

# Altair® HyperWorks®

2022.2

## Open the Part Browser

Use the Part Browser to create, organize and manage the CAE part structure/hierarchy.

From the Assembly ribbon, click the **Parts** tool.



Figure 1.

The Part Browser opens.

By default, the following attributes are listed as columns.

Add or remove columns by right-clicking on a column and checking/unchecking the appropriate attribute.

|                       |   |
|-----------------------|---|
| <b>Entity</b>         | List of the Model, Part Assemblies, Parts and Components. By default the browser is displayed in Hierarchical View.   |
| <b>Color</b>          | Displays the Component and Part entity colors.  |
| <b>UID</b>            | Displays the Part Assembly and Part Unique IDs.   |
| <b>Revision</b>       | Displays the Major revision, Study revision, and Library Part revision.   |
| <b>Representation</b> | Displays the in-session/loaded representation.  |
| <b>Active</b>         | Displays the Part entity active status.<br>For a full description of usage, refer to Manage Configurations.   |
| <b>CID</b>            | Displays the entity specific Component ID's. At the Part level it displays IDs for owned components. At Component level it shows the ID of components.                  |
| <b>PID</b>            | Displays the entity specific Property ID's. At the Part level it displays IDs for referenced properties. At Component level it shows the ID of the referenced property. |
| <b>MID</b>            | Displays the entity specific Material ID's. At the Part level it displays IDs for referenced materials. At Component level it shows the ID of the referenced material.  |
| <b>Material</b>       | Displays the material name.   |
| <b>Thickness</b>      | Displays the entity specific thickness. At the Part level it displays the thicknesses of the referenced properties. At Component level it shows the                     |

thickness of the referenced property.

PDM metadata captured upon the importation of a BOM via the Import dialog will also be listed as columns.  
PDM Property ID metadata.

**PDM PID**

**PDM MID**

**PDM Material**

**PDM Thickness**

**PDM MeshFlag**

**PDM Variant  
Condition**

**PDM Variant Scope**

PDM Material ID metadata.

PDM Material name metadata.

PDM Thickness metadata.

PDM Mesh metadata (not case sensitive).

If non-empty, displays the part that is used as a variant in one or multiple part configurations. It is user editable in the Entity Editor.

Along with the Variant Condition attribute, displays which part configurations the part belongs to as a variant. It is user editable in the Entity Editor.

## View Modes

Access different views to create and organize parts, and subsystem sets and configurations.

At the top of the Part Browser and Subsystem Browser, you can access different views used to create and organize parts, and subsystem sets and configurations.

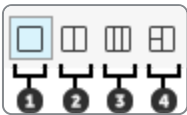


Figure 2.

- 1. Entity View. Displays a single view in the browser for parts or subsystems.
- 2. Set View. Splits the browser into two views: Entity View and Set View. In the Set View you can create, organize and manage part and subsystem sets.
- 3. Configuration View. Splits the browser into three vertical views: Configuration, Set and Entity View. In the Configuration view you can create, organize and manage configurations.
- 4. Configuration View, Split Left. Splits the browser into three views: Configuration, Set and Entity View. In the Configuration view you can create, organize and manage part configurations and subsystem configurations.

## Part View Modes

In Part view, you can change the display of entities in the browser using the predefined browser views.



Figure 3.

1. Hierarchical Part View. Displays all entities, including components, in a hierarchical view.

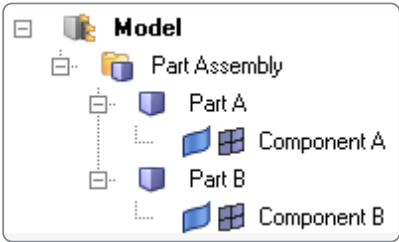


Figure 4.

2. Flat Part View. Displays all entities, with the exception of components, in a flat list. Part Assemblies and Parts are logically grouped into their own collectors.

