82
Prepared By/Date	AM 10-27-82					
Checked By/Date	RV 10/27/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE # 3	(TEMP. LOADS)		
1	δ_x	-0.059959	-0.06078	100%	
	δ_y	0.000003	0.0000030		
	δ_z	-0.032349	-0.0323498		
	θ_x	-0.000411	-0.0004126		
	θ_y	0.000097	0.0000973		
	θ_z	0.001003	0.0010188		
4	δ_x	0.010607	0.009785		
	δ_y	-0.000010	-0.0000103		
	δ_z	0.032377	0.032377		
	θ_x	0.000645	0.0006537		
	θ_y	-0.000132	-0.0001331		
	θ_z	-0.000780	-0.000797		
9	δ_x	-0.016447	-0.017123		
	δ_y	0.026737	0.027261		
	δ_z	-0.032998	-0.0329188		
	θ_x	-0.000570	-0.000515		
	θ_y	0.000175	0.0001771		
	θ_z	0.000181	0.0001813		

NOTES:

Revision	0					30/32
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

FILE#: 08.164.0102

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1

Subject: AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP ver. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE #3			
1	3	F_x	-2.450	-2.465	100%	
		F_y	1.74	1.811		
		F_z	6.20	6.336		
		M_x	0.0	-0.0		
		M_y	595.68	613.077		
		M_z	-167.40	-173.881		
4	6	F_x	-2.45	-2.465		
		F_y	-1.74	-1.811		
		F_z	17.27	16.966		
		M_x	1.44	1.441		
		M_y	-3170.28	-3157.158		
		M_z	293.76	295.838		
8	3	F_x	-5.76	-5.934		
		F_y	0.0	0.0		
		F_z	0.0	0.0		
		M_x	0.0	0.0		
		M_y	-30.12	-30.528		
		M_z	605.76	623.276		

NOTES:

Revision	0					31/32
Prepared By/Date	AM 10/27/92					
Checked By/Date	RV 10/27/92					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3 D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE #3			
NORMAL STRESSES:						
1	3	f_a	-1.1076	-1.116	≈100%	
		f_y	198.5570	203.20		
		f_z	-288.5873	299.20		
		f_{comb}	-488.2524	-505.81		
4	6	f_a	0.6781	0.683		
		f_y	-434.2928	435.20		
		f_z	267.0289	269.40		
		f_{comb}	701.9997	703.87		
SHEAR STRESS:						
1	7	τ_y	-1.0631	-1.10		
		τ_z	-8.2732	-8.52		
7	4	τ_y	-5.0814	5.150		
		τ_z	-0.3764	0.380		

NOTES:

Revision	0					32/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	PV 10/22/82					

FILE # : 08·164·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D. FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE # 3			
5	Fx	-1.74	-1.811	100%	
	Fy	-2.45	-2.465		
	Fz	17.27	16.966		
	Mx	3170.28	3157.158		
	My	-1.44	-1.441		
	Mz	-293.76	-295.838		
6	Fx	-1.74	-1.811		
	Fy	-2.45	-2.465		
	Fz	-17.27	-16.966		
	Mx	-3170.28	-3157.158		
	My	1.44	1.441		
	Mz	-293.76	-295.838		
7	Fx	1.74	1.811		
	Fy	2.45	2.465		
	Fz	-6.20	-6.386		
	Mx	0.0	0.0		
	My	0.0	0.0		
	Mz	0.0	0.0		
8	Fx	1.74	1.811		
	Fy	2.45	2.465		
	Fz	6.20	6.386		
	Mx	0.0	0.0		
	My	0.0	0.0		
	Mz	0.0	0.0		

NOTES:

Revision	0					33/82
Prepared By/Date	AM 11/22/82					
Checked By/Date	RV 11/23/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L-CASE # 4 (Member Distortion Load)			
1	δ_x	0.062086	0.062086	100 %	
	δ_y	0.000010	0.0000097		
	δ_z	0.004614	0.004614		
	θ_x	0.000039	0.0000387		
	θ_y	−0.000489	−0.0004895		
	θ_z	−0.000311	−0.0003109		
4	δ_x	0.000144	0.000143 4		
	δ_y	−0.249887	−0.249887		
	δ_z	0.147029	0.1470274		
	θ_x	0.001870	0.0018697		
	θ_y	−0.001100	−0.0010999		
	θ_z	−0.002109	−0.0021091		
9	δ_x	0.060353	0.06035399		
	δ_y	−0.005278	−0.0052785		
	δ_z	0.075434	0.0754281		
	θ_x	0.000680	0.0006797		
	θ_y	−0.001729	−0.0017292		
	θ_z	0.000058	0.0000578		

NOTES:

Revision	0					34/82
Prepared By/Date	AN 10/22/82					
Checked By/Date	DY 10/22/82					

?

FILE#: 08·164 ·0102

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1

Subject: AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L·CASE # 4			
1	3	Fx	-18.60	-18.605	100%	
		Fy	-1.88	-1.876		
		Fz	-6.83	-6.827		
		Mx	0.0	0.0		
		My	-655.44	-655.414		
		Mz	180.120	180.097		
6	1	Fx	-0.0	-0.0		
		Fy	2.37	2.373		
		Fz	-6.85	-6.847		
		Mx	5.40	5.440		
		My	410.76	410.825		
		Mz	142.32	142.363		

NOTES:

Revision	0					35/32
Prepared By/Date	AM 10/22/82					
Checked By/Date	BY 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND STARDYNE

STRUCTURE TYPE: 3 D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE # 4			
NORMAL STRESSES:						
2	4	f_a	−4.5143	−4.514	100%	
		f_y	−35.5427	−40.22		
		f_z	1065.2829	−1069.0		
		f_{comb}	−1105.3399	−1105.0		
6	2	f_a	0.0001	0.00		
		f_y	1027.0651	1027.00		
		f_z	83.7408	−83.71		
		f_{comb}	1110.8061	1110.80		
SHEAR STRESSES:						
3	5	τ_y	−4.6077	−4.61		
		τ_z	4.5515	4.55		
8	3	τ_y	−23.3356	−23.40		
		τ_z	−5.6190	−5.620		

NOTES:

Revision	0					36/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

FILE #08·164·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE #4			
5	Fx	-11.66	-11.658	100%	
	Fy	-7.91	-7.910		
	Fz	-6.83	-6.827		
	Mx	-641.76	-641.729		
	My	7.2	-7.249		
	Mz	896.16	896.159		
6	Fx	8.04	8.042		
	Fy	16.30	16.297		
	Fz	-6.83	-6.827		
	Mx	-641.76	-641.729		
	My	7.2	7.249		
	Mz	110.28	110.310		
7	Fx	-1.88	-1.876		
	Fy	18.60	18.605		
	Fz	6.83	6.827		
	Mx	0.0	0.0		
	My	-0.0	-0.0		
	Mz	0.0	0.0		
8	Fx	5.49	5.492		
	Fy	-26.99	-26.992		
	Fz	6.83	6.827		
	Mx	0.0	-0.0		
	My	0.0	0.0		
	Mz	0.0	-0.0		

NOTES:

Revision	0					3/7/92
Prepared By/Date	AM 10/11/92					
Checked By/Date	BV 10/23/92					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE #	5 (LOAD COMBINATION)		
1	δ_x	-1.150824	-1.150864	100%	
	δ_y	-0.000159	-0.0001587		
	δ_z	-0.044108	-0.044109		
	θ_x	-0.000385	-0.0003848		
	θ_y	0.020326	0.020326		
	θ_z	0.006626	0.006626		
4	δ_x	0.872937	0.872937		
	δ_y	0.002204	0.002204		
	δ_z	-3.250156	-3.260183		
	θ_x	-0.011967	-0.011967		
	θ_y	0.022481	0.0224818		
	θ_z	0.001228	0.001228		

NOTES:

Revision	0					38/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/23/82					

FILE#: 08-164-01UK

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LBS & IN. LBS.) LOCAL COORD.

