



Autodesk® Advance Steel: Automatic generation of drawings using Drawing Processes

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The automatic generation of drawings is one of the most powerful methods to obtain all the drawings from the 3D model, and with the right configuration the customer can get the most from this part of Advance Steel software.

In this class we will explain what drawing processes are and how you can properly use them. Then we will cover the configuration of drawing processes through the Drawing Process Manager, with indication of frequently used options and settings.

This class will also include configuration and workflow tips for an efficient way of using drawing processes.

Learning Objectives

At the end of this class, you will be able to:

- Know the purpose and usage of drawing processes
- Configure the drawing processes and understand the settings and options
- Discover the most used options and settings
- Discover tips and trick on using and configuring the drawing processes

About the Speaker

Emy Nestor has worked with Advance Steel software for more than 11 years, both as part of the Support and Development Team and as end user for very different projects. He joined Autodesk, Inc.'s, Product Support in 2014, helping customers and partners with their questions and problems for Advance Steel and Advance Concrete software products.

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Table of Contents

About the Speaker.....	1
Drawing Process – scope and use in detailing workflow	3
Introduction	3
Drawing Processes (DP).....	3
Configure the Drawing Processes (DP) using Drawing Process Manager (DPM)	4
Drawing Process Manager - General	4
DPM - Access.....	4
DPM - Main dialog box	4
DPM – functions and tools.....	5
DPM and Quick Documents	6
General definition of a Drawing Process	7
Main definition of Drawing Process – Main step.....	7
Object selection.....	8
Detail drawing(s) – Filename selector.....	10
Scales	12
Drawing styles – Detail Style Map	14
Additional steps of a DP	16
The most used options and settings of DPM.....	17
Detail Style Map.....	17
Filename selector / Prototypes.....	17
Alternative Scales	17
Copy and Deep copy	17
Tips & Tricks on using and configuring the drawing process.....	18

Drawing Process – scope and use in detailing workflow

Introduction

After the 3D model is finalized, the next step in detailing workflow is to generate the detail drawings for workshop and erection.

In Advance Steel, a detail drawing is generated by applying a Drawing Style (DS) – a template which contains a set of rules about what is shown in detail, how it should be shown and how it should be labeled and dimensioned.

When you use a DS to create a detail drawing, the workflow is following these steps:

- Select the desired DS to be used
- Select the element that will be detailed
- Set / change the default title, scale
- Select the desired prototype and set the drawing name
- Generate the detail drawing

These steps are the same every time you create a detail, for an assembly, single part or an overview drawing. Even if you can generate the drawings by manually applying the DSs to each element, there is a more practical way to use for medium or large models.

Drawing Processes (DP)

As you can easily see, the steps used to manually create a detail drawing could be grouped in rules, to be repeated automatically for all similar elements in the model.

The Drawing Process (DP) is a template comprised of a set of rules to be applied for automatic creation of detail drawings. These rules establish:

- elements to be selected for detailing
- appropriate DS to be used for each element
- page format and arrangement of details in page
- behavior when the page is full, or the detail doesn't fit into the current page

The power of DPs comes from the fact that most of the time you are able to find or set rules on how certain elements should be detailed, which drawing style to be used and on which prototype. That means you are able to create a drawing process to be used for automatic generation of details in one step, without additional intervention or interaction from you.

Actually, with proper preparation and configuration you can generate all detail drawings by the use of drawing processes only. The ideal workflow is to use 3 buttons for 3 processes:

- All Single Parts details
- All Assembly (Main Parts) details
- All erection / overview details

Configure the Drawing Processes (DP) using Drawing Process Manager (DPM)

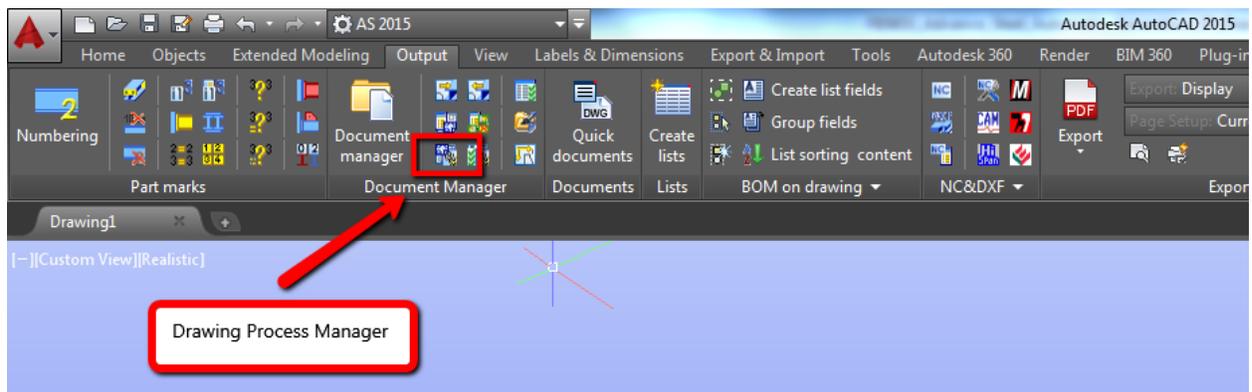
Drawing Process Manager - General

Drawing Process Manager (DPM) is the interface to manage everything about DPs: to show, modify and use the existing DPs, as well as to delete or create new DPs.

DPM - Access

You can access the DPM dialog box from the Advance Steel ribbon:

