Join Data

User Tutorial for Join Data

May 2, 2014

1.0 Purpose

The purpose of Join Data allows users to detail out the type of join (weld, bolt, etc.) when using connectors in CyPhy to connect parts. Also, Join Data allows user to reason in FEA and Blast analysis to see if joins (welds, bolts, etc.) will break.

2.0 Universal Attributes

2.1 Override Semantics

2.1.1 Union

This join information is in addition to other join data present for this connection.

2.1.2 Override

This Join data overrides any other join data used for this component.

2.1.3 Description

This field is used to describe the join using sting inputs for other user's benefits.

> **NOTE:**
> There are default joins and joins in the design. The default weld length of zero will not change the manufacturing cost.

3.0 Atom Joins

3.1 Universal Attributes

3.1.1 Length and Length Unit

These fields are used to describe how long a particular join is in a connection. The unit field is a drop down menu with several metric and imperial units.

3.1.2 Description

This field is used to describe the join using sting inputs for other user's benefits.

3.2 Brazed Join

3.2. 1 Filler Material

This field describes the material used as filler during brazing process.

3.2.2Flux Material

This field describes the material used the flux during brazing process.

3.3 Glued Join

3.3.1 Volume and Volume Unit

These fields are used to describe the volume of glue used in the connection. The unit field is a drop down menu with several metric and imperial units.

3.3.2 Material (Glue)

This field allows the user to define what glue material will be used in the join.

3.4 Soldered Join

3.4.1 Filler Material

This field describes the material used as filler during the welding process.

3.4.2 Flux Material

This field describes the material used the flux during the welding process.

3.5 Welded Join

3.5.1 Length and Length Unit

These fields are used to describe how long a particular join is in a connection. The unit field is a drop down menu with several metric and imperial units.

3.5.2 Joint Type

This drop down menu allows the users to choose what type of joint will be welded together. The options are Edge, Butt, Corner, Lap, and Tee.

3.5.3Weld Type

This drop down menu allows the user between a Seam, Stitch, or Spot weld.

3.6 Weld Penetration

This drop down menu allows for the selection of a Partial or Full penetration weld.

3.6.1 Inspection Requirements

This drop down menu allows the user to specify if a weld should be subject to Visual inspection or X-Ray.

3.6.2 Two Sided

This field allows users to determine of the weld is two sided or not.

4.0 Model Joins

4.1 Mechanical Joins

These joins are unique among other types of joins because they can reference other components such as bolts, washers, and nuts.

4.1.1 Fastening Method

This field shows the different types of mechanical fasteners methods available. Currently, only bolted is supported.

4.1.2 Fastening Quantity

This field defines the number of fasteners that will be used in this join.

4.1.3 Torque and Torque Unit

These fields define the amount of torque that should be applied to the mechanical fastener. The unit field is a drop down menu units of N*m currently.

4.1.4 Force and Force Unit

The force applied to the mechanical fastener. The unit field is a drop down menu with several metric and imperial units.

5.0 Adding Default Join Data

Default join data can be added to any connector with in a component. This join data will be used to the expected use case join between that connector and any other component that will attach to that connector. This data can be used in addition to or overridden by join data added at the design level as described below. The first step to define default join data is to open the connector for the Hole in the Mass_Steel component shown in Figure 1.

