SAP2000 (V24) Frame Analysis Tutorial

The following is a step-by-step procedure for analyzing a two-dimensional frame using SAP2000 (v24). The order of some of these steps is not critical; however, all steps should be completed before the execution of the analysis. If you have questions or find instructions unclear or inaccurate, please get in touch with **Dr. Charles Camp**.

Draw the shear and moment diagrams for each of the three members of the frame. Assume the frame is fixed and connected at *A*, *B*, and *D*, with a pin joint at *C*.

Assume *E* is 200 GPa, A = 20 (10³) mm², and *I* is 300 (10⁶) mm⁴.



When you start SAP2000 Version 24, you should see the following interface window:



Step 1: New Model - To start a new problem, select New Model under the File menu.

The **New Model** window gives many different templates for general structures. On this menu, you can select the units for the problem; the default is **kN**, **m**, **C**. You can change the unit when necessary, and SAP2000 converts the values. In this example, the units are **kN** and **m**. Click on the **2D Frame** icon on the first row of templates.

New Model Initialization				Project Information		
O Initialize Model from S	aved Settings		\sim			
O Initialize Model from an	n Existing File					
Initialize Model from De	efault Settings			Modify/Sho	w Information	
Default Units	Default Units KN, mm, C		~	~		
Default Materials United States		s v				
Save Options as Defau	ult					
Select Template						
Blank	Grid Only	همین المعالم ا Beam	2D Trusses	3D Trusses	2D Frames	
					Î	
3D Frames	Wall	Flat Slab	Shells	Staircases	Storage Structures	
Underground	Solid Models	Pipes and Plates				

The **Frame** template menu should appear.

	Portal Frame Dimensions	
Portal \checkmark	Number of Stories 1 Story Height 600	0.
	Number of Bays 1 Bay Width 500	0.
	Section Properties	
	Beams Default V +	

In this example, the frame has one bay of 5,000 mm (5 m) and a one-story height of 6,000 mm (6 m). Enter the values and click **OK**.

The SAP2000 interface displays the geometry of the frame. By default, the supports are pins.



Since we do not need a 3-D view of the frame, click on the window label and delete the lefthand side window so that you have an **xz** view of the frame.



This example's grid lines are unimportant, so they are turned off. Click on the **View** menu at the top of the SAP2000 interface and then **Show Grid**.

Next, adjust the height of the left column. Select the bottom node of the element by clicking on the joint with the pointer. A blue " χ " should appear at the joint to indicate it is currently selected. Select the **Edit** menu at the top of the SAP200 interface, then **Move**, and the following menu appears. In this example, the node moves in the positive z-direction 2,000 mm (2 m).

S Move Selected Objects	5 ×	Move Selected Objects	×
Change Coordinates by:		Change Coordinates by:	
Delta X	0mm	Delta X	0 mm
Delta Y	0 mm	Delta Y	0 mm
Delta Z	0 mm	Delta Z	2000 mm
Pick Two	Points on Model	Pick Two Pc	ints on Model
Reset Form	n to Default Values Close Apply	Reset Form t	o Default Values lose Apply



Step 2: Define Structural Supports - To define the location and type of structural support, select the support location by clicking on the joint with the pointer. A blue "X" should appear at the joint to indicate it is currently selected. Next, click on the **Assign** tab at the top of the SAP2000 interface, then click on **Joint**, and then the **Restraints** ... button on the bottom toolbar.

S Assign Joint Restraints	×
Restraints in Joint Local Directions	
✓ Translation 1 Rotation about 1	
✓ Translation 2 Rotation about 2	
✓ Translation 3 Rotation about 3	
Fast Restraints	
OK Close Apply	

The **Assign Joint Restraints** menu appears as shown. Usually, the directions **1**, **2**, and **3** listed on the menu correspond to the x, y, and z directions. The Fast Restraints buttons may be used for most problems when working on two-dimensional structures. If the support conditions for your problem are not listed in the **Fast Restraints** section of the menu, you should select the appropriate combination of restraints.

In this frame example, the support at A and D are fixed.

