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Architectural Desktop 2007

Markin' Time - Keeping on Schedule with ADT

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S2-3

Course Summary:

Designed as an introduction and/or update for both new and existing ADT users, this course provides a complete introduction to 3D building design and scheduling doors and windows when working on your designs in ADT. We will guide you through developing a small building from scratch and building up the schedule tables for the combined building components. You'll leave with a better understanding of schedules, which will increase your production, assist in eliminating errors, and save you time in your projects.

Instructor: Paul Oakley

Paul Oakley is Director of Oakley-CAD Services Ltd and has 20 years' extensive experience within the AEC industry, working as both architect and CAD manager for major Architectural practices such as Broadway Malyan and PRP Architects before starting his own CAD management consultancy. As a consultant he has provided services to clients ranging from AutoDesk to individual Architectural practices. Paul runs CAD management, bespoke AutoCAD and ADT training courses and has also presented at major conferences, plus featuring in industry press. Paul has been involved within the development of ADT with AutoDesk for several years and chairs the technical forum for the ADT Community group.



Autodesk User Group International

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Introduction

This session will look at the capabilities of scheduling with ADT and how this can be implemented to aid your project scheduling. We will initially look at the Space object and different methods of using this from the simple to the complex. We will then progress to the door schedule and look at both some of the basic and then more advanced uses of schedules. We will do this by creating our own bespoke content that will show the true power of the scheduling capabilities within ADT. However, there is already plenty of scheduling content available within the product that once you understand the principles behind you could enhance to your own requirements.

The scheduling tools included with Architectural Desktop provide you with the mechanism to schedule virtually any type of item and include almost any type of data you need about that object. Schedules are dynamically linked to the objects that they document; changes to the objects will result in changes in the schedule. The trick here is to use that dynamic link in a hierarchy to reduce risk, reduce duplication and increase productivity.

I have borrowed the initial sections from Matt Dillon AutoDesk University Class "Schedule Anything in AutoDesk Architectural Desktop or Building Systems" which was a 3 hours session devoted to this subject. If you are an AUGI member you can download the full hand out for free from the AUGI website.

Schedule Concepts and Terms

The scheduling tools included with Architectural Desktop and AutoDesk Building Systems provide you with the mechanism to schedule virtually any type of item and include almost any type of data you need about that object. Schedules are dynamically linked to the objects that they document; changes to the objects will result in changes in the schedule.

Critical concepts to remember about schedules include:

- ❑ **Schedule data resides on the object being scheduled.** There is no need to create block attributes, for example, to generate a schedule. The data exists on the object itself. Modifying the object will directly modify the schedule.
- ❑ **Schedule data is "attached" to the objects as Property Sets.** Without an appropriate property set attached to an object, its data will appear as question marks in the associated schedule. Property sets are attached in a variety of automatic, semi-automatic and manual methods, which we will explore later.
- ❑ **Any object can be scheduled.** This includes generic AutoCAD blocks and primitive objects as well as objects created with Architectural Desktop or AutoDesk Building Systems.





- ❑ **Schedules are fully customizable.** You can create your own sets of properties and create your own custom schedule table styles to accommodate almost any scheduling need you may have.

Terminology

To work with schedules and schedule data, there are some basic terms that you need to understand:

- ❑ **Property Set Definitions** are defined in Style Manager and consist of a list of all of the properties for an object that you would like to be able to include in a schedule. Without this list of properties, you can't create a schedule table style and you cannot "attach" the data for scheduling. Property sets come in two basic forms, automatic and user-defined.
 - Automatic properties cannot be edited by the user, but get their values directly from the objects. An example of this type of property would be a door width. Automatic properties can also come in the form of formulas (which derive their properties from a combination of other properties and perhaps some mathematical functions), locations and project-source properties (these will be covered and will make more sense later).
 - User-Defined properties are in some ways very analogous to traditional block attributes, in that their values are assigned by the user and are not a parametrically defined property of the object. Examples, again, for a door would be fire rating, manufacturer, lockset and hardware, to name just a few possibilities.
- ❑ **Object-based property sets** contain properties that are attached directly to individual objects. This means that properties can vary from object to object, even if they are on the same style. These types of property sets are attached to an object by tagging it or by manually attaching the property set (the methods for doing this are discussed later).
- ❑ **Style-based property sets** contain properties that in the case of user-defined values, apply to all objects on that style. For example, if you assign "fire rating" as a style-based property to a door style, editing the value for that property for any door will mean that you are actually editing the value for all doors of that particular door style. Automatic, style-based properties can be different from object to object however (it would be a bit ridiculous to expect all doors of a specific style to have the same width). Style based properties are typically attached by editing the style itself (again, we'll look at exactly how this is accomplished a bit later).
- ❑ **Data Formats** are what control how a property is to appear in a schedule. A door width, for example, would be 36.0 as reported by the raw property that is attached to the door. A data format can be created and applied to that raw property to cause it to be reported as 3'-0" in the schedule or tag. In most cases, you shouldn't have to create a new data format style, since several already exist in the sample style drawings and templates that come with Architectural Desktop 2007.