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE #5			
1	3	F_x	-541.53	-554.776	100%	
		F_y	38.43	38.434		
		F_z	-478.54	-478.537		
		M_x	-0.0	-0.0		
		M_y	-45939.48	-45939.552		
		M_z	-3689.52	-3689.658		
8	4	F_x	503.57	503.572		
		F_y	648.34	648.336		
		F_z	-67.20	-67.195		
		M_x	17.16	17.173		
		M_y	-3972.84	-3972.801		
		M_z	-41359.20	-41359.099		

NOTES:

Revision	0					39/82
Prepared By/Date	MM 10/22/82					
Checked By/Date	DY 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
			L. CASE # 5			
NORMAL STRESSES:						
1	3	f_a	-245.0350	-251.0	100%	
		f_y	-15313.1589	-15560.0		
		f_z	-6361.1737	6122.0		
		f_{comb}	-21919.3676	-21937.0		
5	1	f_a	-64.6062	-67.81		
		f_y	10555.4507	-10620.0		
		f_z	-6152.7091	-6218.0		
		f_{comb}	-16772.7660	-16774.0		
SHEAR STRESSES:						
1	7	τ_y	-23.4342	-23.40		
		τ_z	638.0483	639.00		
8	3	τ_y	-1282.0634	-1280.0		
		τ_z	56.4072	56.40		

NOTES:

Revision	D					40/92
Prepared By/Date	AM 10/22/92					
Checked By/Date	RV 10/27/92					

? FILE # 08.164.0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
		L. CASE # 5			
6	Fx	-269.45	-269.450	100%	
	Fy	115.13	115.129		
	Fz	65.71	65.712		
	Mx	6152.64	6152.826		
	My	-339.60	-339.581		
	Mz	15061.32	15061.315		
8	Fx	-26.90	-26.895		
	Fy	-514.30	-514.303		
	Fz	443.73	443.732		
	Mx	0.0	0.0		
	My	0.0	0.0		
	Mz	0.0	0.0		

NOTES:

Revision	0					41/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	DV 10/23/82					

2.3.4 3-D TUBULAR FRAME (GENSAP Example #5.)

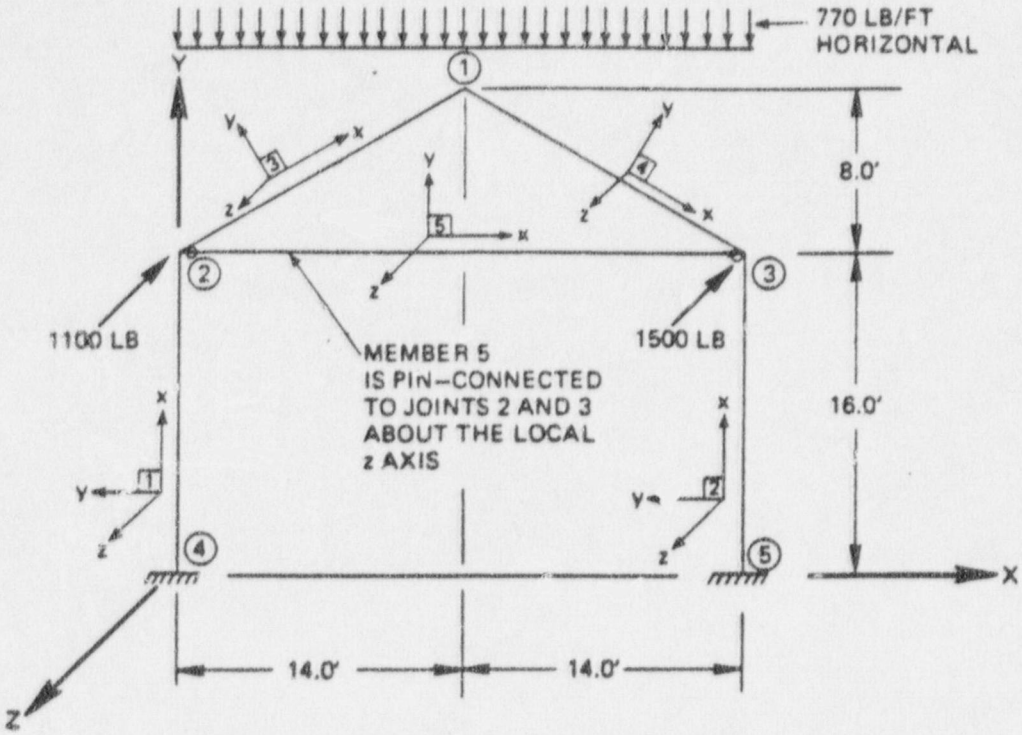
The description of the structure and the loadings imposed are given in page 43/82. Specimen comparison of results based on GENSAP ver. 3.1 and STARDYNE are given in pages 43-47/82.

Inference & Comments:

The GENSAP 3.1 analysis results concur with STARDYNE results.

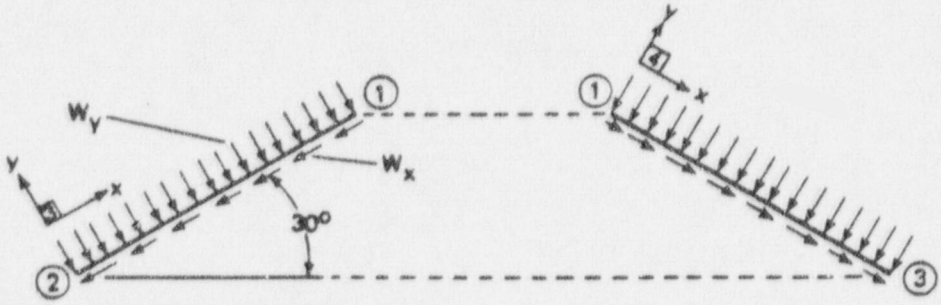
3.5 EXAMPLE PROBLEM 5

The joint displacement and member forces for the tubular member frame and loading shown in Figure 18 are to be determined.



MEMBER	AREA (IN^2)	ASY (IN^2)	I-YY (IN^4)	SY (IN^3)	MAT
1, 2, 3, 4,	9.178	4.59	125.9	23.25	STEEL
5	4.300	0.00	15.16	6.73	STEEL

a) FRAME GEOMETRY, COMPUTER MODEL, AND APPLIED LOADS.