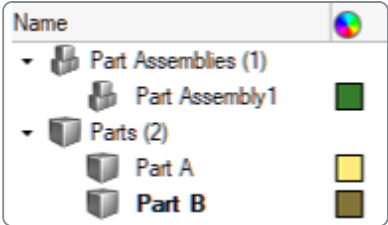


Figure 5.

For example, in Flat Part View, you can use the Query Builder to isolate part entities. In the example BOM shown above, setting the entity type filter to Part results in the following view.

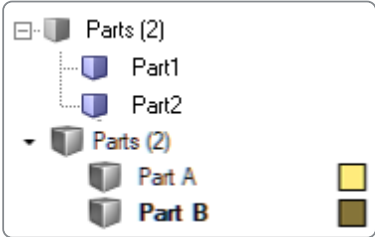


Figure 6.

# Entity Editor

Edit part and component attributes in the Entity Editor.

Edits can be made for a single part or component or multiple parts and components. If a component is selected, the Entity Editor displays component specific attributes.

The attributes available in the Entity Editor vary based on the entity type selected.

## Part/Part Assembly

### General Data

Displays attributes that are unique to the part or assembly, including part/assembly name, Unique ID (UID), color, and include file, and Revision data.

Parts and part assemblies require a unique name and a unique identifier (UID), both of which can contain alphanumeric characters. The UID is an optional field that is utilized in part representation management and import model entity management. For example, when merging a component with a part (module), the two entities will be matched using the UID if it exists. If a UID does not exist, merging will be based on the part name.

## Representations Data

Displays attributes that are specific to a part representation, such as representation name, file location, property ID, material ID/name, and thickness. These attributes are non-editable at the part level.

## Position Data

Displays the 4 x 3 transformation matrix of a part, namely its translation, rotation, and scaling. These attributes are non-editable.

## Library Data

Displays the Major, Study, and Library revisions of the representations. The comment saved along with the representation is displayed here.

## PDM Data

Displays PDM attributes that were parsed as metadata during the BOM importation, such as PDM ID, PDM Revision, PDM Variant Condition and PDM Variant Scope. This information, namely the PDM PID, PDM MID, PDM Material and PDM Thickness, is used to generate the initial component, property, and material cards upon creation of the common representation. These attributes can be used to cross-reference common and discipline specific mesh representation attributes.

## Part Set

### General Data

Displays attributes that are unique to the part set, including part/assembly name and ID.

### Part Assemblies / Parts Data

Displays the number of parts organized into the selected part set. Click the Part Assemblies/Part field to select parts and part assemblies to organize into the selected part set. Select entities in the **Select Part Assemblies/Parts** dialog, or from the graphics area when the Parts selector is enabled.

### Part Sets Data

Displays the number part sets organized into the selected part set. Click the Part Sets field to select part sets to organize into the selected part set. Select entities in the **Select Part Sets** dialog, or from the graphics area when the Partsets selector is enabled.

## Configuration

### General Data

Displays attributes that are unique to the configuration, including name, and ID.

### Parts Assemblies / Parts Data

Displays the number of parts organized into the selected configuration. Click the Part Assemblies/Part field to select parts and part assemblies to organize into the selected configuration. Select entities in the **Select Part**

|                            |  |
|----------------------------|--|
|                            | <b>Assemblies/Parts</b> dialog, or from the graphics area when the Parts selector is enabled.  |
| <b>Configurations Data</b> | <p>Displays the number of configurations organized into the selected configuration.</p> <p>Click the Configurations field to select other configurations to organize into the selected configuration. Select entities in the <b>Select Configurations</b> dialog, or from the graphics area when the Configurations selector is enabled.</p> |
| <b>Part Sets Data</b>      | <p>Displays the number part sets organized into the selected configuration.</p> <p>Click the Part Sets field to select part sets to organize into the selected configuration. Select entities in the Select Part Sets dialog, or from the graphics area when the Partsets selector is enabled.</p>   |
| <b>Active</b>              | Indicates the active/inactive state of the selected configuration. This attribute is non-editable. To activate a configuration, enable the configuration's associated checkbox in the Active column of the Configuration view.   |

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## Workflow Batch

The Part Browser can be used to batch the model build workflow.