Select the bottom nodes with the pointer (an "X" should appear at the joint), then click the **Fixed** button \square and then **OK**. After the supports have been defined, the frame problem should appear in the SAP2000 interface window as follows:



To model the pin connection at node *C*, select the frame element and click on **Assign**, **Frame**, and **Releases/Partial Fixity**. The following menu appears.

	Release		Frame Partial Fixity Springs		
	Start	End	Start	End	
Axial Load					
Shear Force 2 (Major)					
Shear Force 3 (Minor)					
Torsion					
Moment 22 (Minor)					
Moment 33 (Major)		✓		0	kN-mm/rad
			Clear All Releases in Form	1	

Check the box for Release End **Moment 33 (Major)**. The moment at the end of this element are zero. SAP2000 indicates that a release has been specified with a green dot and shows a break on the line.



Step 3: Apply Forces – Two loads are applied to the frame in this example.

The top frame element has two equally spaced point loads, and the right-side column has a distributed load.

To apply the point loads, select the frame element with the pointer, click on **Assign**, then **Frame Loads**, and then **Point**. The following menu appears. Click on **Absolute Distance from End-I** and enter the position and value of the two point loads. This example shows a 50 kN load at 1,500 mm (1.5 m) and a 40 kN load at 3,500 mm (3.5 m) from the left edge.

General		Options	General		Options
Load Pattern Coordinate System	DEAD ~ GLOBAL ~	Add to Existing Loads Replace Existing Loads Delete Existing Loads	Load Pattern Coordinate System	DEAD ~ GLOBAL ~	Add to Existing Loads Replace Existing Loads Delete Existing Loads
Load Direction Load Type	Gravity ~ Force ~		Load Direction Load Type	Gravity v	
Point Loads Relative Distance C Loads C	1. 2. 3. 0.25 0.75 0 0	4.	Point Loads Absolute Distance	1. 2. 1500 3500 10 40	. 4. 0 mm 0 kN
 Relative Distance from the second seco	m End-I O Absolute Distance fro Reset Form to Default Values OK Close Ap	m End-I	 Relative Distance from the second seco	OK Close Absolute Distance fr Reset Form to Default Values OK Close A	om End-I

Click **OK**, and the loads are displayed on the frame:

S SAP2000 v24.2.0 Ultimate 64-bit - frame_tutorial	- 🗆 ×
File Edit View Define Draw Select Assign Analyze Display Design Options Tools Help	٠.
□ ♦ 🗟 🍓 🧿 🗞 🖉 🔓 😳 🖫 🔍 🤤 🧶 🤤 😌 🦉 🧤 3-d xy xz yz nv 🧿 6-3 🛔 🐳 🔛 🗹 🖾 - 👘 🗖 🎰	1 1 • 1 • 1 • 1 • • • •
Frame Concentrated Loads (DEAD)	• ×
LN 52	
ma la	
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-be Z	
7	
alle	
PS ⁴	
dr ^w Ch	
X-7 Plane @ Y=()	🖨 🔿 GLOBAL 🗸 KN. mm. C 🗸

Next, click on the far right element and select **Assign**, **Frame Loads**, and **Distributed**. The following menu should be displayed. In this example, the distributed load is in the negative local x-direction and has a value of 0.015 kN/mm (15 kN/m). Enter these values into the menu and click **OK**.

ieneral			Options	General			Options
Load Pattern	DEAD	3	 Add to Existing Loads 	Load Pattern	DEAD	2	 Add to Existing Loads
Coordinate System	GLOBAL	2	Replace Existing Loads	Coordinate System	GLOBAL	~	Replace Existing Loads
Load Direction	Gravity	2	O Delete Existing Loads	Load Direction	x	v	 Delete Existing Loads
Load Type	Force	~	Uniform Load 0 kip/in	Load Type	Force	v	Uniform Load -0.015 kN/mm
rapezoidal Loads	1. 2.		3. 4.	Trapezoidal Loads	1.	2.	3. 4.
Relative Distance 0	0.25	0.75	1	Relative Distance	0 0.25	0.75	1
Loads 0	0	0	0 kip/in	Loads	0 0	0	0 kN/mm
Relative Distance fro	m End-I O Absol	ute Distance f	rom End-I	 Relative Distance f 	rom End-I C	Absolute Distance fr	rom End-I
	Reset Form to	Default Values			Reset Fo	orm to Default Values	

The distributed loading is displayed on the frame.