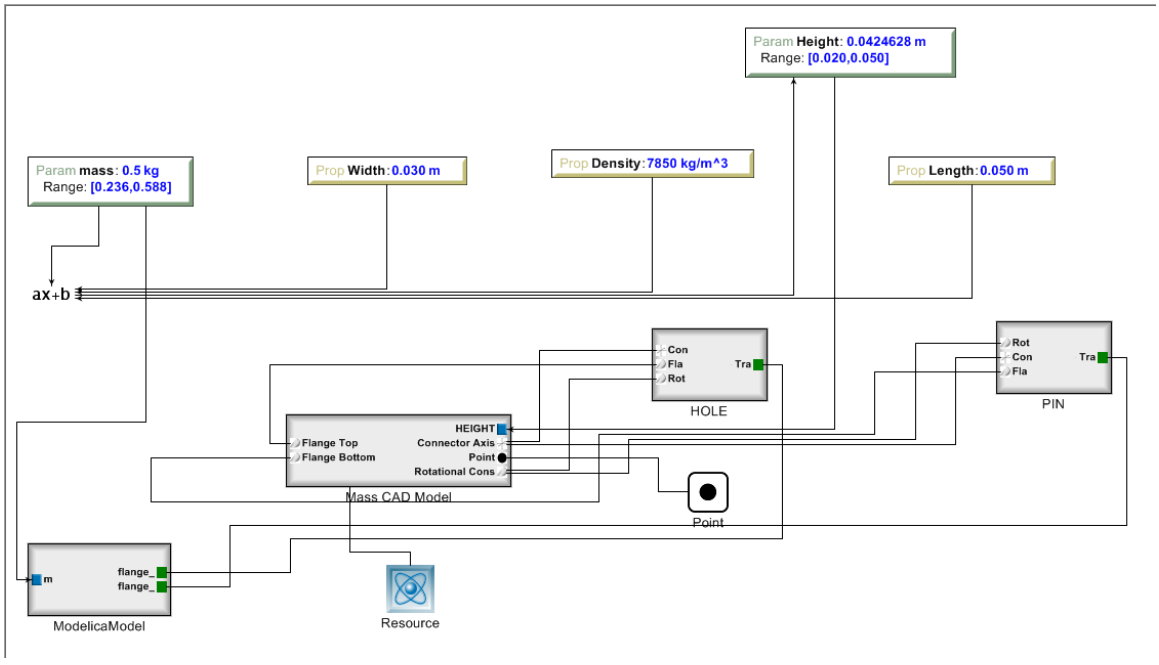

Figure 1: Hole connector in Mass_Steel component

6.0 Adding Join Data to a Design

Next, in the part browser select the type of join data that you want to add to the connection; in this example we will use the weld join data as shown in Figure 2. You can add the join data to either side of the connection.

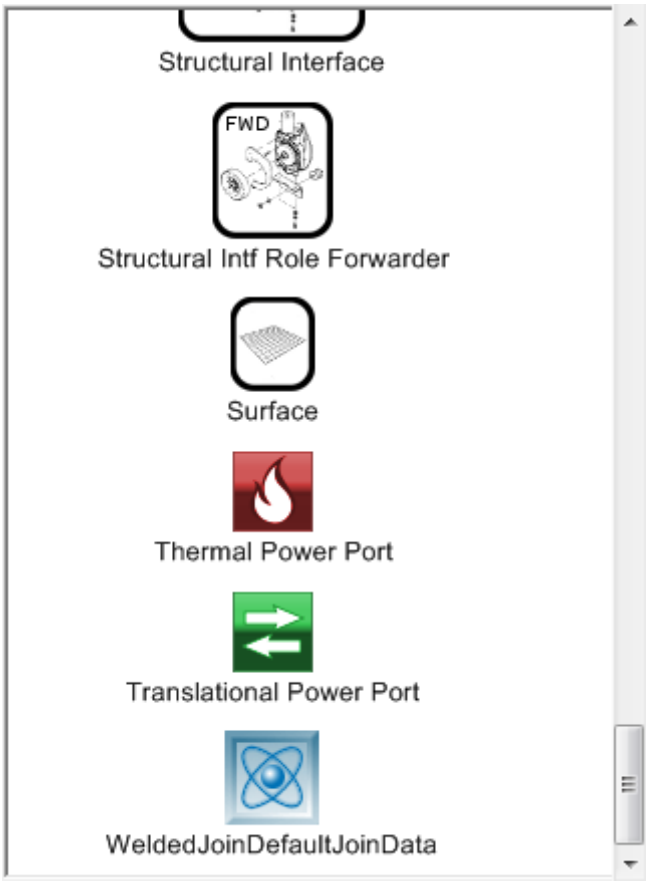

Figure 2: Default weld join in part browser

Drag the WeldJoinDefaultJoinData object into the editing space. Next select the WeldJoinDefaultJoinData object. Modify the items in the object inspector to the following parameters:

- Override Semantic: Union
- Length: 12.5
- Length Unit: mm
- Joint Type: Corner
- Weld Type: Seam
- Weld Penetration: Partial
- Inspection Requirement: Visual
- Two Side: False

That will specify the default join as weld with the attributes specified above when that connector is used.
Next, to add this join at the design level, we will open up the MyMassSpringDamper design space. You should see a screen similar to Figure 3.