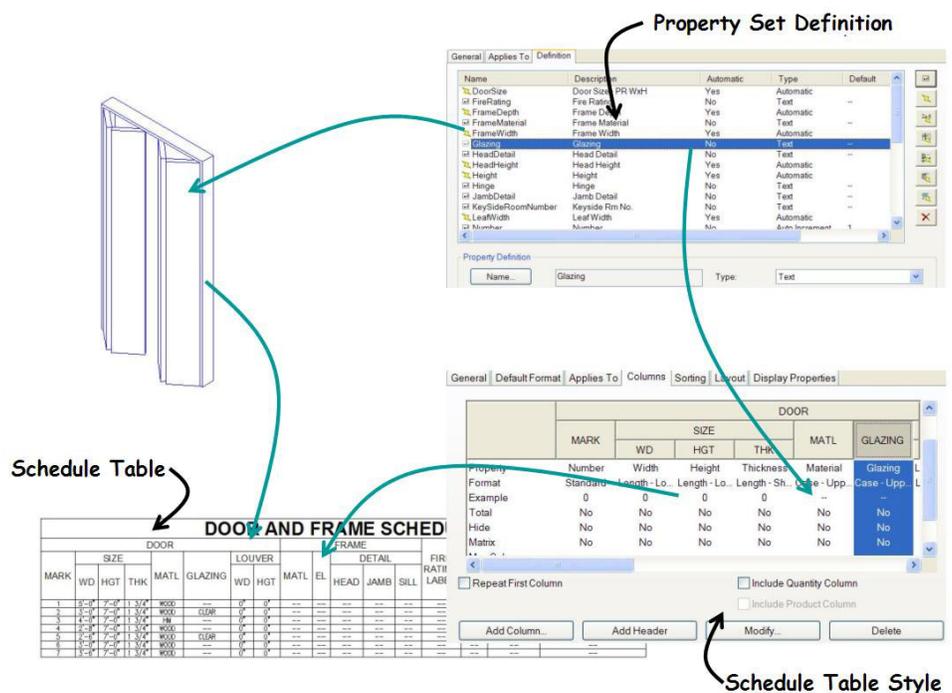


Schedule Table Styles define the appearance and contents of a schedule, and what types of objects can be included. It is in the schedule table style that you define the columns, their order, text formatting, lineweights and color, schedule title, sorting, etc. You cannot create a complete schedule table style until you have defined one or more property set definitions that apply to the object type(s) for which you are creating your schedule.

- Schedule tags** (or object tags) are annotation items that will reflect property data that is attached to an object. For example, if one of the properties of a door is its door number, then a tag can be created that will reflect that value. Editing the door's property data and changing the door number will update both the schedule and the tag associated with the door. These tags are placed using a tag anchor, however this is a fairly automated process and invisible to the user.

How It All Fits Together

Now that we've got some of the terms taken care of, how do they all interact? A Property Set Definition defines the bits of data that we want to be able to show in a schedule. In the schedule table style definition, these properties can become columns. When the properties are attached to an object, the schedule table that is based on that schedule table style will display those bits of data. The illustration to the right shows the relationship, but essentially the most critical aspect of the whole scheduling mechanism is the existence of property sets.

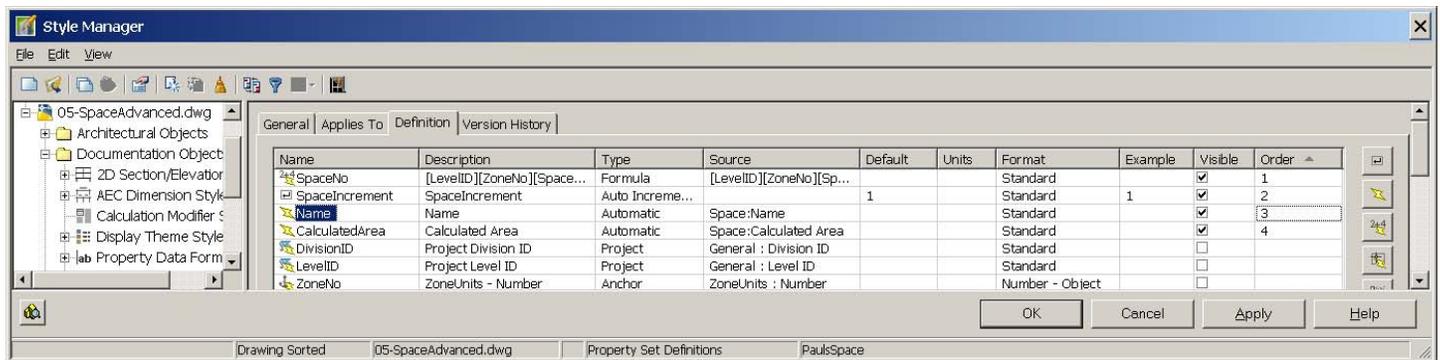


Types of Property Sets

In ADT 2007 there are nine different types of property sets that can be added. These can be found on the definition tab of the property set in Style Manager. The Types of Property available are:

Manual Property	A Manual property that generally has to be typed in. Either a Number, Text, True/False or an Auto Increment	
Automatic Properties	The available properties selected for the appropriate object or style.	
Formulas	Formulas allowing the use of VB scripting on values of one or many property sets	
Location Property	The location allow the definition of which space or AEC polygon an object belong to	
Classification Property	The classification of an object can be added to the property set.	
Material Property	A specific material used by the style or object can be added to the property set.	
Project Property	Add a project specific property such as the Drawing Level	
Anchor Property	Add the property of the another such as a wall that your Door or Window is Anchored in.	
Graphic Property	Add a graphic such as the Door Elevation	
Delete tool for Properties	Delete any property from the property set.	

There are various new feature in the property set dialog such as "Visibility" and "Order" which filter if items are visible in the properties extended data tab and in also in which order.



1 - Creating a Property Set

Through the ADT Style manager under the Documentation Objects are the property Sets. For this example I have purged all the default property sets from the drawing and have created a new property sets called "PaulsSpace".

On editing the Property Set three tabs become available.

General tab

- Name: name of Property sets. (Note: Don't use space or special characters in the Name)
- Description. (As required)
- Notes (Specific Notes or Hyperlink to a file.)