The point loads are not deleted; they are currently not displayed. Select **Display**, **Show Object Load Assigns**, **Frame**, and then **OK** to see all frame loads.



Step 4: Set Analysis Options - This example models the frame in the x-z plane. Click on the **Analyze** menu at the top of the SAP2000 interface window and then click **Set Analysis Options** to limit analysis to variables in the x-z plane. The **Analysis Options** menu appears as follows:

Available DOFs			
V NX	ZUY ⊻UZ	RX 🗹	RY 🔽 RZ
Fast DOFs			
Space Frame	Plane Frame	Plane Grid	Space Truss
Æ			A
	XZ Plane	XY Plane	
Tabular File			
Mod	ify/Show Automat	tic Tabular Output	Data
No files spec	ified for automatic	tabular output	
	Advanced SA	PFire Options	
	OK	Cancel	

To restrict SAP2000 to variables in the x-z plane, select the **Plane Frame** button and click **OK**.

Step 5: Define Material Properties - SAP2000 assumes the loads acting on a structure, including the weight of each element. In our frame analysis, we assume that each element is weightless. To define the properties of a material, select the **Define** menu at the top of the SAP2000 interface window and then click on **Materials.** The Define Materials window appears as shown below:

Define Materials	>
Materials	Click to:
4000Psi A992Fy50	Add New Material
	Add Copy of Material
	Modify/Show Material
	Delete Material
	Show Advanced Properties
	ОК
	Cancel

On this menu, you can change the properties of materials. Select the A992Fy50 (steel with a yield stress of 50 ksi) material in this example and click the **Modify/Show Material...** button.

The Material Property Data window is displayed.

ierierai Data			General Data	
Material Name and Display Color	A992Fy50		Material Name and Display Color	A992Fy50
Material Type	Steel 🗸		Material Type	Steel V
Material Grade	Grade 50		Material Grade	Grade 50
Material Notes	Modify/Sho	w Notes	Material Notes	Modify/Show Notes
Veight and Mass		Jnits	Weight and Mass	Units
Weight per Unit Volume 7.69	7E-08	KN, mm, C 🛛 🗸	Weight per Unit Volume 0	KN, mm, C 🗠
Mass per Unit Volume 7.84	9E-12		Mass per Unit Volume 0.	
otropic Property Data			Isotropic Property Data	
Modulus Of Elasticity, E		199.948	Modulus Of Elasticity, E	200
Poisson, U		0.3	Poisson, U	0.3
Coefficient Of Thermal Expansion, A		1.170E-05	Coefficient Of Thermal Expansion, A	1.170E-05
Shear Modulus, G		76.9031	Shear Modulus, G	76.9031
ther Properties For Steel Materials			Other Properties For Steel Materials	
Minimum Yield Stress, Fy		0.3447	Minimum Yield Stress, Fy	0.3447
Minimum Tensile Stress, Fu	1	0.4482	Minimum Tensile Stress, Fu	0.4482
Expected Yield Stress, Fye		0.3792	Expected Yield Stress, Fye	0.3792
Expected Tensile Stress, Fue	[0.493	Expected Tensile Stress, Fue	0.493
			🗆 Switch To Advanced Broosedy Direk	

Change the **Weight per unit Volume** value to zero and adjust the Modulus of Elasticity, *E*, to 200 kN/mm² (200 GPa). Click **OK** to return to the **Define Materials** window, then click **OK** again. Now, we have a material named **A992Fy50** that has no weight per volume. For this example problem, the default values for the Mass per unit Volume, Modulus of elasticity, Poisson's ratio, and the Coefficient of Thermal Expansion can be used. For most linear elastic statically loaded structures, only values for Weight per unit Volume and Modulus of Elasticity are required.

Step 6: Define Frame Sections - To define the cross-section properties of a structural element, click on the **Define** menu at the top of the SAP2000 interface window, then click on **Section Properties**, then **Frame Sections...**, and then the **Frame Properties** window is displayed.

roperties	Click to:
Find this property:	Import New Property
FSEC1	Add New Property
	Add Copy of Property
	Modify/Show Property
	Delete Property

The default Frame Section label is **FSEC1**. To change the properties of the frame section, click on the **Modify/Show Property...** button. The **I/Wide Flange Section** window is displayed.