### Model Build Workflow

The model build workflow includes the following:

- Importing BOM files (PLMXML, UDMXML or CAD BOM)
- Creating multiple representations
- Exporting UDMXML, delta PLMXML files, or Vizmockup PLMXML files (for PDtek use cases)
- Saving the monolithic HyperMesh binary on export
- Saving the representations to the connected part library
- Syncing metadata on export BOM

### Create the Batch File

In this task you will create the model build batch file.

1. Using any text editor, copy the following content into the text editor and name it, Model\_build.bat.

```

REM Altair HyperMesh v2020
REM Copyright (C)1990-2018 - Altair Engineering, Inc. All Rights Reserved.
REM Contains trade secrets of Altair Engineering, Inc. Copyright notice does not imply publication.
REM Decompilation or disassembly of this software is strictly prohibited.

CLS
@ECHO OFF
pushd %~dp0
set curr_dir=%~dp0

REM Set below 4 Variables
set ALTAIR_LICENSE_PATH=<License_File_Path>
set input_plxml="%curr_dir%input_plxml.xml"
set output_plxml="%curr_dir%output_plxml.xml"
set rep_create={{Crash 5mm} {Crash 10mm}}
set Install_Path=C:\Program Files\Altair\2020.0\hwdesktop\hm

REM Do not change below this line
set Log_File_name=log_%RANDOM%.log
set log_file_path="%curr_dir%Log_File_name%"

set batch_exe_path="%Install_Path%\hwdesktop\hm\bin\win64\hmbatch.exe"
set batch_tcl_path="%Install_Path%\hwdesktop\hm\scripts\br\views\modules\batch\script.tcl"
ECHO .
ECHO
#####
#####
ECHO      #                                     #
ECHO      #                               Altair HyperMesh v2019                       #
#
ECHO      # Copyright (C)1990-2018 - Altair Engineering, Inc. All Rights Reserved.      #
ECHO      # Contains trade secrets of Altair Engineering, Inc. Copyright notice does not imply publication. #
ECHO      # Decompilation or disassembly of this software is strictly prohibited.      #

```

2. On the line that reads, set ALTAIR\_LICENSE\_PATH=<License\_File\_Path>, type in the appropriate license path.
3. On the line that reads, set input\_plxml="%curr\_dir%input\_plxml.xml", type in the appropriate BOM file (PLMXML file) name and path.
4. On the line that reads, set output\_plxml="%curr\_dir%output\_plxml.xml", type in the appropriate output PLMXML name and path.
5. On the line that reads, set rep\_create={{Crash 5mm} {Crash 10mm}}, specify the representations to create.
6. On the line that reads, set Install\_Path=C:\Program Files\Altair\2019.0\hwdesktop\hm, point to the HyperMesh install path.

**Note:** Only HyperMesh 2019 and later is supported. For version 2020 onward, the directory structure is changed for hmbatch.exe.

7. Save the batch file.
8. Run the batch file from the command prompt.

**Note:** After the batch file is executed, it will start HyperMesh in batch mode and create the representations as specified. You will not see the GUI during this process.

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## Solver Specific Details

### Abaqus

The complete set-up of Abaqus parts and instances format input files is supported.

Primary use cases:

1. Import of a CAD geometry
2. Import of an Abaqus parts and instances format input file

### Import of a CAD Geometry

#### Preference setting

Upon opening HyperWorks, you can set the user profile to Abaqus Standard2D/Standard3D/Explicit via **File** > (and then) **Solver Interface**. Further, click **Preferences** in the File menu and check the **Part ID Management** option, as shown below.