Ribbon → Output → Document Manager Panel → Drawing Process Manager



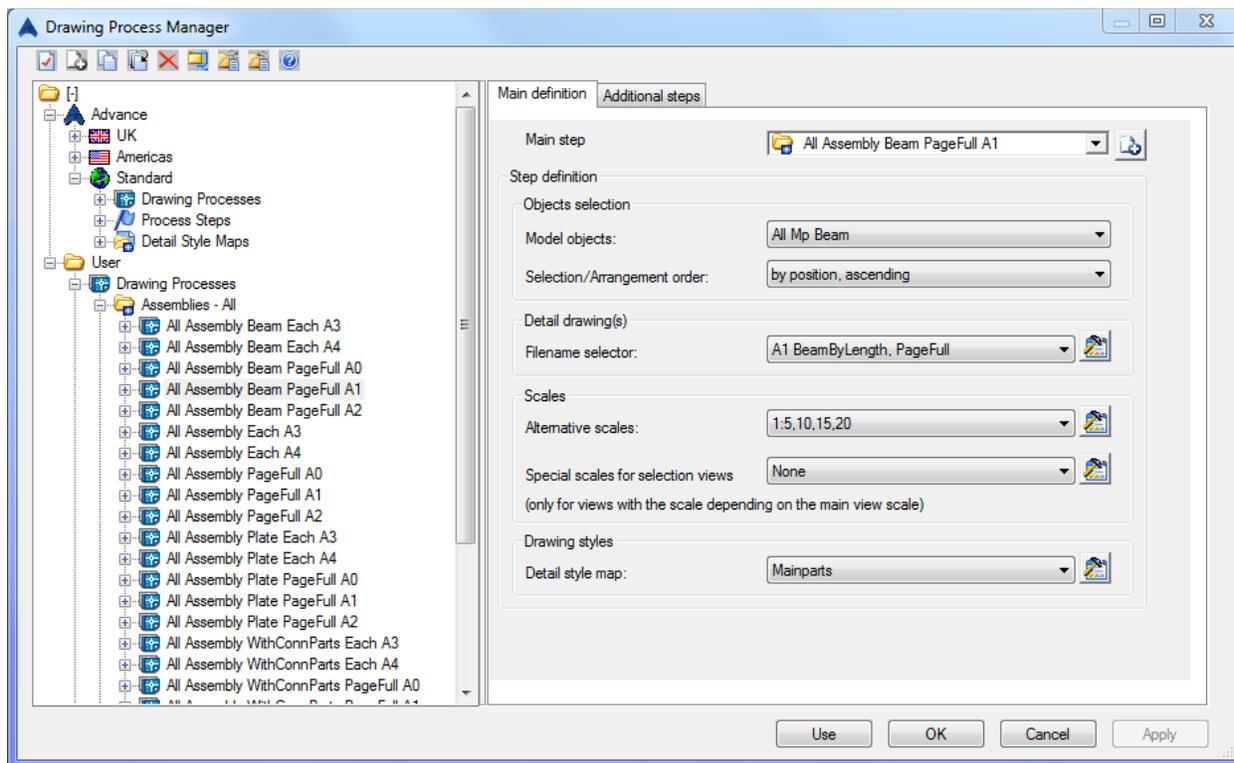
DPM - Main dialog box

The main dialog box of the DPM displays in the left side the processes for **Standard**, **Country AddIn** and **User** categories. Each category has three main sections:

- **Drawing Processes:** you can access the definition of all existing DPs
- **Process Steps:** allows you quick access to the steps definition and configuration
- **Detail Style Maps:** allows quick access to the existing Detail Style Maps definition and configuration

The right side of the main dialog box displays the content of the selected category of processes, or the definition of selected process.

See picture bellow, where you can notice the left side tree with UK, Americas, Standard and User categories, as well as the process definition in the right side of the dialog box.



DPM – functions and tools

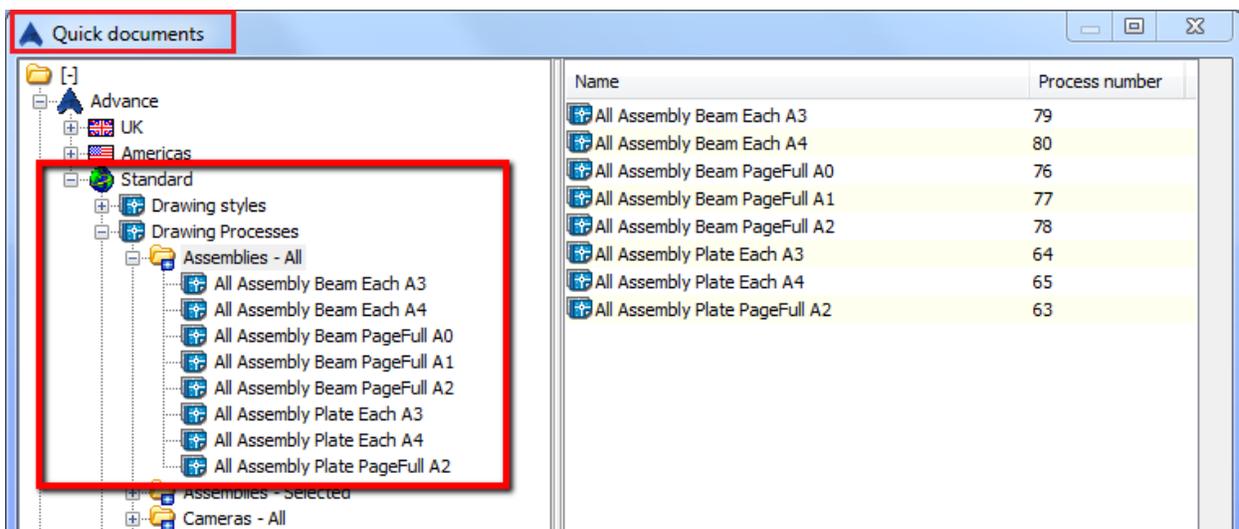
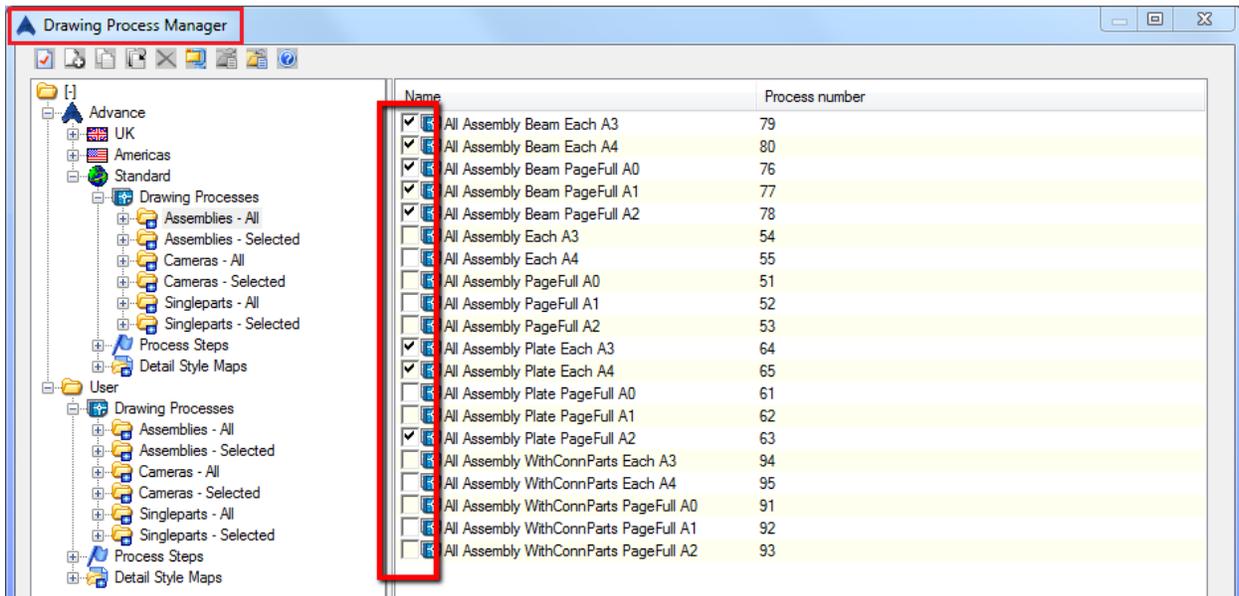
A series of functions are available in the top left side of the dialog box, to be used during configuration of DPs:

- **Properties / Rename:** can be used for a process, a process step or a detail style map
- **New category:** to add a new category for DPs
- **Copy:** to make a copy of the selected DP, process step or detail style map; only the selected level is copied
- **Deep copy:** to make a duplicate of the selected DP, process step or detail style map, with its complete definition
- **Delete:** to delete the selected DP, process step or detail style map; only the selected level is deleted
- **Compact:** used to compact the database which contains the drawing processes
- **Export drawing process:** used to export the configuration of a drawing process in a separate database; you have the option to export the process only or to export the process and all drawing styles that are used by the process
- **Import drawing process:** used to import a process configuration from a database.

DPM and Quick Documents

When select the **Drawing Process** section form any category of processes (User, Standard or Country AddIn), the right side of the main dialog box will display its content, the processes from that category. The checkbox in front of each process name is a flag to mark that the DPs will be shown in the **Quick document** dialog box.

You can select or deselect any process from all categories of processes, as best suit your most used DPs.



General definition of a Drawing Process

The configuration of a drawing process covers the following aspects of automatic generation of detail drawings:

- Selection of the objects to be detailed
- Prototype to be used and arrangement of details in drawing files
- Which DS should be used for which object
- What should be done when the detail does not fit into prototype

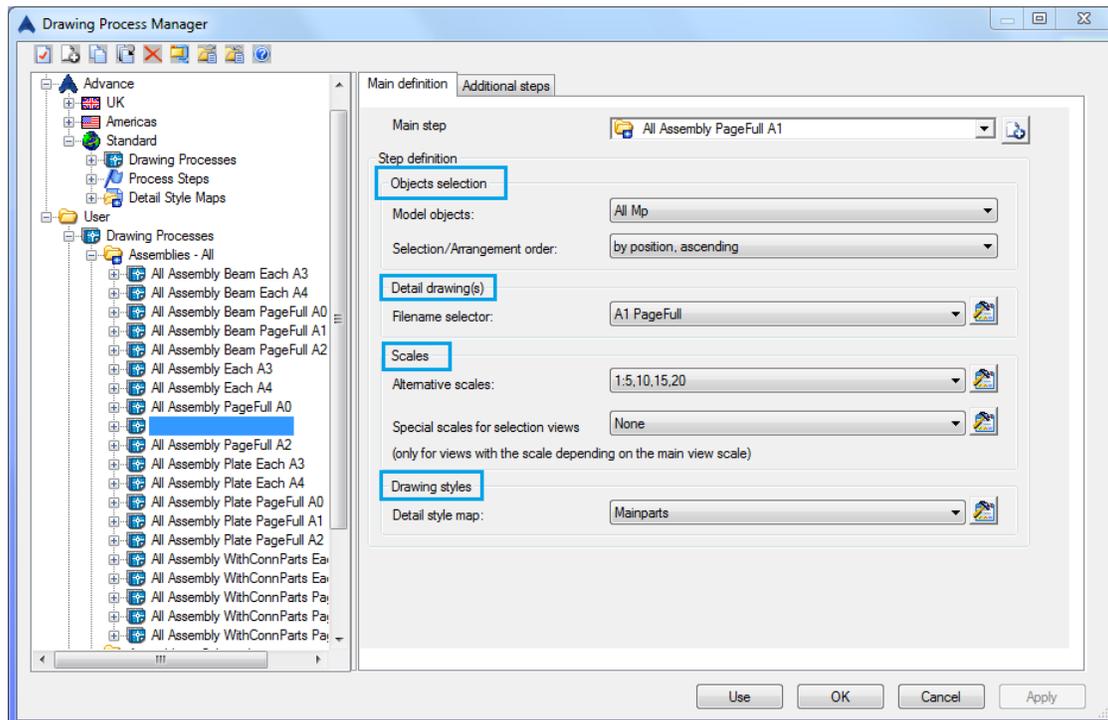
The rules that define a DP are grouped into two tabs:

- **Main definition**, which contains most of the process definition. Here you can select the first step – **Main Step** – that will be used by the process
- **Additional steps** that are used when the generated detail cannot fit in a prototype after applying all main step rules