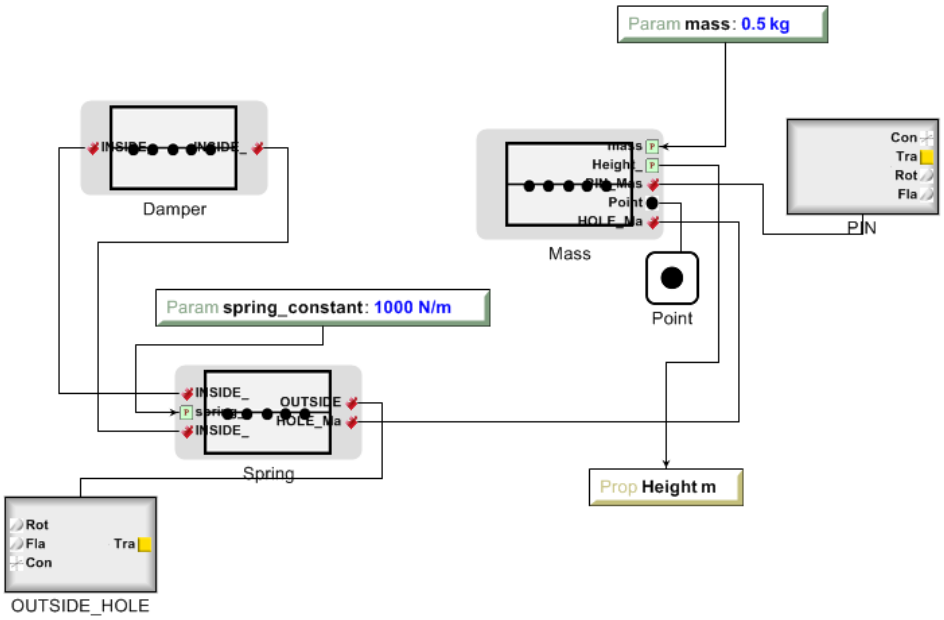

Figure 3: MyMassSpringDamper design container without join data

We will glue the spring and damper together to make sure they do not come loose in this design. To do this we go to the part browser and drag the “Glued Join” into the editing space, as shown in Figures 4 and 5. You'll notice this join data does include the 'DefaultJoinData' string. This is expected because we are viewing it at the design level instead of inside a connector.

