

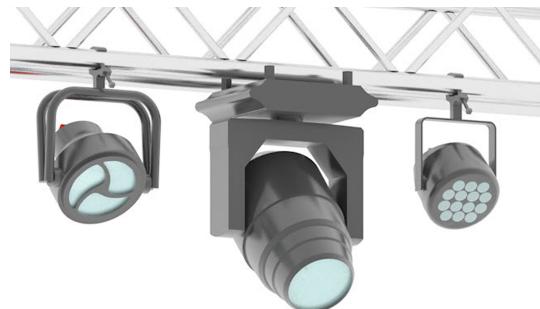
# Vectorworks Resource Style Guide



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Version 1.1

## Guide Intro



### About the guide

Welcome to the Vectorworks Style Guide. This guide has been written to provide guidelines for content creators to make Vectorworks (VW) content in a consistent manner. This includes Vectorworks object symbols that represent manufacturer products such as furnishings, sanitary fixtures, lighting, etc. Other types of Vectorworks resources will also be covered.

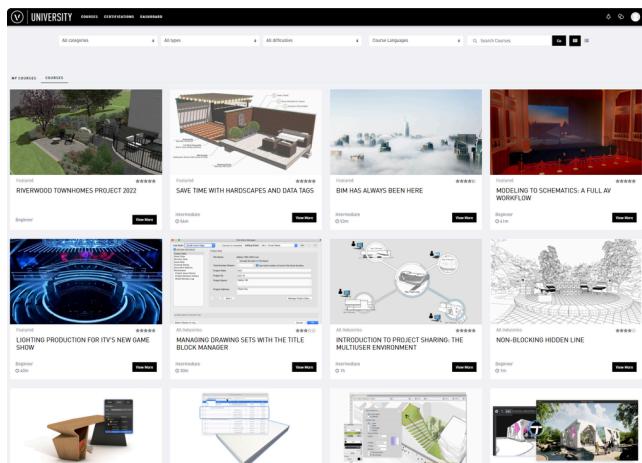
Vectorworks software is constantly being updated and improved; therefore the workflows in this guide will need to be updated to keep up with those changes.

This guide assumes you already have some understanding of Vectorworks, and it is not meant for training on features and topics that can be found within the Vectorworks Help system.

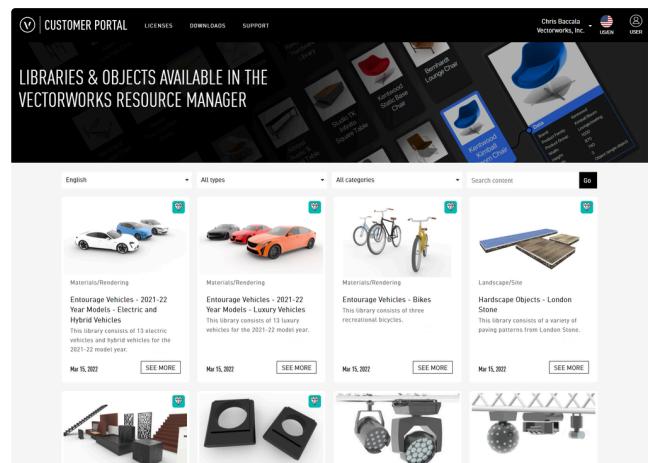
 Please note this guide does not cover every type of Vectorworks resource content creation. Certain development is outside the scope of this guide or may need to be done by Vectorworks developers internally.

You can access a wide range of tutorials in Vectorworks University. Anyone can create a free Vectorworks account to access our Customer Portal. Once you are signed on to the Customer Portal you can:

- Access our free Vectorworks University Training.
  - [Getting Started: The Basics](#)
- See the Vectorworks Libraries highlighted in the Customer Portal.
- You will find the actual Vectorworks Libraries within the software in the Resource Manager palette.



Training and tutorials in Vectorworks University



Vectorworks Libraries

### Who is this guide for?

This guide will focus on how to create content for parties adding content to the application, as well as those providing content to their own customers via, manufacturer product pages, BIM hosting sites, or other types of content hosting.

It will also provide insight and comparison on how Vectorworks develops some of its resources for inclusion with the application and how we recommend 3rd parties to proceed.

#### Disclaimer

We know that not everyone will agree with this guide. But this is how we set up content in Vectorworks to allow for content use across the multiple industries that Vectorworks design products serve, and allows it to work within many factors such as, limitations in plug-ins and features, product delivery limitations, regional needs, and trying to accommodate hundreds of third parties/manufacturers, and our own internal demands, while striking a balance of available time and resources to develop the Vectorworks application content.

Therefore Vectorworks cannot be held liable if something does not work based on the information provided in this guide, or if it cannot accommodate every individual's unique usage and needs.

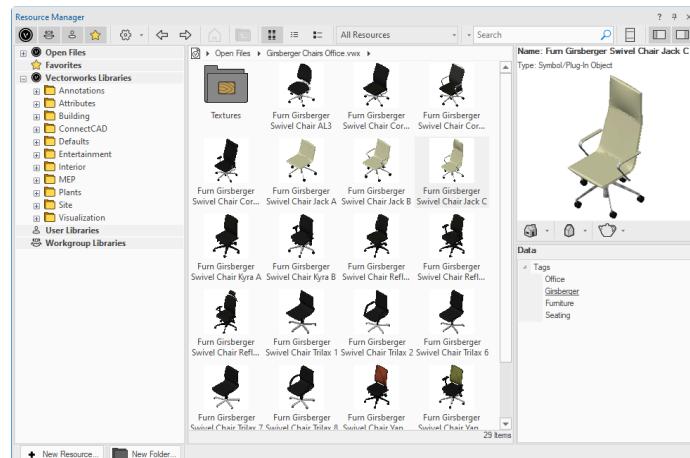
This guide should be used as a baseline in understanding how Vectorworks creates the application content. It is up to you to draw your own conclusions on what works best in your situation.

In fact, this guide is the same guide that Vectorworks own, content developers use, and we have modified it to be usable to outside parties so there is one single source of information internally which can be shared for use with our partners and others wanting to know how to go about making CAD/BIM content.

#### What are Vectorworks resources vs. content?

Most of the content supplied with the Vectorworks application is known as the Vectorworks resources, which can include symbol definitions, textures, plugin object styles (parametric), hatches, images, and others. The resources are part of the overall content. Content can also be included within data and settings throughout the application.

These collections of resources are referred to as the Vectorworks Libraries that are included with the software. A Vectorworks library file will contain one or more resources. All of the Vectorworks resource Libraries are accessible through the Resource Manager. This is a large palette that shows the resources provided within the application, as well as custom-made resource content, and the content in the open Vectorworks documents.



The Resource Manager displaying a symbol library.

#### What standards is Vectorworks using?

Vectorworks English international products are used throughout the world. Therefore, we have developed most of our content to not follow a particular standard. When there is certain content that is standardized for a market, we will typically state it. But typically, we do not follow a specific government standard or international industry standard because there is not one true standard across the world and content may be used across multiple industries with different standards.

## How is it presented?

This guide will provide instructions for 3rd parties, content creators that wish to develop their own Vectorworks version content. Throughout the guide we will also state how Vectorworks develops it for the application, so if you are working with us to add to the application you can see the differences from what we recommend as a simpler solution to those who are not adding partner content directly to Vectorworks.

When there are these comparisons, it will be identified with an emoji as follows:

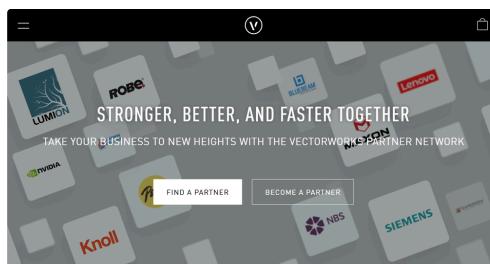
	<b>Content creators</b>  The bullseye and dart indicate information that is more beneficial for content creators and will usually offer a simpler alternative than what Vectorworks' developers will follow. If you are making resources to be hosted on a 3rd party website, you can use the methods marked with this emoji.  If your intent is to create content that will eventually be added to the Vectorworks application, you will need to follow the Vectorworks developers instruction.
	<b>Vectorworks developers</b>  The Vectorworks logo indicates how Vectorworks development makes the library content. This is how it should be done if the resource library is being included with the software.

This guide will eventually include other sections to focus on different workflows and best practices. It is strongly suggested to start with the Basic guide before following any specialized workflows that are eventually added.

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## Partner Program

If you are using this guide and are a product manufacturer or similar 3rd party you may have already worked with us. As a part of that, Vectorworks provides a Data Consent Agreement for those that wish to include their branded content within the software. Once the library is provided to our users we can also add your company to our Partner's page.



### BUILT TO DELIVER POSSIBILITY

Our Partner Network is a diverse ecosystem of innovators whose work embodies the creativity of designers everywhere. Together, we bring new opportunities, expand audiences, and help our shared customers get things done.



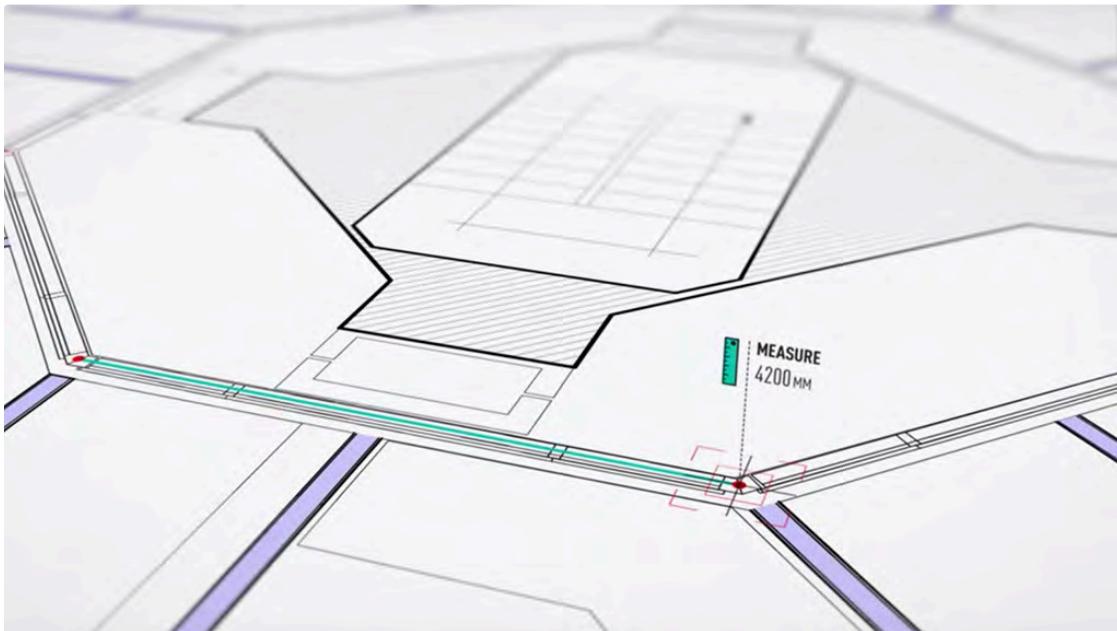
[Partner Network page.](#)

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## Basic Guide

**⚠** Please read this guide first. This first guide goes over the common aspects you need to consider in creating your resource. This information should be understood before going to the other guides (future release) that cover more specific instructions.