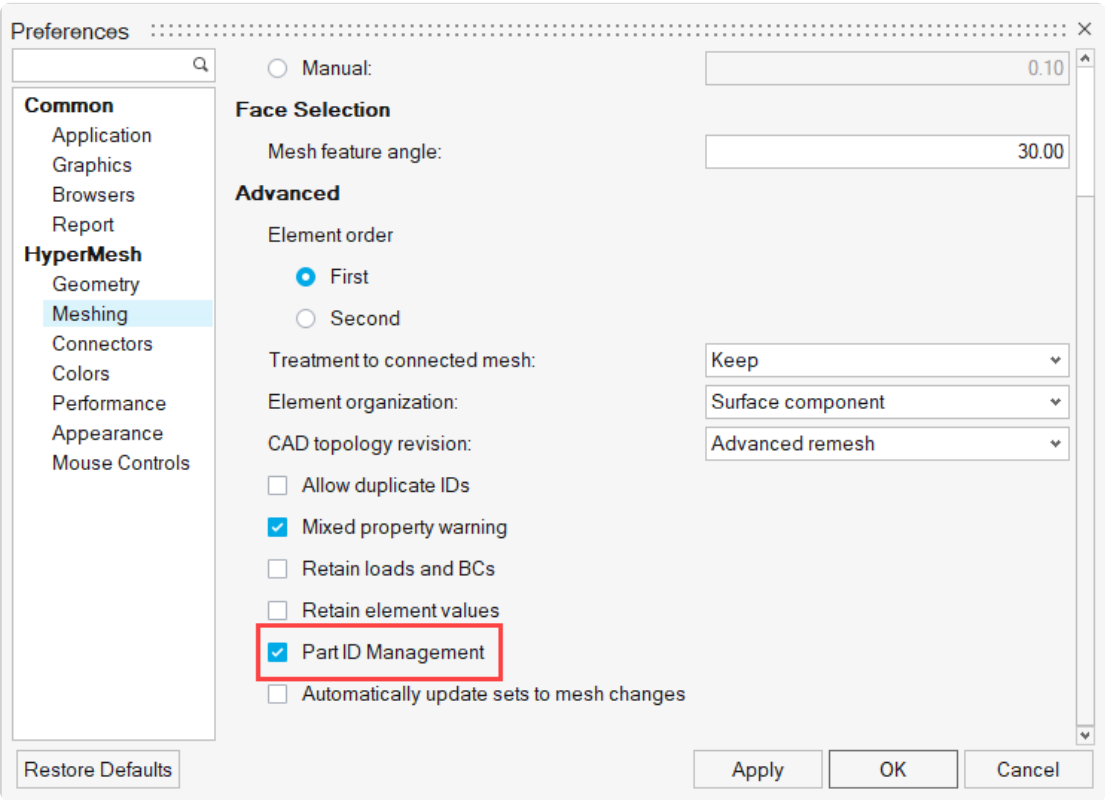


Figure 7.

In classic HyperWorks, the same preference option is available from the Tools pull-down menu when the user profile is set to Abaqus.

Importing the CAD geometry and viewing in Part Browser

Upon importing the CAD geometry with the Part ID Management preference setting checked, you can open the Part Browser to view the part and instance hierarchy.