Main definition of Drawing Process – Main step

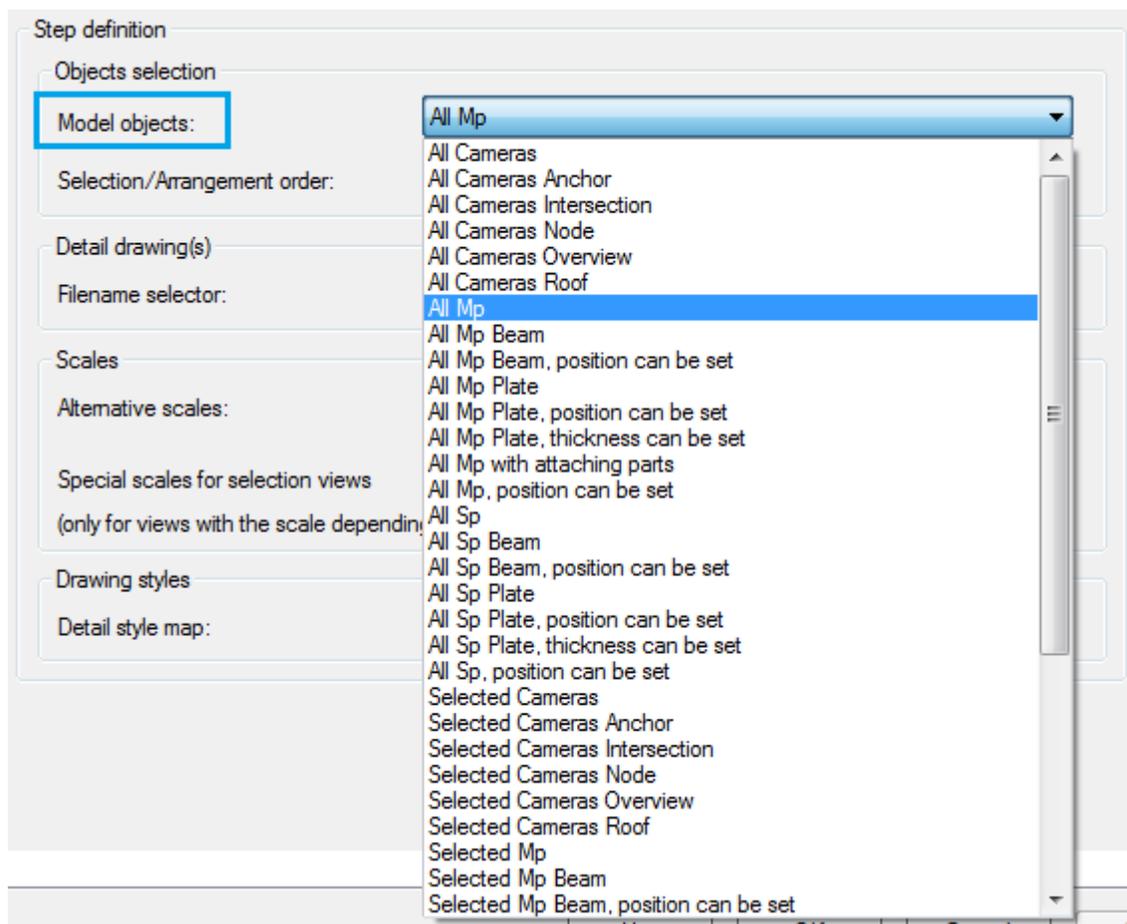
The first step of the process contains all the settings that govern the process behavior and output, until the detail drawing is generated, or the detail cannot fit in the prototype:

- Object selection
- Detail drawing(s)
- Scales
- Drawing styles



Object selection

The **Model objects** drop down list sets which elements will be used / selected to be detailed by the drawing process.



Each option is a combination of settings that filter the elements to be detailed:

- How to select the elements from the 3D model:
 - o **Selected** – the process will take into account only the manually selected elements from the model, prior to starting the drawing process
 - o **All** – all the elements from the model will be taken into account for detailing
- Element type that will be detailed:
 - o **SP (Single parts)**: the process will create single part details / drawings
 - o **MP (Main part – Assemblies)**: the process will create assembly details / drawings
 - o **Cameras**: the process will create view details, using the cameras from the model
 - o **(MP) with attaching parts**: the process will create assembly details and, for each assembly it will create the SP details for the elements that compose that assembly

- **Beam:** only the beams will be taken into account by the process
- **Plate:** only the plates will be taken into account by the process
- **(...) position can be set:** you can specify the range of the part mark to be taken into account by the process; it can be used in combination with MP and SP setting.

Process properties

Selection

All Mp Beam position can be set

Plate thickness [mm]

Minimum Maximum

Part mark 100 150

Drawing number

Drawing number 1

Drawing number increment 1

- **(...) thickness can be set:** you can specify the range for the plate thickness that will be taken into account during the process; it can be used only in combination with the “Plate” option.

Process properties

Selection

Selected Sp Plate thickness can be set

Plate thickness [mm]

Minimum Maximum

Part mark

Drawing number

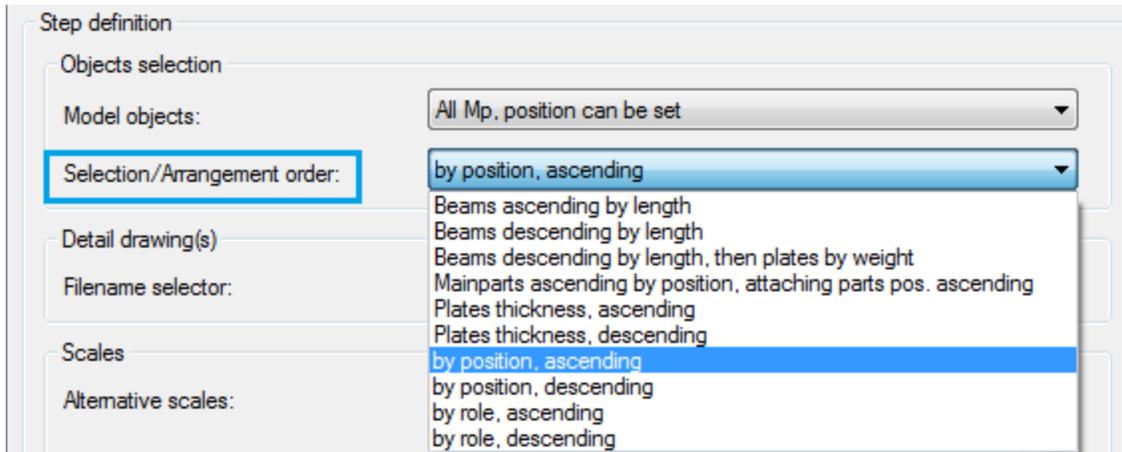
Drawing number 1

Drawing number increment 1

For example, the option “**Selected Mp with attaching parts**” means:

- The drawing process will create detail drawings only for elements that are manually selected prior starting the process
- For each selected assembly, a Main part detail will be created, plus Single part details for all parts that create that assembly

