Connectors

User Tutorial for Connectors

May 2, 2014

Institute for Software Integrated Systems
World-class, interdisciplinary research with global impact.

VANDERBILT
UNIVERSITY

1.0 Purpose

Connectors are the objects that are used to define the interaction between components. These interactions can be geometric connections, such as a bolt going into a hole. Connectors can also represent power transfers, such as heat flowing to the environment from an engine, torque transfer between a transmission and drive shaft, or electrical connections in from a battery to head lights. Connection types that require mechanical connections, such as torque transfers, can be represented with the same connector.

2.0 Procedures

2.1 Making Connections between Components

2.1.1 Enable Connect Mode

Once the three components are located inside of the Editing Area, the next step is to enable Connect Mode. Connect Mode can be enabled either by **pressing CTRL+2** or **selecting the button highlighted in Figure 1 on the left-hand tool bar**.

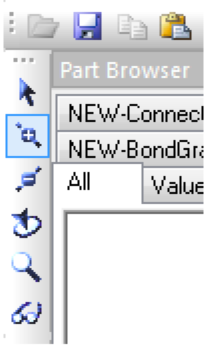


Figure 1: Connect Mode

2.1.2 Connecting Modeling Ports

After Connect Mode has been enabled, the components need to be connected to each other. First **click on the puzzle piece labeled Threaded_Pin on the damper component**, then **connect it to the puzzle piece labeled INSIDE_HOLE on the spring component**. This will create a connection between these two components, as shown in Figure 2. (Note that the ports on your component may be in a different order. This is only visual. Ensure that you connect correctly based on the port NAME.) If you accidentally select the wrong port, simply press Esc and the port will be deselected. **CTRL+3** enables Disconnect Mode and allows you to delete any previous connections.

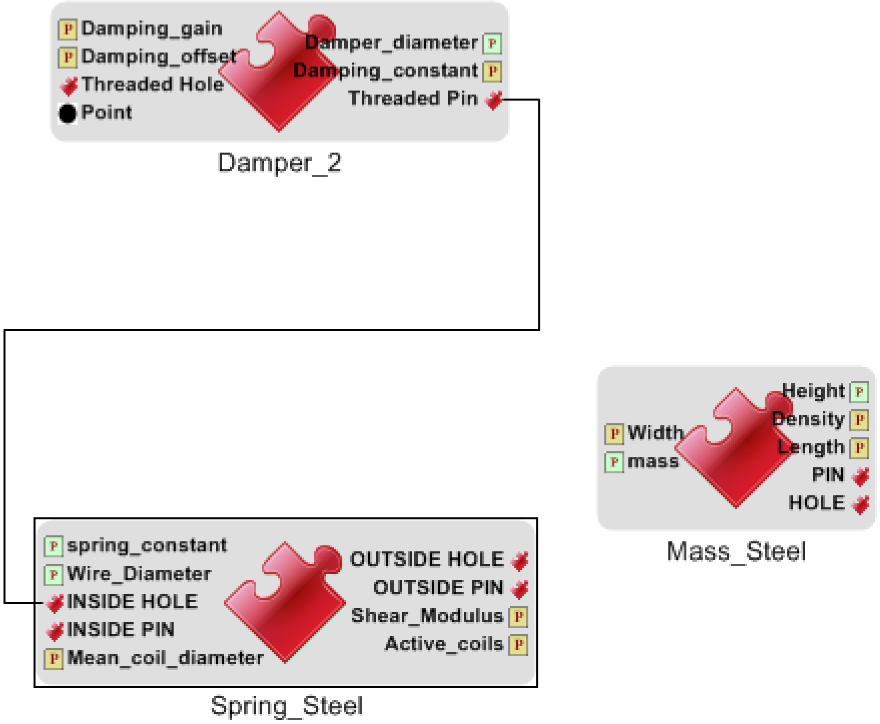


Figure 2: Connecting Ports

Next, **connect the following ports as shown in Figure 3.** OUTSIDE_PIN on the spring component should be connected to HOLE on the mass component, and Threaded_Hole on the damper to INSIDE_PIN on the spring.

