Section-cut first steps

Tutorial	
Name:	Section-cut first steps
Description:	Introductory tutorial for using section cuts.
Program:	SAP2000
Version:	all
Model ID:	na

Section cuts are useful for obtaining the resultant forces which act within a specified section-cut plane.

Section cuts may be defined using any of the following methods:

- 1. Define a quadrilateral cutting plane
- 2. Define a group
- 3. Draw the section cut within the graphical user interface

Each of these section-cut types may be implemented through the procedures described in the following sections:

On this page:

- 1. Define a quadrilateral cutting plane
- 2. Define a group
- 3. Draw the section cut within the graphical user interface
- See Also

1. Define a quadrilateral cutting plane

Section-cut forces are the sum of joint forces for all joints which are:

- Included in the section-cut group;
- Within structural objects entirely cut by the quadrilateral plane; and
- Located on the specified side of the section cut.

Joint forces are then summed about the location specified as the Results Reported at the Location parameter.

The procedure for defining a quadrilateral cutting plane is as follows:

- Launch the Section Cut Data form by selecting Define > Section Cuts > Add Section Cut.
- Select Quadrilateral Cutting Planes, then define the plane by specifying its joint coordinates, as shown in Figure 1:

🔀 SAP2000 v12.0.2 Advanced - MODEI

L					
t					
		Coordinate	System	U	nits
Section Cut Name	SCUT1	GLOBAL	-	•	KN, m, C 💌
Section Cut Defined By		Results Re	eported Are On Th	is Side of Eleme	nts
C Group		Posit	tive 3 Axis Side of	Quadrilateral	
Quadrilateral Cutting Plane	100	C Nega	ative 3 Axis Side o	of Quadrilateral	
Section Cut Group		Quadrilater	ral Cutting Planes		
Group	ALL	Number o	of Quadrilaterals		1
Section Cut Result Type		Currently	Displayed Quadri	ateral: 1	
Analysis (F1, F2, F3, M1, M)	42, M3)	Point	x	Y	Z
O Design (P, V2, V3, T, M2,	M3)	1	0.	0.	0.
Results Reported at this Location	n	2	1.	0.	0.
 Default 		3	1.	1.	0.
O User Defined		4	0.	1.	0.
× Coordinate			Check Fo	r Legal Quadrila	teral
Y Coordinate		Section o	cut results are repo	orted for all eleme	ents that are fully cut
Z Coordinate		by quadri the sectio	laterals and have on cut group.	their associated	objects included in
Section Cut Local Axes Orientati	on - Analysis				
Rotation about Z	0.			04	
Rotation about Y'	0.				
Rotation about X"	0.			Cancel	
Advanced Axes	Advanced				

Figure 1 - Define a quadrilateral cutting plane

- For assistance with additional fields on this form, press F1 to access Context Help.
- Once analysis is run, section-cut forces are available in tabular format by selecting Display > Show Tables > Analysis Results > Structure Output > Other Output Items > Table: Section Cut Forces - Analysis, as shown in Figure 2:

SAP2000 v12.0.2 Advanced - MODEL	
Choose Tables for Display	
Edit	
 MODEL DEFINITION (0 of 48 tables selected) System Data Property Definitions Load Pattern Definitions Dother Definitions Bridge Data Connectivity Data Joint Assignments Options/Preferences Data Miscellaneous Data Miscellaneous Data Structure Output Base Reactions Model Information Other Output Items Table: Section Cut Forces - Analysis 	Load Patterns (Model Def.) Select Load Patterns 1 of 1 Selected Load Cases (Results) Select Load Cases 3 of 3 Selected Modify/Show Options Set Output Selections Options Selection Only Show Unformatted Named Sets Save Named Set Delete Named Set
	OK Cancel
Table Formats File Current Table Formats File: Program Default	

Figure 2 - Section-cut forces

2. Define a group

Section cuts may also be defined by specifying a group of structural objects. Here, section-cut forces represent the sum of joint forces within those frame, s hell, and link objects which are included in the group. As shown in Figure 2, the Section Cut Group must include All joints for which forces should be summed.

SAP2000 v12.0.2 Advanced - MODEL				
Section Cut Data				
Edit				
Section Cut Name	SCUT1	Coordinate System	Units KN, m, C	-
Section Cut Defined By Group Quadrilateral Cutting Planes				
Section Cut Group Group	ALL			
Section Cut Result Type Analysis (F1, F2, F3, M1, M2, Design (P, V2, V3, T, M2, M3)	M3))			
Results Reported at this Location – C Default C User Defined X Coordinate Y Coordinate Z Coordinate				
Section Cut Local Axes Orientation Rotation about Z Rotation about Y" Rotation about X" Advanced Axes	Analysis 0. 0. 0. 0. Advanced		OK Cancel	

Figure 3 - Section-cut group

3. Draw the section cut within the graphical user interface

Section cuts may be drawn within the graphical user interface by selecting Draw > Draw Section Cut. Section-cut forces will then be displayed on the Section Cut Forces and Stresses form shown in Figure 3:

R	K SAP2000 v12.0.2 Advanced - MODEL						
🐹 Section Cut Stresses & Forces							
	Section Cutting Line						
		X	Y	Z			
	Start Point	15.9187	6.9595	0.			
	End Point	15.8445	-2.5372	0.			
	- Desultant Force Least	on and Angle					
	- Nesultanit Porce Locati	un anu Angie X	Y	z	Angle (X to 1)		
		15.8816	2.2111	0.	269.5524		
	Include	🔽 Frames 🔽	Shells 🔽 Asolid	s 🔽 Planes 🔽	Solids 🗖 Links		
		Right Side		Left	Side		
	1	2	Z	1	2 Z		
	Moment						
	moment j	0. j	0.j 0.	j 0.j	- (
		Save Cut]	Sa	ave Cut		
	Close Refresh						

Figure 4 - Directly drawn section cuts

See Also

- Section cuts section
- Context Help (Output Conventions)
- Context Help (Example Problems B, N, and S)