As mentioned in the Intro section there are many types of Vectorworks resources. One of the main types we will discuss are the symbols. A Vectorworks symbol is a container that usually has an object in it.

Vectorworks objects can be either a 2D object, 3D object, or a 3D/Hybrid. A 3D/Hybrid possesses both a 3D object (model) and a 2D object (planar geometry). The 3D can be made to represent a highly detailed model, and the 2D can be more simplistic for achieving a plan view or more schematic look.

Another resource type is textures. These resources can include rendering shaders or image maps. The textures can then be applied to a 3D object. Often these textures will be found in the symbol libraries providing more realistic rendering results rather than just rendering the symbol using its fill color. Many times, the texture is nested (or a child) within the symbol.

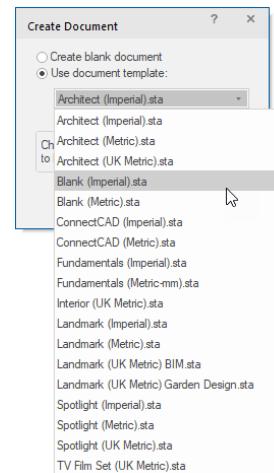
In the Basic Guide we will explain these two resources as it pertains to creating your library and some of the aspects to consider.

# Planning the Library

## Getting started

For consistency you should always begin files with latest 'Blank (Imperial).sta' or 'Blank (Metric).sta' template provided in the Vectorworks application. This will ensure that you have optimal settings applied to the document by its developers.

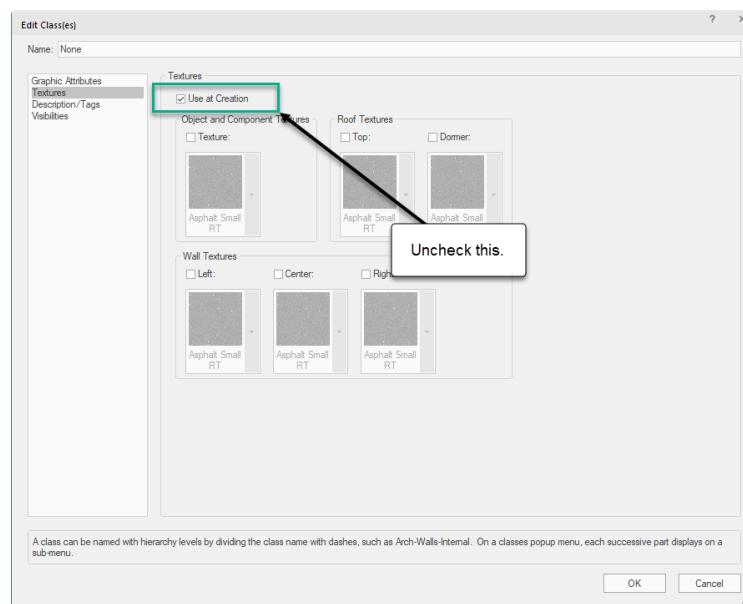
Begin the new library by selecting: File > New... > then select the "Use document template" radio button and pick one of the aforementioned templates.



## File setup

### Turn off Use at Creation on the 'None' class

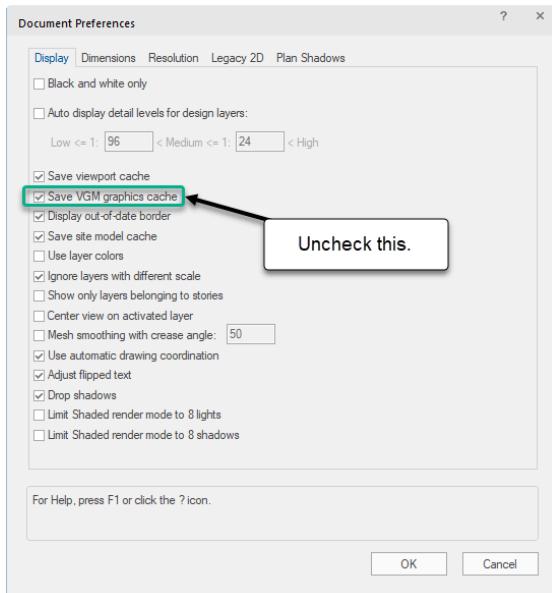
After starting a file with the Blank (Imp).vwx or Blank (Metric).vwx template you should edit the 'None' class.



- ✓ Symbol geometry should typically have the texture setting set to 'None' if no texture is to be applied, on the Render tab on the Object Info palette. This is by default set to "Class Texture" on the Render tab when objects are created. To change this, edit the class you are working on and uncheck "Use at Creation".

## Turn off Save VGM graphics cache

Turn 'Save VGM graphics cache' **off** for development. Default library templates will have this "on". Turning this off is necessary to keep the file size smaller. Otherwise, all graphics are saved within the file making the file too large.



File > Document Preferences

## Planning the library

Vectorworks files can contain numerous resources to represent all the products from a company, or one product line from a manufacturer, or it can just represent only one product.

Internally at Vectorworks, we will make the libraries contain many products for a manufacturer as long as it makes sense in it being presentable without making the files too large. If there are many products and it can't be reasonably contained in a single file, the products are split into individual files for each product line or set of related products.

Here are some considerations for planning your library.

## Presentation and aesthetics

- Consistency across the libraries, especially within the same subject is important for the user to have an easy to follow browsing experience as they look through the libraries.
- Aesthetics are also important for the "look" and presentation of the content.
- The structure of the content and how it will appear adjacent to other files/folders and the subject matter all contribute to part of the presentation.

## File structure and size

File size should be considered when planning the library and the way it is structured will affect that. Below are some basic considerations. This topic will also be mentioned elsewhere, as more aspects of creating the content are explained.

### File size

(V) Vectorworks developed library files included with the application are generally around 25 to 50 MB or less, although there are exceptions. We try to stay in that range so software users with slow connections do not need to wait a longer time when downloading a library file through our Resource Manager.

⌚ If you are hosting the content yourself, it is up to you to decide on the maximum file size you prefer. Keep in mind download time for large files. By making the resources smaller in size inside the file, it will make the file smaller and allow smoother operation in user's documents when combined with many other objects.

## File structure

ⓧ Vectorworks develops most libraries as collections of the same type of VW resource, such as libraries of symbols or textures.

The symbols are the largest type of VW resource that are made in the VW Libraries. These are mostly organized as either generic or branded products in one or more files, typically of the same subject.

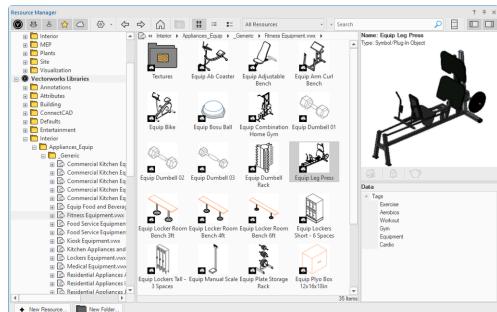
If we develop a manufacturer's entire catalog of products into VW symbols, and all those products fit within the 25 to 50 mb range, we only need to make one file.

If it will be larger than that, multiple files are needed. We can make each file represent a product line or each file represent a category of products.

Here are some examples:

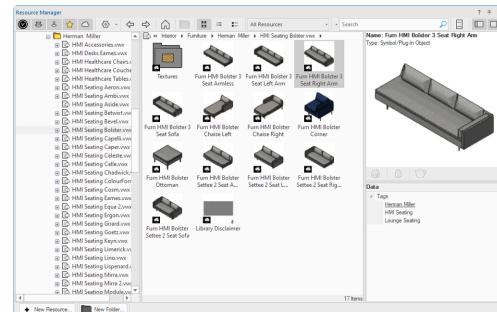
- In the image on the left below, an entire collection of generic fitness equipment symbols is contained within one file.
- Similarly, a single file can contain all the products from a manufacturer's catalog if there are not a lot of products and the file size can be a reasonable size.
- If it is a larger catalog of products, then create multiple files to include each product line as a separate file. See the image below on the right.
- Or if it is a larger catalog of products, then similar objects of the same subject (e.g. Kohler Kitchen Sinks.vwx) can be assembled as a file.

**Generic subject example**



This is an example of a generic (non-branded) library file by subject that Vectorworks has made.

**Manufacturer product line example**



This is an example of a branded product line file that Vectorworks has made.

Another option is to match the structure of the original source file. For example, a single file can be used to mimic a Revit Family file's structure with each of the Revit Family types made into a VW symbol in the new VW file. We will sometimes do this when we want to create one file per product. We will only do this when it is being added to a manufacturer's individual product page for the file to be hosted on a manufacturer's web site.

⌚ If you are an individual Content Creator this may not apply or be needed. If you are building larger collections, you may have your own method in place. Or if converting from another format, you may wish to duplicate that source's structure.

## Naming files

⌚ For Manufacturers and Content Hosting Sites - We will cover the specific naming in each of the workflows in future BIM and Entertainment Guides.

- 
- (V) Internally Vectorworks has a deeper explanation for variables associated with file naming and the file and folder organization to work as a cumulative system within the Resource Manager for the multiple industries we support. This is beyond the scope of this guide.
- 

## Units - metric or imperial - does it matter?

A Vectorworks file's Document Settings will require a Unit of metric or imperial to be set. You may want to pick the unit your source information is provided in then model from there.

Most of the libraries Vectorworks provides are meant to be usable in either metric or imperial unless otherwise indicated within the folder or file name as presented in Vectorworks libraries. Although a unit does need to be set for the developer to create the resources, it is generally meant to be usable in either unit.

Just be aware that metric units will not just convert to an even imperial measurement (by changing the document unit) when it is opened.

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# Symbol Resources

Symbols are the most common resources we develop. The symbols act as containers that store and hold the geometry within the Resource Manager palette in Vectorworks.

## Symbol types

In Vectorworks symbols can contain the following geometry.

- 2D only - Geometry is only 2D planar.
- 3D only - Geometry is only 3D.
- 3D/Hybrid - Contains both 3D objects, along with 2D objects specifically for Top/Plan view. This is the most common type of symbol developed in the Vectorworks Libraries.