Applies To tab

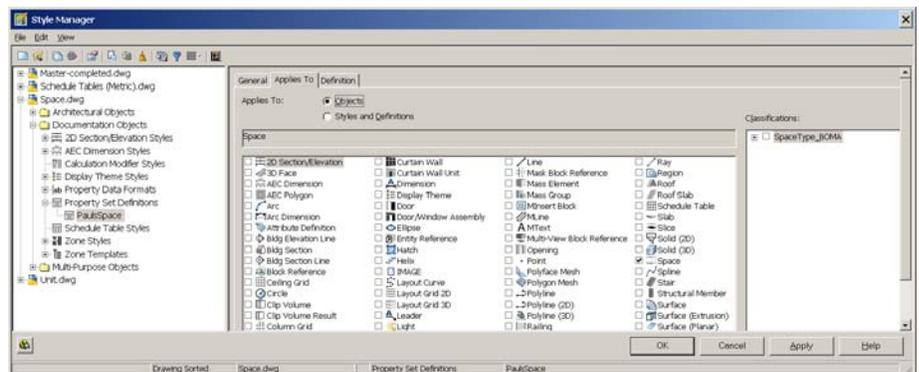
- Object or Styles and Definitions
- Specific Object or Styles and Definitions types
- Classifications

Definition Tab

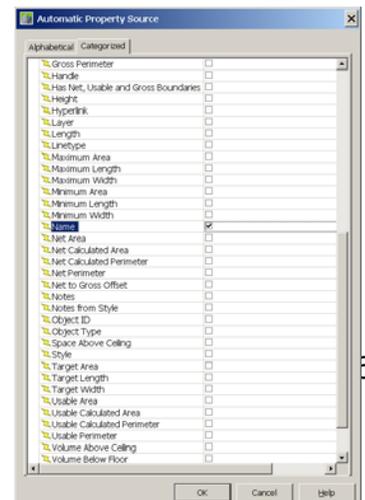
Having created our "PaulsSpace" property set we are going to set the "Applies to" option to "Objects" and tick the "Space" Object. We will then add some Automatic Properties

- Calculated Area
- Space Name

Other automatic properties could be added as required.



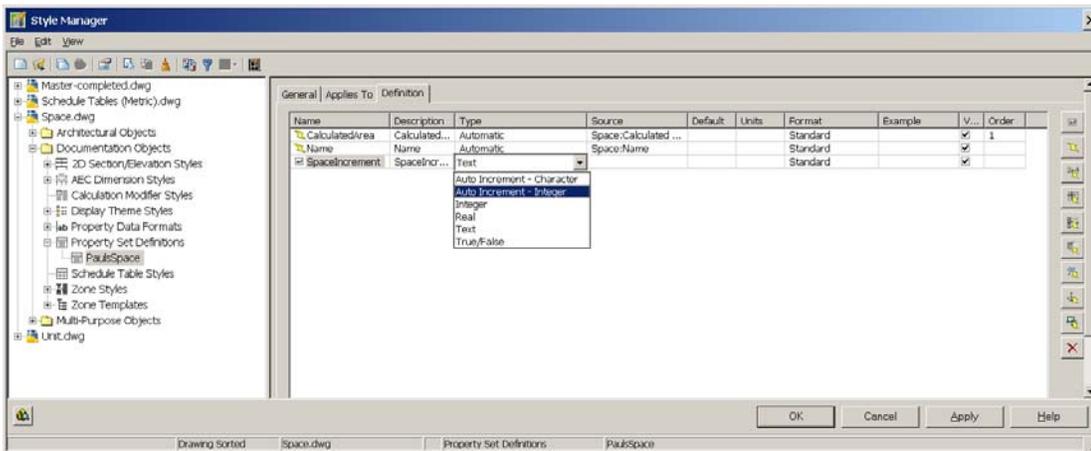
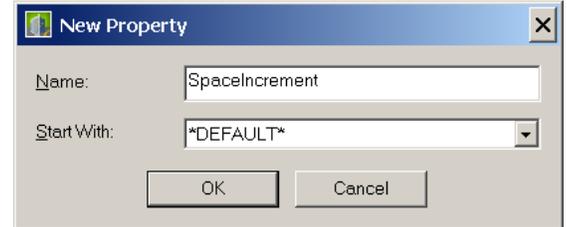
When we select the Automatic property the dialog appears with the available properties for the specific objects. This allows us to tick the appropriate property as required. Use the scroll bar to move up and down the list



Adding Manual Properties

In order to identify each space we are going to add a number that is termed as an Auto Increment. This will provide a unique identifier for each space

To do this we add a "manual" property I have called "SpaceIncrement" and then change its type to be an Auto Increment – Integer. (Number)



We will now save our property set and close the style Manager.

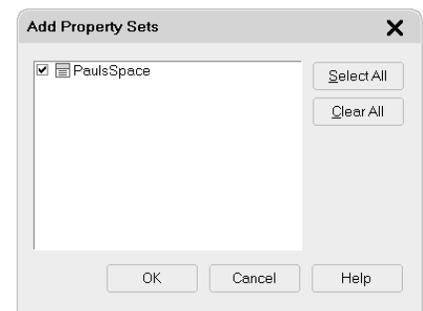
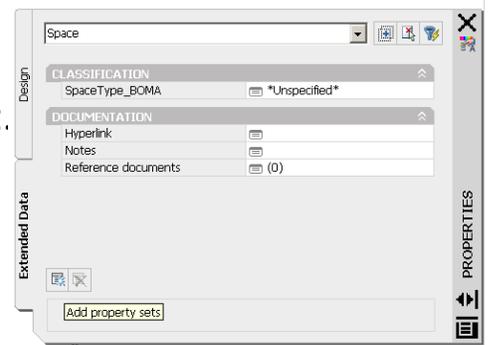
2 – Manually applying a Property Set to an Object.

When you use the predefined tags available within ADT the property sets are automatically applied as you attach the tags.

To apply property sets manually use the extended Data tag from the properties dialog. First select the items that you wish to add the property set to and select the icon in the bottom left hand of the dialog

The Add properties set dialog will then give you a choice of available property sets.