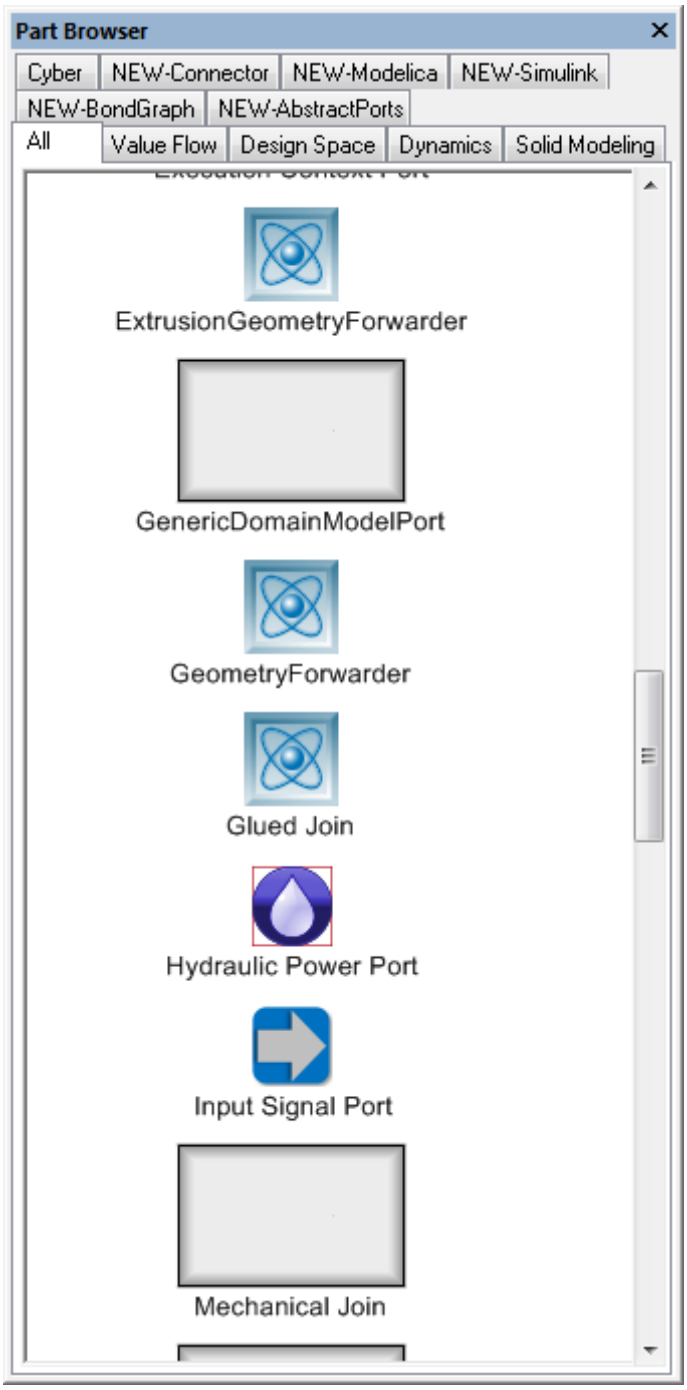

Figure 4: Glue join data in part browser

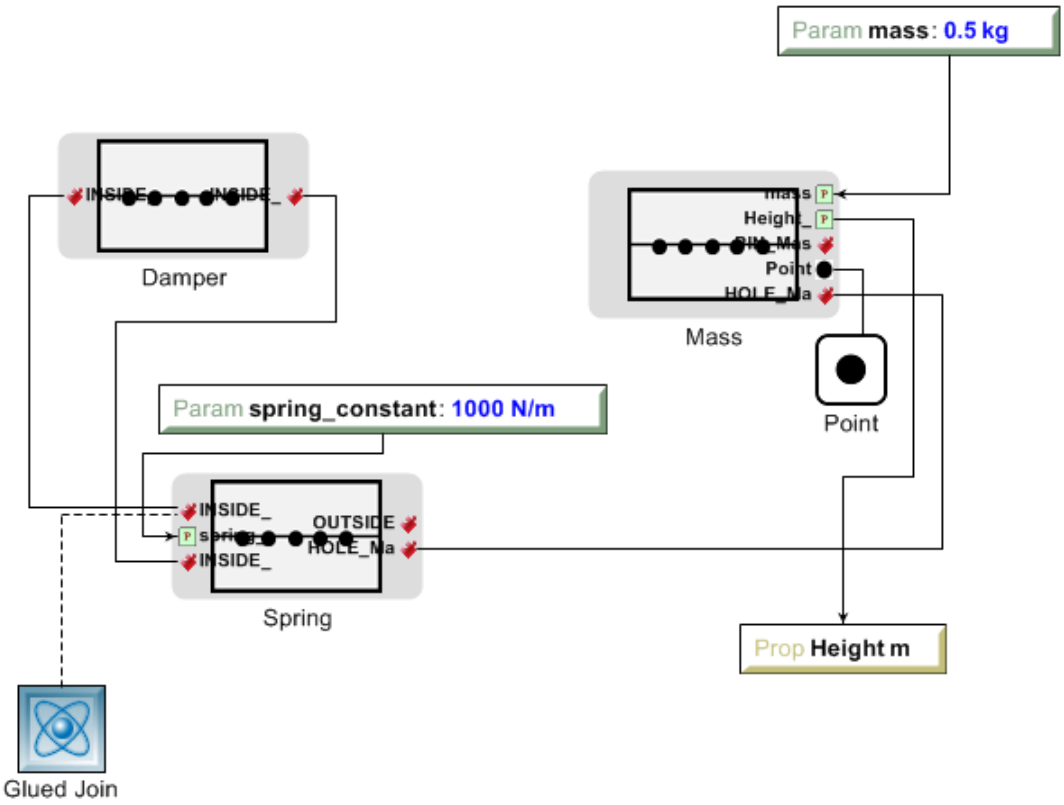

Figure 5: Glue Join in the design

Now enter connect mode, and click on the Glued Join object. Connect this to the Inside_Pin port on the spring design container. This connection will glue the damper and spring together because they have connectors that are connected together. Next, specify the amount and type of glue. Use the following parameter for the Glued Join Attributes:

- Override Semantic: Union
- Length: 12.5
- Length Unit: mm
- Volume: 5
- Volume Units: mL
- Material(Glue): Cyanoacrylate

The MSD system will now have the Outside_Pin of the Spring to the HOLE on the Mass and the INSIDE_PIN of the spring is now glued to the Threaded_Pin.

7.0 Mechanical Joins

Mechanical Joins are more complex than the other four kinds of joins which were shown here. Mechanical Joins are models which can contain information about fasteners with in them. This fastener information refers to other components, such as bolts, washers, and nuts for example. Other components can be used as appropriate for the design.

This information can be can be referenced in two different ways. First, you can add the fastener data to the join by bringing the appropriate component into the mechanical join. This object will be a type fastener. The information from the component fasteners will be pulled into the design when you run this design for manufacturing analysis. You will next need to specify the quantity required in the object inspector attributes. You can leave the AVMID field blank when using this method; the ID will be automatically pulled from the referenced component.

The second option for adding information to a join is to drag a fastener reference from the part browser and select it. In the object inspector, add the AVMID of the fastener you wish to use, and specify the quantity required. You can find the AVMID of a component on VehicleForge exchange or from the attributes of the components needed to represent the mechanical join. No additional information is required for this fastener.