Section Name FS	EC1	Display Color
Section Notes	Modify/Show Notes	
Dimensions		Section
Outside height (t3)	12.	
Top flange width (t2)	5.	
Top flange thickness (tf)	0.38	
Web thickness (tw)	0.25	
Bottom flange width (t2b)	5.	
Bottom flange thickness (tfb)	0.38	
Fillet Radius	0.	Properties
		Section Properties
Material	Property Modifiers	Time Dependent Properties
+ A992Fy50 ~	Set Modifiers	

To define the material of this frame section, click on the **Material** pull-down menu and select our weightless material **A992Fy50**. Click **OK** to return to the **Frame Properties** window, then click **OK** again.

In this example, the frame elements have a cross-sectional area of $A = 20 (10^3) \text{ mm}^2$ and a moment of inertia value $I = 300 (10^6) \text{ mm}^4$. Click Add New Property on the Frame Properties menu to specify this value. The **Add New** Property menu is displayed. For this example, click the **Frame Section Property Type** dropdown menu, select **Other**, and then click on **General**.

Steel	~	Select Property Type Frame Section Property Type	Other ~
Tee Pipe	L Angle Tube	General	Section Designer
Auto Select List	Steel Joist		
	Steel Tee Pipe Auto Select List	Steel	Steel V Frame Sector Property Type Frame Sector Property Frame Sector Property Fra

The **Property Data** menu is displayed. In this example, the **Moment of inertia about the 3 axis** (the strong axis) is $300 (10^6) \text{ mm}^4$. The value of the **Cross-sectional area** is $20 (10^3) \text{ mm}^2$. The

Moment of inertia about the 2 should be a small value of 1 to minimize their effect on the results.

Section Name	F	SEC2	
Cross-section (axial) area	20000	Section modulus about 3 axis (top)	1.
Moment of Inertia about 3 axis	30000000	Section modulus about 3 axis (bottom)	1.
Moment of Inertia about 2 axis	1.	Section modulus about 2 axis (left)	1.
Product of Inertia about 2-3	0.	Section modulus about 2 axis (right)	1.
Torsional constant	1.	Warping Constant (Cw)	0.
Shear area in 2 direction	1.	Plastic modulus about 3 axis	1.
Shear area in 3 direction	1.	Plastic modulus about 2 axis	1.
CG offset in 3 direction	0.	Radius of Gyration about 3 axis	1.
CG offset in 2 direction	0.	Radius of Gyration about 2 axis	1.
Shear Center Offset (x3)	0.]	
Shear Center Offset (x2)*	0.	* Value is not used in analysis	

Enter the value and click **OK**. Then click **OK** on the **General Shapes** menu, and the Frames Properties menu is displayed. Note that **FSEC2** has been added to the list of sections. Click **OK**.

Properties	Click to:
Find this property:	Import New Property
FSEC2	Add New Property
FSECZ	Add Copy of Property
	Modify/Show Property
	Delete Property

Step 7: Assign Frame Sections - To assign the frame properties of a structural element, select all frame elements with the pointer and click on the **Assign** menu at the top of the SAP2000 interface window, then click **Frame**, and then **Frame Sections**. You can assign the same section properties to multiple elements by selecting all the elements that share the same properties. Choose the **FSEC2** frame element from the **Assign Frame Sections** window and click **OK**.

The frame section name is displayed next to each element selected. After the frame sections have been assigned, the SAP2000 interface window is displayed.



Step 8: Run Analysis - To analyze the model, press the Run Analysis button **b**. The Set Load Cases to Run menu is displayed.

ear Static dal	Not Run Not Run	Run	Run/Do Not Run Case
dal	Not Run	Do not Due	
		Do not Run	Show Case
			Delete Results for Case
			Run/Do Not Run All
			Delete All Results
			Show Load Case Tree
			Save Named Set
			Show Named Set
Show Message	es after Run		Model-Alive
0.0.0			_
	Show Message	Show Messages after Run	Show Messages after Run