## Symbol colors

The symbols have categories which is indicated by its color. The table below explains the four types and behavior.

Type	Description	Use
Black	Static symbol that has instances created when placed into the document. Editing the symbol affects all the other instances.	Container for geometry, text, or other objects. This is the most common symbol type used.
Blue	Group symbol that will convert to group when placed in the document and will no longer be an instance. Anything attached to the symbol container will be lost such as record formats and Resource Manager tags.	Used to have a group of products assembled or arranged together for placement. This is rarely used.
Red	Created from plugin and/or converts to a plugin when placed into the document. In most cases these are styles associated and created from a plugin such as, Door, Hardscape, etc.	Container for plugin configurations.
Green	Page based symbol typically for annotation/title blocks only	Typically, only for use on Sheet Layers.

The Vectorworks Help provides a more in depth explanation on the symbols types by following this link

[Vectorworks Help - Symbols](#)

 [BIM Architectural - Symbol Types](#)

## 2D for Symbols

In this section we will show the rules for making the 2D geometry and text (when needed) as it pertains to symbols.

Most 2D plan geometry should be an accurately sized representation of a subject. It should be a simplified version of what is modeled in a 3D model when it is part of a hybrid symbol. Although certain symbols such as diagrammatic symbols (e.g. electrical diagram symbols) would be excluded from having an accurate scale.

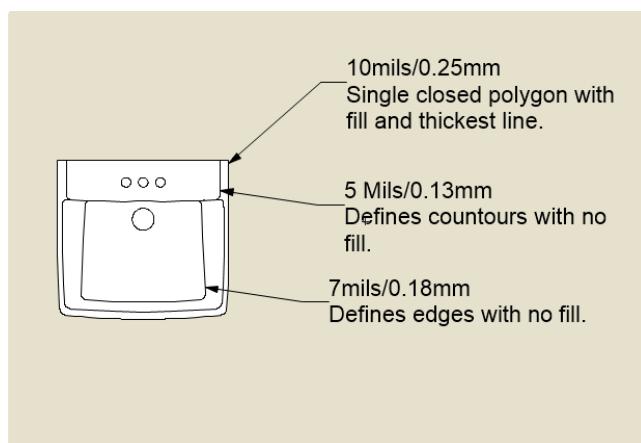
The sections below will provide guidelines for making this 2D geometry.

### 2D planar line work

ⓘ Use of multiple pen thicknesses is optional, as we know this further complicates conversion to Vectorworks format. It is also subjective. If you only use one pen thickness weight in 2D, please use 0.13mm/5mils.

ⓘ If you are developing libraries to be delivered with the software, it must have pen line thickness.

- Use only the default pen thicknesses. The same thicknesses should be used throughout the library to give a uniform look.
- In the 2D linework the smallest default pen thickness (0.05mm) should not be used, because it doesn't always print accurately on certain printers. We use 0.13mm as the finest line size in 2D.
- The line thickness may need to vary sometimes depending on the size and the scale at which it will typically be used.
- Small objects like faucets cannot have a 7mils (0.18mm) outline or the outline will dominate the appearance of the object at a typical design layer's scale.
- Geometry should be constructed with as few connected lines as possible instead of many segmented lines.
- Using arcs instead of segmented lines will produce more efficient geometry for "curved" linework.
- Geometry should be constructed with as few polygon objects as possible.
- Dashed lines should typically use the ISO 02 Dashed line types for the BIM/AEC content. Although additional line types will be used when needed.
- Spotlight generally uses ISO 03 Dashed line type.



2D Linework for Top/Plan view

Lines for	Points	Mils	mm
Object Contours	3/8	5	0.13

Defines edges	1/2	7	0.18
Outline of object	3/4	10	0.25

- ✓ Turn on Zoom Line Thickness to check that the pen thickness will be appropriate for the object size and typical layer scales it could be used for.

## 2D object fills

- 2D plan symbols need to have a solid polygon fill background that usually encompasses the entire perimeter of the geometry and obscures objects under it.
- The interior line work will usually not have any fill as it is mostly used to provide contours and form within the solid polygon.

## Creating 2D geometry for 3D/Hybrid symbols

Vectorworks Inc. typically makes its symbols as 3D/Hybrids. This is a symbol containing both a 3D model and 2D plan view. The 2D view is generally simpler than the detail that is present on the 3D model.

This is also discussed in the next sections on 3D Symbols and 3D/Hybrids and Symbol Options.

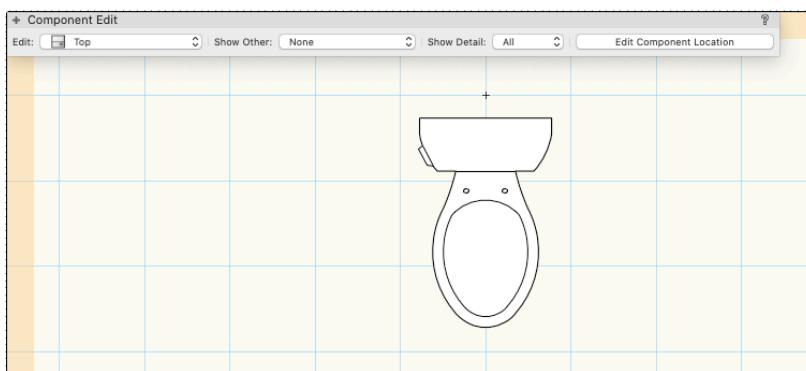
Here are some methods to consider when you want to provide a 2D plan view like those found in most 3D/Hybrid symbols of the Vectorworks Libraries.

### Method 1 - Create from 3D object

Ⓐ This is the Vectorworks, Inc. preferred method.

When creating a matching 2D representation of a 3D object, like for making Hybrid objects, this option can be used.

1. From the Resource Manager (RM) right click on the 3D symbol and select "Edit 2D Components..."
2. From the Component Edit palette, on the "Show Other" dropdown select "3D."
3. Right click on the 3D object and select, "Generate 2D Graphics from 3D component" and select 'Hidden Line Rendering.'
4. This will produce the 2D polygons. These polygons can be cleaned up and simplified for inclusion in the Vectorworks Libraries.



2D Top in the Component Edit palette.

This will result in:

- All geometry being grouped together.
- The outer geometry polygon shape with a 0.18mm line thickness.
- The inner linework geometry will be set to 0.13mm line thickness.
- There will be extraneous linework after running the command that will need to be removed and checked for overlapping lines.

- Any segmented lines should be further checked for, then run Modify>Compose command on the segmented lines wherever possible.
- With the object selected, select the Level of detail: Show Detail All Levels checked on the Object Info Palette.

See also: [2D Components for Hybrid Objects](#)

## Method 2 - Auto Hybrid

Use the Create Auto Hybrid command feature from a 3D model in Vectorworks.

- ⓘ This is not used by Vectorworks, Inc. when developing the symbols libraries, but is an option for a quick 2D planar object representing the model. Please consult the Vectorworks Help system by searching, “Creating auto hybrid objects” for more information on adding an Auto Hybrid.

For more information you can also watch this live session recording on [Auto Hybrid](#), from Vectorworks University.

## Method 3 - No 2D

You could forego including 2D geometry altogether in the symbols and it will only be a 3D only symbol. This is the least optimal solution for content that will be included in the Vectorworks Libraries.

- ⓘ Vectorworks will include a 2D component in almost all cases to produce a 3D/Hybrid symbol.

- ⓘ This is up to the 3rd party content creators when it is not included in Vectorworks.

## For the 2D sides, front, back, ...

Repeat one of the above methods to also create “Generate 2D from 3D component...” in Vectorworks if this is needed.

- ⓘ Vectorworks developers only add the front, sides and back to the plumbing fixtures in the Vectorworks Libraries.

- ⓘ This is up to the 3rd party content creators.

## Text font usage in symbols

Text is sometimes included on certain 2D objects in symbols. Furthermore, it may be used to differentiate the same 2D geometry used on more than one hybrid symbol.

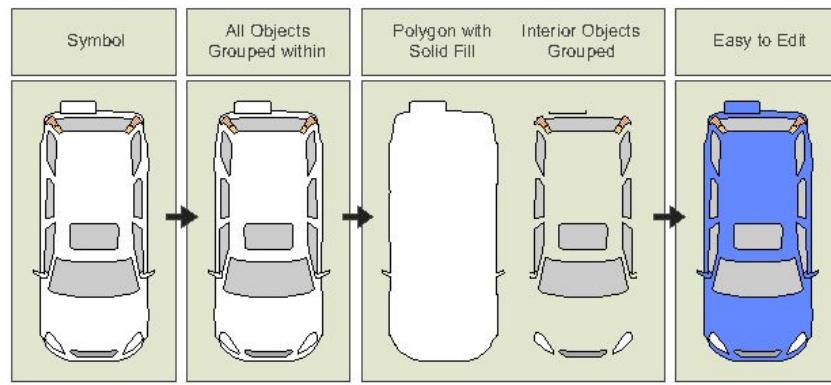
- ⓘ We recommend to always use Arial fonts. Vectorworks is Mac and Windows compatible, and one system may have fonts that are not present on the other platform system. Therefore, we only use the **Arial** font for text in Vectorworks resources and labeling, as it is a common font. There are font mapping issues created when a Mac only font is opened in Windows and vice versa presenting a Font Mapping dialog when first opening the file when the font is not present on another computer.

**✗** Please do not use the VW company font, DIN Pro, in the library files. That is reserved for company use in emails and marketing materials.

## Grouping and structure

When constructing your 2D geometry (and if not using Auto Hybrid) you should think about making the geometry easy to edit by someone wishing to do so when they use the symbol. The symbol structure should be organized so that similar objects are grouped together.

Typically objects that are all the same color are usually grouped together so the color can be changed for all of those objects at once, instead of having to select numerous individual objects to edit.



Example of 2D grouping for easy fill color changes.

## 3D Symbols

In most cases the 3D component of a symbol will contain a 3D model. A 3D/Hybrid symbol also contains a 2D planar component like a plan view of the object. A Vectorworks symbol is essentially a container that holds 3D geometry, image props (2D image in 3D space), plug-in styles, etc.

In this section we will only discuss developing the 3D geometry and considerations. Other topics like image props and styles will not be addressed at this time.

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## 3D geometry in symbols

The 3D geometry models should be presented accurately. They should provide enough detail to be able to distinguish them from other models in the category but not with so much detail that they represent a perfect physical model of the source item; that makes them too large to be usable.

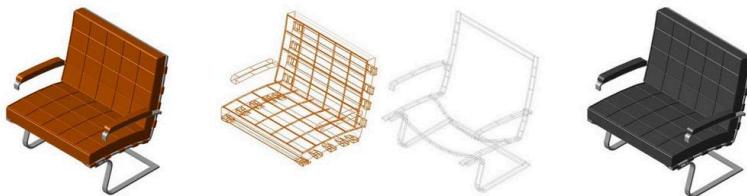
You will find that some imported models (especially DWG, 3ds) may need to be simplified if extremely detailed and too large.