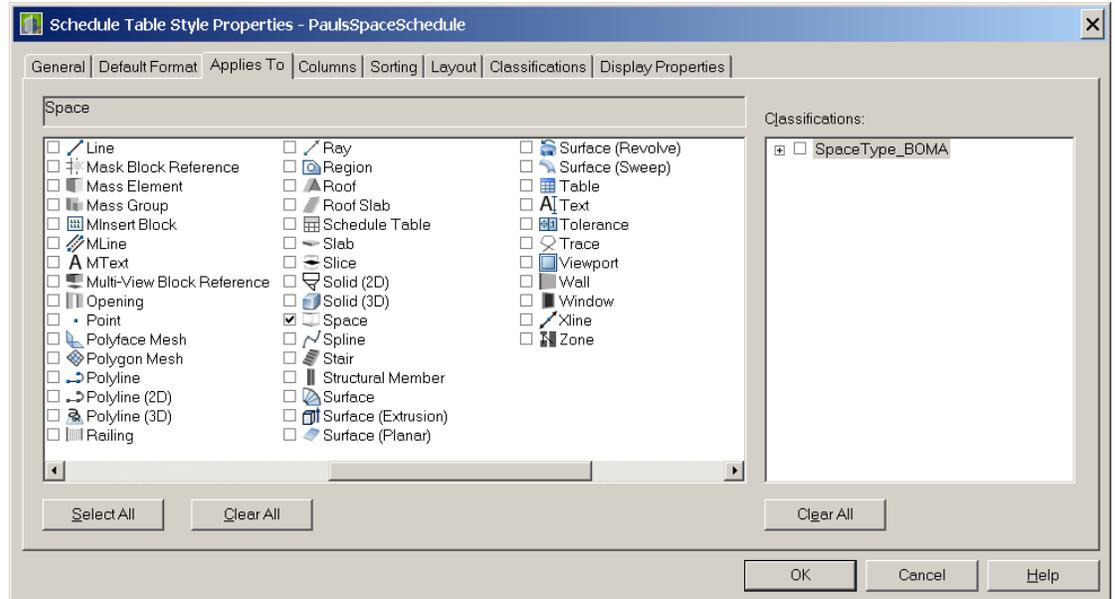
Select the available property set and the appropriate data should now be available in the extended data tab.



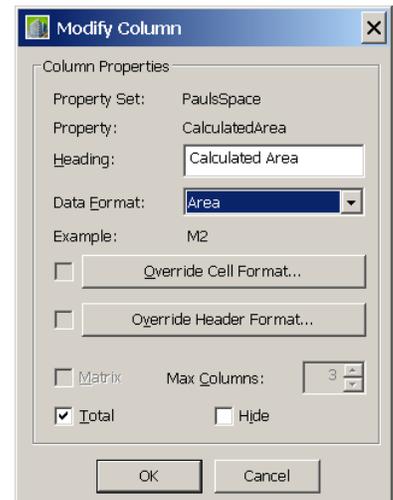
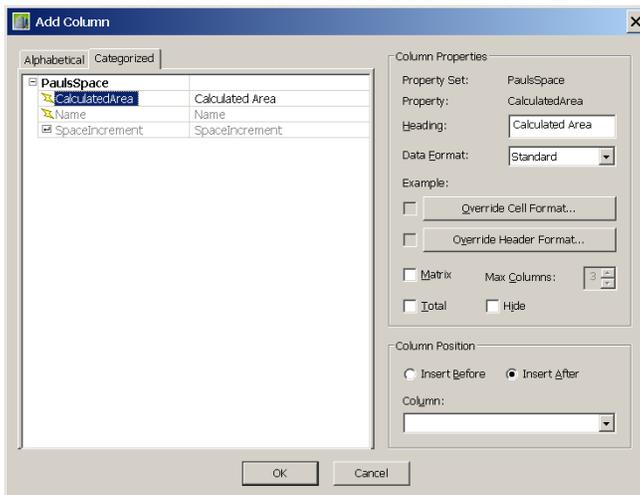
3 - Creating a schedule table

From the Style Manager add a new schedule table I have called mine "PaulsSpaceSchedule".

Edit the schedule. Within the Applies To tab select the "Space" tick box



From the Columns tab select the Add button that brings up the Add Column dialog. This shows all the property sets that are available for that object type. Having selected the three properties that we have created we can then select the column "Modify" button for the Calculated Area property. Select the Data Format option and choose the "Area" data format and also tick the totals button. We can now add our schedule table and see the results.



4 - Data Formats

The **Data Formats** control how a property appears in a schedule. A space Calculated Area may give the result of 9.64321 in the extended data tab. For the schedule table a data format can be applied to turn that raw property to cause it to be reported as 9.64m² in the schedule. In most cases, you should not have to create a new data format style, since several already exist in the sample style drawings and templates that come with Architectural Desktop 2007.

In order that the Area displays with out any decimal places we will create our own data format style called Area2 by copying and pasting the existing Data format style in the Style Manager. We will then change the precision to 0 decimal places. Also the M2 symbol in the default is a bit clumsy. We will therefore cut and paste from Word a suitable "m²" text.

Remember that if you wish to use specific calculations with Formulas that it may be better to apply a data format after the calculation or errors may occur with the result.

5 - Using Other Property Set creation Options.

We have looked at the basic Manual and Automatic Property Sets that are available to us. We are now going to add some additional property sets using the other options. Whilst within a small project manually applying room numbers etc can be carried out on a larger project it is more economical to apply a hierarchy of numbering. An Example of this for room numbers could be:

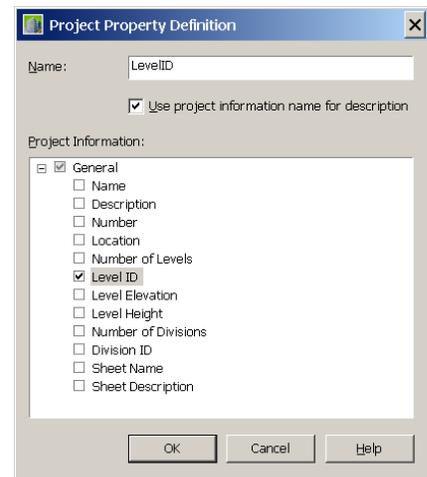
Project Level ID – Project Division ID – Zone Increment – Space Increment

In order to do this we will look at the Project property Definitions and also the anchor Property definitions.