By default, there are two load cases: **DEAD** and **MODAL**. More load cases can be added, but only the **DEAD** load case is required for this example. Click on the **Run Now** button. If the analysis is successful, the **Analysis Complete** window is displayed and reports that the analysis is complete. Click **OK**, and the **Save Model File As** window is displayed.

ganize • New folder Name Date modified Size Image: Control of Size Size Image: Contron of Size Image: Control of Size<							
 Dropbox Name Date modified Type Stace Destrop Beam_tutorial.adb D/27/2023.159 PM SAP2000.adb Frile D KB Gravity Cloud Fries Gravity Cloud Fri	ganize 👻 New folder					B	•
Decktop Semu_trickladb 10/27/023 159 PM SAP2000 adb File 10 KB Orebrive Semple 11e 5.db 5/22/023 401 PM SAP2000 adb File 9 KB Orebrive Semple 11e 5.db 5/22/023 401 PM SAP2000 adb File 9 KB Orebrive Semple 11e 5.db 5/22/023 401 PM SAP2000 adb File 9 KB Orebrive Semple 11e 5.db 10/26/23 1045 AM SAP2000 adb File 10 KB Orebrive - The University of Memphis Semple 11e 5.db 10/18/2023 11:23 AM SAP2000 adb File 10 KB Orebrive - The University of Memphis Semple 11e 5.db 10/18/2023 11:23 AM SAP2000 adb File 10 KB Orebrive - The University of Memphis Semple 11e 5.db 10/18/2023 11:23 AM SAP2000 adb File 10 KB Orebrive - The University of Memphis Semple 11e 5.db 10/18/2023 11:23 AM SAP2000 adb File 10 KB Orebrive - The University of Memphis The SP Semple 11e 5.db 10/18/2023 11:23 AM SAP2000 adb File 10 KB Orebrive - SP Downends Semple 11e 5.db Semple 11e 5.db 10 KB <	😍 Dropbox	🖈 ^ Name	Date modified	Туре	Size		
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	Libraries	v					

When you run a model, SAP2000 creates about 40 temporary files, so choosing a particular folder to store the SAP2000 files is beneficial. The Windows Desktop is not a good location. When a folder is selected, name the SAP2000 model file.

In this example, the file name is frame_tutorial. SAP2000 saves the model information in the file named **frame_tutorial.sdb** in the folder selected. The SAP2000 interface window displays an exaggerated deflected shape of the modeled structure.



Step 9: Print Frame Forces - To get a quick feel for the relative magnitude of the forces in the frame, click on the **Show Forces/Stresses** pull-down menu 🗺 at the top of the SAP2000

interface, select Frames/Cables/Tendons..., and the Display Frame Forces/Stresses menu is displayed.

Case/Combo					
Case/Combo Name		DEAD		\$	
Multivalued Options					
Envelope (Max or	Min)				
Step			1	* *	
Display Type					
Force	(Stress			
Component					
O Axial Force	(O Torsion			
O Shear 2-2	(O Moment 2-2			
○ Shear 3-3	(Moment 3-3			
Scaling for Diagram					
 Automatic 					
\bigcirc User Defined					
Options for Diagram					
 Fill Diagram 	(Show Values			
	Reset F	Form to Default	Values		
	Reset Form 1	to Current Wind	low Settings		
	Reset F Reset Form 1	Form to Default to Current Winc	Values low Settings		

Select **Moment 3-3** (the strong axis) and then **OK**; the bending moment along the frame is displayed.



For the shear force, Select the **Shear-22** and then **OK**; the shear force along the frame is displayed.



The default view is the **Fill Diagram**, where the relative magnitude of the moments are displayed. Negative bending moments are in **red**, and positive in **blue**.

Another way to display force information is to unclick **Fill Diagram** and click on **Show Values on Diagram**. In this case, the value of each axial force is displayed next to the elements.



To view more detail about the forces along an element, click on the element in the SAP2000 interface and right-click. The **Diagram for Frame Object** # (FSEC2) window is displayed. Below are the results for each of the three elements in this example.



Drag the vertical slider along the element to see values on the loads, shear, moment, and deflection.

To print the results to a file, click the **File** menu, select **Print Tables...**, and display the following menu.