### Line work

- Use only the default pen thickness. The same thicknesses should be used throughout the library to give a uniform look.
- The pen style should be the smallest size since line weight is generally not a factor for the 3D models.

### Pen and fill color

- The pen color and fill background should be identical for 3D geometry. This excludes objects with white fill, which should have black pen.
- Like materials should be the same color and grouped together.
- If a texture is applied, make the pen and fill color similar to the texture's overall color.
- All 3D models should look aesthetically pleasing when rendered in Shaded rendering mode, whether or not textures are attached.



Pen color and Background fill

### Structure and grouping

The symbol structure should be organized so that similar objects are grouped together. As with 2D, objects that are the same color, are usually grouped together. This is so the color can be changed for all the objects at once, instead of the users having to select numerous individual objects.

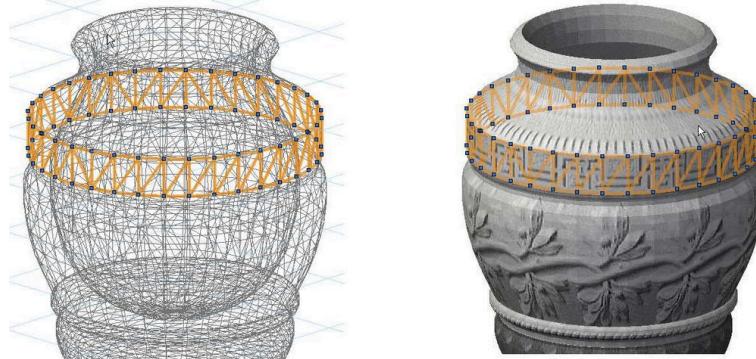
### Structure for texturing

- If a symbol is to have a single texture applied to the entire model in the symbol, then all the geometry should be a single piece or grouped before applying the texture. This could be for a single mesh or group of meshes. Solids should be combined if they will have a

single texture applied.

- If the symbol geometry is to have multiple textures, the geometry should be organized into separate components, so that each texture can be applied to a single piece of geometry.

 Texture creation is discussed later in this guide.



Original imported geometry and remodeled solid in Wireframe

## Grouping

Model parts can be grouped within the symbol, and it can be beneficial for easier editing to have related geometry together, especially in complex models. This is something that should be considered when constructing models.

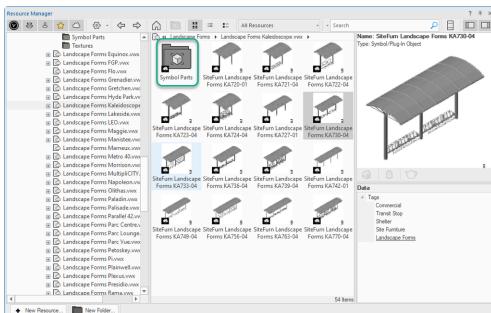
In this example, more complex models like this vehicle are made up of many components. Each component is a single mesh, with matching fill and pen color, and has a single texture applied. All the individual components (meshes) are then grouped together.



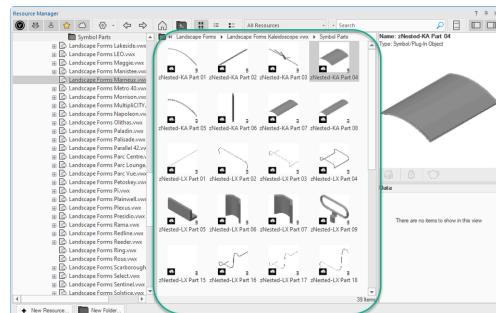
Exploded view showing geometry groups

## Nesting symbols

Some symbols may share the same parts. By making that geometry into symbols that represent those parts, it can be shared as nested instances of those symbols in multiple parent symbols. Using nested symbols like this can reduce the overall file size of the library by eliminating the duplication of parts. If an edit needs to be made on the shared part, all parents symbols will benefit from that update.



Parent symbols using nested parts from the folder



Nested Symbol Part folder contents

The example above shows a library of transit stops. Many of the same parts are placed as instances that are grouped within the parent symbols. These arrangements of nested symbols produces the overall model(s). This library is much smaller using these instances than it would be if each part was just repeated geometry.

## Scaling symbols

We do not recommend the scaling of symbols. This can lead to potential issues especially when the symbols are used in certain Vectorworks plugins. It is best to create unique and accurate sized geometry within symbols.

## Modeling in Vectorworks

You will either need to create new models or convert another format to Vectorworks format by importing models into your file. Here we will go over the model creation portion, and make some recommendations.

If no 3D models are available then starting with a good 2D source may be the best option to start the building of your models. This can be from references like photographs, technical drawings, imported raster files, PDF specification sheets, and imported 2D CAD files including those from other formats, etc.

## Using image sources

If no other source is available, images can be used by importing them into Vectorworks. Then scale the image(s) to a size that is accurate, and then trace out the form to begin creating the required 2D and 3D shapes.

BMP, JPEG, PNG and TIFF are all image/raster formats that can be imported into Vectorworks and placed on the Design Layer and used as reference to model from. See the Help for other formats supported.

## Using existing 2D geometry

If only 2D CAD files exist, then these sources can be used as a “template” to trace from when modeling your 3D shapes.

Extrusions can be created from the 2D objects, and other 3D operations can be “snapped” to the 2D geometry to begin modeling.

See also the **Vectorworks Help** section on, **Collaboration > Importing files**, for more thorough details on importing files.

## Using 3D modeling features in Vectorworks

Obviously, in order to model from scratch or from 2D source in Vectorworks, you will need to use the Vectorworks modeling features. We will not go into all the 3D modeling methods. But you should consult our online Help and training that is available through Vectorworks University to learn these methods and techniques.

Here are some common geometry operations you should consider.

- Extrudes - create simple extrudes
- Push/Pull Tool

- Primitive shapes
- Use Sweeps
- Use Sweeps along a path
- Subdivision tool
- Loft Surface
- Shell Solid Tool
- Fillet Edge Tool
- Chamfer Edge Tool
- 3D Power Pack menu items

 Consult the **Vectorworks Help** section on, **Creating objects > 3D Modeling**. This will provide you with explanations on the many modeling techniques. [Vectorworks Help - 3D Modeling](#)

## Create simpler 3D objects with direct texture mapping

Another method when building from scratch or simplifying is to make simpler geometry forms, and then apply images to these to represent more detailed areas.

This can be done with direct texture mapping. This allows the use of a simpler 3D model that then has had an image applied to replace very detailed part that would otherwise need to be modeled. You can see in the images below that these simple models define the overall shape of the kiosk or device, and they then have a texture applied for the detailed areas of the screens and controls.



Kiosks with direct texture mapping applied



Credit Card device with image texture keypad and screen

 See also the **Vectorworks Help** section on, **Applying and mapping textures > Direct texture mapping**, for more thorough details on importing files. [Vectorworks Help - Direct texture mapping](#)

## Geometry types - considerations

When either creating models from scratch, or reviewing imported geometry results from another CAD format, you should consider the type of geometry being used and your options.

In the table below are some basic considerations of 3D geometry that is often used in Vectorworks models. Also shown are the preferences on some of this geometry when we construct our libraries. More on these geometry types will be mentioned in the next section on Importing.

Geometry type	Preference
<b>Solids geometry</b>  Produces a smaller file size and quicker rendering, but requires a lot of modeling time. More complex shapes are more difficult to make but the mathematical accuracy is greater. Most of the parametric plug-ins are solid operations.	 Preferred
<b>NURBS</b>	 Preferred

Are defined by control points. With NURBS it is more difficult to size the geometry accurately than with solids, but it does allow greater freedom for intricate model shapes. These are best suited for organic modeling.

#### Subdivisions

Preferred

Provides better flexibility for creating irregular and complex forms.

Difficult to use texture mapping.

#### Mesh and 3D Polysurfaces

less preferred

Most imported geometry is available in this form, or it is converted to meshes during the importing into VW like from OBJ, 3DS, and certain DWG files. Meshes create larger files and longer rendering times.

Grouped 3D Polygonal surfaces should be converted to mesh for applying textures and texture mapping if not already.

Mesh is typically unavoidable with many organic forms for plants, people, etc.

Experiment with using the Modify > Simplify Mesh... command in Vectorworks to see if the mesh triangulation can be reduced without losing too much detail.

Now that you know the types of geometry that are commonly used, along with some of the advantages and disadvantages, use these considerations when importing from other formats.

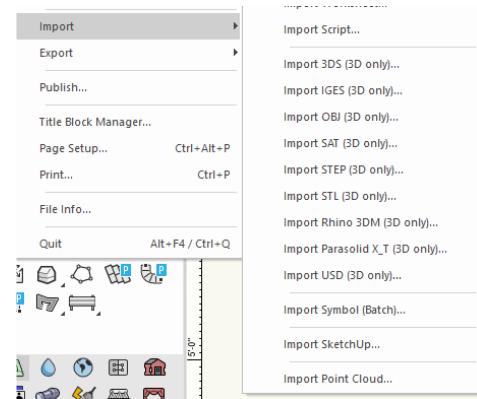
## Importing models from other CAD/BIM formats

More and more product manufacturers provide their products in various CAD/CAM/BIM formats. Many of these formats can be easily imported into Vectorworks, to then be “cleaned up” by applying standards for uniformity, aesthetics, and organization.

Vectorworks has multiple direct import options available from the File>Import menu.

There are many CAD/BIM models representing products in other CAD model formats. Here are some considerations for you on using other geometry sources and importing into Vectorworks.

- Some of the more common formats will also allow the option to have it created within a symbol on import along with textures as well.



Import options under the File>Import menu

## CAD file sources - considerations

Here are some CAD file formats typically found as sources for models and notes on each type. If the option exists that more than one BIM/CAD format type is available, we highly recommend to test importing the different formats to see which resulting geometry provides the

best results.

## Source: Revit Families

Revit is a common format for manufacturers who have products related to building construction and furnishings. Here are some observations when importing from this format:

⌚ Method 1 - Recommended to most content creators with small collections wishing to convert to Vectorworks.

Import Revit files into Vectorworks. Go to *File > Import > Import Revit...*

- This method produces heavier geometry and larger file sizes but still very usable geometry for most.
- It should also preserve image mapping/texturing resulting in Vectorworks textures being created and still mapped to the geometry.
- This method is convenient for anyone to use.
- This process is not used by Vectorworks.