$W_Y = W_{HORIZ} \cos\theta \cos\theta$

$= 577$ LB/FT

$W_X = W_{HORIZ} \cos\theta \sin\theta$

$= 333$ LB/FT

b) EQUIVALENT MEMBER LOADS FOR MEMBERS 3 AND 4

Figure 18. Tubular Steel Frame for Example Problem 5

43/82

* EXTRACT FROM GENSAP USER INFORMATION MANUAL, REV. C, JUNE 1977

FILE #: 08·164·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND STARDYNE

STRUCTURE TYPE: 3D-TUBULAR FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	δ_x	-0.0	-0.0	100%	
	δ_y	-0.045615	-0.04555		
	δ_z	-1.430556	-1.40785		
	θ_x	-0.006365	-0.006264		
	θ_y	0.000502	0.000499		
	θ_z	-0.00	-0.00		
2	δ_x	-0.012414	-0.012391		
	δ_y	-0.007576	-0.0075108		
	δ_z	-0.757309	-0.744725		
	θ_x	-0.005994	-0.005893		
	θ_y	0.000382	0.0003805		
	θ_z	-0.001079	-0.0010631		
3	δ_x	0.012414	0.012391		
	δ_y	-0.007516	-0.007511		
	δ_z	-0.881665	-0.868216		
	θ_x	-0.006736	-0.0066360		
	θ_y	0.000382	0.0003805		
	θ_z	0.001079	0.0010631		

NOTES:

Revision	0					44/82
Prepared By/Date	AM 1/12/82					
Checked By/Date	RV 1/13/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1

Subject: AND STARDYNE

STRUCTURE TYPE: 3D-TUBULAR FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	4	Fx	10742.74	10741.438	100%	
		Fy	-723.49	-725.473		
		Fz	1134.28	1134.708		
		Mx	-5759.04	-5830.926		
		My	-226418.28	-226329.891		
		Mz	-48300.96	-48465.374		
3	2	Fx	11521.33	11515.424		
		Fy	4254.79	4257.090		
		Fz	34.85	35.096		
		Mx	3925.68	4008.057		
		My	-8985.72	-9081.276		
		Mz	90608.16	90825.388		

NOTES:

Revision	0					45/82
Prepared By/Date	AM 11/22/82					
Checked By/Date	RV 11/23/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND STARDYNE

STRUCTURE TYPE: 3D. TUBULAR FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
1	4	f_a	−1170.4886	−1170.0		
		f_y	−9738.4186	8411.0		
		f_z	−2077.4613	−3221.0		
		f_{comb}	−10908.9071	−10967.0	100%	
4	1	f_a	−1225.3203	−1254.0		
		f_y	96.4827	−1357.0		
		f_z	7202.2038	5822.0		
		f_{comb}	−8457.5241	−8330.30	100%	
5	2	f_a	2209.4218	2205.0		
		f_y	14.1285	15.8		
		f_z	0.0	0.0		
		f_{comb}	2223.5502	2220.8	100%	

NOTES:

Revision	0					46/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/27/82					

FILE # 08.164.0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND STARDYNE

STRUCTURE TYPE: 3D - TUBULAR FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	STARDYNE	PERCENTAGE COMPARISON	REMARKS
4	Fx	723.49	725.473	100%	
	Fy	10742.74	10741.438		
	Fz	1134.28	1134.708		
	Mx	226418.28	226329.891		
	My	-5759.04	-5830.926		
	Mz	-48300.96	-48465.374		
5	Fx	-723.49	-725.473		
	Fy	10742.74	10741.438		
	Fz	1465.72	1465.292		
	Mx	272781.72	272870.109		
	My	-5759.04	-5830.926		
	Mz	48300.96	48465.374		

NOTES:

Revision	0				
Prepared By/Date	AM 10/22/82				
Checked By/Date	MV 10/22/82				

PROJECT GENSAP VERIFICATION
OWNER NUTECH
CLIENT

nutech
San Jose, California

FILE NO. 08-164-0102

REVISION 0
PREPARED BY/DATE
CHECKED BY/DATE

2.3.5 COMPUTER RUN ID's & TAPE/FILE DETAILS

. VERIFICATION OF GENSAP VER. 3.1 AGAINST STARDYNE

EXAMPLE PROBLEM	GENSAP 3.1/ STARDYNE	COMPUTER RUN ID/DATE	OUTPUT FILE NAME	DETAILS OF TAPES SAVED	FICHE/ ARCHIVE DETAILS	REMARKS
3D-TRUSS	GENSAP 3.1	10-21-82	EX1Φ	N/A	IN PROGRESS	
	STARDYNE	MAH16MI 10-12-82	N/A	L= 3DT T2,4,7,9 I: GENSAPVER, D=PE, BF, VSN: P20005	"	
				L= 3DT T2,4,7,9 OUT I = GENSAP, D= PE BF, VSN = P12379	"	
2D-FRAME	GENSAP 3.1	10-04-82	EX2ΦUT	N/A	IN PROGRES.	
	STARDYNE	MAH16EB 10-20-82	N/A	L= 2DF T2,4,7,9 D=PE, BF, VSN=PA5104 I: GENSAPVER	"	
				L= 2DF T2,4,7,9 ΦUT D: PE, BF, VSN=DPA926 I = GENSAPVER	"	

NOTES:

PROJECT GENSAP VERIFICATION

OWNER NUTECH

CLIENT

nutech
San Jose, California

FILE NO. QB-164-0102

REVISION 0

PREPARED BY/DATE AM 10/12/82

CHECKED BY/DATE

2.3.5 COMPUTER RUN ID'S & TAPE/FILE DETAILS

. VERIFICATION OF GENSAP VER. 3.1 AGAINST STARDYNE

EXAMPLE PROBLEM	GENSAP 3.1/ STARDYNE	COMPUTER RUN ID/DATE	OUTPUT FILE NAME	DETAILS OF TAPES SAVED	FICHE/ ARCHIVE DETAILS	REMARKS
3D FRAME	GENSAP 3.1	10-17-82	ØMEXAM3	N/A	IN PROGRESS	
	STARDYNE (L CASE; 1,2,3,5)	MAH16D4 10/19/82	N/A	L= 3DF T2,4,7,9 D=PE, BF, VSN = P23540 I= GENSAP VER. L = 3DF T2,4,7,9 OUT D=PE. BF, VSN = P14485 I= GENSAPVER	"	
	(L CASE : 4)	MAH16ØG 10/17/82	N/A	L= 3DF T2,4,7,9 D=PE, BF, VSN = P11270 I= GENSAPVER L= 3DF T2,4,7,9 OUT D=PE, BF, VSN = P23304 I=GENSAPVER	"	
				Contd...		

NOTES:

PROJECT GENSAP VERIFICATION

OWNER NUTECH

CLIENT

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San Jose, California

FILE NO. QP-164-0102-1

REVISION 0

PREPARED BY / DATE AM 10/22/82

CHECKED BY / DATE

2.3.5 COMPUTER RUN ID'S & TAPE/FILE DETAILS

VERIFICATION OF GENSAP VER. 3.1 AGAINST STARDYNE

EXAMPLE PROBLEM	GENSAP 3.1/ STARDYNE	COMPUTER RUN ID/DATE	OUTPUT FILE NAME	DETAILS OF TAPES SAVED	FICHE/ ARCHIVE DETAILS	REMARKS
3D-TUBULAR FRAME	GENSAP 3.1	10/17/82	ϕEXAMSM	N/A	IN PROGRESS	
	STARDYNE	MA1116QK 10-17-82	N/A	L=TUBE T2,4,7,9 D=PE, BF, VSN=PA9861 I=GENSAPVER	"	
				L=TUBE T2,4,7,9 ϕUT D=PE, BF, VSN=P26673 I=GENSAPVER	"	

NOTES:

PAGE 50 OF 82

PROJECT GENSAP VERIFICATION FILE NO.
OWNER NUTECH
CLIENT

2.4 VERIFICATION OF GENSAP VERSIONS 2.4 & 3.0 AGAINST VER. 3.1

DESCRIPTION OF EXAMPLE PROBLEMS:

The example problems used for verification are from the existing production files. No changes to the coded input was made while modeling these problems in the GENSAP Ver. 3.1.

The following page gives the details of the references for the selected example problems.