In this example, we want the shear forces and bending moments in the frame, so click on expand the **Element Output** item under the **ANALYSIS RESULTS** section, expand the **Frame Output** item, and then click on **Tables: Element Forces - Frames**. Also, click on the box **Print to File** and the **TXT file** button to define the file format. Click **OK** and define the name and location of the TXT file.

There is an option for **Spreadsheet Format** if desired. The default location for the file is the same directory as the problem files. A different location can be specified by clicking **File Name** and choosing the desired file location and name.

Turn on the frame labels to correlate the results printed in the output file to frame elements in the structure. Click the Show Undeformed Shape button / on the main interface to display the

frame element labels. Next, click on the **Display Options** button in and under the **Frame** section of the menu, click on **Labels**.

The frame element numbers or any other information displayed in the main SAP2000 interface can be printed by clicking on the **File** menu and selecting **Print Graphics** (the image is sent to the default printer).

The results of the frame analysis presented in the output file are listed by frame element number.

Station C mm 0. 2000. 4000. 0. 3000. 6000. 0. 500. 1500. 1500. 1500. 2500. 2500. 3000. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic	P KN -47.416 -47.416 -47.416 -42.584 -42.584 -42.584 -42.584 -42.584 -26.99 -26.99 -26.99 -26.99	cs, part of 2 kN -26.99 -26.99 -26.99 -63.01 -18.01 26.99 -47.416 -47.416 -47.416	V3 KN 0. 0. 0. 0. 0. 0. 0. 0.	T KN-mm 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	M2 KN-mm 0. 0. 0. 0. 0. 0.
mm 0. 2000. 4000. 0. 3000. 6000. 0. 500. 1500. 1500. 1500. 2200. 2500. 3000. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic	KN -47.416 -47.416 -42.584 -42.584 -42.584 -26.99 -26.99 -26.99 -26.99 -26.99 -26.99	KN -26.99 -26.99 -26.99 -63.01 -18.01 -26.99 -47.416 -47.416 -47.416	KN 0. 0. 0. 0. 0. 0. 0. 0. 0.	KN-mm 0. 0. 0. 0. 0. 0. 0. 0.	KN-mm 0. 0. 0. 0. 0. 0. 0.
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3000. 6000. 0. 500. 1000. 1500. 1500. 2000. 2500. 3000. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic	-42.584 -42.584 -26.99 -26.99 -26.99 -26.99 -26.99	-18.01 26.99 -47.416 -47.416 -47.416	0. 0. 0. 0. 0.	0. 0. 0. 0.	0. 0. 0. 0.
6000. 0. 500. 1000. 1500. 1500. 2000. 2500. 3000. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	LinStatic LinStatic LinStatic LinStatic LinStatic LinStatic	-42.584 -26.99 -26.99 -26.99 -26.99	26.99 -47.416 -47.416 -47.416	0. 0. 0. 0.	0. 0. 0.	0. 0. 0
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2000. 2500. 3000. 3500.	DEAD	LinOtatia	-26.99	2.584	0.	0.	0.
3000. 3500.	1/1-01/	LinStatic	-26.99	2.584	0.	0.	0.
3500.	DEAD	LinStatic	-20.99	2.584	0.	0.	0.
	DEAD	LinStatic	-26.99	2.584	0.	0.	0.
3500.	DEAD	LinStatic	-26.99	42.584	0.	0.	0.
4000.	DEAD	LinStatic	-26.99	42.584	0.	0.	0.
4500.	DEAD	LinStatic	-26.99	42.584	0.	0.	0.
nt Force	es - Fram	les Part 2	of 2				
Table: E	Element Force	s - Frames, Part	t 2 of 2				
Station C mm	OutputCase	M3 KN-mm	FrameElem	ElemStation mm			
0.	DEAD	-105883.47	1-1	0.			
2000.	DEAD	-51902.57	1-1	2000.			
4000.	DEAD	2078.33	1-1	4000.			
0.	DEAD	-108057.31	2-1	0.			
5000.	DEAD	134/1.34	2-1	3000.			
0000.	DEAD	-2078 33	3-1	0000.			