⭐ Method 2 - This is only recommended for internal developers with Revit + Inventor + Vectorworks software. Summarized:

- Best method for producing large collections/libraries of Vectorworks symbols.
- This is a more complex multi-import/export process that produces the best results but involves many workarounds and tools.
- We have found that if you are converting from another format to Vectorworks that models exported from Revit to ACIS/SAT format, and then imported to Vectorworks typically gives some of the best results. This assumes that the Revit geometry was created.
- The caveat to this is that some SAT geometry created in new Revit features may not come in completely due to Vectorworks not using SAT natively for its geometry library. Parasolid geometry is Vectorworks' native format.
- Import into a blank temporary file to isolate possible problems introduced during import.
- We recommend creating a new file with the library template and then importing the cleaned-up resources into this. This will leave any extraneous content in the old file.
- Please note Revit materials are lost through this method.
- *This will be explained in more detail in a future BIM conversion workflow.*

⚠ Please note for converting from Revit MEP that Vectorworks does not have a Revit Connector equivalent that is typically found in Revit MEP content.

## Source: AutoCAD DWG/DXF

If the DWG/DXF models are modeled with solids geometry then the imported result will generally be very good.

But if originally modeled with mesh, the results may not be as desirable. Typically you will get larger files and longer rendering time due to the number of polygonal faces composing the mesh object.

This often results in heavy mesh. We will typically remodel the geometry if that is the result.

## Source: SketchUp

Sketchup generally provides very good results, and if textured the image mapping comes in typically without problems and a texture resource is created through Vectorworks import.

Mesh geometry is often the result, with polygon numbers being low enough that minimum remodeling is needed.

## Source: 3DS and OBJ

Generally, 3DS and OBJ formats will result in heavy mesh, but will bring in the image mapping as Vectorworks textures. 3DS import is generally only used when importing people and plant models with no other options. This will include the image mapping of the object that can be converted to a Vectorworks texture.

## Source: Parasolid X\_T

Although this is our native geometry modeling kernel, it is not a format we have used for importing to build libraries. We think great results should be expected if that source format is available.

## After import

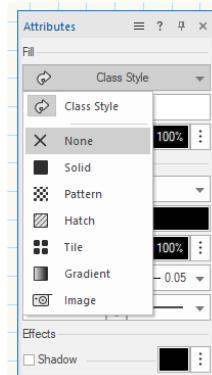
There are a few things to consider after importing files from other formats into your file.

- We recommend just importing model geometry into a file and doing your cleanup from there. Occasionally some extraneous (junk) objects can get introduced during the import/cleanup process.

After your objects are established and cleaned up, start a new file(s). Import the cleaned-up objects into the new file(s). Then organize and make that your final file for the symbols.

- For imported geometry, 'Remove By Class Settings' on the Attributes palette should be checked for and changed to None for the Fill, and Solid for the Pen.

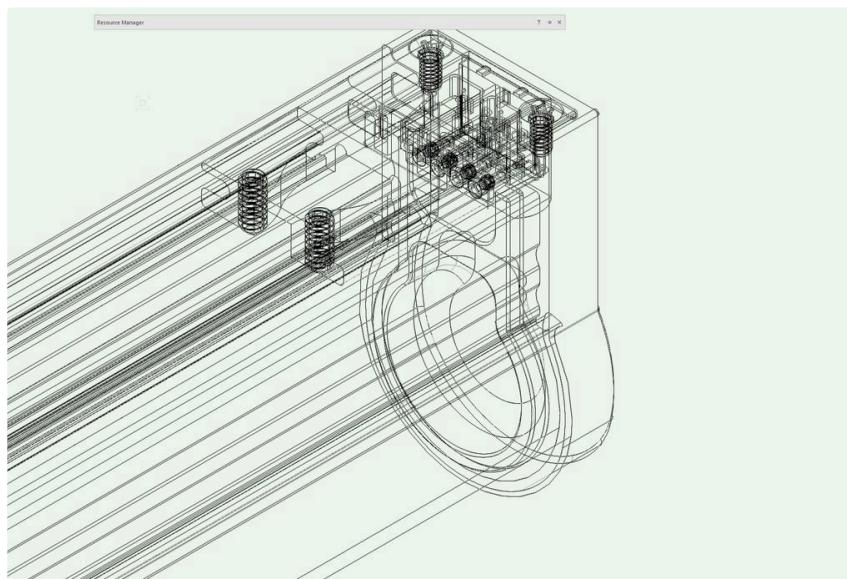
This will sometimes be changed to 'Class Style' when importing from other formats. This needs to be changed.



Attributes Palette

## Simplifying imported geometry

Imported models from other sources, like manufacturer's CAD files, may be overly detailed. These may contain small details or parts that should be eliminated to simplify the geometry for design use (vs manufacturing purposes) in Vectorworks. This is typically a problem in files that come from CAD product design files.



Example imported ceiling mounted light fixture with many details from manufacturer

Geometry models like this should typically be simplified for use in Vectorworks as it will often be used as one of many other objects in a Vectorworks user's design documents. All the internal parts are unnecessary for building large collections of products, for example.

When these models have a lot of multifaceted surfaces and complex details such as screw holes, fillets for corners, small bevels, radius, and heavy mesh, remodeling may be required.

Or if the models are from a source that results in complex meshes like from 3DS and OBJ sources, the geometry should be reduced or replaced.

As mentioned above in the, "Use the 3D Modeling features in Vectorworks" section, use Vectorworks functionality to replace geometry that is too large with simpler shapes like solids.

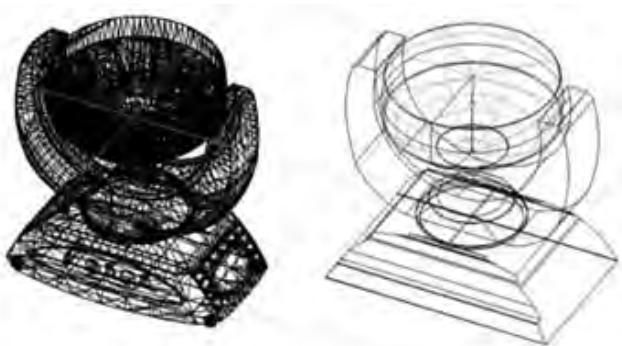
Below are some options that can be used to simplify imported models. Overall, we try to lower most symbol object sizes to less than 3-4 MB per symbol. But there are exceptions especially with organic forms like plant models and very curved forms that are difficult to remodel and reduce.

## Remodel geometry from import

You may find that it is better to remodel part or all of the model that has been imported. You can use the imported model as a guide to rebuild a new version with improved geometry. Vectorworks developers often do this to reduce heavy geometry that makes the file size too large.

In the example below a heavy mesh object with many polygonal faces has been used as a guide to remodel it into a more usable and smaller 3D model. This is often done with imported lighting instruments.

By using the features mentioned in the section above "Use the 3D Modeling features in Vectorworks" a model can be reworked to have more efficient geometry.



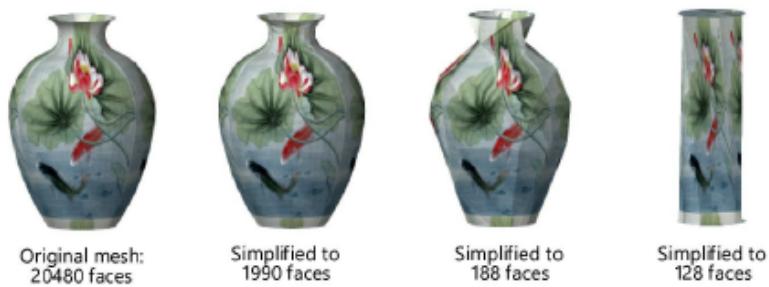
Example light instrument with dense mesh vs. light instrument remodeled in solids.

Advantages	Disadvantages
Most efficient geometry when well modeled and planned out.	Labor intensive to make.
Best overall performance with many instances	

## Simplify Mesh menu command

Complex mesh models may need to be simplified. The Modify > Simplify Mesh... menu command can help by reducing the number of polygon faces. Applying simplification will reduce polygons but can also affect the overall quality of the shape. Experiment with lowering the

polygon faces to see if a good balance of aesthetics and lowering size can be achieved. Overall lowering the polygons in mesh will reduce the file size and regeneration time.



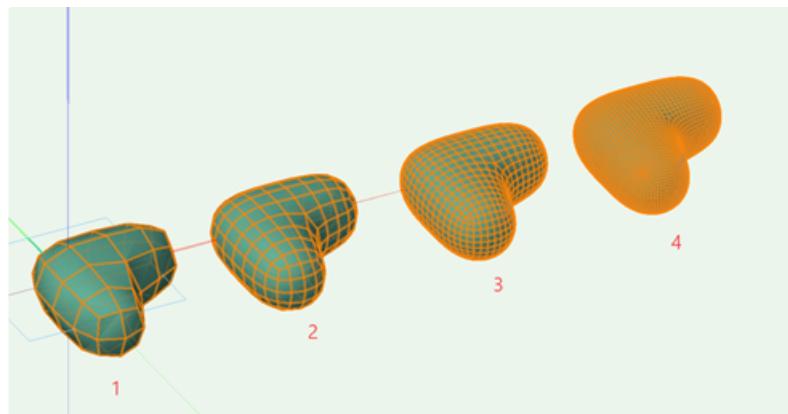
Example textured vase model with varying results from using the Simplify Mesh command.

Advantages	Disadvantages
Can greatly reduce the number of polygon faces.	May lose some of the needed form if it is overdone.
Reduced model size.	Texture image mapping can get weird looking.
	Requires “trial and error” experimenting with polygon number.

## Using the Subdivision tool

The Subdivision tool can be used to create or replace all or part of the geometry. This tool is more free form and can allow more difficult shapes to be modeled easier. Here are some tips to follow:

- If you set the subdivision to 1 this will create too few subdivision mesh faces which is equivalent to polygon modeling.
- Increasing the subdivision iteration to 3 will create 64 subdivision mesh faces per cage face.
- See the figure below which shows subdivision iterations from 1 to 4 for comparison. Integration 1 is too low and integration 4 is too high. Choosing integration 2 or 3 provides a good balance for simplifying polygon numbers.



Choosing a Subdivision iteration in the middle (2 and 3) is a better balance.

Advantages	Disadvantages

Can control the polygon faces	More faces make its properties much like mesh.
Makes complex forms	
Can convert to Solids/NURBS.	

## Remove geometry history (optional)

Solid operations created using commands such as Add Solid, Subtract Solid, Create Subdivisions Primitive, and tools like the Fillet Edge, Chamfer Edge, Shell Solid, and Edit Subdivision, will retain editing history in the object.

★ The history can be removed by using the *File > Convert > Convert to Generic Solids* menu command. This will often reduce the file size; however the object is no longer editable. Make sure your edits are final before doing this command. You may want to create copies of your symbol if you think it will be revisited at a future date.