PROJECT _____ FILE NO. _____

OWNER _____

CLIENT _____

DETAILS OF THE SAMPLE PRODUCTION PROBLEMS CHOSEN TO VERIFY GENSAP VER. 2.4 & 3.0 AGAINST 3.1

GENSAP VERSION	STRUCTURE TYPE	PROJECT (SOURCE)	SUPPORT ID/ FILE #	REMARKS
2.4	2-D FRAME	CECO/2300	1509-G-212 20.0202.0832.54	–
	3-D FRAME	NSP/6300	SR-193 30.2363.0202.2-1	
3.0	2-D FRAME	NSP/3900	24NS4 30.0339.0039.020	–
	3-D FRAME	NSP/5600	SR-206 30.2356.0416.6	

REVISION	0					PAGE 52
PREPARED BY / DATE	AM 10-22-82					OF 82
CHECKED BY / DATE	RV 11/22/82					

PROJECT _____ FILE NO. _____
OWNER _____
CLIENT _____

2.4.2 2D - FRAME IN VER. 2.4

A skeleton view of the model is shown in Page 54/82. For detailed description of the structure and loading, refer to the corresponding project file as given in Page 52/82. Speciment comparison of the results obtained based on GENSAP ver. 2.4 & 3.1 are given in pages. 55-57/82.

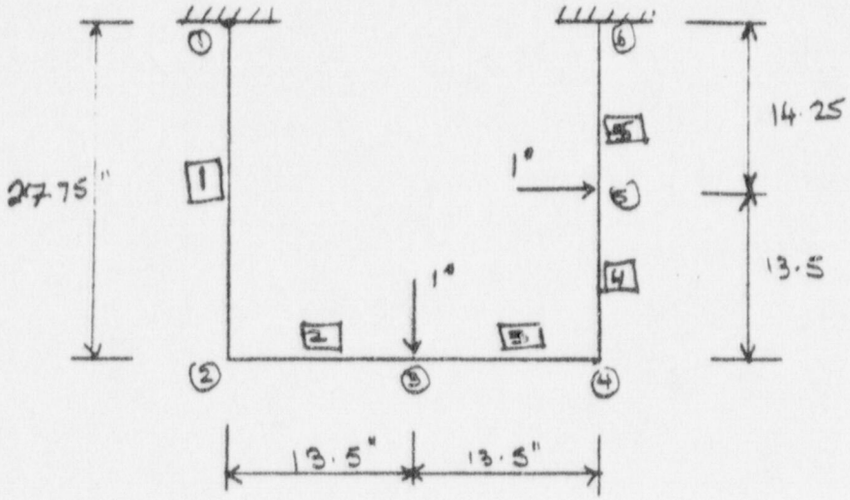
Inference & Comments: The results based on GENSAP Ver. 2.4 and 3.1 are identical.

Project Dresden Nuclear Power Station SPRA HEADER LINE from X311A File No. 29.0202.83
Owner Commonwealth Edison Company
Client Commonwealth Edison Company

SUPPORT 1509-G-212 at NODE GD 11

MODEL FOR GENSAP

(1) Assuming center line dimensions
(2) Assuming gaps will be reduced (modification) to function as proper guide
(3) Ignoring plates welded to members 3 & 5 (see figure) for member properties.



all members are W10 x 29

Member Properties: W10 x 29

Area AX = 8.54 in²
Shear Area ASZ = 0.87 x 8.54 = 7.43 in²
Moment of Inertia I-ZZ = 158
Section Modulus SZ = 30.8

EXTRACT FROM FILE 29.0202.0832.54

54/82

Revision						
Prepared By/Date	[illegible]					Page
Checked By/Date						of

FILE #: 08.164.0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 2.4

STRUCTURE TYPE: 2D-FRAME

NODAL DISPLACEMENTS (GLOBAL), inches

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
		L.CASE-1			
2	X-TRAN	-0.0	-0.0	100 %	
	Y-TRAN	0.0000001	0.0000001		
	Z-ROT	0.0	0.0		
3	X-TRAN	-0.0	-0.0		
	Y-TRAN	0.0000001	0.0000001		
	Z-ROT	0.0	0.0		
4	X-TRAN	0.0	0.0		
	Y-TRAN	0.0000001	0.0000001		
	Z-ROT	-0.0	-0.0		
		L.CASE-2			
2	X-TRAN	0.0000001	0.0000001		
	Y-TRAN	0.0	0.0		
	Z-ROT	-0.0	-0.0		
3	X-TRAN	0.0000001	0.0000001		
	Y-TRAN	-0.0	-0.0		
	Z-ROT	-0.0	-0.0		
4*	X-TRAN	0.0000001	0.0000001		
	Y-TRAN	-0.0	-0.0		
	Z-ROT	-0.0	-0.0		

NOTES:

Revision	0				
Prepared By/Date	AM 10/22/82				
Checked By/Date	RV 10/22/82				

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 2.4

STRUCTURE TYPE: 2D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
			L. CASE # 1			
1	1	F_x	−0.5000	−0.5000	100%	
		F_Y	0.1125	0.1125		
		M_Z	0.9680	0.9680		
	2	F_x	0.5000	0.5000		
		F_Y	−0.1125	−0.1125		
		M_Z	2.1550	2.1550		
3	3	F_x	−0.1125	−0.1125		
		F_Y	0.5000	0.5000		
		M_Z	4.5950	4.5950		
	4	F_x	0.1125	0.1125		
		F_Y	−0.5000	−0.5000		
		M_Z	2.1550	2.1550		
5	5	F_x	−0.5000	−0.5000		
		F_Y	−0.1125	−0.1125		
		M_Z	−0.6357	−0.6357		
	6	F_x	0.5000	0.5000		
		F_Y	0.1125	0.1125		
		M_Z	−0.9680	−0.9680		

NOTES:

Revision	0					56/82
Prepared By/Date	AM 10/22/92					
Checked By/Date	[illegible]					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1

Subject: AND 2.4

STRUCTURE TYPE: 2D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
			L. CASE: 2			
2	2	Fx	-0.1836	-0.1836	100%	
		Fy	-0.1072	-0.1072		
		Mz	-1.9306	-1.9306		
	3	Fx	0.1836	0.1836		
		Fy	0.1072	0.1072		
		Mz	0.4829	0.4829		
3	3	Fx	-0.1836	-0.1836		
		Fy	-0.1072	-0.1072		
		Mz	-0.4829	-0.4829		
	4	Fx	0.1836	0.1836		
		Fy	0.1072	0.1072		
		Mz	-0.7647	-0.7647		
5	5	Fx	0.1072	0.1072		
		Fy	0.8164	0.8164		
		Mz	3.4432	3.4432		
	6	Fx	-0.1072	-0.1072		
		Fy	-0.8164	-0.8164		
		Mz	8.1907	8.1907		

NOTES:

Revision	0					57/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/27/82					

2.4.3 3D-FRAME IN VER. 2.4

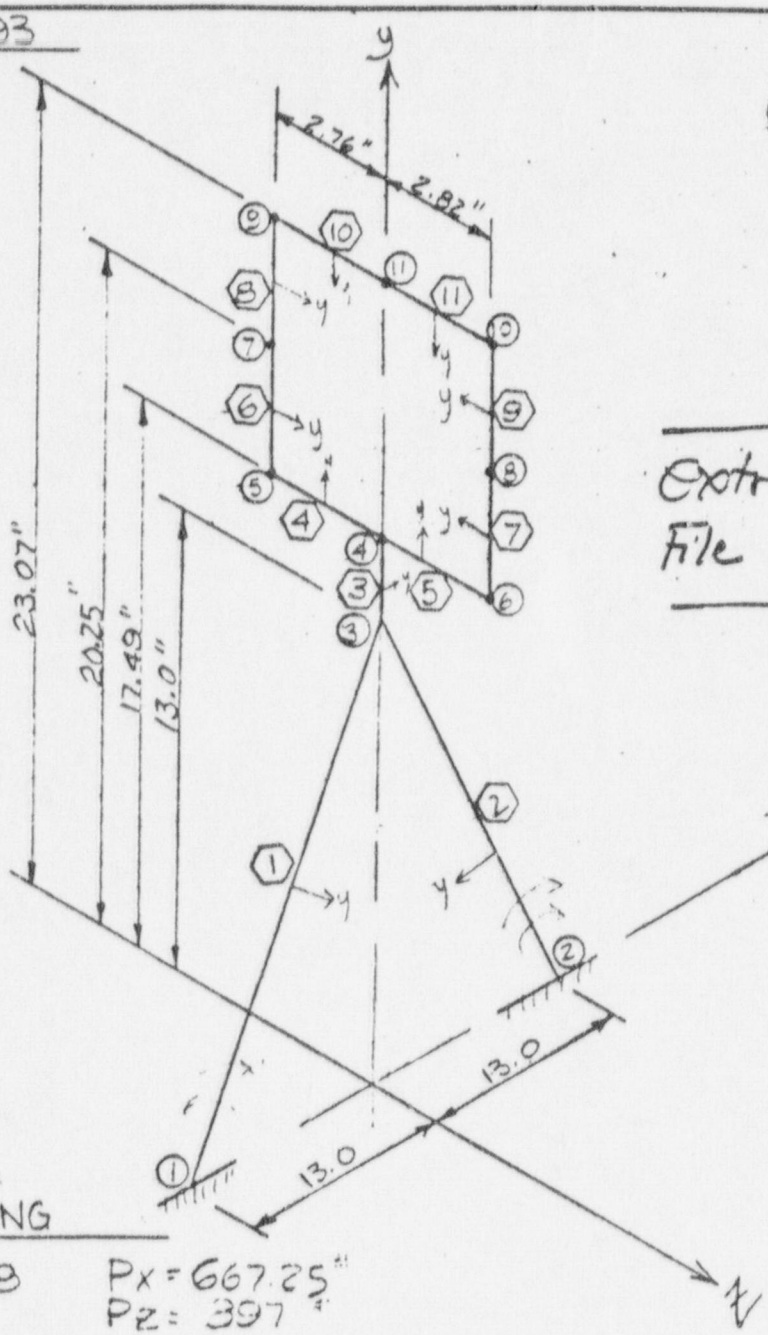
A skeleton view of the model is shown in Page 59/82. For detailed description of the structure and loading refer to the corresponding project file as given in page. 52/82. Specimen Comparison of the results obtained using GENSAP ver. 2.4 & 3.1 are given in Pages 60-66/52.

Inferences & Comments: The results based on GENSAP versions 2.4 and 3.0 are identical.

nutech
San Jose, California

PROJECT MONTICELLO OWNER NSP CLIENT NSP	FILE NO. & CALC. No. 30.2363.0202-2, -2.1 SHEET 7 OF 25

SR-193



GENSAP MODEL

11 JOINTS
2 JOINT CONSTRAINTS
1 MATERIAL
2 MEMBER PROPERTIES
11 MEMBERS
1 LOAD CASE

Extract from File 30.2363.0202-2.1

MODEL DIMENSIONS TO NEUTRAL AXIS

LOADING

JOINT 8 $P_x = 667.25$#, $P_z = 397$#

JOINT 7 $P_x = 667.25$

JOINT 4 $P_x = 667.25$

JOINT 11 $P_y = 2812$, $P_x = 667.25$

59/82

REVISION	0			
PREPARED BY/DATE	TCF 10-1-81			
CHECKED BY/DATE	SIT 10-8-81			

SYSTEM COMBUSTIBLE GAS CONTROL
LINE NO. CGC1B-4"

FILE #: 08·164·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 2.4

STRUCTURE TYPE: 3D-FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
3	Dx	0.000521	0.000521	100%	
	Y	0.000383	0.000383		
	Z	0.004483	0.004483		
	Rx	0.000511	0.000511		
	Y	0.000001	0.000001		
	Z	-0.000231	-0.000231		
6	Dx	0.002835	0.002835		
	Y	-0.000949	-0.000849		
	Z	0.007158	0.007158		
	Rx	0.000612	0.000612		
	Y	0.000012	0.000012		
	Z	-0.012651	-0.012651		
11	Dx	0.073260	0.073260		
	Y	0.001698	0.001698		
	Z	0.011367	0.011367		
	Rx	0.000670	0.000670		
	Y	0.000034	0.000034		
	Z	-0.012654	-0.012654		

NOTES:

Revision	0					60/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/26/82					

08·164·0102

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1

Subject: AND 2.4

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
1	1	F_x	-4445.49	-4445.49	100%	
		F_y	777.89	777.89		
		F_z	450.27	450.27		
		M_x	-3251.48	-3251.48		
		M_y	-9605.73	-9605.73		
		M_z	3649.94	3649.94		
	3	F_x	4445.49	4445.49		
		F_y	-777.89	-777.89		
		F_z	-450.27	-450.27		
		M_x	3251.48	3251.48		
		M_y	1327.70	1327.70		
		M_z	10651.41	10651.41		
3	3	F_x	-2812.00	-2812.00		
		F_y	-2667.00	-2667.00		
		F_z	897.00	897.00		
		M_x	-40.03	-40.03		
		M_y	-6503.25	-6503.25		
		M_z	-19390.29	-19390.29		
	4	F_x	2812.00	2812.00		
		F_y	2667.00	2667.00		
		F_z	-897.00	-897.00		
		M_x	40.03	40.03		
		M_y	2475.72	2475.72		
		M_z	7906.48	7906.48		

NOTES:

Revision	0					61/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 2.4

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
7	6	Fx	-1246.88	-1246.88	100%	
		Fy	673.76	673.76		
		Fz	995.53	995.53		
		Mx	-2.83	-2.83		
		My	-3668.46	-3668.46		
		Mz	1965.48	1965.48		
	8	Fx	1246.88	1246.88		
		Fy	-673.76	-673.76		
		Fz	-995.53	-995.53		
		Mx	2.83	2.83		
		My	920.80	920.80		
		Mz	-106.26	-106.26		
11	10	Fx	-223.24	-223.24		
		Fy	1246.88	1246.88		
		Fz	328.28	328.28		
		Mx	4.95	4.95		
		My	2.83	2.83		
		Mz	735.79	735.79		
	11	Fx	223.24	223.24		
		Fy	-1246.88	-1246.88		
		Fz	-328.28	-328.28		
		Mx	-4.95	-4.95		
		My	-928.58	-928.58		
		Mz	2780.42	2780.42		

NOTES:

Revision	0					62/82
Prepared By/Date	AM 10/27/82					
Checked By/Date	[illegible]					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND 2·4

Subject:

STRUCTURE TYPE: 3D FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
			NORMAL STRESSES:			
1	1	f_a	1008.0468	1008.0468	100%	
		f_y	-2249.5858	-2249.5858		
		f_z	854.7869	854.7869		
		f_{comb}	4112.4195	4112.4195		
	3	f_a	1008.0468	1008.0468		
		f_y	310.9365	310.9365		
		f_z	2494.4762	2494.4762		
		f_{comb}	3813.4594	3813.4594		
3	3	f_a	637.6417	637.6417		
		f_y	-1523.0094	-1523.0094		
		f_z	-4541.0504	-4541.0504		
		f_{comb}	6701.7014	6701.7014		
	4	f_a	637.6417	637.6417		
		f_y	579.7939	579.7939		
		f_z	1734.5375	1734.5375		
		f_{comb}	2951.9731	2951.9731		