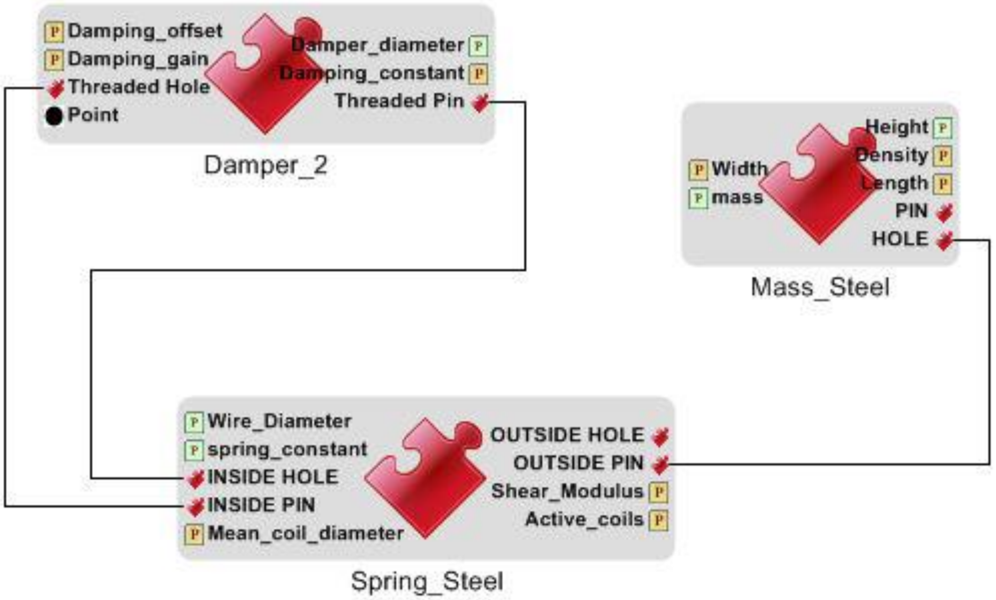
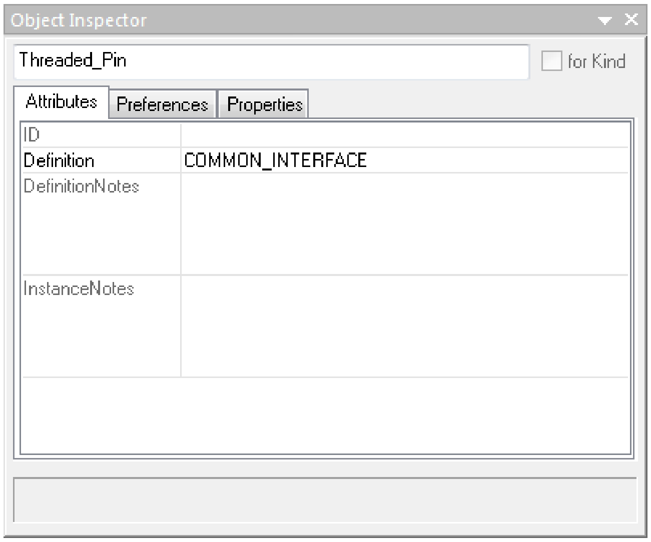


Figure 3: Connecting Interfaces between the Spring_Steel and Mass_Steel

3.0 Connector Attributes

Connectors have four (4) attributes in the object inspector: ID, Definition, Definition Notes, and Instance Notes.

- **ID:** This is a string input that can be used to create a unique ID for a connector. If any children of that connector are created, they will inherit this ID unless the child is modified.
- **Definition:** This label uses a string to define what kind of interface this connector represents, such as a universal join or a bolt. It is used by the CyPhy2CAD interpreter to determine if two connectors are of the same type before creating an assembly.
- **Definition Notes:** This field can be used to give more information about the definition of an interface.
- **Instance Notes:** This field can be used to give information specific to that instance of the connector.



Threaded_Pin

ID	
Definition	COMMON_INTERFACE
DefinitionNotes	
InstanceNotes	

Figure 4: Connector Attributes

3.1 Connector Object

A connector is an aggregate of all the objects within it to fully define that connection. Objects used to define these connections are any power or signal ports that relay information in dynamics simulations, datum with standard names that is used to define the structural interfaces between components, and default join data, which can optionally be used to define what type of join will be used in that connection absent any join information provided at the design level.

4.0 Connections between Connectors

For a connector to be fully compatible, three requirements must be met.

1. The definition of the connectors must be exactly the same. This requirement is for CAD only and will not affect dynamics simulations.
2. The datums in the connector must be of the same type (e.g. 2-surface 1-axis, coordinate system, 3 axis, 3 points, etc...), and the names must match exactly. Also, for any surface objects the Alignment attribute must match between with two connecting surfaces that have the same name. This requirement is for CAD only and will not affect dynamics simulations.
3. The connectors must have the same type of modelica connector that flow power between two connectors (e.g. TranslationalFlange, ElectricalPin, FluidPort) or must have an input/output signal relationship of the same signal type (e.g. RealInput/RealOutput, BooleanInput/BooleanOutput). This requirement is for the Modelica Interpreter only and will not affect CAD simulations.