		24620.54	3-1	500			
0. 500.	DEAD	21029.51					
500. 1000.	DEAD DEAD	21029.51 45337.34	3-1	1000.			
0. 500. 1000. 1500.	DEAD DEAD DEAD	21029.51 45337.34 69045.17	3-1 3-1	1000. 1500.			
0. 500. 1000. 1500. 1500.	DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17	3-1 3-1 3-1	1000. 1500. 1500.			
0. 500. 1000. 1500. 1500. 2000.	DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17 67753.	3-1 3-1 3-1 3-1 3-1	1000. 1500. 1500. 2000.			
0. 500. 1000. 1500. 1500. 2000. 2500.	DEAD DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17 67753. 66460.84	3-1 3-1 3-1 3-1 3-1 3-1	1000. 1500. 1500. 2000. 2500.			
0. 500. 1000. 1500. 2500. 2500. 3000.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17 67753. 66460.84 65168.67	3-1 3-1 3-1 3-1 3-1 3-1 3-1	1000. 1500. 2000. 2500. 3000.			
0. 500. 1000. 1500. 1500. 2000. 2500. 3000. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17 67753. 66460.84 65168.67 63876.5	3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1	1000. 1500. 2000. 2500. 3000. 3500.			
0. 500. 1000. 1500. 1500. 2000. 2500. 3500. 3500.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 69045.17 67753. 66460.84 65168.67 63876.5 63876.5	3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1	1000. 1500. 2500. 3000. 3500. 3500. 3500.			
0. 500. 1000. 1500. 2500. 2500. 3500. 3500. 4000.	DEAD DEAD DEAD DEAD DEAD DEAD DEAD DEAD	21029.51 45337.34 69045.17 67753. 66460.84 65168.67 63876.5 63876.5 42584.33 2102.17	3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1 3-1	1000. 1500. 1500. 2000. 2500. 3500. 3500. 3500. 4600.			
n	5000. It Forc Table: 1 tation mm 0. 2000. 4000. 0. 3000. 6000	5000. DEAD t Forces - Fram Table: Element Force tation OutputCase mm 0. DEAD 2000. DEAD 0. DEAD 0. DEAD 3000. DEAD 3000. DEAD	5000. DEAD LinStatic tt Forces - Frames, Part 2 Context Sector Context Sector Table: Element Forces - Frames, Part 1 Context Sector Cont	5000. DEAD LinStatic -26.99 t Forces - Frames, Part 2 of 2 Table: Element Forces - Frames, Part 2 of 2 tation OutputCase M3 FrameElem mm Colspan="2">Colspan="2"Colspan=	5000. DEAD LinStatic -26.99 42.584 the Forces - Frames, Part 2 of 2 Table: Element Forces - Frames, Part 2 of 2 tation OutputCase M3 FrameElem ElemStation mm 0. DEAD -105883.47 1-1 0000, 0. DEAD -51902.57 1-1 2000, 4000, 0. DEAD 2078.33 1-1 4000, 0. 0. DEAD 108057.31 2-1 0, 3000, 0. DEAD 13471.34 2-1 3000, 0. 0. DEAD 0. 2.1 6000 0. 2.1 6000 0. 2.1 6000 0. 0. 0. 0. 2.1 6000 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.	5000. DEAD LinStatic -26.99 42.584 0. t Forces - Frames, Part 2 of 2 Table: Element Forces - Frames, Part 2 of 2 tation OutputCase M3 FrameElem ElemStation mm 0. DEAD -105883.47 1-1 0. 2000. DEAD -105883.47 1-1 2000. 4000. DEAD -2078.33 1-1 4000. 0. DEAD -108057.31 2-1 0. 3000. DEAD 13471.34 2-1 3000. 6000 DEAD 0 2-1 6000	5000. DEAD LinStatic -26.99 42.584 0. 0. t Forces - Frames, Part 2 of 2 Table: Element Forces - Frames, Part 2 of 2 tation OutputCase M3 FrameElem ElemStation mm 0. DEAD -105883.47 1-1 0. 2000. DEAD -51902.57 1-1 2000. 0. DEAD -2078.33 1-1 4000. 0. DEAD -108057.31 2-1 0. 3000. DEAD 13471.34 2-1 3000. 0000 DEAD 0 2-1 6000

Note that SAP2000 lists the variation of the internal forces and moments along the element. For frame analysis, there are bending moments and shear forces. The values in the "M3" are the bending moments, and "V2" are the shear forces.