Project Property Definition

The First of these we will apply is the Project Property Definition. For this to work the drawing must be part of an ADT project (Using Project Navigator).

Add a Project Property Definition and select the "Level ID" property from the list available. Apply and the relevant information will become available. If the ***NO PROJECT*** appears in the properties then the drawing does not belong to an ADT Project.



Anchor Property Sets

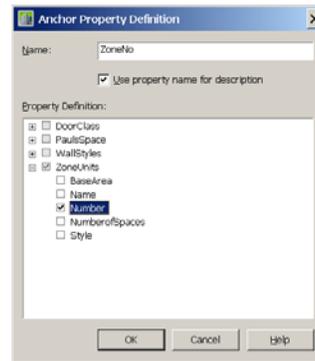
In order for an Anchor property to work objects must be anchored to one another. For objects such as Doors and Windows within Walls this happens automatically. However as we wish to Anchor Spaces to a Zone this must be carried out as a manual exercise using the anchor objects tools.

Also because we wish to get information from the Zone object we need to create a property set definition for the Zone in order to extract the Zones Number. The Property Set called "ZONEUNITS" has been created with the following automatic properties plus and Auto Increment for numbering.

Name	Description	Type	Source	Default	Units	Format	Example	V...	Order
BaseArea	Base Area	Automatic	Zone:Base Area			Standard		<input checked="" type="checkbox"/>	
Name	Name	Automatic	Zone:Name			Standard		<input checked="" type="checkbox"/>	
Number	Number	Auto Increment - Integer		1		Standard	1	<input checked="" type="checkbox"/>	
NumberofSpaces	Number of Spaces	Automatic	Zone:Number of Spaces			Standard		<input checked="" type="checkbox"/>	
Style	Style	Automatic	Zone:Style			Standard		<input checked="" type="checkbox"/>	

When the Anchor Property option dialog is selected a list of the property sets available is shown.

Select the appropriate Property (Number) from the Property sets.



Adding Formulas.

In order to complete our room Number we are now going to use the formula option and select the various properties that apply.

These are:

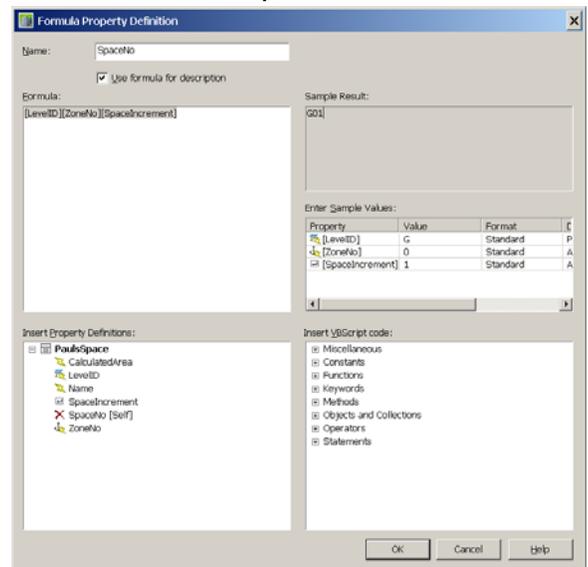
- LevelID
- ZoneNo
- SpaceIncrement

By adding sample values for each of the properties we can test if the formula works. Be careful when using separators such as "-" as depending upon the data type the formula may try to work out the sum.

Example

You are expecting to see 1-10

The result you get is -9.



6 - Creating a Custom Tag

Having created our own Property set and Schedule table for our spaces the only item left is to create our own custom tag. Traditionally this was a cumbersome exercise as the tag is a multi-view block that in turn references a block that has attributes that reference the property set and property definition. Use the explode command on an existing Multi-view blocks to see how they are made up.

To start off with you need to create some graphics for the tag made up of text and lines etc. As these are to be scaled dependent using the drawing scale it is necessary to draw them at one to one. The text size is generally approx 1 unit so the size of the graphics will be very small.

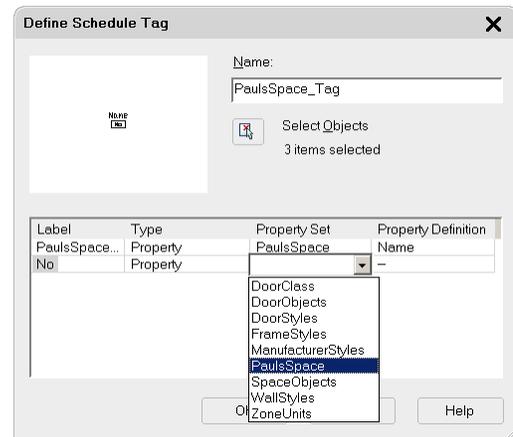
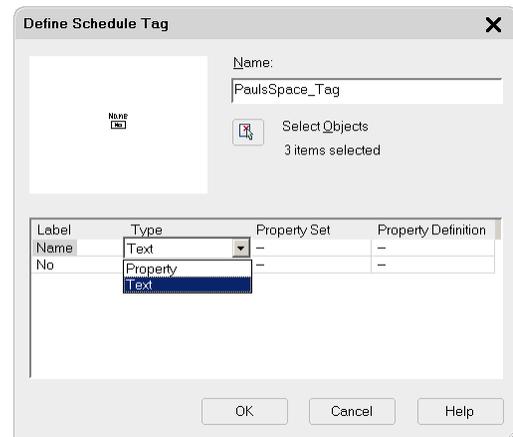
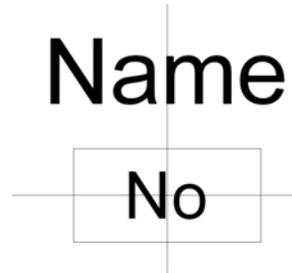
From the Format Menu select the "Define Schedule Tag" command. You are then prompted at the command line to select the objects to create the tag from. I have created two Mtext objects called "Name" and "No" and a polyline.

