Altair OptiStruct™

JOINTG

Bulk Data Entry

Defines a joint connection between two grids.

Format

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
JOINTG	*JID*	*JPID*	*JTYPE*	*GID1*	*CID1*	*GID2*	*CID2*		

Example

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
JOINTG	2	3	UNIVERSA	234	1	2445	1		

Definitions

Field	Contents	SI Unit Example
JID	Joint element identification number. No default (Integer > 0)	
JPID	Property identification number of PJOINTG. Default = Blank (Integer > 0)	
JTYPE	Joint type. 2 **UNIVERSA** Universal joint **BALL** Ball joint **REVOLUTE** Revolute joint **AXIAL** Axial joint	

	CARTES Cartesian joint **CARDAN** Cardan joint **INPLANE** In-plane joint **INLINE** In-line joint **ORIENT** Orientation joint **HINGE** Hinge joint **RLINK** Rigid link joint **RPIN** Rigid pin joint **RBEAM** Rigid beam joint **UJOINT** Universal connection with rigid pin joint **CYLINDRI** Cylindrical joint **TRANSLAT** Translator joint **ROTATION** Rotation joint Combination Joints: Any combination of the following translational joints: AXIA, INLI, RLIN, CART, INPL can be assembled with any of the rotational joints: ORIE, CARD, ROTA to create a combination joint. **Note:** translational joints always should be listed first, followed by the rotational joint (as shown in the examples below, and in the table). **AXIAORIE** Combination of Axial and Orient joints. **INLICARD** Combination of Inline and Cardan joints. **RLINORIE** Combination of Rigid Link and Orient joints. **CARTROTA** Combination of Cartesian and Rotation joints. **INPLORIE** Combination of In-plane and Orientation joints. No default	
GID1	Grid Point identification number of the first grid. No default (Integer > 0)	

CID1	Coordinate system identification number for the first grid point *GID1*. Default = blank (Integer > 0)	
GID2	Grid Point identification number of the second grid. No default (Integer > 0)	
CID2	Coordinate system identification number for the second grid point *GID2*. Default = blank (Integer > 0)	

Comments

1. JOINTG element identification numbers should be unique compared to any other element in OptiStruct.

2. The following table provides information regarding currently supported Motion (MOTNJG), Loading (LOADJG), stop/lock (PJOINTG) degrees of freedom.

Joint Type	Motion (MOTNJG)	Load (LOADJG)	Stop/Lock (PJOINTG)	Constrained degrees of freedom	Elasticity (PJOINTG)	RIGID (PJOINTG)	*CID1*	*CID2*
AXIAL	1	1	1		1		NO	NO
BALL 2.a/2.b				123			NO	NO
RPIN 2.a2.b				123			YES	NO
CARTESIA	123		123		123	123	YES	NO
INLINE	1	1		23			YES	NO
INPLANE	23			1			YES	NO
CARDAN	456						YES	NO
ORIENT				456			YES	YES
REVOLUTE	4	4		56			YES	YES
UNIVERSA				5 (twist)			YES	YES
HINGE2.d	4	4		12356	4 (ELAS only)		YES	YES
RLINK				1 (AXIAL)			NO	NO
RBEAM				123456			NO	NO
UJOINT				1235			YES	YES
CYLINDRI	14	14		2356			YES	YES
TRANSLAT	1	1	1	23456	1	1	YES	YES
ROTATION	456	456	456		456	456	YES	NO
Example Combination Joints 2.e								
AXIAORIE	1	1	1	456			YES	YES
INLICARD	1456	1		23			YES	YES
RLINORIE				1 (axial) 456			YES	YES
CARTROTA	123456	123456	123456		123456	123456	YES	NO
INPLORIE	23	23	23	456	23	23	YES	YES

a. For BALL joint, there is no relative translation between the two degrees of freedom in the basic system. Local systems should not be defined for the BALL joint and will not be used if specified.

b. For RPIN joint, there is no relative translation between the grids in the local system defined on *CID1* (this is where RPIN differs from BALL joint).

Note: For any local system defined on a grid for the joints, the local systems move/rotate along with the grids on which they are defined.

Therefore, even though from the perspective of the basic system, there may seem to be relative translation between the grids in RPIN joint, there will not be any relative translation between the grids in the local *CID1* which moves/rotates with grid *GID1*.

c. Constrained degrees of freedom are degrees of freedom of each grid of the joint that allow no relative motion with each other in that dof. For example, in BALL joint, no relative motion is allowed in degrees of freedom 123 between the two grids of the joint.

d. *CID2* for HINGE joint is mandatory only for LGDISP and only if the JOINTG grids are non-coincident.

e. Combination joints listed in the table above are examples. Any combination of the following translational joints: AXIA, INLI, RLIN, CART, INPL can be assembled with any of the rotational joints: ORIE, CARD, ROTA to create a combination joint. The translational joints always should be listed first, followed by the rotational joint (as shown in the examples).

3. For additional information regarding the joint definitions, refer to JOINTG (Connectors) in the *User Guide*.

4. JOINTG support information:

a. JOINTG is supported for Linear Static, Small Displacement Nonlinear Static, Large Displacement Nonlinear Static, Direct Transient, and Inertia Relief solution sequences.

b. MOTNJG (zero and non-zero motion) and LOADJG are supported for all relevant joints and solution sequences for which JOINTG is supported (with some exceptions). For linear analysis, only MOTNJG with zero-motion is supported. MOTNJG with non-zero motion is only supported for CYLINDRICAL and AXIAL joints in SMDISP. LOADJG is supported only for CYLINDRICAL and AXIAL joints in SMDISP.

c. *STOP*/*LOCK* on PJOINTG entry is only supported for LGDISP and SMDISP Nonlinear Static Analysis (NLSTAT).

5. Force and Displacement results for JOINTG are output to the <filename>.joint file when OPTI file format is chosen on STRESS and STRAIN I/O Entries, respectively. If H3D file format is requested on STRESS and STRAIN entries, then the corresponding results are labeled as JOINTG Force and JOINTG Disp.

6. Over-constraint check information is printed in the `.out` file when `JOINTG` degrees of freedom are over-constrained. This is currently only available when the `JOINTG` entry is in the model, and if multiple constraints apply on the same degree of freedom. These multiple enforced constraints create a loop, which is now printed in the `.out` file, allowing you to identify such grid points. In Figure 1, a loop can be seen as:

   2003 → 9003 → 1003 → 2003

```
 A total of   2 overconstraint loops are found.

 The loop #  1 has   25 involved constraints:
item      grid id 1     grid id 2
   1)            1002            9004
   2)            1002            9004
   3)            1002            9004
   4)            1002            9004
   5)            1002            9004
   6)            1003            9004
   7)            1003            9004
   8)            1003            9004
   9)            2003            9003
  10)            2003            9003
  11)            2003            9003
  12)            3007            9003
  13)            3007            9003
  14)            3007            9003
  15)            3007            9003
  16)            3007            9003
  17)            3007            9003
  18)            1002            3007
  19)            1002            3007
  20)            1002            3007
  21)            1002            3007
  22)            1002            3007
  23)            1002            3007
  24)            1003            2003
  25)            9003            1003
```

   Figure 1.

7. The OptiStruct joints defined using `JOINTG` are different from the Multibody Dynamics (OS-MBD) joints which are defined using the JOINT entry with OptiStruct-MotionSolve integration.

See Also

Bulk Data Guidelines

Bulk Data Entries by Function

Bulk Data Input File

JOINTG (Connectors)