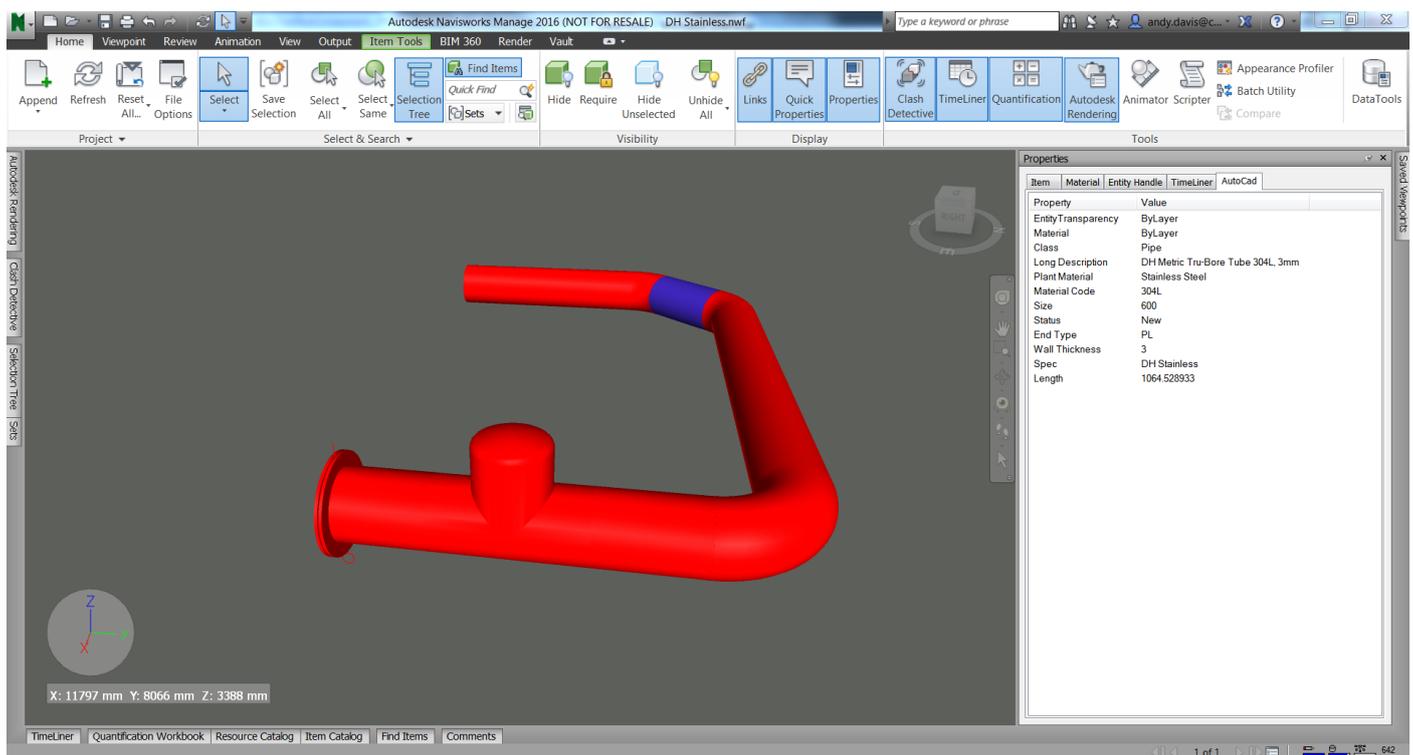


View Plant 3D User Properties in Navisworks

Autodesk AutoCAD Plant 3D and Navisworks Simulate 2016

When you append a Plant 3D model into Navisworks, you can view the properties of the AutoCAD Plant 3D entities on the AutoCad tab of the Navisworks Properties window.



