

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 - MODEL

Section Cut Data

Edit

Section Cut Name

Coordinate System

Units

Section Cut Defined By

☐ Group
☒ **Quadrilateral Cutting Planes**

Section Cut Group

Group

Section Cut Result Type

☒ Analysis (F1, F2, F3, M1, M2, M3)
☐ Design (P, V2, V3, T, M2, M3)

Results Reported at this Location

☒ Default
☐ User Defined

X Coordinate
 Y Coordinate
 Z Coordinate

Section Cut Local Axes Orientation - Analysis

Rotation about Z
 Rotation about Y'
 Rotation about X''

☐ Advanced Axes

Results Reported Are On This Side of Elements

☒ Positive 3 Axis Side of Quadrilateral
☐ Negative 3 Axis Side of Quadrilateral

Quadrilateral Cutting Planes

Number of Quadrilaterals

Currently Displayed Quadrilateral: 1

Point	X	Y	Z
1	0.	0.	0.
2	1.	0.	0.
3	1.	1.	0.
4	0.	1.	0.

Section cut results are reported for all elements that are fully cut by quadrilaterals and have their associated objects included in the section cut group.

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:

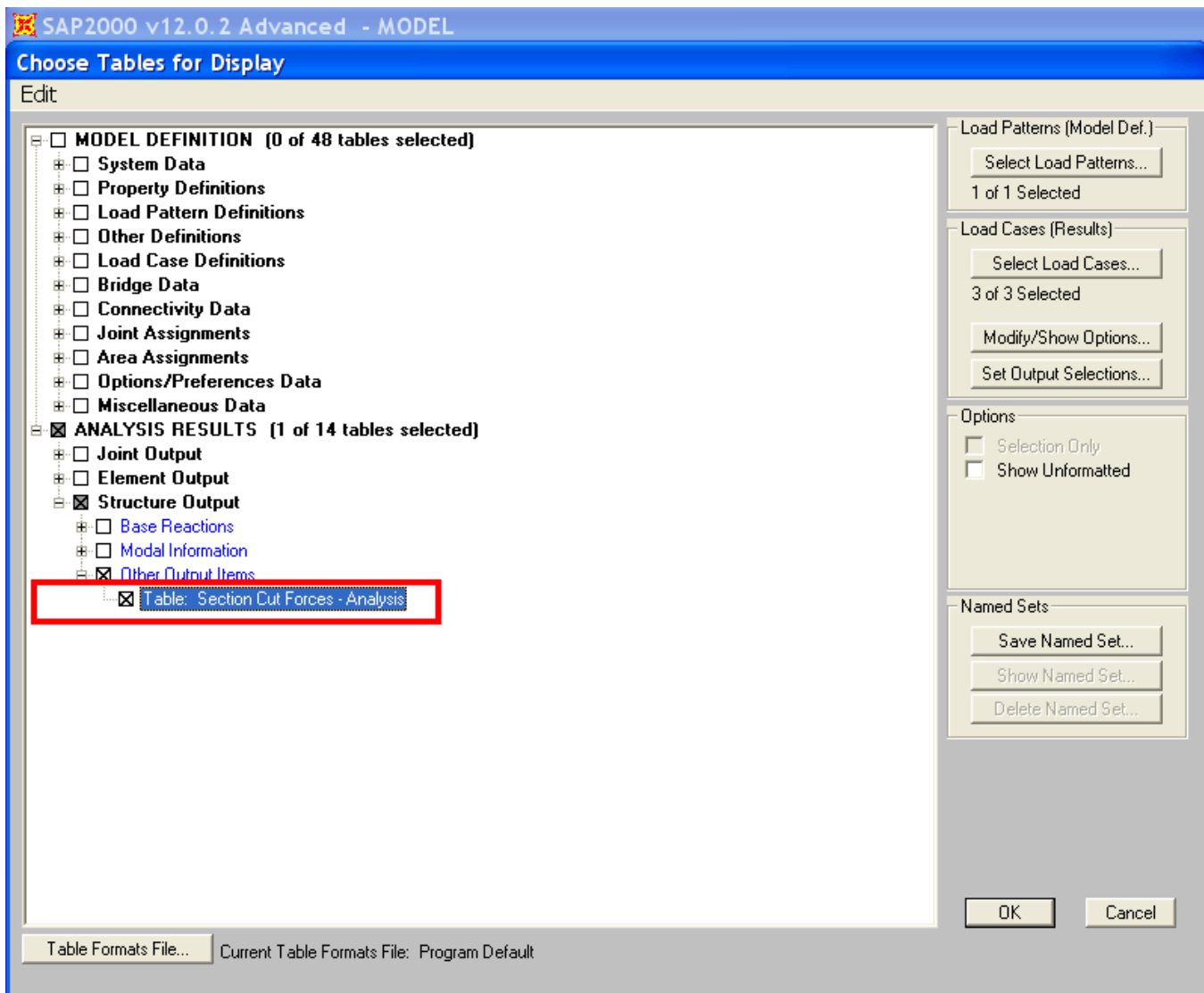


Figure 2 - Section-cut forces

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](#), [shell](#), 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	GLOBAL	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, M3)

☐ Design (P, V2, V3, T, M2, M3)

Results Reported at this Location

☒ Default

☐ User Defined

X Coordinate

Y Coordinate

Z Coordinate

Section Cut Local Axes Orientation - Analysis

Rotation about Z 0.

Rotation about Y' 0.

Rotation about X'' 0.

☐ Advanced Axes

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:

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.

Resultant Force Location and Angle

	X	Y	Z	Angle (X to 1)
	15.8816	2.2111	0.	269.5524

Include ☒ Frames ☒ Shells ☒ Asolids ☒ Planes ☒ Solids ☐ Links

Integrated Forces

	Right Side			Left Side		
	1	2	Z	1	2	Z
Force	0.	0.	0.	0.	0.	0.
Moment	0.	0.	0.	0.	0.	0.

Save Cut Save 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)