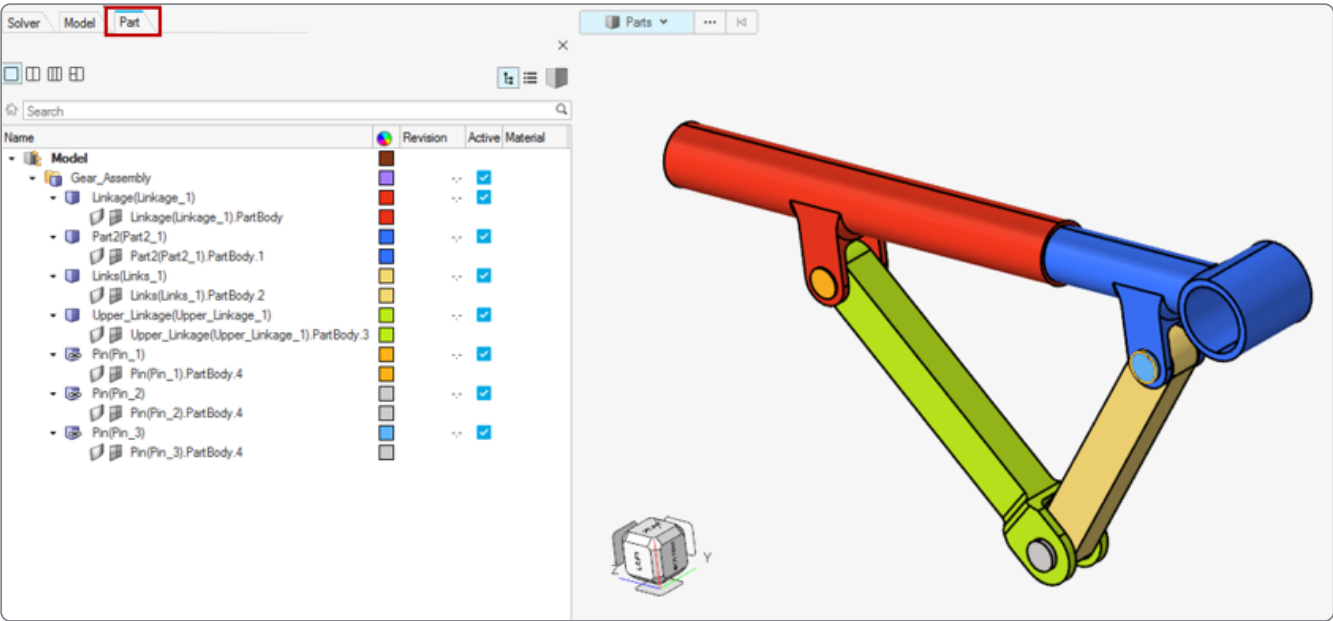


Figure 8.



Any instanced part from the CAD geometry is recognized as an Abaqus instanced part. The Part Browser is available in classic HyperWorks via **View** > (and then) **Browsers** > (and then) **HyperMesh** > (and then) **Part**.

### Meshing Abaqus parts and instance format geometry

Meshing parts individually is always recommended. When there are multiple instances of the same part, it is crucial to mesh the first instance of the part and synchronize the mesh to other parts. It is always important to ensure that the part geometry that is meshed has the mesh stored in its original component.

The screenshot shows the 'Options' dialog box in HyperMesh. The 'Element size definition' is set to 'Average' with an 'Average size' of 25.00. The 'Element order' is set to 'First'. The 'Retain existing surface mesh' checkbox is checked. The 'Curvature based refinement' checkbox is unchecked, with 'Minimum size factor' at 0.10 and 'Feature angle' at 30.00. The 'Growth rate' is 1.30. The 'Layered tetra' checkbox is checked, with 'Number of layers' set to 2. The 'Fix invalid surface mesh' checkbox is checked. The 'Quality control criteria' is set to 'Tetra collapse' with a 'Tetra collapse >' value of 0.10. Under the 'Advanced' section, the 'Fill voids' checkbox is checked, 'Fix mid-nodes for second order mesh' is unchecked, 'Quality' is set to 'Optimize Quality', and 'Meshing method' is 'Delaunay'. The 'Mesh destination' dropdown is highlighted with a red box and set to 'Original component'. The 'Restrict minimum size' checkbox is unchecked, with a 'Minimum size' of 2.00.

Figure 9.

Once the first instance of a part is meshed, a right-click option to synchronize the mesh with other instances of the same part is available in the Part Browser.

