

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:

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Section Cut Data

Edit

Section Cut Name SCUT1

Coordinate System GLOBAL

Units KN, m, C

Section Cut Defined By
☐ Group
☒ **Quadrilateral Cutting Planes**

Results Reported Are On This Side of Elements
☒ Positive 3 Axis Side of Quadrilateral
☐ Negative 3 Axis Side of Quadrilateral

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

Quadrilateral Cutting Planes
Number of Quadrilaterals 1
Currently Displayed Quadrilateral: 1

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

Check For Legal Quadrilateral

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.

OK
Cancel

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:

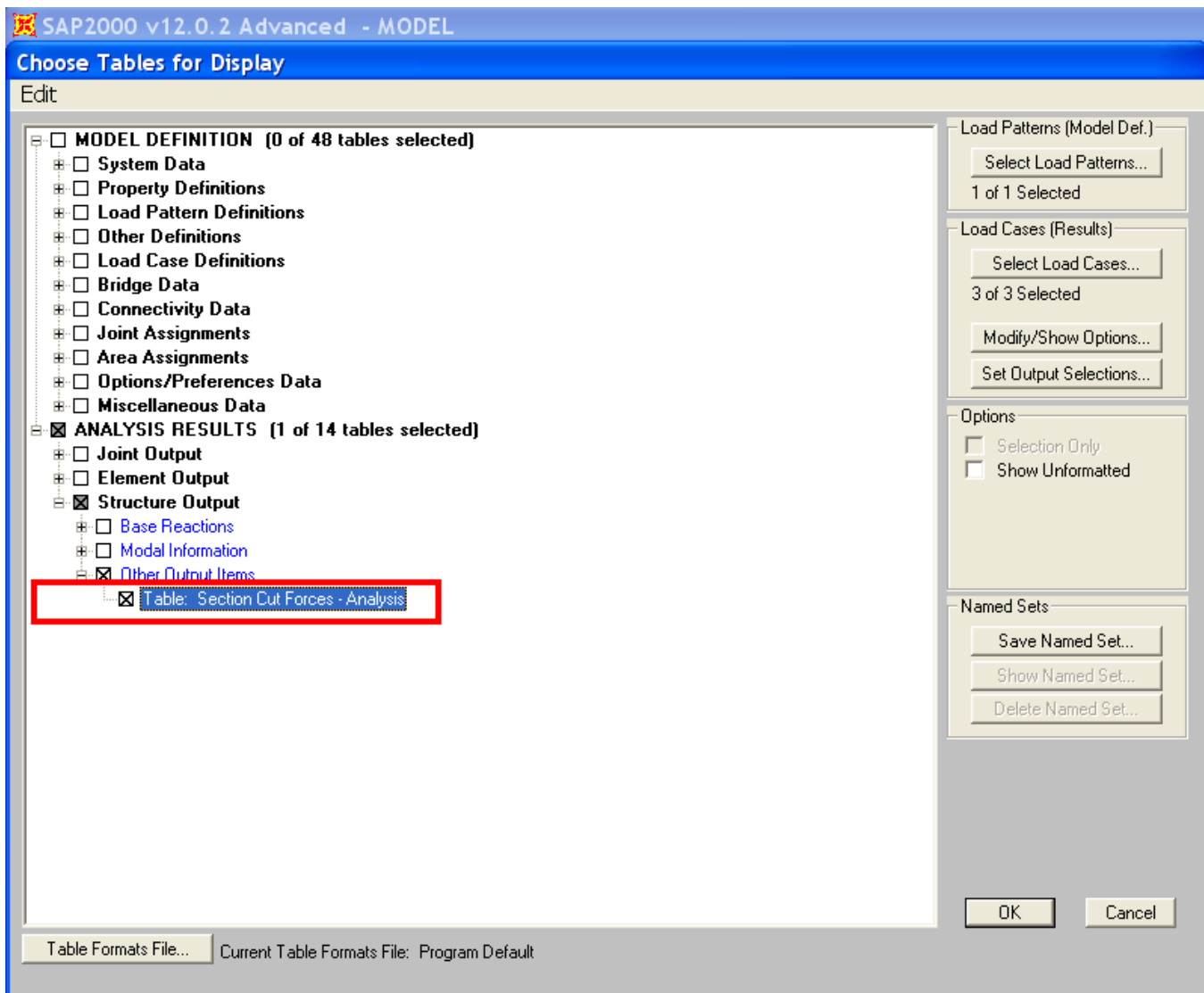


Figure 2 - Section-cut forces

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.

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Section Cut Data

Edit

Section Cut Name	SCUT1	Coordinate System	GLOBAL	Units	KN, m, C
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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:

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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)