Having selected the text and graphics a dialog appears. Give the Tag a name. There is also an option to select or deselect objects if a mistake was made with the original selection.

On the Type combo box change the Text field to Property. Then select the adjacent Property Set box from the next box and finally the Property definition.

Notice that the label updates automatically. Repeat this exercise for the second property.

Select OK and you will be prompted for an insertion point. Select this and the objects will be turned into a multi view block as per your tag.



7 - Scheduling Internal Doors.

Having got all our spaces numbered we are now going to look at creating a property set specifically for internal doors, applying tags and property sets to the doors and then create an Internal Door schedule.

But first what happens if I apply the standard ADT tags and door schedules? Unfortunately I have created all my windows and bays using Window Assemblies because I want full height glazing and specific mullions and transoms etc. The standard ADT Door Schedule looks at both Door objects and Door and Window Assembly Objects. I therefore need to filter the information that is to be scheduled. One option would be to use the Layer filter that applies to the schedules. Such as *A325* for the Internal Doors Layers. However, this is not available for the tags.

8 - Classifications

A better method of defining specific types of data is to use Classifications. As part of the UK specific content there are specific classification objects defined and included for Doors. This include amongst others the following classifications:

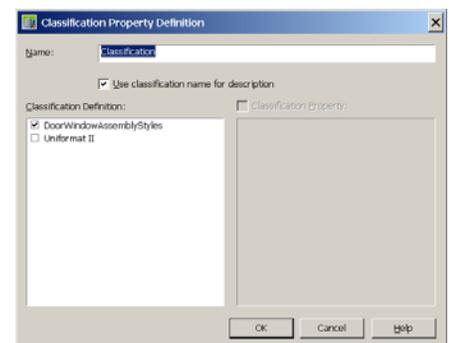
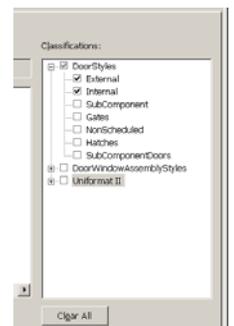
- External Doors
- Internal Doors
- Subcomponent Doors
- NonScheduled Doors.

The classifications have already been applied at UK Style level but you can carry out a similar exercise for your own content.

Applying Classifications

I will create a property set called "PaulsDoors". Classifications can be used two different ways within property sets. The first way involves using the "Applies to" tab of a property set. This acts as a filter and stops the property set being applied to objects of the wrong classification.

The Second method is to add a Classification Property definition to a Property set. This will allow the actual classification to be included either as a Tag or as part of a Schedule. To do this select the add classification button. A dialog with the appropriate Classifications that apply to the objects will appear. Select the Classification. We can now review the results on the extend data tab for the properties dialog.



Note that the classifications selected on the "Applies to" Tab need to match on the property set and the schedule before a column can be added to the schedule.

9 - The Door Property Set

Automatic Properties

Having created our property set and added our classification we will start by adding the Automatic properties.

We will add the following Automatic Styles

- Style
- Height
- Width
- Door-Size -2@WxHxT

This can be repeated to add as many properties as required.



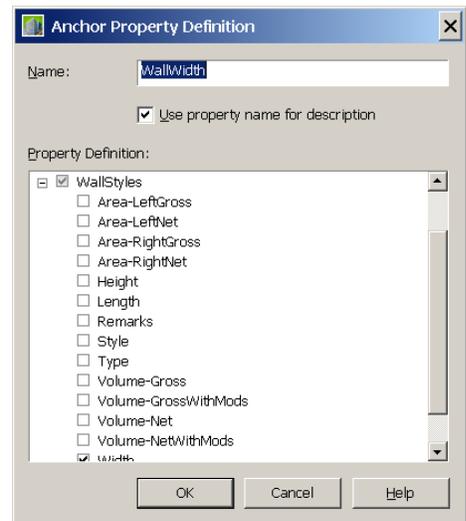
Note.

Many of the properties seem the same but there are subtle differences specifically for the result when different door types are used such as Single or Double leaf.

10 - Anchor Properties

A useful piece of information for the Door Schedule is the width of the wall that the Door resides in. This can be achieved by using an Anchor property. To do this a property set must be available for the Anchored wall and the property set also needs to have been applied to the wall objects or the styles. Default Wall styles property sets exist with the width already available.

There is no need to use the Anchor tool as with the Zones and Spaces as Doors and Windows are already anchored to the wall.

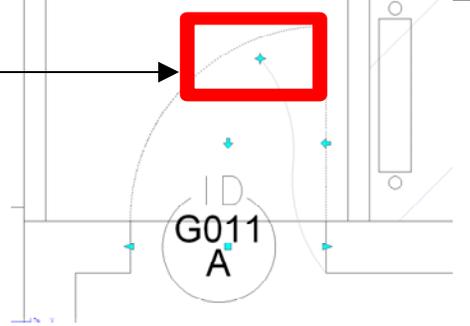
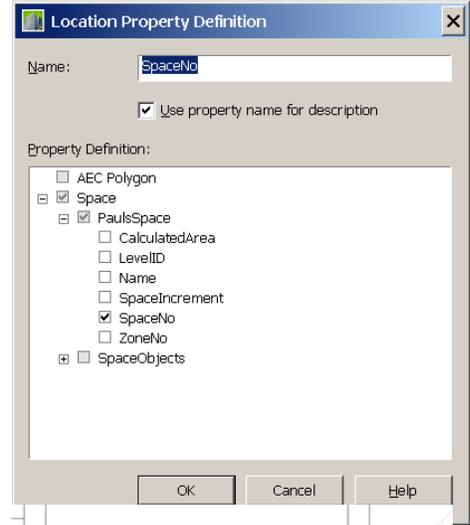


11 - Location Properties.