- This method should be used knowing that once performed the geometry will no longer be editable.
- It should also be tested to see if the model did reduce the file size. Sometimes it may make the file size larger, as in with extrude and sweep solid operations.

## 3D/Hybrids and Symbol Options

Being familiar with the symbol options is important for any type of symbol setup and planning how the symbol will be placed into the Vectorworks document.

3D/Hybrid symbols, which combine both 2D and 3D geometry within a symbol, will require proper arrangement that also relates to the proper setup and placement using Symbol Options.

This section will explain setting up the Symbol Options and creating 3d/Hybrid symbols.

### Making a 3D/Hybrid

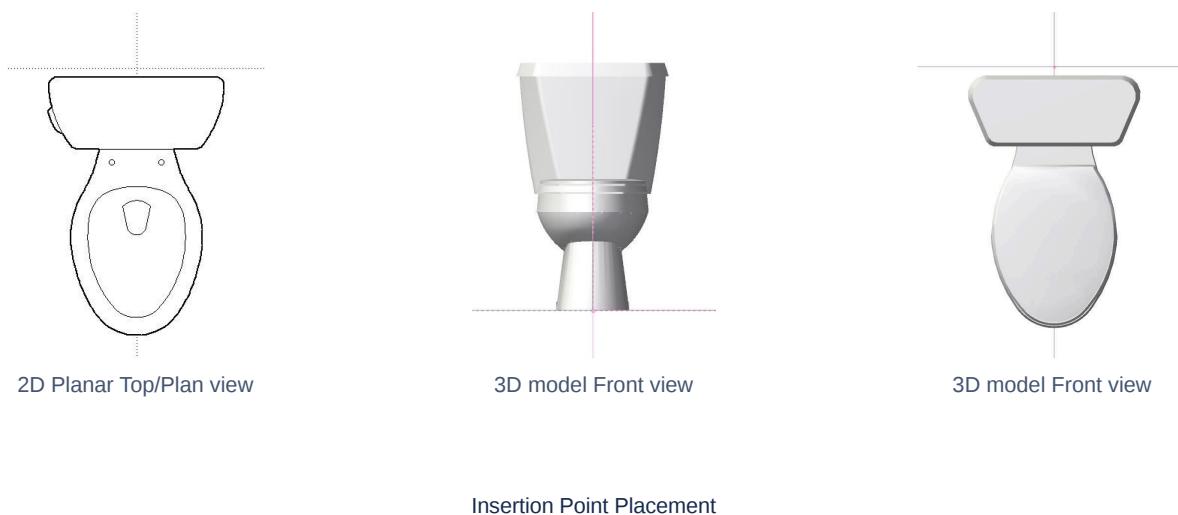
Now that you have an understanding about the 2D and 3D symbol geometry, there is another type of symbol, the 3D Hybrid. To make this work correctly both the 2D and 3D geometry should be aligned on the X and Y axis when the symbol is created or when editing an existing symbol and adding one object with the other.

### Relation of 2D and 3D geometry for insertion

Insertion points should be planned so that when placed, a minimum effort or no effort is needed in adjusting the position of the symbol in relation to other objects and the layer plane. 2D symbols will only need an "X" and "Y" position established, but 3d will need the "Z" value position considered as well. Hybrid symbols will need to have the 2D object's insertion point (usually from a top, plan view) match the insertion of the 3D object from the same planar view or position that the 2D object represents.

For example, this toilet below has a required distance for installation from the wall. Both the 2D plan and 3D top are at the same position and distance relative to the insert point. The 3D's "Z" value is at zero, so when it is placed the bottom of the symbol will be at the floor which is the "0" height "Z".

This way when a standard view (View > Standard Views > ...) in Vectorworks is selected to switch between Top/Plan and the Top 3D view, both the 2D object and 3D will align.



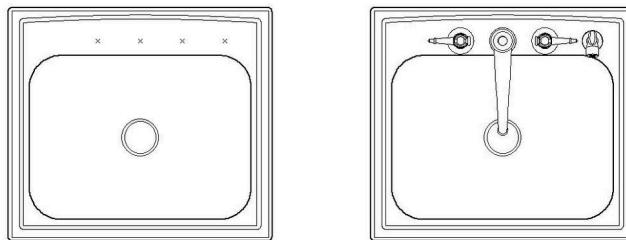
Insertion Point Placement

### Locus points

Locus points are not typically left in symbols, but in certain cases there is a need for them.

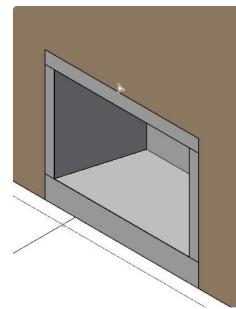
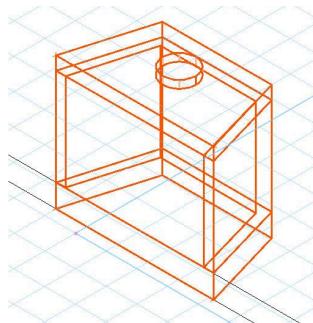
If a symbol is to have other parts attached to it, then a locus may be needed to specify the correct location for placement as demonstrated in this sink and faucet example.

The sink symbol on the left has had locus points added for snapping separate faucet symbols to it to create a greater assembly.



Locus points in a symbol for placement attachment symbols

Locus points can also be used to designate the size of the break in a wall for symbols that are used in wall insertion. On the face of this example fireplace there is a locus point on each of the four corners that determines the opening size when placed in a wall break.



Locus points for wall breaks

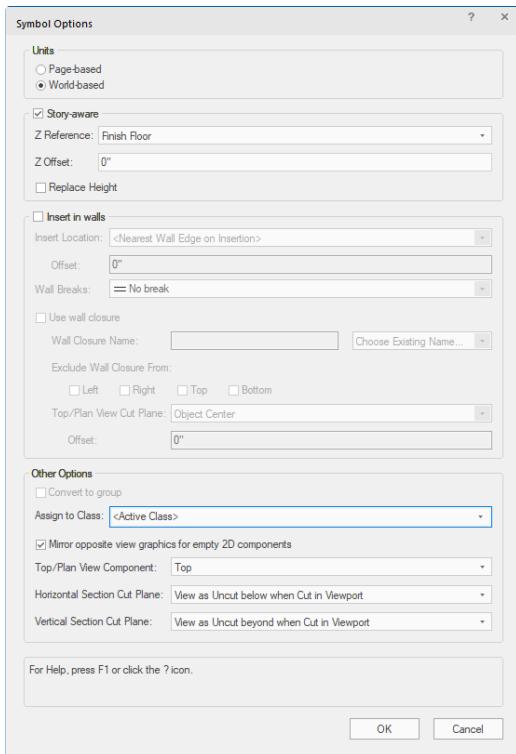
## Detailed insertion placement

For more specific information about the insertion point placement for specific categories of objects, see [Appendix - Insertion Point Rules](#) at the end of this Basic Guide.

 Note – This is for Vectorworks internal and may be more detail than someone just creating symbol models may care to know.

## Symbol Options

Every symbol has symbol options that need to be set up for optimal use depending on the symbol's use and purpose. Below is more information on how we set this up. For more information also consult the Vectorworks Help system.



VW2024 Symbol Options dialog box

## Units

Most symbols should be World-based except special symbols meant for annotation on Sheet layers.

## Story-aware

Checking the Story-aware box allows the symbol placement to interact with the Stories elevation feature.

	Story-aware setup is unnecessary for most content creators.
	BIM/AEC content will typically use this when we want to work with the standard story levels in the standard Architect templates.  This may include some Landmark content that can be used in and around buildings.

Story levels are present in the default Architect, Blank, and Landmark templates that are accessed when creating a new document.

*File > New... menu*

## Insertion in walls

Developer discretion needs to be used depending on how the symbol should interact with the wall and if it should break the wall in Top/Plan view.

Most symbols can have this unchecked unless it is meant to be inserted into a wall like for a door or window object.

## Other options - Convert to group

This creates a blue symbol that will no longer be a symbol once it is placed into the document. It converts to a group and any records will also be lost using this option.

This option is used for objects that are created to be further modified. For example, profile shapes for extrusion where a symbol container is not needed once added to the document.

## Other options - Assign to class

This provides a “container” class for the entire symbol. This can be used to control the placement of the symbol in a document.

When the class is made invisible later, you do not see the symbol(s) assigned to that class.

🎯	For 3 <sup>rd</sup> party creators having classes set for insertion is optional and leaving set to <Active Class> is recommended
ⓧ	Vectorworks developers typically have the symbols insertion options set up to place the symbols in one of the classes from the default set of classes if for Architect and Landmark product use.  This rule is generally not applied to the Spotlight product content.

### Vectorworks classes vs. layers

Classes and Layers can be seen in the Organization dialog box and Navigation palette (Design Suite product required).

- **Vectorworks Classes** - are comparable to layers found in AutoCAD and Rhinoceros.
- **Vectorworks Design Layers** - are a working space where all modeling is done.
- **Vectorworks Sheet layers** - are for presentation and printing.

Classes will be all you need to consider when making a library of symbols.

## How to add classes to your file

This explains how to add Vectorworks standard classes to the file where you are developing your models in.

ⓧ Vectorworks uses a set of predefined classes in its library files.

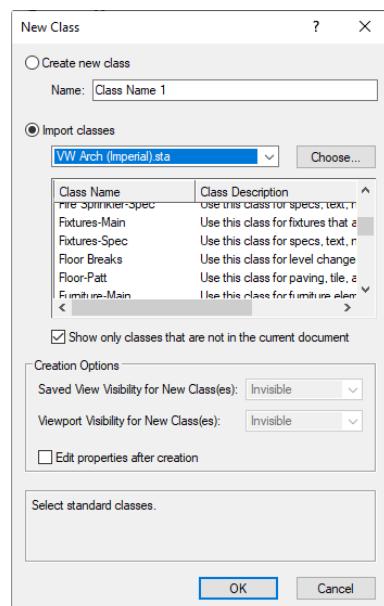
These default classes can be accessed from the Navigation palette, by selecting the Classes tab, and then right clicking in the spaces where the classes are listed. Select, New...

This opens the New Class dialog box. Select the Import Classes radio button, and select “VW Arch (Imperial).sta” from the drop down.

Classes are added to the symbols as an Insertion Option, which will be explained below.

✓ Future guides will provide recommendations on class use in specific workflows.

🎯 As mentioned above for Content Creators, the use of classes is optional.



New Class dialog box

## Spotlight entertainment specific libraries

Spotlight has its own unique classes for the content that is applied to geometry parts and not the symbol's container class as described above. These are found in the Spotlight templates.

## Architectural and Landmark BIM libraries

More explanation of the classes for BIM content may be provided in a future BIM conversion guide.

## Cut Planes settings

The Cut Plane settings are described in detail in the Appendix of the Basic Guide. This is a more complex setting.