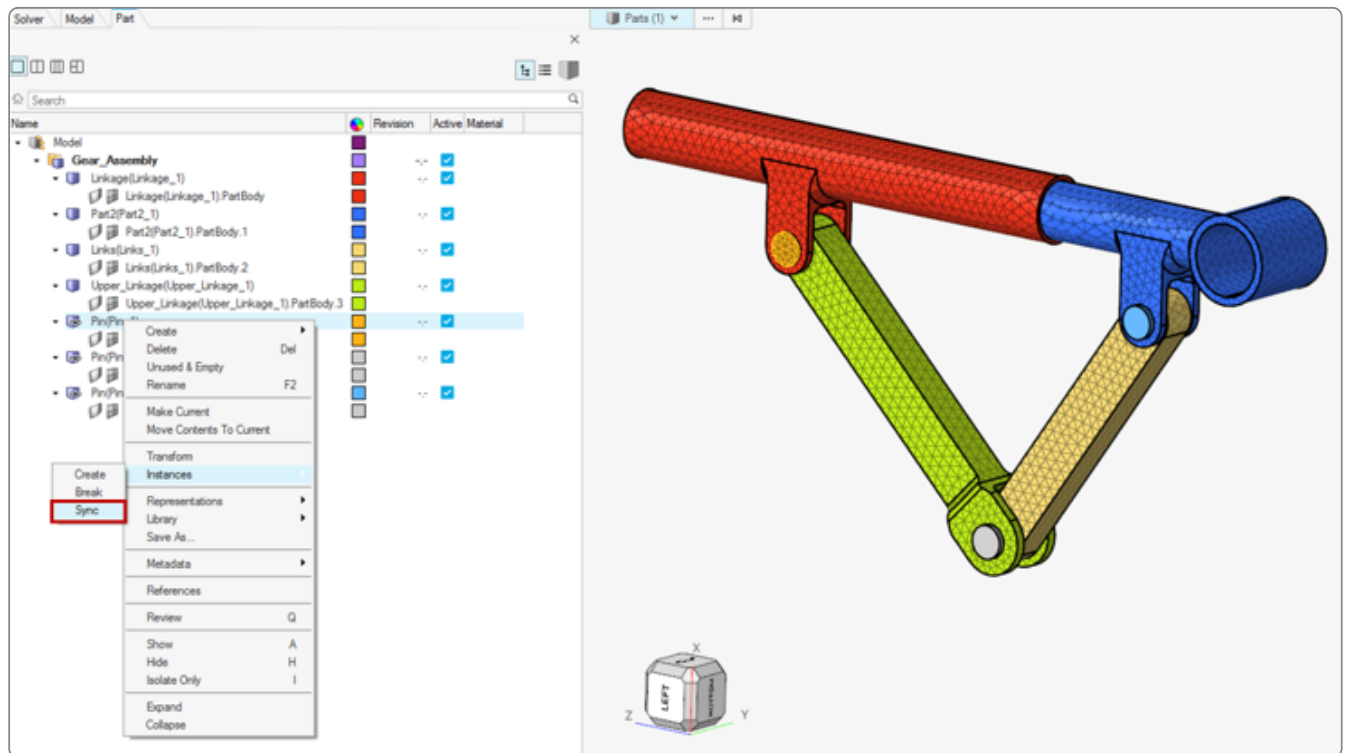


Figure 10.

In HyperWorks classic, mesh generation should be used with “Elements to Surf/Solid Comp”.

## Material

Materials can be created in the Model Browser.

## Part content (Property, Sets, Surfaces, System, and so on)

A double-click on any instance in the Part Browser will take it to an isolated part edit mode. Here, you can set up all the part content, such as a property with a material orientation system, sets, and surfaces that can be contained within a part. If the part has multiple instances in the model assembly, upon exiting the part edit mode, the changes and additions are automatically synchronized with other instances of the same part.

It is only in this location that any part related content mentioned above can be added in HyperWorks. A right-click on the part in this mode will allow the creation of a property and other part contained entities. Switching back to a hierarchical part view or flat part view will automatically synchronize the changes with other instances of the same part.

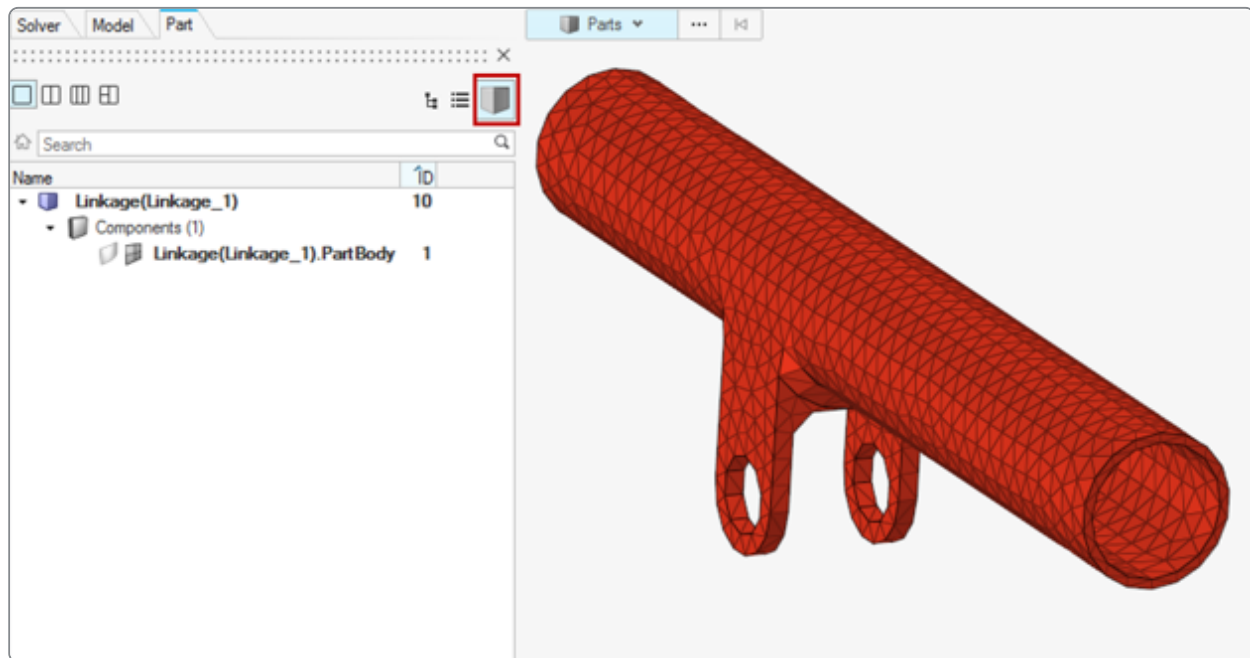


Figure 11.

If a part needs to split from other instances, a right-click on the part in the Part Browser will allow you to break the part from other instances.

### Assembly and Root model content

A right-click on Model allows a selection option to make the root model current. With the root model set as current, any surface, set, contact/tie, boundary conditions created using the Model Browser, panel, or any specific workflow tools like the Contact Browser creates entities in Assembly (outside of instances) or at root model (outside of Assembly) where it is relevant for the entity to remain.

### Analysis setup

All the analysis conditions are a part of model level data (after \*END ASSEMBLY). The corresponding model is set as current. Further, loads and boundary conditions can be created through panels with a load collector created for their use in the Model Browser. The Contact Browser is available to set up contact/tie between mating parts or components. Tie constraints created using the Contact Browser ensure that the keyword is placed at the Assembly level, as per the solver requirement. The analysis step can be defined using the loadstep manager. All these entities can also be created through the Model Browser or Solver Browser.

Similarly, all other entities, such as output blocks and group entities like control cards, model change, contact interference, and so on can be created in the Model Browser or Solver Browser and can be appropriately chosen for a defined loadstep.

### Export

Exporting a solver input file with Parts and Instances format requires activating a checkbox in the solver export options, as shown below.

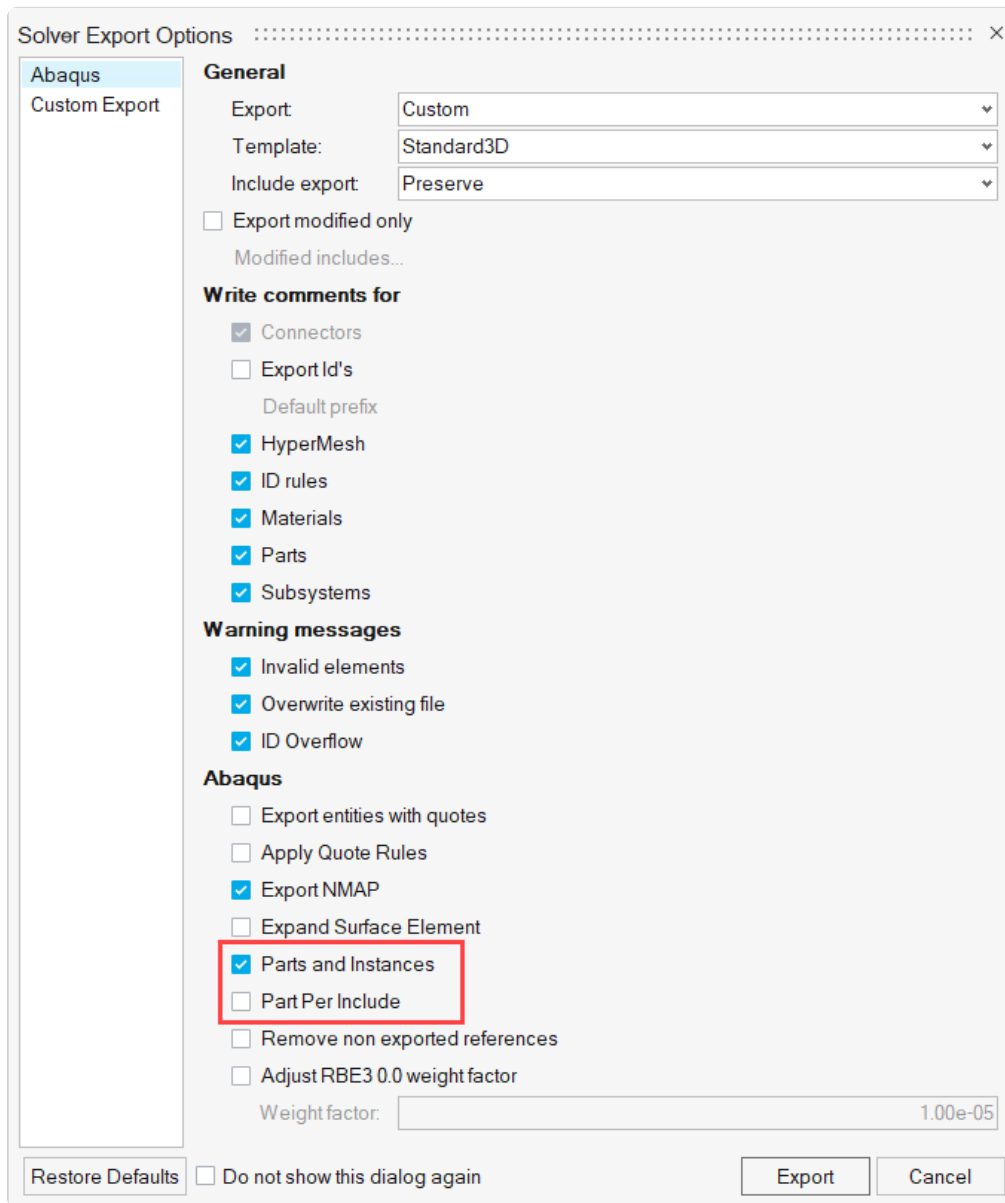


Figure 12.

If the Parts and Instances option is not turned on for export, HyperMesh will export a flat format Abaqus input file. Additionally, you have an option to push each part to a separate include file while exporting.

### Import of an Abaqus parts and instances format input file

Unlike CAD geometry, an Abaqus parts and instances format input file can be directly imported using the solver import options. There is no need to turn on the Part ID management. Further set-up of any analysis conditions can be defined using the options discussed above.

### Limitations and Restrictions

- Entities defined at the instance level are not supported.
- Does not support the creation or export of new include files. Include files from the imported input file are preserved and cannot be modified.

- Analysis set-up is restricted to the following:
  - Entities such as sets and surfaces cannot be created or edited in an instance. The same entities can be created at the assembly or part level.
  - It is highly recommended not to use panels for any set-up except for loads and boundary conditions.