You need to have the AutoCAD Plant 3D Object Enabler installed to be able to do this. However, the object enabler provides a fixed set of properties for Navisworks that is not user definable. Thus, if you have defined your own user properties in your Plant 3D project, or wish to view other properties that the object enabler does not provide, these will not be displayed on the AutoCad tab of the Navisworks Properties window.

So, how can you view other Plant 3D properties in Navisworks?

Navisworks DataTools

Navisworks has a function called DataTools. DataTools provide a means by which you can connect a Navisworks model to an external database and create links between objects in Navisworks to fields in the database tables to view extra properties. The additional properties are displayed on new link specific tabs in the Navisworks Properties window.

Data linked through a database connection can also be embedded as static data within a published NWD file.

We can use the DataTools functionality to create a link between our Navisworks model and our Plant 3D project database.

Any database with a suitable ODBC driver is supported, but the properties for the objects in the model must include unique identifiers to the data in the database. For example, for AutoCAD-based files, entity handles can be used.

Database links can be saved inside Autodesk Navisworks files (NWF and NWD). You manage these links on the DataTools tab of the File Options window.

You can also save database links globally, making them persistent across all Autodesk Navisworks sessions. The global connection information is saved on the local machine. You manage global links in the DataTools window which is accessed from the Home ribbon.

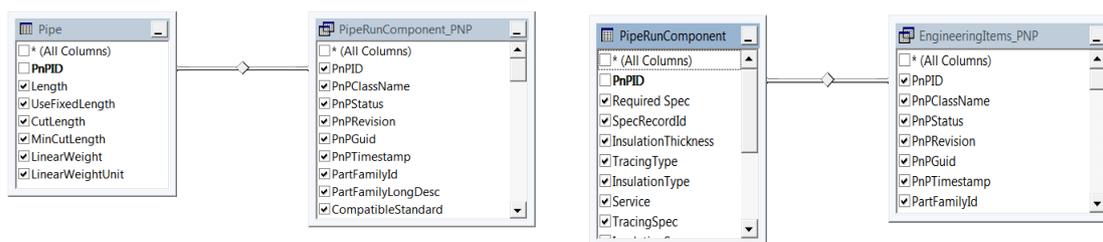
Plant 3D Database

To be able to link our Navisworks model to our Plant 3D database we need to understand the structure of the Plant 3D piping database. The piping database contains a copy of the properties of all of the objects that we have modelled in our Plant 3D piping model.

Plant 3D supports two types of database: SQLite, the default database, and SQL Server which is required for large, multi-user projects and also when using Autodesk Vault to manage projects and drawings. The database structure within both is similar and reflects the data hierarchy that is displayed in the Plant 3D Project Setup window.

In the Plant 3D database, all Plant entities have records in the *EngineeringItems* table, pipe run fittings also have records in the *PipeRunComponent* table and a further record in a table specific to each type of fitting; similarly, fasteners also have records in the *Fasteners* table and a further record in a table specific to each type of fastener.

Within the database, the fields from the different tables are combined together into entity specific database views. For example, below we can see the links between the *Pipe*, *PipeRunComponent* and *EngineeringItems* tables that form the view of pipe data; the pipe view is called *Pipe_PNP*.



Using pipes as an example, if we wish to view properties defined just for pipes, we need to look in the *Pipe_PNP* database view. If we wish to view properties of a pipe that are also defined for all other Pipe Run Components, we only need to look in the *PipeRunComponent_PNP* view.