### Appendix - Cut Plane Settings for Symbols

	For 3 <sup>rd</sup> party creators this can more than likely be omitted from your workflow.
	Vectorworks developers typically apply this for many symbols libraries.

## Renderworks Textures

Symbol parts can have Renderworks Textures (texture) attached to improve the presentation, and provide a more realistic look for 3D geometry.

As shown in the section discussing the 3D grouping, you may need to break up and arrange your geometry so separate textures can be applied to achieve your desired look.

All geometry should look aesthetically pleasing in 2D and 3D. For the 3D it should look good in Shaded rendering mode, and if textures are to be applied, they should look even better when rendered in Final Quality Renderworks rendering mode.

## Texture shader options

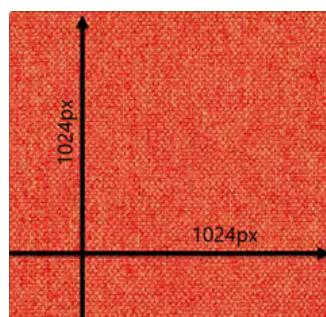
Below are some of the shaders we more commonly use in our textures in the VW Libraries. There are many others that are not covered here. For more information on the textures please read the Vectorworks Help system's section on [Creating Textures](#) in the "Presenting the project" section.

### Make image based textures

Most of the textures that Vectorworks provides are image based textures. Images should only be JPG or PNG images. These textures use the Image shader in the Shaders > Color field of the Edit Texture dialog box.

#### Considerations

- We recommend that these images are no more than 1 megapixel in size. For example 1024x1024 pixels would be standard 1mp size of many images sizes. Larger images will make for very large textures and thus increase files size when nested/applied to the geometry. This will be unnecessary since most images in textures are made to repeat or tessellate.



1024x1024 image is all that is typically needed

- If your source image maps that are imported and become Vectorworks textures, are too large, consider reducing the image size.
- Sometimes images may need to be used that entirely cover the object and cannot or should not tessellate. See the Direct Texture Mapping example below.
- An image can tessellate but may not be square. For example, a wood texture that is meant to show the long wood grain.

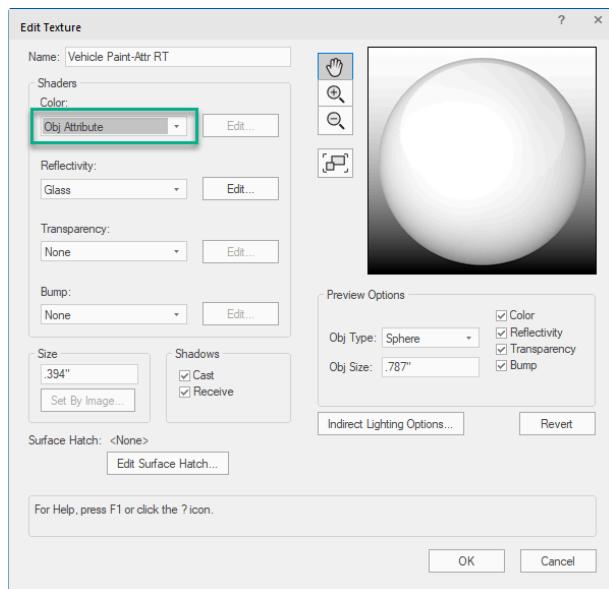
#### Direct texture mapping

As mentioned in the 3D symbols section of this guide, image base textures can also be used with the Attribute Mapping tool to apply images instead of detailed modeling. It is a great option to map an image on the surface of an object. Make sure the textures are an adequate size, so you won't lose quality if it is meant for closer viewing. Refer to the Help system for more information.



## Using the Object Attribute shader texture

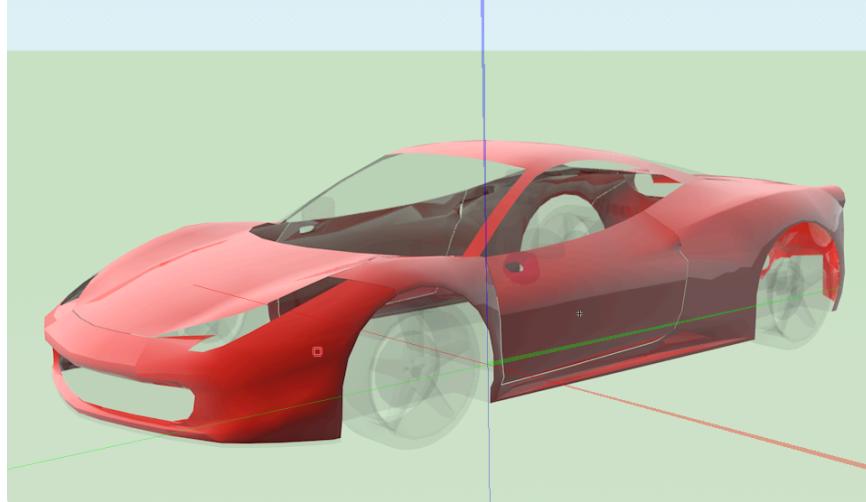
Rather than making a lot of textures that use the Texture's Color shader to represent each of the colors be numerous, we may use the Obj Attribute shader. This will use the color fill of the object instead of the texture's Color shader. Then we apply shaders such as reflectivity and/or bump maps to an object, rather than needing to create separate color textures for each color needed.



Obj Attribute color shader

Applying a texture using the Obj. Attribute shader like this allows the color fill to be easily changed vs. making many individual textures.

This can be very useful after importing many models from another format, like SketchUp, where each color may become its own texture. Replacing many textures with just one texture for a finish type (e.g. paint), can save a lot of space and make parts easier to edit the fill color, later.



Car body with Obj Attribute shader texture applied.

Changing the color fill is easy on this car body while retaining the same paint sheen by using a texture that uses the Obj Attribute shader. The object can now be selected and have its fill changed to another color without having to go back and edit the texture. This single texture can be used across many models with different color variations.

## Reflectivity

Reflectivity is a commonly used shader like in the car example above. This shader is used for creating shiny objects or surfaces that have reflective surfaces. It is often used for plastic, glass, cloth, and metallic surfaces. It is also used to provide glow and light emitting effects.

## Bump mapping

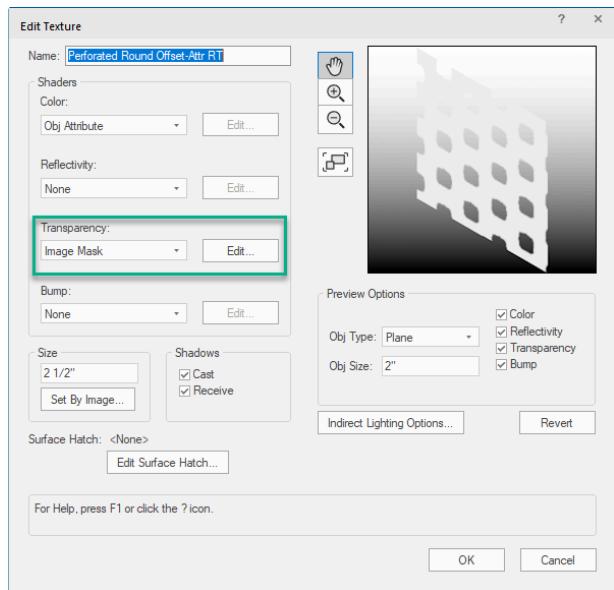
When bump mapping is added to a texture it is usually image based from another source “color” image.

The benefit is the 3D effect created in showing relief such as bumps, grooves, or scratches on an object. This provides a nice effect for bricks, wood grains, and scratches in metal surfaces.

Bump mapping is not used a lot, as we find there is a performance and file size penalty when building large collections of textured objects with bump maps applied. It is better reserved for final presentation effects and not more general rendering.

## Transparency

This shader specifies how opaque or transparent the object is. This will affect how light shows through an object, such as through window glass, plastic and glass bottles, and water. A mask with alpha channel can also be used with this shader.



Transparency shader with Image Mask

In the example above the mask will have opaque areas with transparent areas where the holes appear.

For more information on texture shaders see the Help: [Renderworks shader parameters](#)

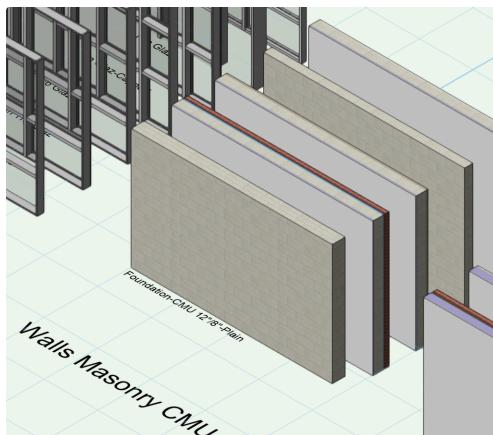
## Surface hatch textures

ⓘ Surface hatches are only applied for certain textures. We do not typically use it on 3D models in symbols. Instead, it is mostly used for textures to be applied to certain plug-in object styles, usually with components. This would include plug-in styles like walls, slabs, roof, and hardscape styles.

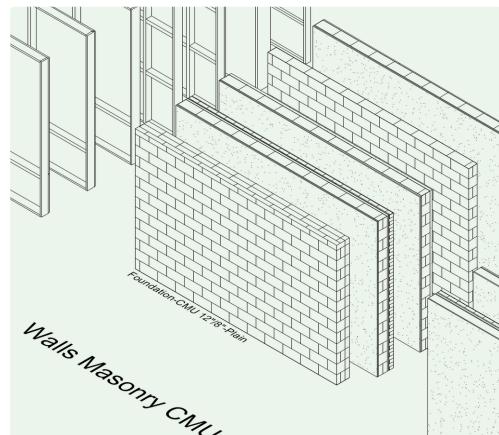
ⓘ This is likely rarely needed for most Content Creators, but it is good to know.