For Door numbering it is generally worth numbering them in accordance with reference to the space to which they are attached. Even if they are not numbered this way it is worth scheduling in which space the door reside either by name, by reference or both. To aid this ADT provides a Location Property. This looks for either a Space object or an AEC Polygon. Property sets that exist for spaces can then be accessed this way.

When I select the location option, "PaulsSpace" property set that applies to spaces is available. I can then choose the "Name" property definition and then repeat for the "SpaceNo".

Note: If an object has a location property attached to it when the object is selected a star become available to define which space that object is referenced to.



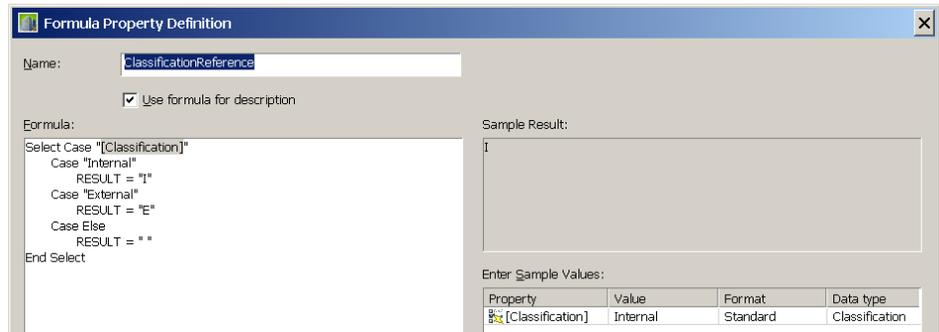
12 - Formulas

The Formulas options for schedules can be used to conglomerate properties as we did for the Space reference. We are now going to create the Door Number by adding the Door increment to the Space Number created for the Space property set. (**SpaceNo DoorIncrement**).

Formulas can be used for lots of purposes such as mathematical equations. Another use is to take advantage of the Vbscript capabilities. Here we are going to test the value of the "Classification" to provide a single character reference for using in the Tag. To do this we use what is called a Select Case statement. Other examples of VB scripting can be found on the Microsoft web site.

Example:

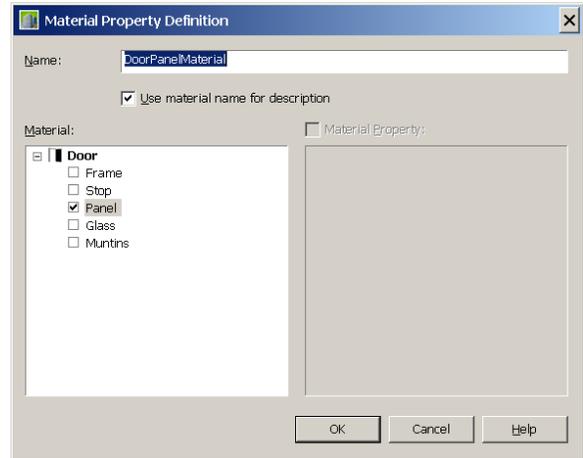
Select Case "Object"
Case "Value of object"
Result "Whatever you want"
Case Else " All other Values of object"
Result "What else you want"
End Select



13 - Material

The material property definition looks at the style of the object and the various components of that object that can have materials applied.

As our schedule refers to only door objects only those components of a door that have materials will be available. Select the appropriate component and the relevant material will be added to the property set.

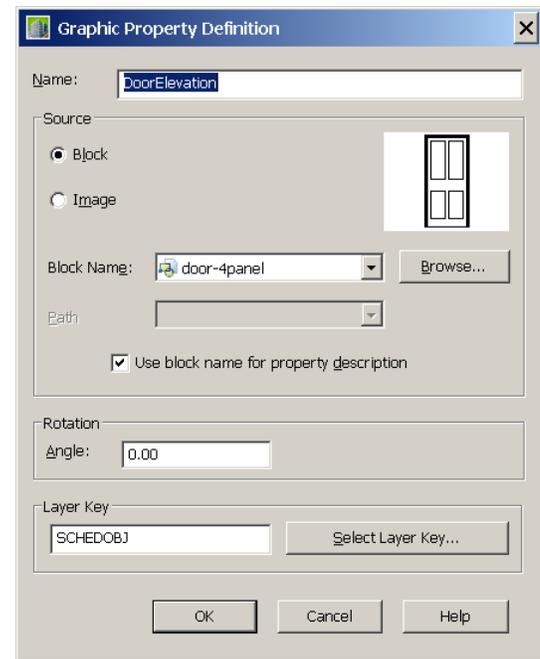


14 - Images

The last of our properties definitions to apply is the image. The actual image to be used can either be an image file in the form of a BMP, GIF JFIF, PNG or Tiff. Alternatively a block can be used.

As most images will relate to the style rather than object specific images we will start by creating a separate property set specifically for Door styles. Ensure that with the "Applies to" Tab that "style" is selected. Also the classification should match that of the schedules. Whilst in theory the classifications need not be selected I have found that images do not always appear if there is a discrepancy between the classifications settings in the schedules and the property sets.

For each of the door styles the property set needs to be attached and the appropriate image for that style defined. This is best done in a central library file for the various styles, which could also store the blocks if necessary.



15 – Creating The Schedule

Having created the property set and applied this to the door styles we can now proceed with creating the schedule table. Create a new Schedule which I have called "PaulsInternalDoorSchedule". Add the columns using the property sets that we have defined. Select the table and edit the style. When adding a column the new property set should be automatically available. Note that if adding a graphic property that the column heading is left blank. Add the appropriate title.

