

HVAC for MicroStation Triforma - Dynamic, Smart, and Accurate

HVAC for MicroStation Triforma (HTF) is an intelligent 3D modeling tool for duct design and equipment layout. I have had several opportunities over the past six months to teach HTF to HVAC designers, and my students agree the most interesting feature of HTF is its ability to develop a 3D model while creating a 2D plan of the duct system.

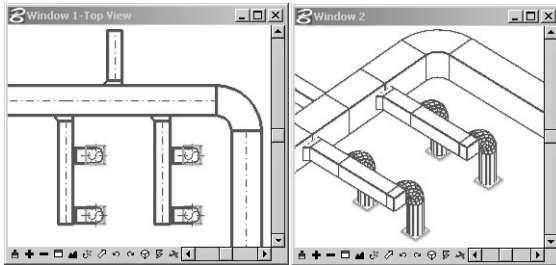


Figure 1: Draw Plan and 3D Model is Created Automatically

Architects and Engineers often ask me whether they should use intelligent 3D design tools. Of course there is no simple answer since it depends on the type of work being performed. Some questions you might ask however, include, “Is the work design or production oriented? Are you designing commercial or industrial projects? Is your firm involved in construction management?”

Maybe the question shouldn't be, “Should I use 3D” but “Should I create intelligent designs?” All CAD files contain some degree of non-graphic intelligence. The length of a line, and the diameter of a circle are examples of non-graphic information stored within a CAD file. What we need in building design though is the ability to track a higher level of information. We need to know wall volumes, and duct quantities. Consolidating your design decisions and linking or storing them within the design file may actually be more important than 3D modeling.

“But 3D is important, right?” Yes, three-dimensional models enhance design conceptualization, they improve the communication of the design between the consultant and the owner, and 3D models are necessary for construction staging and clash resolution.

Maybe you are an HVAC designer who is transitioning from 2D to 3D. If you want 2D only, just turn off the 3D model option. If you need 3D then turn it back on. In such cases HVAC for MicroStation Triforma's ability to draw 3D components automatically is an interesting solution to the 2D versus 3D question.



Figure 2: Turn the Modeling Option Off

So with HTF, if you can create a 2D plan then you already know how to create a 3D model.

Smart Data

Like primitive MicroStation elements, when you add an HTF component to your design file you add essential non-graphic data. HTF adds smart data such as shape, dimensions, and duct material. HTF provides three great tools to edit and extract component data. Two tools are provided for editing.

The first is Edit Component. The command acts on a single HTF element the same way a MicroStation modify command, such as Change Element Attributes.



Figure 3: Edit Component

When you select the command you are prompted to select a component. Depending on the component that you select a corresponding dialog displays. Figure 4 shows what happens when a duct route is selected, the “Edit Duct” dialog displays. Further, fittings, devices, flex duct also have edit component dialogs with different attribute settings corresponding to the type of data stored on each of these components.

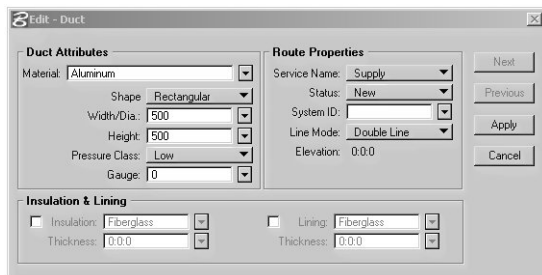


Figure 4: Edit Duct Dialog

The second Edit command allows you to edit non-graphics data globally. To select the elements, use a fence or selection set. Next, select the Edit Component Group command.



Figure 5: Edit Component Group

In this case the components are already selected, and you have probably selected different types of components. So HTF asks that you “filter” the components that need to be edited. This is an important step, because if more than one component type is selected HTF needs to determine which attributes are common among each of the component types. You are then allowed to only edit these common attributes.

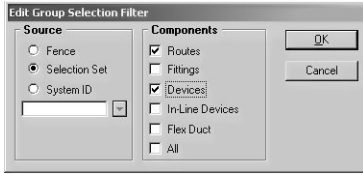


Figure 6: Component Filter

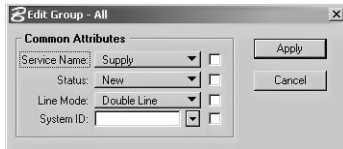


Figure 7: Common Attributes

For example, if I were to select both Routes and Devices, I am only allowed to change the Service, Status, Line Mode, and System ID. If however, I had decided to only modify duct routes I am presented with an Edit Duct dialog with all duct attributes similar in form to that in Figure 4.

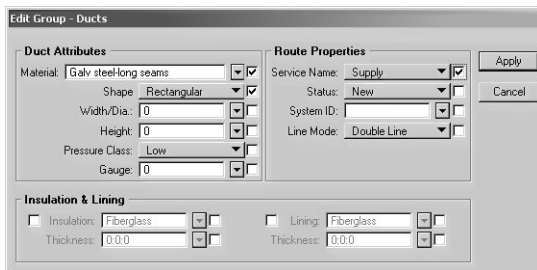


Figure 8: Edit Group – Ducts

The dialog in Figure 8 is almost the same as the dialog in Figure 4. The difference is the check box next to each attribute. The check box must be checked to make the attribute change.

