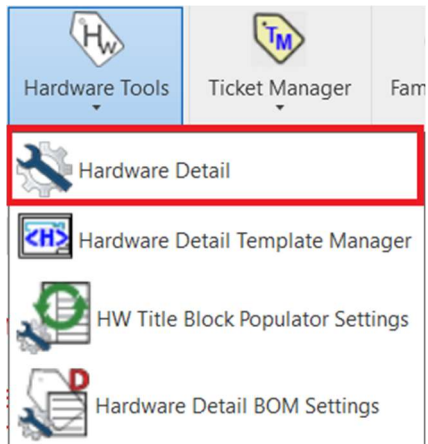


# Hardware Detail: Hardware Detail Tool

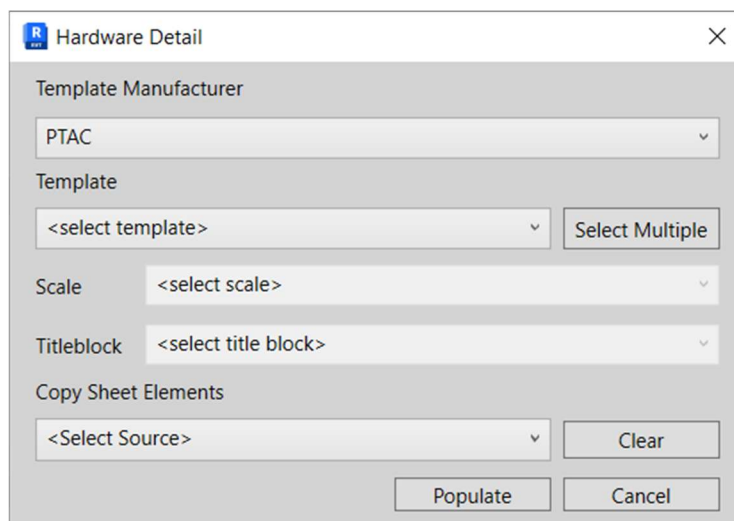


## **Programmed Result of Tool:**

The Hardware Detail tool is meant to allow the user to easily create hardware details with EDGE in the same way they can create shop tickets. This tool will generate a hardware detail sheet based on a created template associated with a hardware detail assembly created by the tool, and it will generate appropriate views, dimensions, callouts, schedules, and legends.

## **Steps to Perform Tool Operation:**

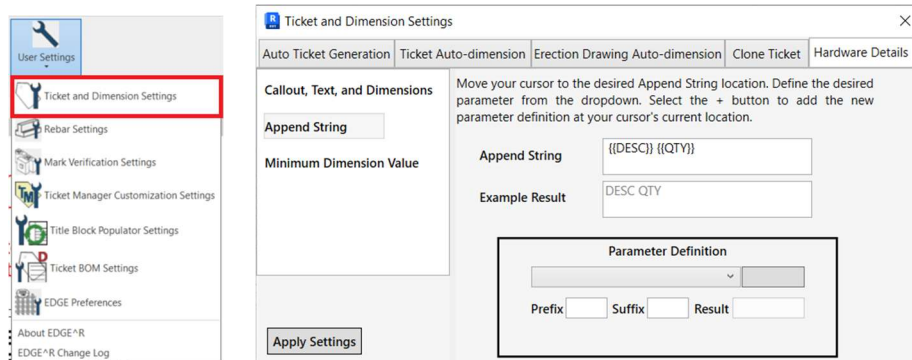
1. Select the elements and/or hardware detail assemblies for which to create a hardware detail. If only assemblies are selected, an option to only update the title block of the hardware details associated with selected assemblies will appear.
2. If there are already hardware details created for the selected element's control mark (a hardware detail exists named "\_HWD-x" where x is the control mark) the tool will ask to delete the existing assembly and associated hardware detail to continue.
3. Select a template or templates to create the hardware detail from. Sheets will be created in the order that the templates are listed for the multi-selection workflow.
4. (OPTIONAL) Select a source assembly sheet to copy its legends and annotations onto the hardware detail being created.
5. The created hardware detail sheets and views will have dimensions for those elements with hardware detail dim lines present in the family. Callouts will be generated for elements and sub-elements in the hardware detail assembly.



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## Customization:

The results of the Hardware Detail tool can be customized using the Ticket and Dimension Settings under the User Settings tab.



- Callouts, Dimensions, and Text
  - From the dropdowns, select which families to use for callouts, the dimension style for overall dimensions, the dimension style for general dimensions, and the append string text style. Check whether to apply Equality Formula to dimensions if appropriate.
- Append String
  - This tab allows you to build what the append string should look like for dimension strings placed by this tool.
    - Place your cursor at the desired location in the Append String field.
    - From the dropdown, select which parameter to add to the append string.
    - You can add prefixes and suffixes for the quantity, description, and location in form parameters in an append string.
      - The Result field will display what the selected parameter with its prefixes/suffixes looks like.
    - Selecting the + button will add the current parameter with its prefixes/suffixes to the cursor's current location in the Append String field.
    - The Example Result field displays what the append string would look like next to a dimension string.
    - If an element doesn't have a location in form parameter, then the LIF Parameter Definition does not apply and will not be included in the real append string.
- Minimum Dimension Value
  - Set the minimum spacing in feet and/or inches between like elements in a single dimension string. Any elements with spacing less than the defined minimum will be omitted from inclusion in the dimension string. These elements would still count toward the assigned Quantity value in the append string if Quantity was included.