16 - Schedule Table Formatting

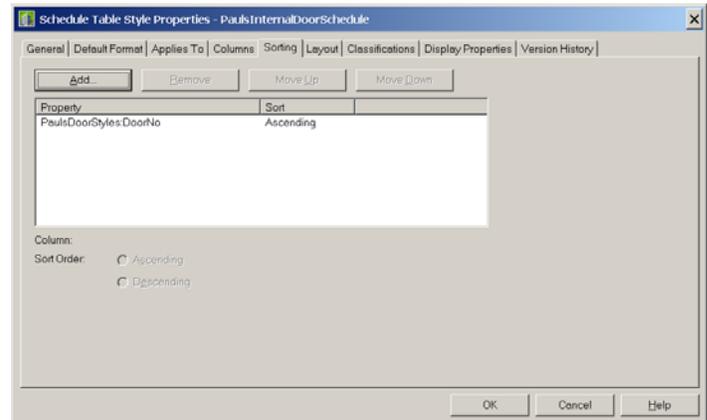
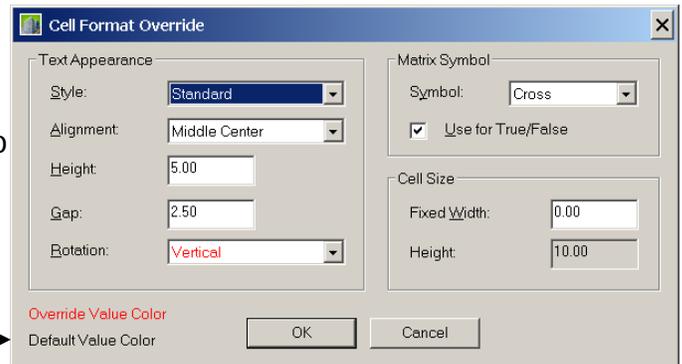
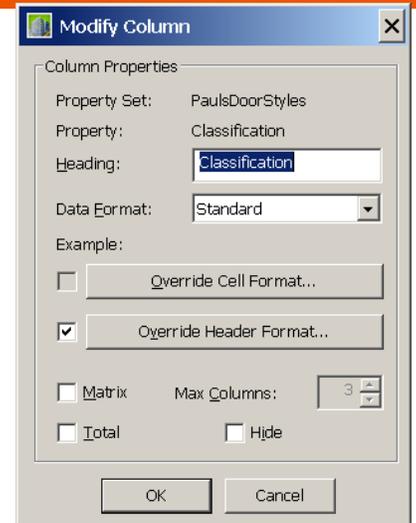
ADT provide full editing features for the text styles orientation etc of the cells column headers and Headers. Whilst editing a schedule table you can select a column and choose the modify option.

There are various options such as using Matrix, a total hidden columns etc. There are also formatting options for the column headers and text including text orientation and styles.

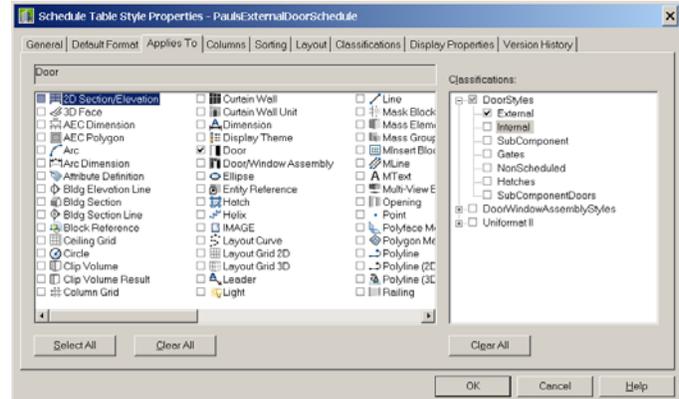
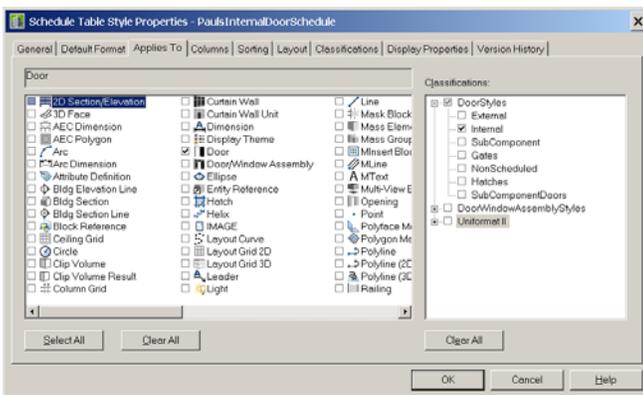
By selecting the override Cell Format option you can customize the specific column cell appearance. If you want to customize the whole table there are also specific options under the tables "Default Format" tab. In this instance we are going to rotate the text to make the orientation vertical

Note that the override is colored red whilst the default values are black.

The other area of formatting we will change is the door number order. By selecting the Sort tab I can add a property. I have selected the "PaulsDoorStyle:DoorNo" property definition and defined that it is in ascending order. If I choose more than one property I can move them up and down with the top property given priority.



Finally we can ensure that the appropriate classifications are correct and apply our schedule to the drawing



By Changing the classification to External and changing the schedule title and title header we can quickly produce a separate schedule for External doors. It is also worth creating a schedule for all doors but with the classifications listed. This is a good way of cross-referencing all your doors across the various schedule.s

Having created our schedule we can now see how they can be applied across the various levels of our project. Note that by changing the level for the drawing in project Navigator how our spaces and doors now automatically update.

We should also centralize our new content into the project styles drawings and then we can create our own custom project palettes with tags and schedules. Use the default tool catalog to add tools to the palette and then change the properties to your requirements.

Finally.

We have covered most of the specific area available with schedule tables and property sets but it is worth looking at further documentations such as Matt Dillon's scheduling guide. Also the AUGI web site is a useful source for further information.

I hope that you enjoyed this session and found it worthwhile. If you have any specific questions please see me after or you can contact me by email as below.

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