## Setup

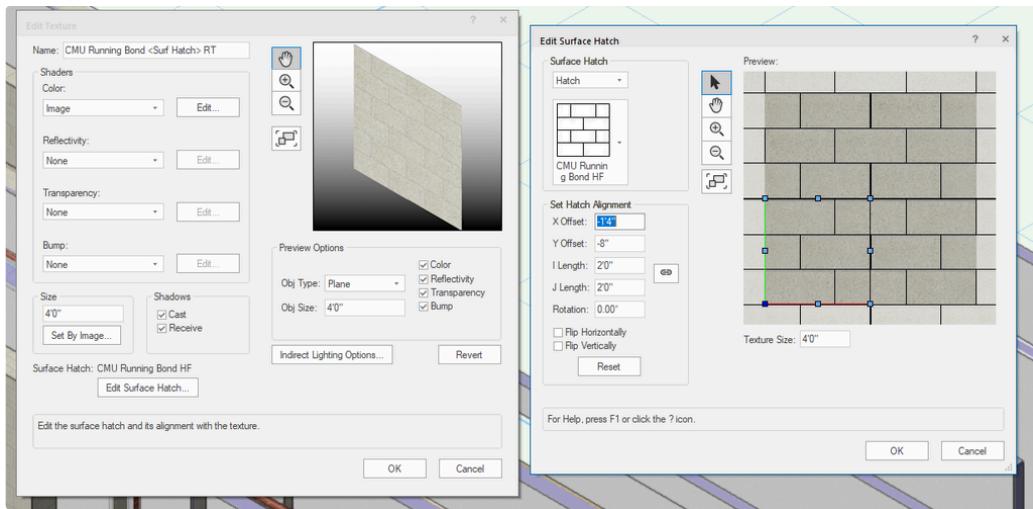
The surface hatch used in textures provides an additional presentation visual when the rendering is set to Hidden Line rendering.



Textured Wall Styles in Shaded rendering.



Textured Wall Styles in Hidden Line rendering displaying Surface Hatches.



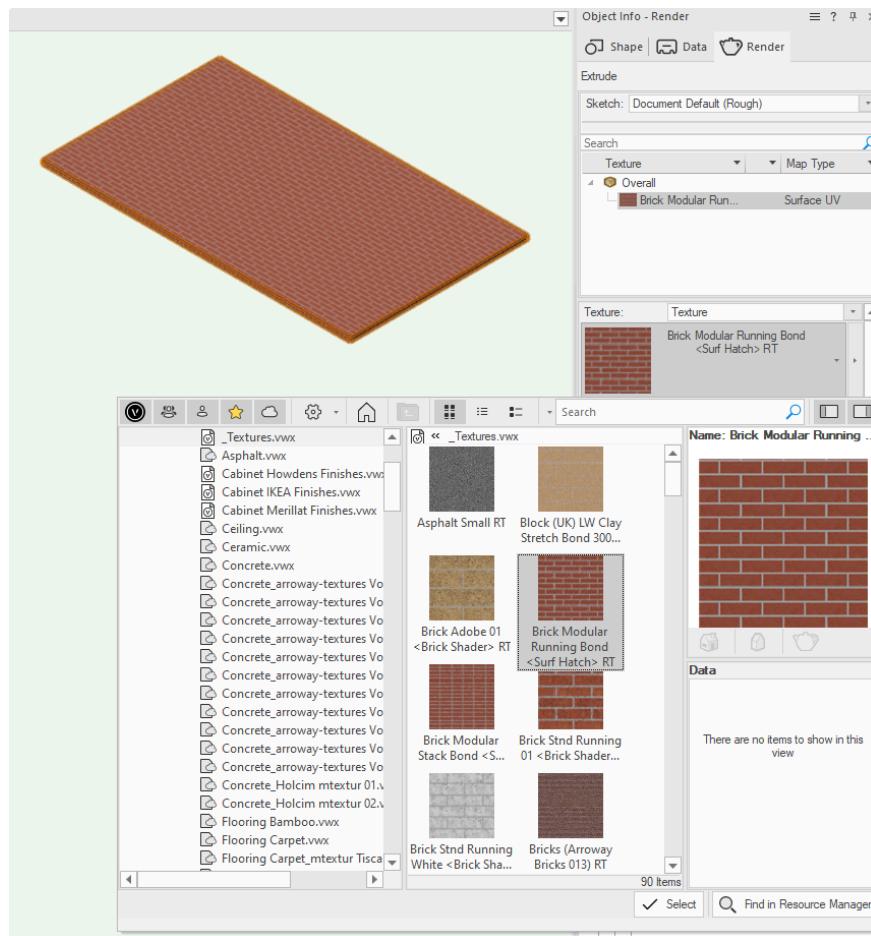
Edit Texture dialog using Surface hatch, and on the right, the edit dialog box for the surface hatch

## Textures in the Vectorworks Libraries

We recommend that everyone keep the Resource Manager up to date by accepting the update when first opening Vectorworks so you have all the content available. This will update the underlying catalog/database to correctly display the latest version of the content.

For the textures, you can then make use of all the textures in the libraries as many are online and not in the application as indicated by a cloud on the file icon in the Resource Manager.

In the image below, an object is selected, which has had a texture applied from the Object Info palette. The first texture file listed, in the Resource Selector, shows the “basic set called” **\_Textures.vwx** containing examples of various subjects of textures. This is followed by a deeper collection organized by subject in many files that follow.



Object with texture applied from the Object Info palette.

By accessing these files, you can see how Vectorworks has built its texture collection.

## Texture resource organization

### Nomenclature

**(V)** Most Vectorworks textures have a one word prefix to show its main subject or category. This is followed by some simple description, and it always has a “RT” suffix to identify that the resource type is a Renderworks texture. This suffix is added because there can be very similar names for hatches (HF suffix), image fills (IF), tile fills (TF) and material (MT) resources that represent real world materials. All have a two letter suffix to easily distinguish them.

Symbols don't typically have a suffix to identify the resource type because it is the most common resource in the Vectorworks libraries.

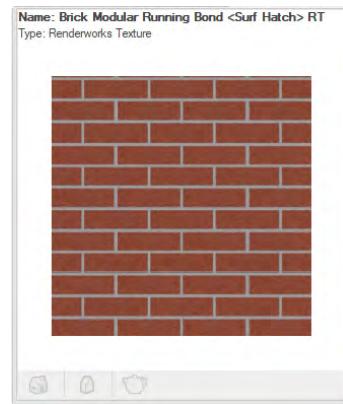
Here is an example of a texture nomenclature break-down. Texture name:

**Brick Modular Running Bond <Surf Hatch> RT**

Looking at the table below you can see how its name is derived with four different parts to name the texture resource. This includes:

- Prefix Category.
- Description with as few words as possible.
- Special suffix - only for special cases like pointing out special use texture shaders.

- Resource Type identifier



Texture with surface hatching

Prefix Category	Description	Special suffix (special case)	Resource type identifier
Brick	Modular Running Bond	<Surf Hatch> Identifies this as using a surface hatch for hidden line rendering.	RT Abbreviation for Renderworks Texture.

Content creators can use whatever nomenclature they wish.

## Texture organization in symbol files

When there are textures nested in a symbols collection, a resource folder will be created to hold the textures. This separates the main subject from supportive (nested) content.



Texture folder separates main subject content.

Providing a resource folder like this is similarly repeated when other support resources are present like, Line Types, Hatch Fills, Tile Fills, etc.

## What about materials with textures?

We do not cover the material resources in the Basic Guide. Since most of this guide is related to standard 3D symbols, we just recommend using textures to represent your object's finishes. It is not usually necessary for symbols to have materials applied.

Materials are a much more complex setup combining multiple resources (i.e. surface hatch textures, hatch fills), assigning classification, providing real world physical property data, and requires planning its usage with various objects. It is therefore not covered here in the Basic Guide. A section may be added on this topic at a future date.

# Finishing the Library

Once the library of resources is complete, it should be presented in a file, or collection of files, in a consistent manner. There are a few steps to take to refine your presentation.

ⓘ Vectorworks developers should also consult our 'Library Development Checklist'.

## Clean up the library

### Remove extraneous objects

From the View bar, go to the Zoom group, and select Fit all objects. This can help identify extraneous geometry lying outside your view, if it is present. If any is found, delete it.

Also run, Select All, Ctrl+A or Cmd+A to select any objects and if there are any on the Object Info Palette.

### Purge it out

Files should be purged **carefully!**

Vectorworks will purge (Tool > Purge...) anything not placed into the document. You should review the dialog and deselect resources that should not be removed. There may be junk classes, layers, and objects to remove.

### Start fresh with a new file

Or create a new file from one of the Blank (*unit*).sta files and import all the resources you have created into a "clean" file. This is a good way to leave all the junk behind by just selecting the resources you need and then importing them into the new file.

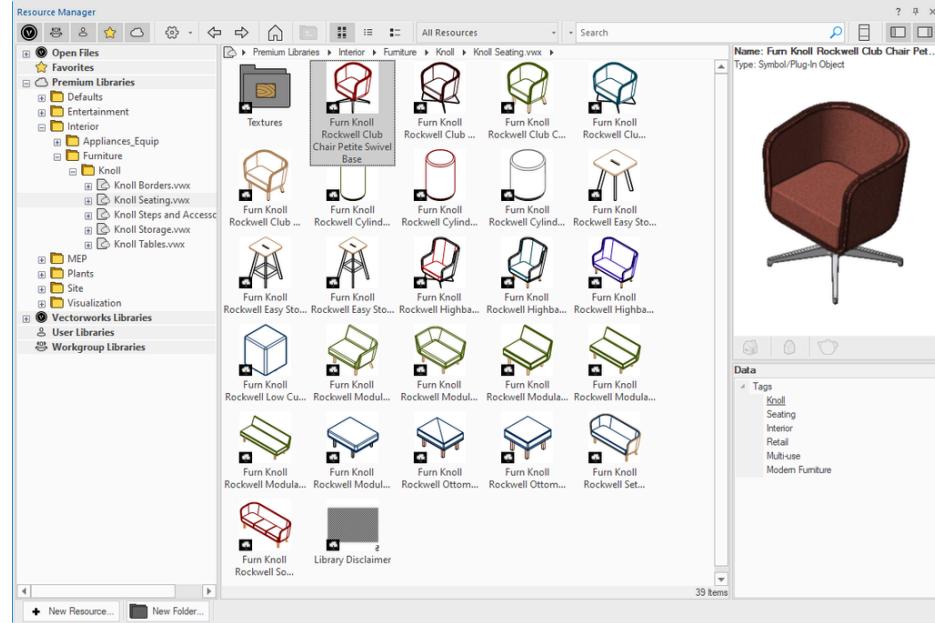
We recommend to never make the files too large. Most Vectorworks developed library files are around 25 - 50 MB because most are provided via download from the cloud.

## Setting RM Previews

For any collection it is best to have all the symbol's thumbnails shown in the same view and with the same rendering mode. The example below shows the smaller thumbnails in "Hidden Line" for the Thumbnail Rendering Mode for a cleaner look than the other two options (Wire Frame and Shaded) would give in this instance.

In the large Hi Res Previews, all symbols use the Shaded rendering and provide another view than what the thumbnails show. This will provide a nice comparison of hidden line and shaded rendering.

To change this, select all of the symbols and right click to set the Thumbnail and Hi Res Preview, Views and Render Mode.



A collection of Knoll brand files with the resources well presented

Since this is a symbols library of products, the texture resources have been collected in a resource folder, because it is not the main subject of this example library.

*Congratulations! You have created a collection of Vectorworks resources!*