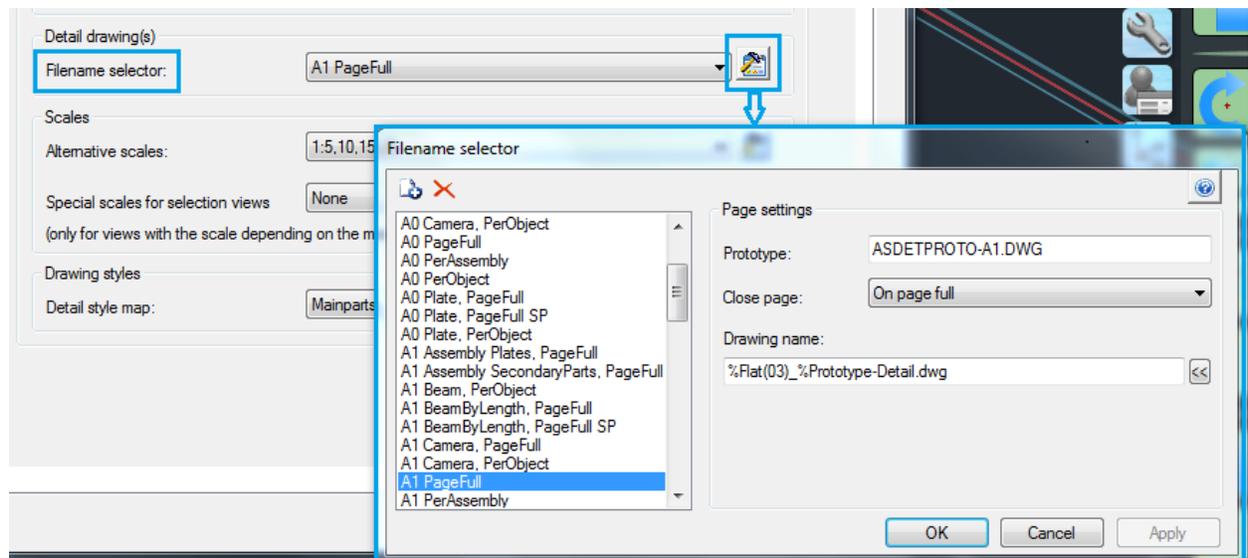
The **Selection / Arrangement order** drop down list sets the sorting of the elements during detailing and the order in which the elements should be detailed.



Detail drawing(s) - Filename selector

The drop down list for **Filename selector** contains the settings for the drawing files created by the drawing process:

- Prototype - file to be used by the DP,
- Close Page - when the drawing should be closed
- Name of the created *DWG* file.



The **Prototype** field contains the filename of the prototype drawing that will be used by the process step.

Please note that the filename should contains the extension “.DWG” !

The **Close page** drop down list sets the behavior on closing the drawing during detail creation:

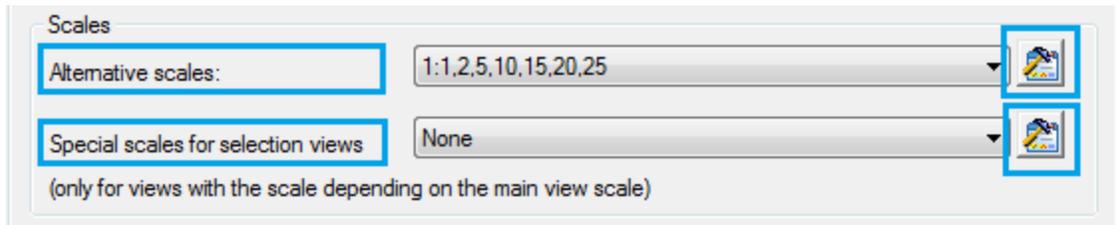
- *On page full*: the details are placed in a drawing until one cannot fit in it. When it is full, the drawing will be closed and a new drawing file will be opened to continue the detailing process.
- *On next object*: the drawing will contain one detail only. This option is used to create one detail per drawing.
- *On next main part*: this option is used for process type “MP with attaching parts”. The drawing will contain one assembly detail and the SP details for all parts that compose the assembly.

The **Drawing name** field sets the name of the created drawings. A combination of tokens and texts can be used.

The available tokens to be used for filename are:

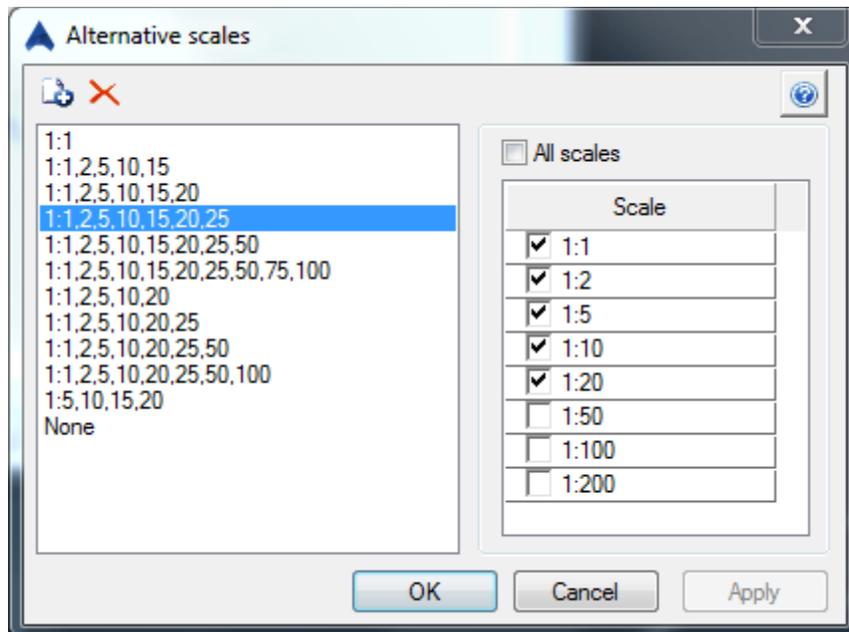
1. **Flat (%Flat)**. This token is a counter for the pages detailed by the process. It requires a parameter that defines the maximum digits for the number of pages. For example, if this token must be used for more than 100 pages, then the token should look like “%Flat(03)” meaning that the counter will start with 001, 002... and will run up to 999.
2. **Position number (%PosNum)**. This token will add the position number of the element. It works for processes that detail assemblies or only single parts on a page. It displays the Main Part mark if the detailed element is a main part, or the single part mark for the others (if the file contains an assembly, then this token will always display the MP number).
3. **Sequence Number (%SequenceNumber)**. This token is used together with other tokens. It creates a sequence of other tokens attached to the name to differentiate them. It can be used, for example, together with Position Number: when two or several drawings contain the same MP number, then both will have the same MP Number, but the sequence number will be 1 and 2, differentiating them.
4. **Single part number (%SinglePartPosNum)**. This token will only show the single part mark, regardless if the element is a main part or single part.
5. **Model name (%ModelName)**. This token writes the name of the model in the detail drawing filename.
6. **Lot phase (%Assembly)**. This token writes the value from “Lot/Phase” field from Advance Steel Properties of the detailed element.
7. **Prototype / page format (%Prototype)**. This token writes the prototype format.

Scales



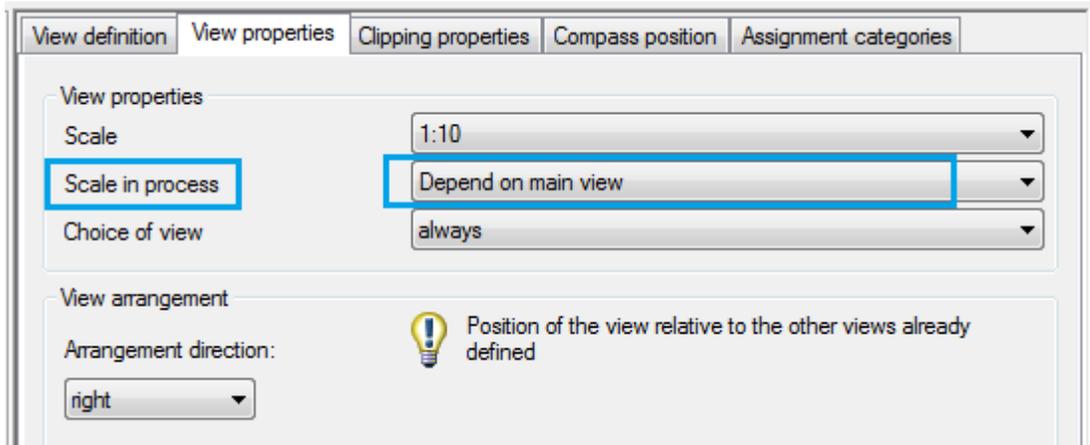
A drawing process creates the detail with the scales of the used drawing style.

The **Alternative scales** represent a set of different scales that will be used in case the detail does not fit in the drawing page (prototype) with the original scale of the drawing style.

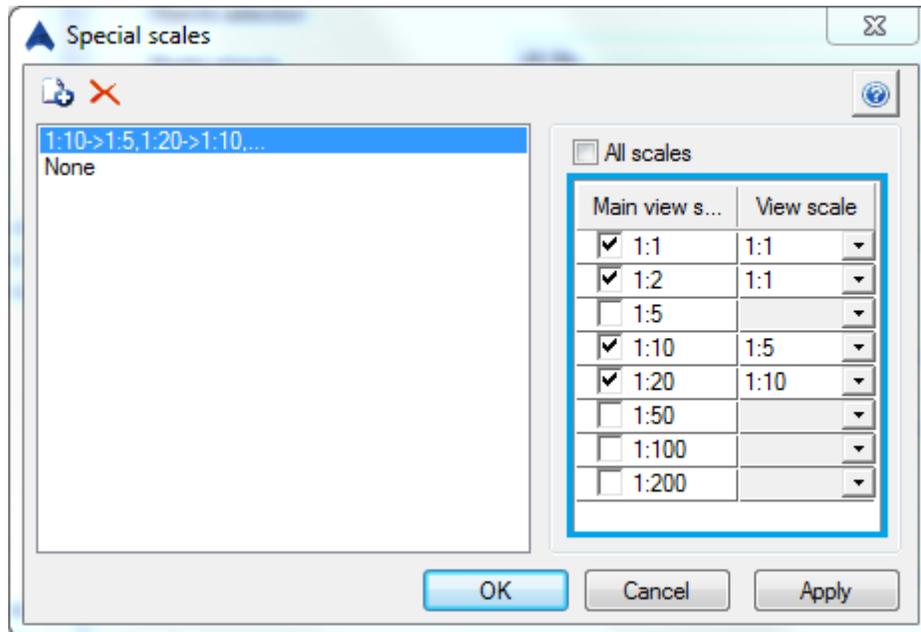


In the example above, if a DS is using the scale 1:5 and the detail does not fit in the prototype, then the scales 1:10 and 1:20 will be used to try and fit the detail into the drawing.

You can have a drawing style that is using one scale for the main view(s) and a different scale for another view. For the second view you can select the option “**Depend on main view**” for the behavior in process. See the bellow picture from Drawing Style Manager.



In this case, when a process is using an alternative scale for the main view, it will look for a corresponding scale for that second view in the option “**Special scales**”.

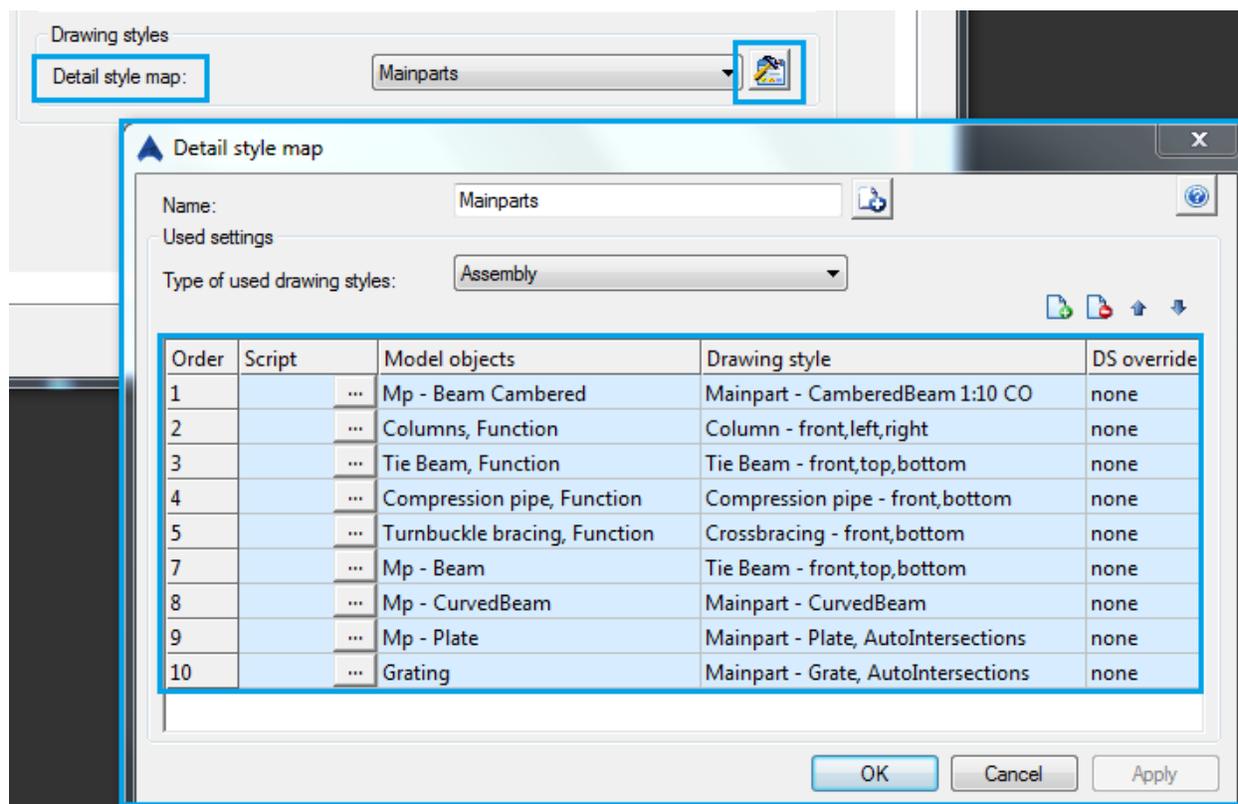


In the above example, when the process is trying to create the main view with scale 1:10, the scale 1:5 will be used for the view that is dependent on the main view scale.

Next, for 1:20 scale of the main view the scale 1:10 will be used for the dependent view.

Drawing styles - Detail Style Map

The **Detail Style Map** contains the drawing styles that will be used to create the detail drawings for the elements that are selected through “Model selection” option of the process step.



Each line from detail style map is a rule that will assign a drawing style to the elements that comply with the conditions set by the **Script** and **Model objects** fields. The rules are applied in order, according to the **Order** column.

That means that if an object complies with the conditions from Script and Model objects, it will be detailed with the corresponding Drawing style and the rest of the rules will not be evaluated further.

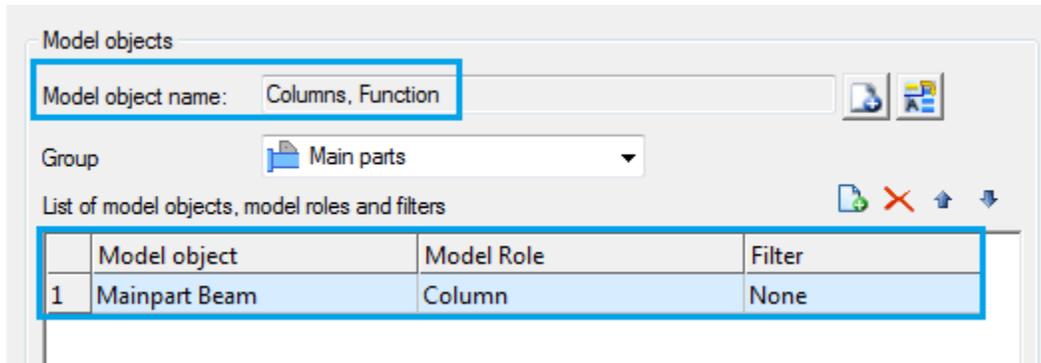
The **Script** field can contain an expression, written using Microsoft VBScript language that will be evaluated for each element to be detailed, prior to going to the column Model Objects. It works as a “True / False” filter:

- If the script expression returns “True”, the element will be sent further to the Model object column for evaluation
- If the script returns “False”, the element will be sent to the next rule of the detail style map.

Please note that some programming skills are required to create scripts.

The **Model objects** are predefined sets of elements from the 3D model that can have specific functions or model roles. The model role definition is found and managed in the Drawing Style Manager (DSM).

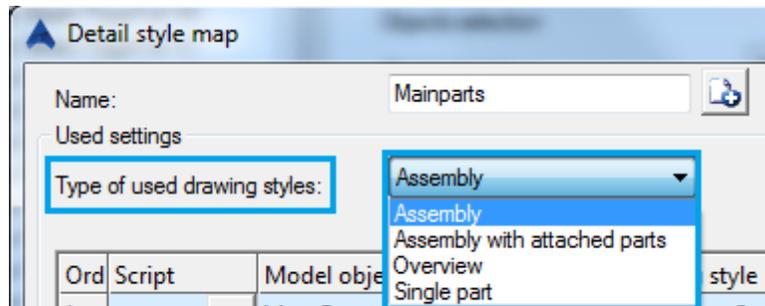
As example for the above Detail Style Map, the model objects “*Columns, Function*” represent the beams that are also main parts and have the model role *Column*. See bellow picture with the definition from Drawing Style Manager.



The column **DS override** from Detail Style Map rule is not used at this moment.

In addition, for each Detail Style Map you have to select the appropriate type of detail style from the drop down list **Type of used drawing styles**:

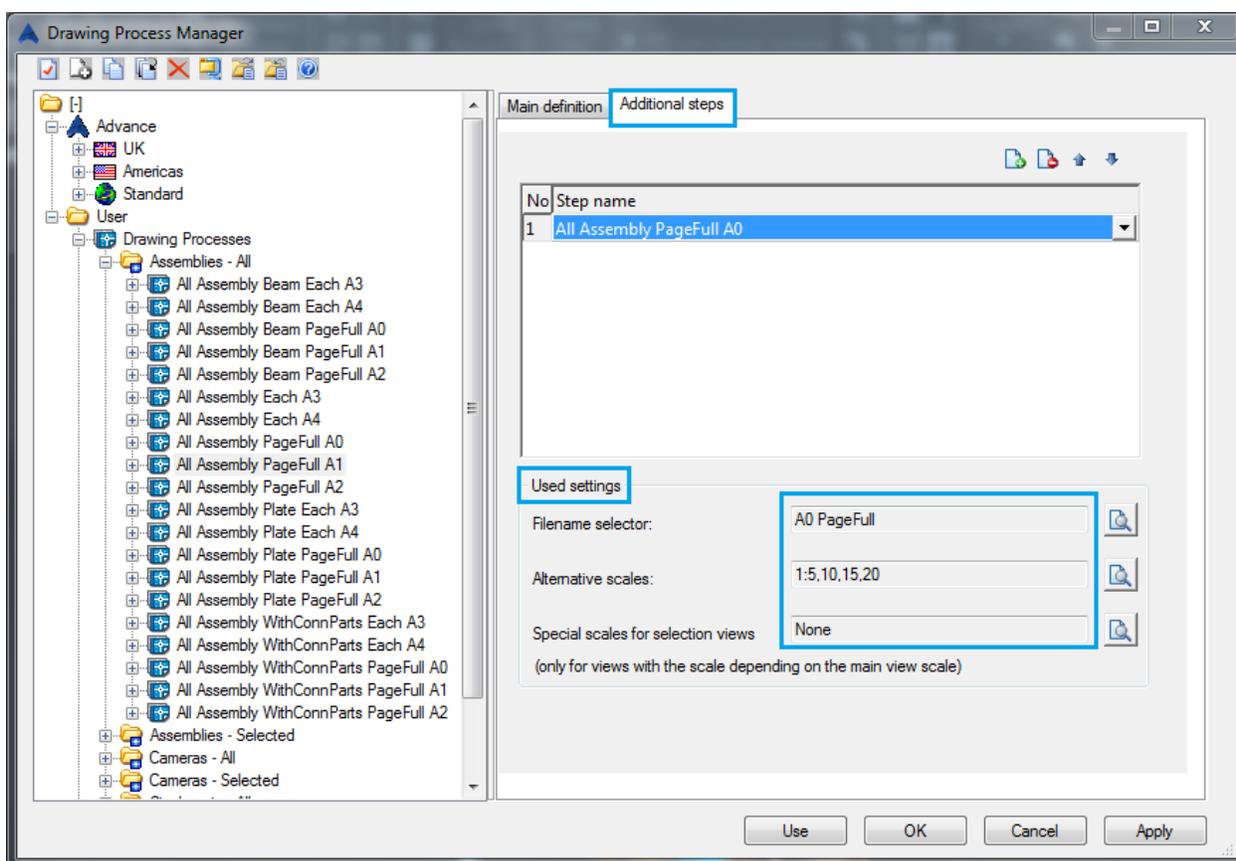
- Assembly
- Assembly with attached parts
- Overview
- Single part