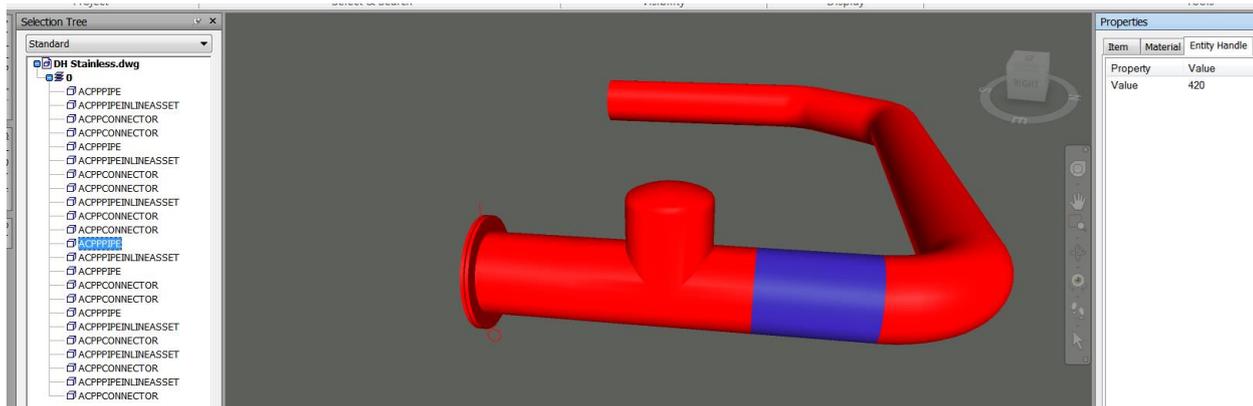
Unique Identifiers

To identify a specific item in the database, each item has a unique identifier stored in the PnPID field of the corresponding database tables. To be able to access the data for an item and return it to Navisworks, we need to be able to determine the PnPID value from our Navisworks model.

Unfortunately, the PnPID value is not provided by the object enabler. However, as mentioned earlier, in AutoCAD-based files every object has a unique identifier stored in the Entity Handle > Value property in Navisworks.

This entity handle is also stored in the Plant 3D database; it is stored in the field *DwgHandleLow* in the *PnPDataLinks* table.

However, the value of the Entity Handle that is stored in Navisworks is saved as a Hexadecimal string (e.g. 420); the value stored in *PnPDataLinks.DwgLowHandle* is saved as an integer (e.g 1056). $0x420=1056$

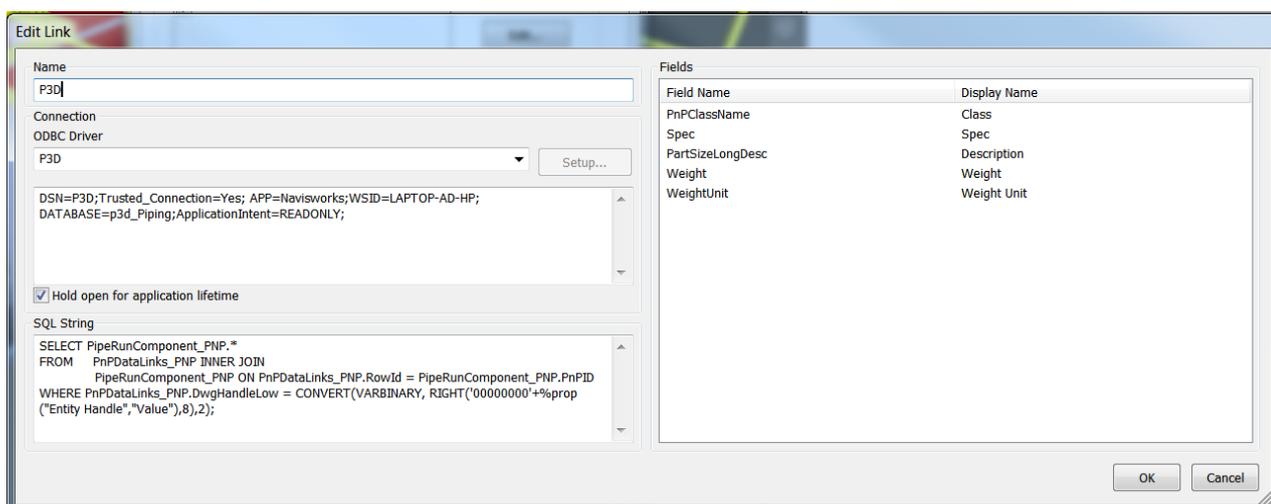


The corresponding PnPID value is stored in the *RowId* field of the *PnPDataLinks* table, such that for pipe run components, for example, $PnPDataLinks.RowId = PipeRunComponent.PnPID$

DataTools Link – SQL Server

To define a DataTools link, we need to define an ODBC connection to our Plant 3D database and a SQL Select statement that will return the item data to us.