NOTES:

Revision	0					63/82
Prepared By/Date	AM 10/21/92					
Checked By/Date	CV 10/29/92					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 2.4

Subject:

STRUCTURE TYPE: 3D FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
			NORMAL STRESSES (cont'd..)			
6	5	f_a	652.1323	652.1323	100 %	
		f_y	853.4285	853.4285		
		f_z	596.8191	596.8191		
		f_{comb}	2102.3798	2102.3798		
	7	f_a	652.1323	652.1323		
		f_y	-219.3718	-219.3718		
		f_z	-1844.1277	-1849.1277		
		f_{comb}	2720.6317	2720.6317		
10	9	f_a	93.0157	93.0157		
		f_y	1.5930	1.5930		
		f_z	3128.6604	3128.6604		
		f_{comb}	3223.2691	3223.2691		
	11	f_a	93.0157	93.0157		
		f_y	212.0048	212.0048		
		f_z	5651.2666	5651.2666		
		f_{comb}	5956.2871	5956.2871		

NOTES:

Revision	0					64/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	EV 10/22/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND 2·4

Subject:

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi) - SHEAR

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
			SHEAR STRESSES			
1	1	τ_y	351.9869	351.9869	100%	
		τ_z	203.7401	203.7401		
	3	τ_y	-351.9869	-351.9869		
		τ_z	-203.7401	-203.7401		
3	3	τ_y	-1207.6923	-1207.6923		
		τ_z	405.8824	405.8824		
	4	τ_y	1207.6923	1207.6923		
		τ_z	-405.8824	-405.8824		
10	9	τ_y	1185.6950	1185.6950		
		τ_z	-282.4754	-282.4754		
	11	τ_y	-1185.6950	-1185.6950		
		τ_z	282.4754	282.4754		

NOTES:

Revision	0					65/82
Prepared By/Date	AM 11/22/82					
Checked By/Date	BV 11/23/82					

FILE # : W8·164 ·0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND 2.4

STRUCTURE TYPE: 3D FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 2.4	PERCENTAGE COMPARISON	REMARKS
1	F_x	-2593.38	-2593.38	100%	
	F_y	-3693.49	-3693.49		
	F_z	-450.27	-450.27		
	M_x	-9091.42	-9091.42		
	M_y	4493.14	4493.14		
	M_z	-3649.94	-3649.94		
2	F_x	-75.62	-75.62		
	F_y	881.49	881.49		
	F_z	-446.73	-446.73		
	M_x	-9072.83	-9072.83		
	M_y	-4487.26	-4487.26		
	M_z	-1737.40	-1737.40		

NOTES:

Revision	0				
Prepared By/Date	AM 10/22/92				
Checked By/Date	PV 10/23/92				

2.4.4 2-D FRAME in VER. 3.0

A skeleton view of the model is shown in Page 68/82. For detailed description of the structure and loading refer to the corresponding project file as given in Page 52/82. Specimen comparison of the results obtained using GENSAP ver. 3.0 & 3.1 are given in Pages 69-73/82.

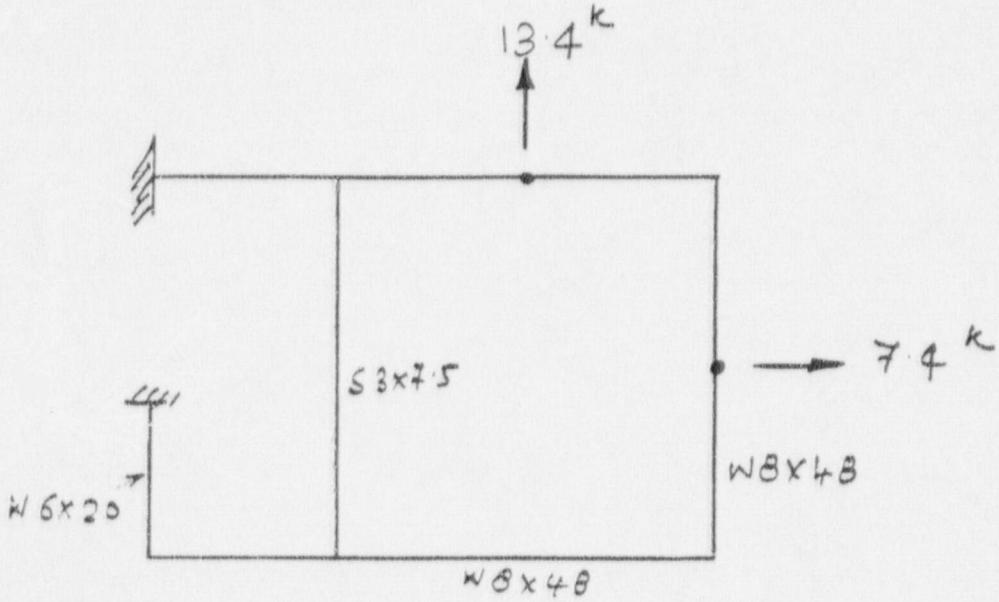
Inferences & Comments: The result based on GENSAP Version 3.0 and 3.1 are identical.

PROJECT _____ FILE NO. _____

OWNER _____

CLIENT _____

2-D Frame in GENSAP Ver. 3.0



Loading Case "A"

Reproduced from Proj. File

30.0339.0039-020

REVISION	0					PAGE 68
PREPARED BY / DATE	[illegible]					OF 82
CHECKED BY / DATE	[illegible]					

File # 08.164.0102
08.164.0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 3.0

STRUCTURE TYPE: 2D-FRAME

NODAL DISPLACEMENTS (GLOBAL), INCHES

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
2	X-TRAN	-0.0032381	-0.0032381	100%	
	Y-TRAN	0.0000554	0.0000554		
	Z-ROT	0.0001729	0.0001729		
4	X-TRAN	-0.0091366	-0.0091366		
	Y-TRAN	0.0001745	0.0001745		
	Z-ROT	0.0002561	0.0002561		
6	X-TRAN	-0.0090382	-0.0090382		
	Y-TRAN	0.0046751	0.0046751		
	Z-ROT	0.0002840	0.0002840		
8	X-TRAN	-0.0030759	-0.0030759		
	Y-TRAN	0.0045141	0.0045141		
	Z-ROT	0.0003210	0.0003210		
10	X-TRAN	-0.0001415	-0.0001415		
	Y-TRAN	0.0044391	0.0044391		
	Z-ROT	0.0003024	0.0003024		

NOTES:

Revision	0					69/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	By 10/27/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 3.0

STRUCTURE TYPE: 2D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
1	1	F_x	-3144.7725	-3144.7725	100 %	
		F_y	-10603.3426	-10603.3426		
		M_z	-166295.3789	-166295.3789		
	2	F_x	3144.7725	3144.7725		
		F_y	10603.3426	10603.3426		
		M_z	89951.3121	89951.3121		
6	7	F_x	-4254.0612	-4254.0612		
		F_y	-2222.2032	-2222.2032		
		M_z	12778.6932	12778.6932		
	6	F_x	4254.0612	4254.0612		
		F_y	2222.2032	2222.2032		
		M_z	-29978.5457	-29978.5457		
11	9	F_x	-574.4542	-574.4542		
		F_y	1.1663	1.1663		
		M_z	-695.5340	-695.5340		
	8	F_x	574.4542	574.4542		
		F_y	-1.1663	-1.1663		
		M_z	706.0887	706.0887		

NOTES:

Revision	0					70/82
Prepared By/Date	AM 10/21/92					
Checked By/Date	[illegible]					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND 3.0

Subject: AND 3.0

STRUCTURE TYPE: 2D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
1	1	f_a	223.0335	223.0335	100%	
		f_b	-3849.4301	-3849.4301		
		f_{comb}	4072.4636	4072.4636		
	2	f_a	223.0335	223.0335		
		f_b	2082.2063	2082.2063		
		f_{comb}	2305.2398	2305.2398		
5	5	f_a	157.6031	157.6031		
		f_b	197.2386	197.2386		
		f_{comb}	354.8417	354.8417		
	6	f_a	157.6031	157.6031		
		f_b	693.9478	693.9478		
		f_{comb}	851.5509	851.5509		
9	11	f_a	-475.6220	-475.6220		
		f_b	-4518.8314	-4518.8314		
		f_{comb}	-4994.4534	-4994.4534		
	10	f_a	-475.6220	-475.6220		
		f_b	1779.9256	1779.9256		
		f_{comb}	-2255.5476	-2255.5476		

NOTES:

Revision	0					71/82
Prepared By/Date	AM 11/22/82					
Checked By/Date	CY 11/23/82					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 3.0

STRUCTURE TYPE: 2D-FRAME

MEMBER STRESSES (psi) — SHEAR

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
			SHEAR STRESSES			
1	1	τ_y	−3956.4711	−3956.4711	100 %	
	2	τ_y	3956.4711	3956.4711		
2	2	τ_y	−4170.8197	−4170.8197		
	3	τ_y	4170.8197	4170.8197		
4	4	τ_y	−1173.8578	−1173.8578		
	5	τ_y	1173.8578	1173.8578		
6	7	τ_y	−829.1803	−829.1803		
	6	τ_y	829.1803	829.1803		
9	11	τ_y	−3809.5143	−3809.5143		
	10	τ_y	3809.5143	3809.5143		

NOTES:

Revision	0					72/82
Prepared By/Date	AM 10/21/92					
Checked By/Date	DY 10/27/92					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND 3.0

STRUCTURE TYPE: 2D-FRAME

SUPPORT REACTIONS (GLOBAL), LBS. & in. LBS

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
1	F_x	10603.3426	10603.3423	100 %	
	F_Y	-3144.7725	-3144.7725	↓	
	M_z	-166295.3789	-166295.3789	↓	
11	F_x	2796.6574	2796.6574	↓	
	F_Y	-4255.2275	-4255.2275	↓	
	M_z	-60552.3406	-60552.3406	↓	

NOTES:

Revision	0					73/82
Prepared By/Date	[illegible]					
Checked By/Date	[illegible]					

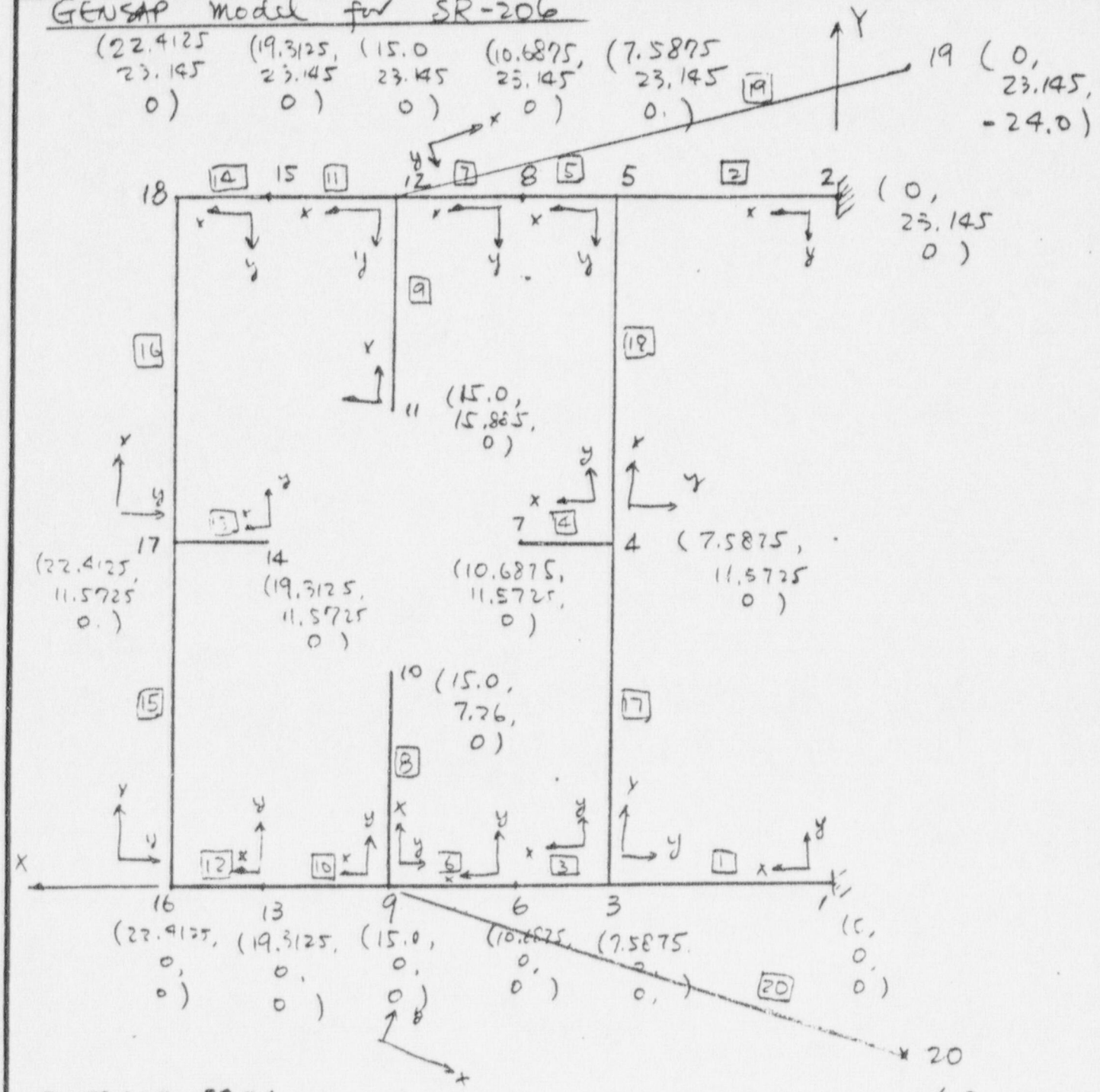
PROJECT _____ FILE NO. _____
OWNER _____
CLIENT _____

2.4.5 3-D FRAME IN VER. 3.0

A skeicton view of the model is shown in Page 75/84. For detailed description of this structure and loading, refer to the corresponding project file as given in Page 52/82. Specimen comparison of the results obtained using GENSAP ver. 3.0 & 3.1 are given in Pages 76-81/82.

Inference & Comments: The results based on GENSAP version 3.0 and 3.1 are identical.