To complete the series of smart data commands HTF has a Data Extraction tool. This command allows you to automatically build comma-separated files for duct, fittings, in-line devices, and standard devices. All attributes are included. The resulting “csv” files are easily imported to spreadsheets and databases.

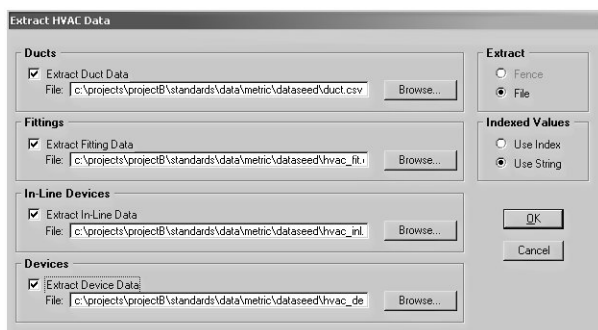


Figure 9: Extract Data

The ability to modify non-graphic design data allows HVAC designers to add design decisions directly to the graphic data. The data can be as simple as a cross reference to a specification, or a complex equipment definition indicating vendor, model number, and system ID.

HTF designers are familiar with these features already. But HTF experts, did you know that AccuDraw is fully integrated into HTF? Here is a sophisticated example that you might appreciate the next time you need to route duct along walls placed at an angle.

Routing Offset from an Angled Wall

What happens when a wall is drawn at an angle? How would you route the duct? Here is a procedure, using AccuDraw that allows you to continue the route path without having to stop to measure the angle of the wall.

First, start the route duct command. Snap to the inside bottom edge of the wall. Accept the point with a data point. AccuDraw is oriented to the view, so the compass is not rotated the way it needs to be rotated.

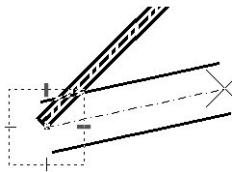


Figure 10: Snap to the end of the wall.

To match the orientation of the wall we need to define and save an auxiliary coordinate system for the wall. Type **RA** for rotate ACS and set the ACS to match the angle of the wall. Snap to a known point (in this case the midpoint of the wall) to activate the rotate to ACS compass feature.

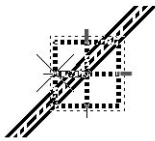


Figure 11: Snap to the midpoint of the wall.

Orient the x-axis of the ACS by snapping to a point on the wall that runs through the snap point.

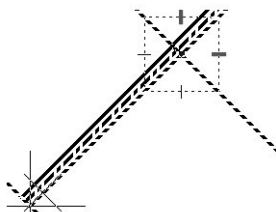


Figure 12: Orient the X-Axis

Orient the y-axis by identifying a point on the wall that is perpendicular to and runs through the last point identified.

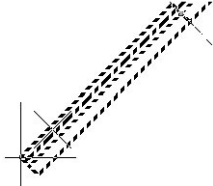


Figure 13: Orient the Y-Axis

Having accepted the last point the compass is rotated but the start point of the duct is not in the correct location.

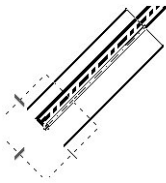


Figure 14: Last Point Accepted

To save the ACS, type **WA** for “Write ACS”. Give it a name. I will use the name MARK.



Figure 15: Save the ACS

Next, snap to the bottom inside edge of the wall. You will need to reset to suspend the place duct command.

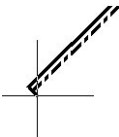


Figure 16: Snap To the Wall

Type **O** for origin and offset 1m from the wall. Notice that the compass rotates back to top. Upon accepting this point the route duct command starts again and the compass resets to top view (this is why we saved the ACS).



Figure 17: Offset 1m from Wall

Type **GA** for “Get ACS”. Type in the name of the ACS you want to get, the last one you typed (MARK) will still be in the text field, so click OK. The AccuDraw compass rotates to the ACS of the wall.

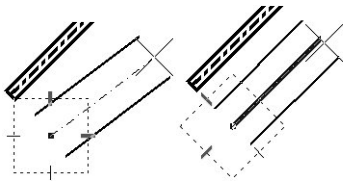


Figure 18: Get ACS

Now, draw your duct.

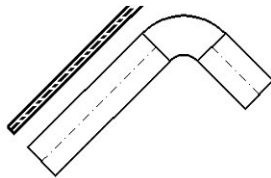


Figure 19: Draw Duct Aligned to Wall

HVAC for MicroStation Triforma is a dynamic, smart, and accurate application. You're not sure if you're ready for 3D? HTF is an excellent 2D to 3D transition tool. Your HVAC designers can continue to draw in 2D while learning 3D. Features like AccuDraw improve 2D production, and HTF intelligent data is extractable and easily edited. Are you ready now?