The example below, shows how we might create a link to the Plant 3D project P3D that is using a SQL Server database. We have defined an ODBC datasource called P3D that references the Plant 3D piping database p3d_Piping. The SQL String we have defined will return all fields from the PipeRunComponent table for any piping fitting that we select in our Navisworks model.



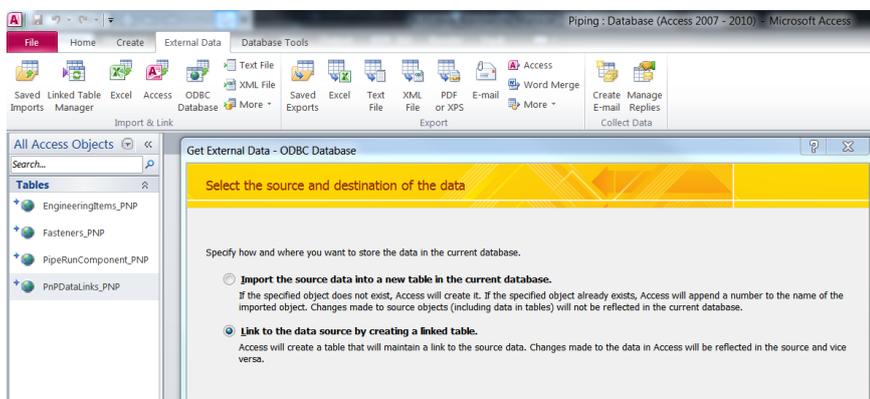
In the Field panel we have defined the fields that we wish to view in the Navisworks Properties window; these fields will be displayed on a tab called P3D – the same name that we gave to the link.

DataTools Link – SQLite

Unfortunately, if we are using SQLite for our Plant 3D database then we cannot connect directly to our piping database from Navisworks. However, we can create a linked Microsoft Access database and connect to that.

First, we need to create a Machine Data Source configured with an ODBC driver for SQLite that is linked to the piping.dcf file.

Then we create a new Access database and link to our Plant 3D piping database piping.dcf as an external ODBC Database.



Here we have linked to the EngineeringItems_PNP, PipeRunComponents_PNP, Fasteners_PNP and PnPDataLinks_PNP views in our piping database and we can see the data in the PnPDataLinks_PNP view, below.

PnPID	PnPClassNan	PnPStatus	PnPRevision	PnPGuid	PnPTimeStan	RowId	DwgId	DwgHandleLow	DwgHandleH	DwgSubIndex	RowClassName
5048	PnPDataLinks	0	0	X\F744CF15C6E	2147483647	5047	5005	1056	0	0	Pipe
5052	PnPDataLinks	0	0	X\96EDF91ED1E	2147483647	5051	5005	1064	0	0	Tee
5054	PnPDataLinks	0	0	X\C1B2FC3F26D	2147483647	5053	5005	1069	0	0	Pipe
5056	PnPDataLinks	0	0	X\2F68AD4AAE	2147483647	5055	5005	1074	0	1	Buttweld
5058	PnPDataLinks	0	0	X\E4BD1E73DAE	2147483647	5057	5005	1074	0	0	P3dConnector
5060	PnPDataLinks	0	0	X\0B1AE976B3A	2147483647	5059	5005	1077	0	1	Buttweld

In DataTools we can now link to our Access database and add the fields that we require into our Navisworks Properties window.