GENSAP model for SR-206



EXTRACT FROM
FILE NO: 30.2356.0416.6

75/82

Revision	1					
Prepared By/Date	[illegible] 12-4-81					Page 3
Checked By/Date	[illegible]					of 24

FILE # 08.164.0102

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3.1 AND 3.0

STRUCTURE TYPE: 3D FRAME

NODAL DISPLACEMENTS (GLOBAL)

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
	FROM	L. CASE # 1			
3	X-TRAN	0.000044	0.000044	100%	
	Y "	0.000008	0.000008		
	Z "	-0.000014	-0.000014		
	X ROT	-0.0	-0.0		
	Y "	0.000003	0.000003		
	Z "	-0.000004	-0.000004		
10	X-TRAN	0.000151	0.000151		
	Y "	0.000024	0.000024		
	Z "	-0.000095	-0.000095		
	X ROT	-0.000007	-0.000007		
	Y "	0.000004	0.000004		
	Z "	-0.000010	-0.000010		
17	X-TRAN	0.001272	0.001272		
	Y- "	0.0	0.0		
	Z- "	-0.000072	-0.000072		
	X-ROT	-0.0	-0.0		
	Y- "	0.000004	0.000004		
	Z- "	0.0	0.0		

NOTES:

Revision	0					76/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	[illegible]					

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1 AND 3.0

STRUCTURE TYPE: 3D-FRAME

ELEMENT FORCES & MOMENTS (LOCAL COORD. LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
	FROM	LOAD	CASE #2			
1	1	Fx	1218.80	1218.80	100 %	
		Fy	2523.33	2523.33		
		Fz	-10.30	-10.30		
		Mx	-0.12	-0.12		
		My	170.57	170.57		
		Mz	23737.54	23737.54		
	3	Fx	-1218.80	-1218.80		
		Fy	-2523.33	-2523.33		
		Fz	10.30	10.30		
		Mx	0.12	0.12		
		My	-92.44	-92.44		
		Mz	-4591.77	-4591.77		
8	9	Fx	5000.00	5000.00		
		Fy	-0.0	-0.0		
		Fz	0.0	0.0		
		Mx	-0.0	-0.0		
		My	0.0	0.0		
		Mz	0.0	0.0		
	10	Fx	-5000.00	-5000.0		
		Fy	0.0	0.0		
		Fz	-0.0	-0.0		
		Mx	0.0	0.0		
		My	-0.0	-0.0		
		Mz	-0.0	-0.0		

NOTES:

Revision	0					77/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	BV 10/27/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1

Subject: AND 3.0

STRUCTURE TYPE: 3D FRAME

ELEMENT FORCES & MOMENTS (CONT.) LOCAL COORD. (LBS & IN. LBS.)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
		FROM L.CASE #2				
15	16	Fx	-1219.06	-1219.06	100%	
		Fy	-573.49	-573.49		
		Fz	6.42	6.42		
		Mx	-0.66	-0.66		
		My	-93.04	-93.04		
		Mz	-5568.28	-5568.28		
	17	Fx	1219.06	1219.06		
		Fy	573.49	573.49		
		Fz	-6.42	-6.42		
		Mx	0.66	0.66		
		My	18.71	18.71		
		Mz	-1068.41	-1068.41		
20	9	Fx	29.56	29.56		
		Fy	3.91	3.91		
		Fz	-74.43	-74.43		
		Mx	-1.10	-1.10		
		My	217.95	217.95		
		Mz	18.52	18.52		
	20	Fx	-29.56	-29.56		
		Fy	-3.91	-3.91		
		Fz	74.43	74.43		
		Mx	1.10	1.10		
		My	1888.62	1888.62		
		Mz	92.17	92.17		

NOTES:

Revision	0					78/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/26/82					

3·154·0102

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1

Subject: AND 3.0

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi)

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
		FROM	L·CASE #3			
1	1	fa	-460.6871	-460.6871	100 %	
		fy	2218.1187	2218.1187		
		fz	-72.5399	-72.5399		
		fcomb	-2751.3457	-2751.3457		
7	12	fa	-279.2539	-279.2539		
		fy	401.3066	401.3066		
		fz	425.4515	425.4515		
		fcomb	-1106.0120	-1106.0120		
15	16	fa	29.0006	29.0006		
		fy	-145.9030	-145.9030		
		fz	176.6806	176.6806		
		fcomb	351.5843	351.5843		
20	20	fa	1294.2639	1294.2639		
		fy	-5123.3926	-5123.3926		
		fz	29.7839	29.7839		
		fcomb	6447.4403	6447.4403		

NOTES:

Revision	0					79/82
Prepared By/Date	AM/10.22.82					
Checked By/Date	RV 10/27/82					

COMPARISON OF RESULTS BETWEEN GENSAP VER. 3·1

Subject: AND 3.0

STRUCTURE TYPE: 3D-FRAME

MEMBER STRESSES (psi) - SHEAR

ELEM #	NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
	SHEAR STRESSES - FROM LOAD CASE #3					
1	1	τ_y	119.0795	119.0795	100%	
		τ_z	-168.4996	-168.4996		
5	5	τ_y	772.7982	772.7982		
		τ_z	-75.6301	-75.6301		
12	13	τ_y	-152.2533	-152.2533		
		τ_z	-244.1411	-244.1411		
14	18	τ_y	152.2532	152.2532		
		τ_z	-244.1401	-244.1401		
20	20	τ_y	142.9152	142.9152		
		τ_z	-312.0667	-312.0667		

NOTES:

Revision	0					80/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	RV 10/22/82					

FILE # :

Subject: COMPARISON OF RESULTS BETWEEN GENSAP VER 3.1 AND 3.0

STRUCTURE TYPE: 3D-FRAME

SUPPORT REACTIONS (L. CASE #4) (GLOBAL), LBS. & In. LBS

NODE #	TYPE	GENSAP VER. 3.1	GENSAP VER. 3.0	PERCENTAGE COMPARISON	REMARKS
1	Fx	2940.11	2940.11	100 %	
	Fy	2620.45	2620.45		
	Fz	-859.70	-859.70		
	Mx	-83.65	83.65		
	My	9793.54	9793.54		
	Mz	23255.04	23255.04		
2	Fx	502.36	502.36		
	Fy	2255.25	2255.25		
	Fz	-839.16	-839.16		
	Mx	83.80	83.80		
	My	9452.52	9452.52		
	Mz	21413.75	21413.75		
19	Fx	-2740.19	-2740.19		
	Fy	1086.71	1086.71		
	Fz	-4173.53	-4173.53		
	Mx	-9108.91	-9108.91		
	My	-24.73	-24.73		
	Mz	5756.80	5756.80		
20	Fx	-2702.28	-2702.28		
	Fy	-962.41	-962.41		
	Fz	-4127.61	-4127.61		
	Mx	6419.25	6419.25		
	My	159.55	159.55		
	Mz	-4075.15	-4075.15		

NOTES:

Revision	0					81/82
Prepared By/Date	AM 10/22/82					
Checked By/Date	SY 10/27/82					

PROJECT
OWNER
CLIENT

nutech
San Jose, California

FILE NO. 08·164·0102

REVISION 0
PREPARED BY/DATE AM 10-22-82
CHECKED BY/DATE EV 10/23/82

2.4.6 COMPUTER RUN ID's & TAPE/FILE DETAILS

VERIFICATION OF GENSAP VER. 2.4 & 3.0 AGAINST 3.1

SAMPLE PROBLEM	GENSAP VERSION	COMPUTER RUN ID/DATE	OUTPUT FILE NAME	FICHE/ ARCHIVE DETAILS	REMARKS
2D FRAME	2.4	08-30-81	–	–	For reference see page. 52/82
	3.1	10-07-82	2DF24Φ	In progress	–
	3.0	04-23-82	–	–	For reference see page. 52/82
	3.1	10-07-82	2DF30Φ	In progress	–
3D FRAME	2.4	09-29-82	–	–	For reference see page. 52/82
	3.1	10-07-82	3DF24Φ	In progress	–
	3.0	12-03-81	–	–	For reference see page. 52/82
	3.1	10-07-82	3DF30Φ	In progress	–

NOTES: