

Joint

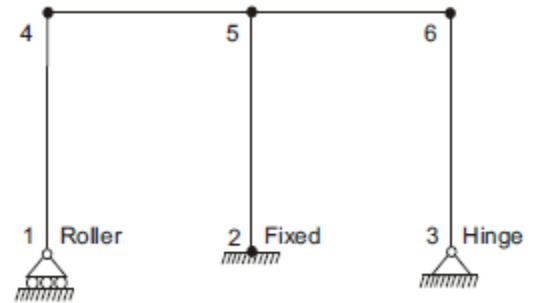
Joints represent points of connection between structural members. Joints are automatically created at the ends of line objects ([frames](#), [cables](#), [tendons](#), [links](#)) and at the corners of [area](#) and [solid](#) objects. Joints may also be added manually to capture localized behavior, or to simulate [restraint](#) supports. [Constraint](#) conditions are also applied to joints to establish correlation among their displacement DOF.

Joints are fundamental to numerical solution in that stresses and strains are resolved according to joint displacement. First, an object-based model is created by drawing structural objects which are connected by joints and subjected to loading.

CSI Software then generates a [finite-element](#) model according to structural geometry and individual-member properties. Users have additional control over [mesh](#) refinement and intersecting-object connections. The FEM model then provides for analysis, and results are reported in terms of the object-based model.

Element [mass](#) and distributed loading are automatically transferred to joint locations during analysis. Users may assign additional mass to joints. During dynamic analysis, users should also assign mass moment of inertia (MMI) to joints such that inertial forces correlate with joint [Acceleration](#). MMI formulation is presented in the

[CSI Analysis Reference Manual](#) (page 41), and guidelines for dynamic-analysis acceleration are presented in the [Time-history output-acceleration accuracy](#) article.



Articles

Tutorials

Title	Description	Program
Complicated joint patterns	Guidelines for creating complicated joint patterns using interactive database editing.	SAP2000
Joint renumbering	The process for renumbering structural joints is outlined in this tutorial.	SAP2000
Joint-pattern first steps	This tutorial provides an introduction to the assignment of joint patterns.	SAP2000
Modeling a pin connection between crossing members	Modify joints and apply constraints such that a pin connection allows crossing members to translate freely.	SAP2000
Radial point load	Application of point loads in the radial direction using the Advanced Joint Coordinate Axes feature.	SAP2000

Test Problems

Title	Description	Program
Frame to shell connections	This tutorial describes the application of connections between frame and shell elements.	SAP2000
Modeling segmental-bridge joint openings	The modeling and response of joint openings, simulated using gap link elements, between shell segments of a post-tensioned bridge deck.	CSiBridge