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## Dimensions:

- The tool will place dimensions for elements with hardware detail dim lines present.
- The dimensions created will reference the hardware detail dim lines that are perpendicular to the dimension line.
- Hardware detail dim lines are model lines added in the family editor with a subcategory set to HWDBoundLine [projected] or HWDDimLine [projected].
- HWDBoundLine dim lines that are present in the family will be used to set overall bound dimensions and will be referenced to in every dimension created by the tool. HWDBoundLine dim lines in any nested families will not be referenced.
- HWDDimLines within the assembly's member elements and nested elements will be referenced by the created dimensions. The tool will sort HWDDimLines in groups based on their family's control mark. If control mark is not present the tool will use the family's name. A dimension will be created for each grouping.

## Callouts:

- The Hardware Detail tool will group all visible nested elements within the family.
- The tool will group the elements by control mark or family name if there is not a valid control mark and will only callout one from each group.

## Workflows:

- Select elements and assemblies to create hardware details for.
  - If a generic model or specialty equipment with a valid control mark that does not have an existing hardware detail created for it (based on control mark value and assembly names) is selected, the tool will proceed to the main window to select templates.
  - If a generic model or specialty equipment with a valid control mark that does have an existing hardware detail created for it (based off control mark value and assembly names) is selected, the tool will display a warning message asking to delete existing hardware detail and assembly associated with it before continuing to the main window to select templates.
  - If a hardware detail assembly or a generic model or specialty equipment element that is a member of an existing hardware detail assembly that also has a control mark value matching the hardware detail assemblies' name is selected, the tool will ask to update title block populator parameter values (set with HW Title Block Settings) or to continue creating new hardware details. If the user selected to create new hardware details the tool will delete any current hardware details but will not create a new hardware detail assembly.
- The user will then select the template(s) to base the hardware detail on and click populate to create hardware details.

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## Hardware Detail Assemblies and Parameters:

With this tool, a new shared parameter called `HARDWARE_DETAIL` has been added to generic models, specialty equipment, assemblies, and views. Another shared parameter called `DO_NOT_SCHEDULE` has been added to assemblies, generic models, and specialty equipment. By running Project Shared Parameters, the tool will add these parameters to the project and attempt to update any view templates whose name does not start with “\_HWD-“. It will add a filter to view templates so that elements and assemblies with a `HARDWARE_DETAIL` parameter value of “yes” are not visible. Any view templates created to be used with hardware details should start with “\_HWD-“. Project Shared Parameters will also add a filter to all schedules that have a `HARDWARE_DETAIL` parameter value that is not “yes” so that they will not include any elements with a parameter value for the `DO_NOT_SCHEDULE` parameter set to yes. Other EDGE tools have also been updated to ignore hardware detail elements and assemblies denoted by the `HARDWARE_DETAIL` parameter. The result is that all hardware details will be associated to real elements in the model, but those elements will not interfere with the actual project.

The Hardware Detail tool will duplicate selected elements 1000 feet below the lowest defined level and create an assembly. The tool will also update the parameters described above when creating these elements and assemblies so that they do not appear in views and schedules or interfere with other EDGE tools. The tool will also copy shared instance parameters to the duplicate element except for project parameters. All assemblies created by the tool will be named “\_HWD-x” with *x* being the control mark of the selected element.

## Update Title Block:

This Hardware Detail tool will update sheet parameters with values from the hardware detail assembly using the HW Title Block Populator Settings when creating a hardware detail or updating an existing one as described above. The tool will calculate the weight of the hardware detail assembly members combined to populate the `TKT_HW_WEIGHT` sheet parameter. The tool will also calculate the weight of the individual nested families and write the value to the `HW_COMPONENT_WEIGHT` parameter on the element itself so that it can appear in schedules. The weight is calculated by multiplying the density of the element’s material by the volume of that material in the element (The tool uses the density under the physical header not the thermal header in the material settings). If the element does not have a material applied to it or the material does not have a valid density value, the tool will use the `WEIGHT_PER_UNIT` parameter value times the volume of the element. If unable to obtain the density or `WEIGHT_PER_UNIT` parameter value, the tool will not calculate the weight of that element. If any elements have nested families that are shared the weight calculated for `HW_COMPONENT_WEIGHT` will not account for the shared nested family. The shared nested family will have its weight calculated separately and it will be reported to its own `HW_COMPONENT_WEIGHT` parameter.

# Hardware Detail: Hardware Detail Tool

## Known Limitations:

- Selected elements must be a generic model or specialty equipment element and have a valid control mark parameter value.
- Selected assemblies must have a yes value for their HARDWARE\_DETAIL parameter value and their name must start with “\_HWD-”.
- View placement on sheets can be incorrect due to sizing and shape of the views (usually due to annotations and section cuts)
- If the default dimension styles or callout family does not exist in the project, then the last used dimension style and/or callout family will be utilized by Auto Ticket Generation.