Additional steps of a DP

The **Additional steps** tab is used only when the generated detail cannot fit in a prototype, after applying all main step rules. The workflow is as follow:

- The process creates the detail according to the Detail Style Map rules, using the scale of the applied DS.
- If the detail cannot fit in the prototype, the alternative scales are used, if any
- If after applying all alternative scales the detail will still not fit in the prototype, then the process will look for additional step(s) and it will continue trying to fit the detail in the Additional Step prototype. See picture bellow.



From the Additional Steps, the process will only use the settings regarding the Filename selector, Alternative scales and Special scales.

You can only see the settings that are used from the additional steps, but you cannot modify them here. You have to go to the Process Step definition to change the process step configuration.

The most used options and settings of DPM

Detail Style Map

You can look to all DP options and settings like this:

- **selection of elements:** single parts / assembly / overview
- **the prototype** used to create the detail drawing, including **when to close** the page (after each detail or when it is full)
- **the drawing styles** used for each detail (**Detail Style Map**)
- and details – all other options

When you first create the process, you will go through all the options and settings. The result of the drawing process is influenced by all of them. However, once you have a relative good process, modifications will be mostly made for the **Detail Style Map** – the appropriate DS for each element.

Often areas where you notice that you can make improvements will be located in the generated details:

- the presentation or labeling or dimensioning of some elements can be improved
- you can create or import new drawing styles
- you can find an existing DS that can be used instead of the current one
- you could want to change the DS only for some specific elements / model objects

For all these, you will access the Detail Style Map definition – to read the information in it, or to modify the current configuration. You may want to get used to the settings and behavior of Detail Style Map right from the beginning of the configuration.

Filename selector / Prototypes

Most companies have their own rules and templates about the drawing page header, layout and drawing filenames. That means the default settings from the filename selector will not be suitable “as they are” for your projects. Either you can modify the prototype(s) or the drawing filenames, or you will have to adapt the Filename selector accordingly, for all the processes you use.

Alternative Scales

Many companies have specific rules or restrictions about the scales that can be used in a detail drawing. As example, there are countries where the scale 1:15 is not used / desired.

So, at least in the beginning, you will want to verify and customize the allowed alternative scales that could be used by a process.

Copy and Deep copy

The easiest way to learn the process configuration, but also to add new processes, is to start from an existing process and “play” with the available settings and options.

Since you do not want to change the existing configuration, you will use the **Copy** and **Deep copy** functions quite often. It is best to get used with the difference between these two functions.

As example, if you copy a process step, you can select different options for the new step (a different filename selector or detail style map) without affecting the rest of the processes. But if you change the definition of the detail style map, you will affect both the new steps and the original steps.

Tips & Tricks on using and configuring the drawing process

1. **Test the existing DPs** on a real project; see the result of each process and the options used in their configuration. This is the fastest way to learn how to use the processes and **what options are important for you**.

2. **Use the processes as a checking tool**. After you have created the details using the processes, do not start the detail finishing phase. First, open all details and take a look at them. A “survey look” to the titles, to the details as they are, to the scales, to the part marks. No need for a very deep check at this phase.

That will allow you to discover some errors that were not seen earlier. And at this stage it is much easier to delete all details, change the 3D model or the process configuration and create the details again. And repeat the checking process. It is worth the time.

3. Take a look at the **drawing processes from other countries**, besides your standard installation. There are different processes, different settings and configurations, specific to each country.

Even if they may not apply for your projects as they are, for sure they can be a **source of ideas** for your configuration. Just by seeing what is different in their settings might inspire you to further customize your own.

4. **Note your remarks and ideas** about the drawing process results **right when you have them**, preferably when you use it to generate the details for a real project. Even if you do not have the time to change the process in that specific moment, the ideas captured during the project are the most relevant for you and your workflow.

5. **Review the existing options in DPM** from time to time. You will become more aware of some options that could be better used for your next project and your processes.

6. **Study and adapt the used Drawing Styles (DS)**. The processes are used to create the details automatically, in the right format and with the right DS, without your intervention.

What the detail actually contains is governed by the drawing style that was used. So, you will want to study the DS configuration and Drawing Style Manager options and setting, in order to be able to customize them as you need.

7. **Configure your “Auto page” processes**. You have already processes using different prototypes (or you will configure your own). To create an “Auto page” process you have to add in the “Additional steps” tab the steps using the bigger formats.

As example, for a process using the A2 prototype in the main step, you will add the additional steps that are using A1 and A0 prototypes. If the detail will not fit into A2 prototype, then the A1 prototype will be tried and afterwards the A0.

This type of process is most useful when you want one detail per page (one single part or one assembly per drawing).

8. After you have configured a process type **“Selected (MP or SP ...)”**, create an equivalent process type **“All (MP or SP ...)”**. And vice-versa. Sooner or later you will discover that you want both processes, for different situations. The best moment to create the second one is right after you finalized the first process, when it is still fresh in your mind.

9. Make sure that **the drawing process creates details for all elements**. That means that the Detail Style Map will start with the most restrictive rules, but in the end it must have rules that will accept all the elements. In this way, you will not have elements in the model that are not detailed.