AxGlyph Help

A Professional Graph/Diagram/Chart Editor

$$A = \sum dA = \int_a^b y\,dx$$

Catalog

1. Introduction

1.1 Installation

Before starting the installation, please exit all running AxGlyph, MS Word and PowerPoint processes. Then double-click the package and follow the prompts to complete the software installation.

The first version of AxGlyph was released in 2016, some anti-virus softwares may be too sensitive to a new software release so that warnings would pop up during the installation process. The installation package downloaded on our official website (http://www.axsoft.co) is secure and you can install it with confidence. You can scan this installation package to ensure its security before installation.

AxGlyph needs to read and write the registry of the system. If the system or security software pops up a warning, please select "Allow all operations" or similar options.

If you need to uninstall AxGlyph, please go to the installation location of AxGlyph to find the uninstaller uninstall.exe and run it to complete the uninstallation. A shortcut to this program can also be found in the Start menu of the Windows system.

System requirements: Windows 7 or newer, including Windows 10.

1.2 Register

The shared version of the software provides all core functions and basic editing tools. You can use it free of charge without time limit but its functionality is limited in some way. The licensed version is a better solution if you want to work efficiently with illustrations. The following list shows the functions that are only available in the licensed version.

1. Cut, Copy, Paste
2. Undo/Redo
3. Capture Picture
4. Magnets
5. Layer Manipulation
6. Remove Watermark
7. Exporting Pictures with PNG, JPG, GIF, TIFF and EMF format.

To use a licensed copy of AxGlyph on a specific computer, you must firstly activate your copy on the machine using a key. The key will be binded to the computer and can be used once again to activate the same computer but can not be used to activate another computer.

1.3 Upgrade

We do not provide online incremental upgrading, but you will be notified if there are new releases. You need to download the latest installation package and do a reinstallation to upgrade the software. Please visit our website www.axsoft.co for detailed upgrade information.

1.4 Main interface

The main interface of AxGlyph consists of a main toolbar, a toolbox panel, a workspace canvas and a right side bar. The right side bar can be switched to the layer management panel（ ![layer icon] ）, the graph property editing panel （ ![property icon] ） or the animation parameter editing panel (![animation icon]).
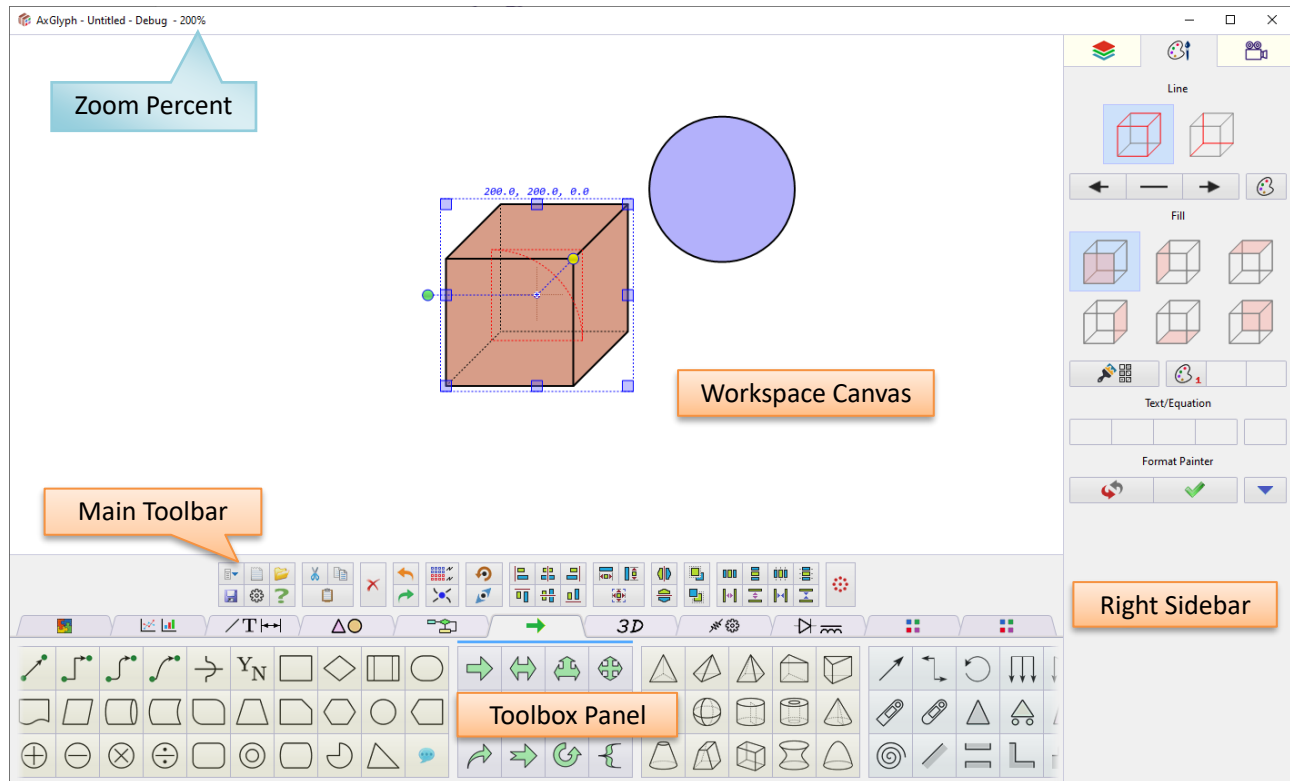
Figure 1.1 Main interface

1.5 Features

Graphs Editing

WYSIWYG

Scrollable, customizable toolbox panel, click to create graphs directly

Support layer operations

Support for templated graph creation, which can generate rich deformation through node control

Support free vector brushes, handling paths, clipped paths and flood fills

Built-in lite version of AxMath* for easy embedding of text and math formulas in graphs

Support freely defined magnets lattice for accurate or semi-accurate drawing

Support flow chart, circuit diagram, logic diagram drawing

Support scientific drawing functions such as curves, wafers, radar, 3D surfaces, 3D curves, etc.

Support memo-board, favorite and library

Support graph searching

Support for parameterized graph editing and animation based on parameter timing

Support for illustration numbering and reference management (MS Office add-in)

   *AxMath is an equation editor and scientific calculator, see www.axsoft.co for more details.

Outputs and Compatibility

Support OLE embedding, can be used as a plug-in for word processing software such as WORD and WPS

Vector output for direct printing or publishing

Can be output as BMP, JPG, PNG, GIF and other common image formats

Support image capture

2. Graph Editing

2.1 Basic Operations

2.1.1 WYSIWYG

AxGlyph is a WYSIWYG graphs editor. All graphs created in AxGlyph are vector formatted except for embedded bitmap image. Each graph remains independently editable.

The AxGlyph presents a borderless canvas with cartesian coordinate system. When a new AxGlyph document is created, the canvas original point, i.e. the point with coordinates (0,0), is automatically placed in the center of the view, marked with a cross symbol. The original point is by default with a magnet point attribute, that is, when the graph control point is dragged to the vicinity of the point using the mouse, it will be automatically grabed.

When the mouse is inside the canvas, you can **scroll the mouse wheel to zoom the view**. The zoom percentage of the current view is shown in the title of AxGlyph window, as seen in Fig. 2.1.

You can **hold down the right mouse button and move the mouse to drag the canvas** (The mouse shape changes to 🖐).

After zooming or draging operations, the origin of the canvas may be outside of the current view. You can retrieve the original point by the context menu command "**View → Auto Fit**", or using the shortcut key **CTRL+F.**

2.1.2 Create a new graph

Clicking a button, which represent a graph template, in the scrolling toolbar, a corresponding type of graph will be created into the center of the workspace canvas. You can also use the left mouse button to drag and drop the icon into the canvas to create a new graph. In this mode, the newly created graph will be located at the mouse release position. For some special type of graphs, such as text/formulas, scientific charts, the edit dialog will be opened automatically after creation.

You can use the shortcut "R" to repeatedly create the same graph. For example, after you create a rectangle using the above method, move the mouse to a new target position (no need to press the mouse button), and then press the shortcut key "R", you can quickly create another rectangle at the new location.

In addition, you can also use the copy and paste method to create a graph, or use the drag-drop method with CTRL key pressed to duplicate selected graph to a new position.

Regardless of how it is created, new created graphs are automatically placed in the active layer (Please see Section 2.4 of this article for details about layers).

2.1.3 Select one or more graphs

Before editing a graph, you need to select it first. Among the selected graphs, one and only one graph is in master selected state (active editing state). The other selected graphs are in slave selected state. The master selected graph will show a blue outline or an overlapping background to indicate that it is in this state. For several special types of graphs, when they are in the master selected state, the basic size and inclination of the graph is displayed in blue text above the blue frame, and a red point that indicating the center position is also displayed, as seen in Fig. 2.1. For

the slave selected graph, only the gray frame or overlapping background and center point are displayed.

Click selection (Intuitive, Precise)

You can select a graph by clicking on the line or fill area of a graph with the left mouse button in AxGlyph. If no auxiliary keys are pressed when clicking, the graphs that were selected before this click operation are unchecked. If the left mouse button clicks on a blank area on the canvas, all selected graphs are unchecked (back to unselected state).

Drag selection (Batch, Large range)

When you need to select multiple graphs at the same time, you can use the selection method by pressing the left mouse button on the canvas blank and dragging a selection box. The graphs drawn by this frame will be selected. The first selected graph in the selection process will be the master selected graph, and the rest will be the slave selected graph. If the **ALT** key is pressed during the selection process, only those graphs are entirely covered by the selection box will be selected; Otherwise, those graphs with center point covered by the selection box will be selected.

Auxiliary key

In the process of selection, you can also use the **CTRL** key and **SHIFT** key to achieve add-selection, re-selection or de-selection. When the **CTRL** key is held down, you can only make add-selection, and the master selection is dynamically changed. While the **SHIFT** key is held down, you can make re-selection. The graphs involved will back to be unselected if they have been previously selected.

2.1.4 Edit the shape and size of the graph

You can modify the size and the shape with mouse drag, mouse wheel, toolbar, keyboard arrow keys, and graph parameter editors in the right-sidebar tool.

Drag and drop editing (Intuitive, Flexible)

When a graph is in the master selection state, you can change the size, shape and style of the graph by dragging the knot nodes with the left mouse button pressed down, as shown in Fig. 2.1. The knot nodes are roughly divided into two categories in AxGlyph, one is the consolidation type knot node, usually the corner point on the graph boundary, the midpoint of the boundary line, the end point of the line segment, the key parameter point of the curve, etc. Such kind of knot points is displayed as translucent blue filled squares or circles. The consolidation type knot point is the basic control point for controlling the shape and size of the graph. The second type is the free knot point, which is marked with a circular or diamond shape filled with an opaque three-dimensional background color, and the free type knot point serves as an auxiliary control point. It has a variety of functions in different graph templates, and its functions are more flexible.

Width/Height/Angle

200.0, 120.0, 0.0

Center Point

Drag here to move the graph

Free knot node by which to change the curvature of the wave line

Consolidation knot node by which to resize or reshape the graph
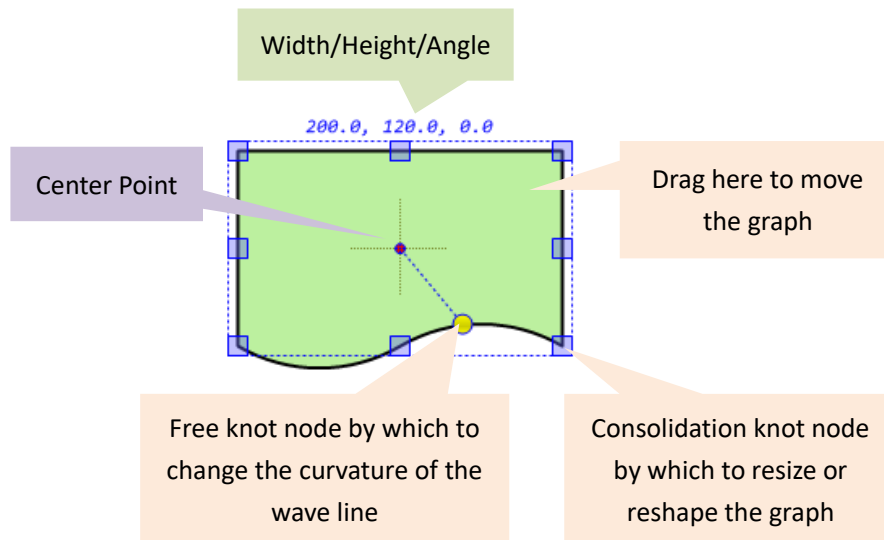
Figure 2.1 Editing the graph by dragging the knot nodes

Due to the limited space of this help file, it is not possible to enumerate the specific roles of the knot nodes of all graph templates. The users need to understand the knot nodes, especially the functions of the free knot nodes, through practice. For most graph templates, the function of knot nodes are intuitive.

Drag auxiliary key

When you drag a knot node, you can hold down the **SHIFT** key to change the size or shape of the graph according to a specific rule. For example, for a line, when you hold down the **SHIFT** key and drag the endpoint with the mouse, the drag process keeps the inclination of the line unchanged.

Main toolbar tool (Multi-selected sync, Resize by scale)

With the main toolbar button (   ), you can scale up/down all selected graphs.

Main toolbar tool (Multi-selected sync, Same size)

With the main toolbar button (   ), you can make all selected graphs the same size as the master selected one.

Roll the mouse wheel (Response fast, Proportional hold, Multi-selected sync)

With the help of the CTRL key and the SHIFT key, scrolling the mouse wheel can be used to synchronously scale the size of all selected graphs. This scaling process keeps the size ratio of the graph unchanged. The specific operation method can be seen in Table 2.1.

Direction keys (Precise, Controllability, Height/width independent , multi-selected sync)

With the help of the **CTRL** key and the **SHIFT** key, the size of the selected graph can be fine-tuned by using the arrow keys of the keyboard. In this process, all selected graphs are adjusted synchronously. In addition, this method can independently adjust the height and width of the graph. The specific operation method can be seen in Table 2.1.

Table 2.1 Operations related to graph size editing

Size adjustment	Method
Size increased by 20%	SHIFT + Scroll up the mouse wheel
Size decreased by 20%	SHIFT + Scroll down the mouse wheel
Size increased by 2%	CTRL + SHIFT + Scroll up the mouse wheel
Size decreased by 2%	CTRL + SHIFT + Scroll down the mouse wheel
Width increased by 20%	SHIFT + Right arrow key
Width decreased by 20%	SHIFT + Left arrow key
Width increased by 2%	CTRL + SHIFT + Right arrow key
Width decreased by 2%	CTRL + SHIFT + Left arrow key
Height increased by 20%	SHIFT + Up arrow key
Height decreased by 20%	SHIFT + Down arrow key
Height increased by 2%	CTRL + SHIFT + Up arrow key
Height decreased by 2%	CTRL + SHIFT + Down arrow key

Use the graph parameter editor in the right sidebar tool (Precise)

Open the graph parameter editor (📹) on the right sidebar, and the editable parameters of the master selected graph will be displayed in this panel, as shown in Fig. 2.2. The editable parameters of the graph are divided into two categories, one is a kind of five-element array consisting of the central coordinates (x_C y_C), the width (↔), the height (↕), and the angle ( ); The other one is consisting of all coordinates of the endpoints or the knot nodes (x_{01} y_{01} etc.). Use the left mouse button to click on the light blue area on the upper right side of the parameter entry to pop up a dialog box to edit the parameters. Editing the parameters related to the size allows precise control of the dimensions.

x_C	260.00	x_{01}	-28.00
	c3 @TimeSer_1		
y_C	0.00	y_{01}	-19.00
	c4 @TimeSer_1		
↔	120.00	x_{02}	-47.20
↕	120.00	y_{02}	-134.20
	-0.00	x_{03}	-3.68

A   B

Figure 2.2 Graph Parameters

2.1.5 Change the position of the graph

You can modify the position of the graph with mouse drag, toolbar commands, keyboard arrow keys, and the graph parameter editor in the right-sidebar tool.

Drag and drop editing (Intuitive, Flexible, Multi-select sync)

You can move the graph position freely by dragging and holding the area outside the control point in the selected graph with the left mouse button, as shown in Figure 2.1. In the drag operation, all of the selected graphs move in sync with the master selected graphs. **(Note: If you**

hold down the CTRL key while dragging, all selected graphs will be duplicated to the release position)

Main toolbar tool (Aligned, Equidistant)

You can use a set of command buttons ( ) on the main toolbar to achieve alignment of multiple graphs, or use buttons ( ) to achieve equidistant alignment of graphs.

Use the keyboard direction keys (Fine tuning, Controllability, Multi-selected sync)

With the help of the **CTRL** key, you can use the arrow keys to fine-tune the position of the selected graph. In this process, all selected graphs move synchronously with the master selected graph. The specific operation method is shown in Table 2.2.

Table 2.2 Operations related to graph position

Move Position	Method
Move left by 5 coordinate unit	Left arrow
Move up by 5 coordinate unit	Up arrow
Move right by 5 coordinate unit	Right arrow
Move down by 5 coordinate unit	Down arrow
Move left by 1 coordinate unit	CTRL + Left arrow
Move up by 1 coordinate unit	CTRL + Up arrow
Move right by 1 coordinate unit	CTRL + Right arrow
Move down by 1 coordinate unit	CTRL + Down arrow

Use the graph parameter editor in the right sidebar tool (Precise)

Click the graph parameter editor ( ) on the right sidebar, the editable parameters of the master selected graph will be displayed in the panel. Use the left mouse button to click on the light blue area on the upper right side of the parameter entry to pop up a dialog box to edit the parameters. Editing the parameters allows precisely control of the position.

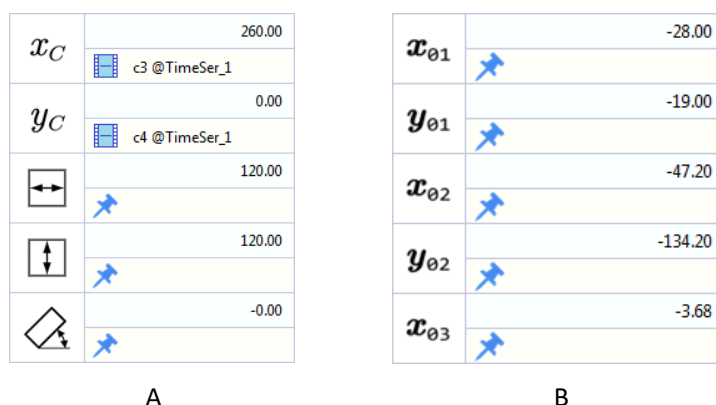## 2.1.6 Change the inclination of the graph

You can adjust the angle of the graph by scrolling the mouse, toolbar commands, keyboard arrow keys, and the graph parameter editor in the right sidebar tool.

Scrolling the mouse wheel (Fast response, Multi-selection sync)

With the help of the **CTRL** and **ALT** key, scrolling mouse can be used to synchronously adjust the tilt angle of all the selected graphs. This adjustment process keeps the relative positional relationship between the graphs unchanged, and the rotation center is the center of the selected graphs. The specific operation method can be seen in Table 2.2.

Main toolbar tool (Multi-select sync, Fine-tuning, Precise)

Use the main toolbar button ( ) to adjust the tilt of all selected graphs simultaneously. This adjustment process keeps the relative positional relationship between the graphs unchanged, and the center of rotation is the center of the selected graphs.

Use the direction keys (Fine tuning, Controllability, Multi-select sync)

With the help of the CTRL and ALT key, the tilt angle of all selected graphs can be adjusted synchronously using the arrow keys. This adjustment process keeps the relative positional relationship between the graphs unchanged, and the center of rotation is the center of the selected graphs. The specific operation method can be seen in Table 2.2.

Use the graph parameter editor in the right sidebar tool (Precise)

Click the graph parameter editor (   ) on the right side bar, the editable parameters of the master selected graph will be displayed in this panel. Use the left mouse button to click on the light blue area on the upper right side of the parameter entry to pop up a dialog box to edit the parameters. Editing the parameters allows precisely control of the angle.

Table 2.3 Operations related to graph rotation editing

Rotation	Method
Rotate anti-clockwise by 90°	Space key
Rotate clockwise by 90°	ALT + Space key
Rotate anti-clockwise by 15°	ALT + Scroll up the mouse wheel
Rotate clockwise by 15°	ALT + Scroll down the mouse wheel
Rotate anti-clockwise by 10°	CTRL + ALT + Scroll up the mouse wheel
Rotate clockwise by 10°	CTRL + ALT + Scroll down the mouse wheel
Rotate anti-clockwise by 5°	ALT + Left arrow key
Rotate clockwise by 5°	ALT + Right arrow key
Rotate anti-clockwise by 1°	ALT + Up arrow key
Rotate clockwise by 1°	ALT + Down arrow key
Rotate anti-clockwise by 0.5°	CTRL + ALT + Left arrow key
Rotate clockwise by 0.5°	CTRL + ALT + Right arrow key
Rotate anti-clockwise by 0.1°	CTRL + ALT + Up arrow key
Rotate clockwise by 0.1°	CTRL + ALT + Down arrow key

2.1.7 Modify the stacking order of graphs

When the canvas contains more than one graphs, It is inevitable that some graphs may overly on others. So the under graphs will be obscured. For graphs in the same layer, the new created one is set overlying on the previously created graphs. If you need to change the stacking order of the graphs, you can use the command button (   ) on the main toolbar. This command can also be found in the context menu from the canvas.

The method of adjusting the layer stacking order described above is limited to the inside of the layer. On the other hand, the stacking order graphs also depends on the order of the layers in which they are located. Therefore, when you find that the stacking order of the graphs is not as expected, you may need to adjust the layer order.

2.1.8 Group of graphs

You can group several graphs as a combination object to edit them simultaneously. Graphs in the combination object are constrained by the group and cannot be modified individually. you can ungroup a combination object to the original state. Please see Section 5.4 for more infermation.

2.1.9 Graph mirror operation

Use the toolbar command ( ) to perform horizontal or vertical mirroring of selected graphs. The operation will mirror all selected graphs simultaneously, and the mirrored reference lines pass through the center of the master selected graph.

2.2 Graph template panel

2.2.1 Graph panel scrolling and category switching

AxGlyph divides all graph templates into ten classes and organizes them in the scrollable toolbar, as shown in Figure 2.1. You can click on the category tab to select which one to be the current palette. When the mouse cursor is located inside the panel area, you can also change the current palette by rolling the mouse wheel.

You can change the order of the palettes by using the context menu on the category tab.

2.2.2 Change the Appearance and Background Color

The appearance of the toolbox panel is customizable. To open the setting dialog, right-click on any one button of the panel and select "**Appearance**…" in the context menu. You can enable the check "**Using Large Icons**" in the dialog if you think the icons on the UI are too small.

You can also set a distinctive background color for each palette using the entry "Set Page Color" which can be found int the same context menu.

2.2.3 Re-mapping and Expanding

Some palettes of the toolbox panel, such as the flowchart, contain a large number of templates. To keep the interface clean and tidy, AxGlyph makes them collapsed. Only a part of templates, maybe the most commonly used, are pinned on the front interface. You can fetch all templates by the tail button ( ). And you are also allowed to re-mapping the buttons of the collapsed pages. The re-mapping command can be found in the context menu.

2.3 Memo-board, Favorite list, Library and Searching

Besides the toolbox panel, you can also use the memo-board ( ), the favorite list ( ) , the library ( ) and graph searching ( ) to create graphs efficiently.

2.3.1 Memo-board

The memo-board works like a multi-frame clipboard. Everytime you copy or cut some graphs from the workspace canvas, the memo-board will record them as a new template. Then later you can fetch the templates and create new instances into the workspace from them just by **drag-drop** or **clicking the right-bottom corner** of each item's thumbnail.

2.3.2 Favorite List

You can save those frequently used graphs as templates into the favorite list of AxGlyph. The favorite is orginazed with a 2-level tree list. You can create new folders or modify the eixsting

folders by using the **context menu** in the tree list view. In the workspace canvas, memo-board view or the library view you can save the selected into the favorite list by using **context menus**. It is also supported to create a new template to the favorite by drag-drop from the workspace canvas. To fetch the templates and create new instances into the workspace from the favorite, just using **drag-dro**p or **clicking the right-bottom corner** of each item's thumbnail.

Using the **context menu** in the tree list view, you can export the favorite as a file or import the favorite content from a file.

2.3.3 Library

AxGlyph provides more built-in templates in the graph library in addtion to the toolbox panel. The library is originzed with a 3-level tree list. you can use the templates to create new instances into the workspace just by **drag-drop** or **clicking the right-bottom corner** of each item's thumbnail.

2.3.4 Searching

You can search a template from the toolbox panel, the favorite list or the library by a keyword and create new instances into the workspace from the search results by using **drag-dro**p or **clicking the right-bottom corner** of each item's thumbnail.

2.4 Layer manager

AxGlyph uses layers to manage all the graphs in the canvas. Each graph created in the canvas belongs to a layer. Layers can make graphs editing more efficient, especially for situations with a large number of graphs. Layers also make it easy for users to work in a "one document, multiple output" manner.

AxGlyph provides a layer manager in the right sidebar tool, which can be opened by clicking the page icon ( ) above the right sidebar. The toolbar ( ) on the layer manager provides the most commonly used 5 commands, and below the toolbar is a list of layers.

2.4.1 Layer list

All layers in the current document are displayed in the layer list. Each item in the list represents one layer and displays a thumbnail of all the graphs contained in the layer in a square area at the left. The name of the layer is displayed in a long strip area above the right side of the thumbnail, and below it is a group of icons, as shown in Fig. 2.2.
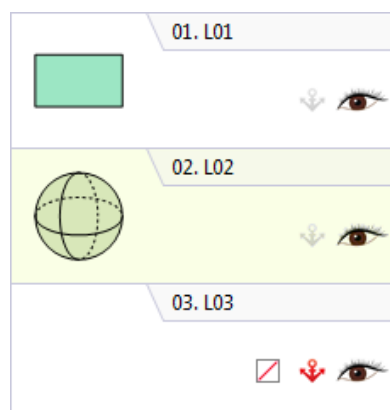
Figure 2.2 Layer list

You can select a layer in the layer list by clicking on it, or hold down the Ctrl or Shift key to select multiple layers. The background of the selected layer is light blue or light green, and the layer with a light green background is the active layer. As mentioned above, the newly created graph in the canvas will automatically belong to the active layer.

Right-click on the layer list area to bring up the context menu. All commands for layer management will be found in this menu. You may have noticed that context menus are employed almost everywhere in AxGlyph. In the process of using this software, you can try the right-click whenever you are overwhelmed. In most cases, right click will bring you the context menus that give you the entry you need.

When the mouse is in the layer list area, you can zoom the view by scrolling the mouse wheel with the CTRL key pressed.

2.4.2 Create a new layer

AxGlyph provides three ways to create new layers.

Use the toolbar command or the new command in the context menu

You can create a new layer by clicking the create layer command ( ) on the toolbar of the layer management panel. The new layer will be automatically named in increasing order of layers. The newly created layer is at the bottom of the layer list. This command can also be found in the context menu. In this way, an empty layer is created. In the layer list, an icon ( ) is displayed in the corresponding entry to indicate that it is an empty layer.

Drag and drop

You can create new layers by drag-drop. The process is, select one or more graphs in the canvas, hold down the graphs with the left mouse button and drag them to the blank space below the layer list and release the mouse left button. The layer manager will automatically create a new layer and move all the selected graphs to this new layer. If you hold down the **CTRL** key during this drag-drog, the selected graph will be copied to this new layer. During this process, the position, shape, etc. of all relevant graphs in the canvas remain unchanged.

Directly duplicate

Open the context menu in the layer list area to find the "duplicate" command. This command copies all selected layers and automatically pastes them at the bottom of the layer list.

Switch the right sidebar to the layer management panel ( ), then you can use the toolbar or context menu to create, delete, duplicate layers, adjust sequence, lock, and switch visible. One can also quickly adjust the layer order by drag-drop with the left mouse button.

2.4.3 Layer stacking order

Based on a common rule of convention, the new created layer is always overlaid on the layer that was created previously. That is, when the positions overlap, the partial graphs in the later created layer may block some of the graphs in the layer. For editing or display purposes, you may need to change the stacking order of the layers. There are two ways to change the layer order in AxGlyph.

Drag and drop

Press and hold the selected layer with the left mouse button and drag the selected layers to the target position and release, the selected layers will be inserted into the release position.

Use the context menu

Open the context menu in the layer list area to find the four menus used to move layers.

2.4.4 Change the layer to which the graph belongs

As mentioned earlier, each graph in the AxGlyph canvas belongs to a layer. When you need to change the layer to which the graph belongs, you can use drag and drop or context menus.

Drag and drop

Press and hold the selected graph with the left mouse button in the canvas, and drag it to the target position in the layer list and release, then the selected layer will be moved to the layer at the release position.

Use the context menu

Select the graphs you want to move, open the context menu in the canvas, you can find the menu "Move selected to...", then select the corresponding command in the submenu. You can also use a similar method to copy selected graphs directly to a new layer or to a layer that already exists. The above operations can also be implemented with hotkeys, as described in Section 2.2.2 of this document.

2.4.5 Layer visibility

In order to avoid interference caused by graphs overlay during editing, or to achieve "one document, multiple output", you can hide some layers.

Use the icons in the layer list (Intuitive)

At the bottom right corner of each item in the layer list, there is an icon looks like ( ) or ( ) that identifies whether the layer is visible or not. You can switch the visibility of the layer by clicking this icon with the primary mouse button.

Use the context menu (Multiple selection sync operation)

In the context menu of the layer list, there are three commands "Show Selected Layers", "Hide Selected Layers" and "Reverse Visible" to operate on the visibility of the selected layer.

Use the Layer Manager's toolbar menu (Overall sync)

Use the buttons ( ) in the Layer Manager's toolbar to manipulate the visibility of all layers.

Note: The graphs in those hidden layers are not editable, and the active layer (with light green background) are always visible and can be edited.

2.4.6 Layer locking

You can lock the layer in several ways.

Use the icons in the layer list (Intuitive)

At the bottom right corner of each entry in the layer list, there is an icon of the form (   )
or (   ) that identifies the lock state of the layer. You can toggle the lock or unlock by clicking this
icon with the left mouse button.

Use the context menu (Multiple selection sync operation)

In the context menu of the layer list, there are three commands "Lock Selected Layers",
"Unlock Selected Layers" and "Reverse Locked" for locking/unlocking operate.

Use the Layer Manager's toolbar menu (Overall sync)

Use the buttons (   ) in the toolbar of the layer manager to lock or unlock all
layers.

**Note: The graphs in the locked layer are not editable, but the active layer (light green
background) can be edited even it is locked.**

2.5 Drag-drop

The drag-and-drop operations are widely supported in AxGlyph, as mentioned previously. The
following table gives a summary of the operations for your information.

1. Drag from the toolbox panels to the workspace canvas.
2. Drag from the memo-board, the favorite list or the library to the workspace canvas.
3. Drag from the workspace to the memo-board or the favorite view to create a new
   template.
4. Drag and drop inside the memo-board or the favoirte view to repositon the template.
5. Drag and drop inside the workspace, i.e, to move the selected graphs from one position to
   another. If the Ctrl key is pressed during the process. The selected graphs will be
   duplicated to the target location, instead of being moved.
6. Drag the selected graphs from the workspace to the layer list to move the grahps to
   another layer or a new layer if dropping at blank area of the layer list view.
7. Drag and drop inside the layer list view to change the sequence of the layers.

2.6 Graph property editor

AxGlyph provides a graph property editor (click the icon   to switch on) in the right
sidebar. The editable properties include line style, line width, line cap, fill style, font, font size, font
arrangement, and various of colors.
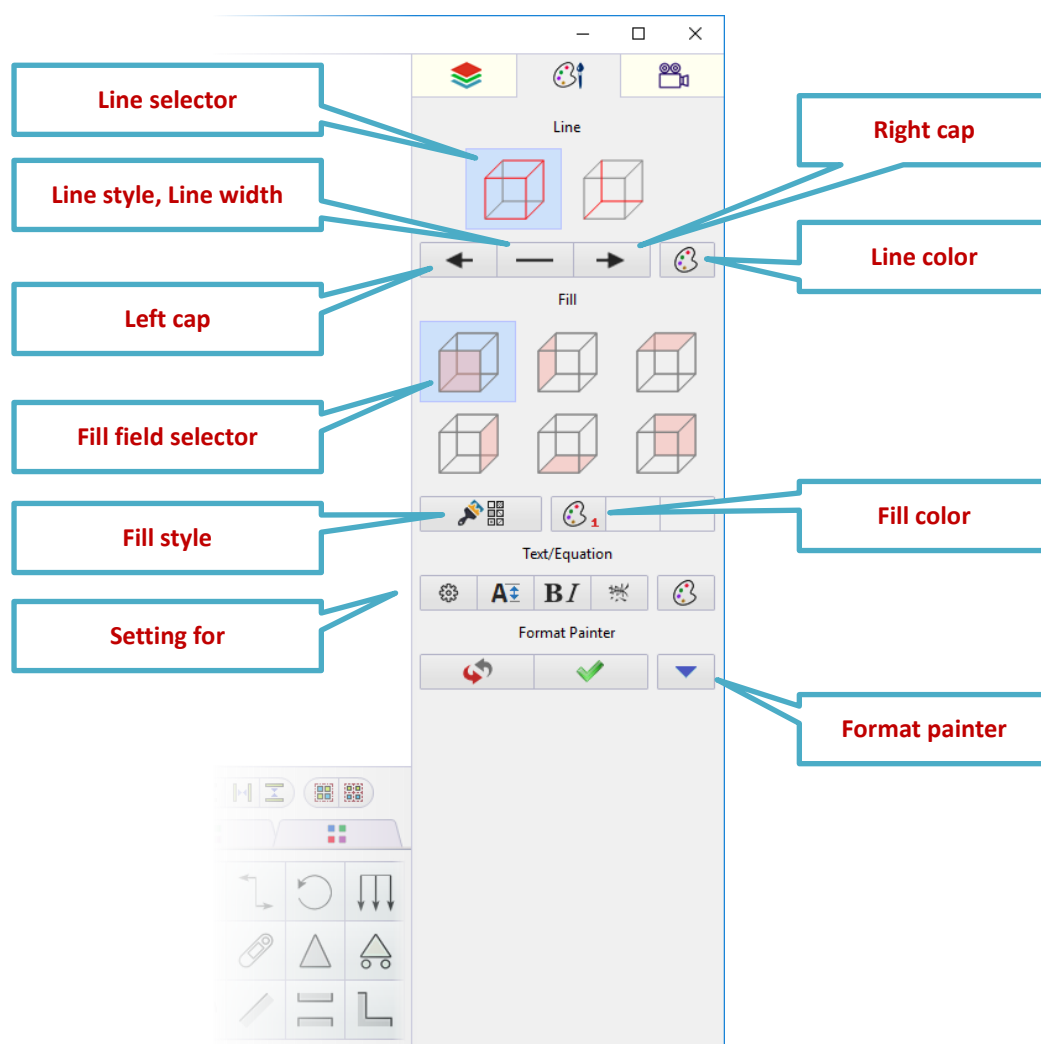
Figure 2.3 Graph property editor in the right sidebar

Most of the graphs in AxGlyph contain a main outline, and some of the graphs also contain a delimited guide line and an optional line, which can be set using the properties editor to have different properties than the main outline.

Most of the graphs in AxGlyph contain only one fill area. A small number of graphs, such as a hexahedron or a cylinder, contain multiple fill areas. You can use the fill area selector to set the fill properties of a fill area separately. Press the CTRL key during the process to synchronize settings all fill areas.

The property editor panel also provides property settings for text or equations at the bottom, including font, font size, alignment, and color. It's easy to quickly set the properties of text or formulas in batches.

AxGlyph also provides a format painter in the graph property editor, which allows you to quickly copy a graph's settings to another.

Graph properties editing is an intuitive graphal operation. It is mainly based on by AxGlyph's built-in common controls. About the common controls, please refer to Chapter 4, for details. And about the setting of text or formula, please refer to Chapter 5 of this article.

2.7 Magnets

When drag or move graphs using the mouse, you can use magnets (or grab points, snap points, grids) to achieve precise alignment, arrangement or multi-graph consistency.

There are four basic type of magnets in AxGlyph: the 1st type is the endpoints, the knot nodes or the key points of the graph; the 2nd type indicates the magnets lattice created by a certain rule in the magnets lattice editor; the 3rd type is the temporary magnets created arbitrarily by clicking the right mouse button inside the workspace, or based on the path of existing graphs; the 4th type is for creating special geometrical relationship between lines and circles

2.7.1 Create and edit magnets

Click the button ( ) on the main toolbar of AxGlyph to open the magnet lattice editor, or use the shortcut key F5 to open.

Magnets management
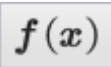
AxGlyph manages all the magnetic points in groups. The group list is on the left side of the magnets lattice editor. All groups are titled as the format of "Serial number/Name", and the name can be customized by the user. There is also a checkbox in front of each entry in the list to enable or disable the group.

Using the toolbar ( ) , you can create/delete/enable/disable magnet groups. The commands can also be found in the context menu inside the group list area.

In the list of magnets lattice groups, there is always a group in selected state, whose magnetic points definition is displayed in the table at the rightside of the editor. The table is an array of multiple rows and two columns, the first column is the x coordinate of the magnetic point, and the second column is the y coordinate of the magnetic point. Each row in the table corresponds to a magnetic point. You can edit the numbers in the table directly.

The 2nd and 3rd type of magnets in AxGlyph are displayed in the group list. A group with a special name of "**__TEMP_MAG**" will be automatically created when you create the first magnet with the 3rd type, and all magents of this type that are created consequently will be included in this group. If you rename it, it will be converted to the 2nd type.

Create magnet lattice by certain rules

You can use the toolbar button ( ) to create magnet lattice with linear, cross, rectangular, circular or triangular distribution. The buttons ( ) is for ASCII import/export. The button ( ) is for generating magnets using the AxGlyph calculator. About ASCII imp/exp and the calculator, you can read Chapter 4 for more information.

Create magnets of the third type

Magnets of the third type are created directly in the AxGlyph canvas. There are two methods to create them.

1. When you hold down the CTRL key and right-click the mouse inside the canvas, a new

magnet will be added to the position where you clicked.

2. Create magnets based on path of existing graphs. For example as shown in Fig. 2.4, firstly select a straight line in the canvas, and click on the tool button ( ) or press F6, and type "3" (means to interpolate 3 internal points) in the next dialog, then 5 evenly distributed magnets will be added to along side the straight line.
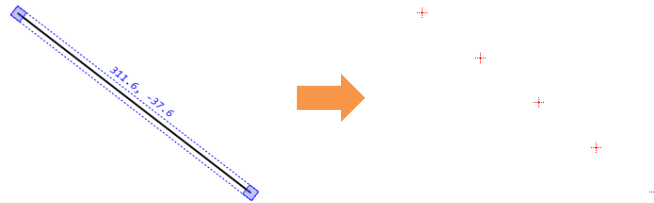
Figure 2.4 Add magnets based on a straight line

If multiple paths was selected, AxGlyph will automatically split the paths at all intersection points and non-smothing connecting points before creating on-path magents. So this method is useful when you need to find the intersection points. Fig. 2.5 gives an example.
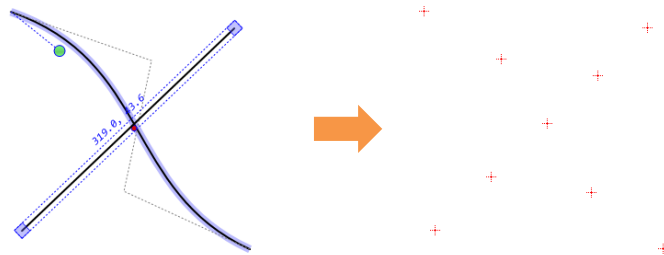
Figure 2.5 Add magnets based on multiple paths

The 4th type magnets (for creating special geomitrical relationship)

The 4th type magnets are automatically created during graphs editing. When you edit a line or a circle by drag the key points or the whole graph, the magnets will be creating. These magnets makes it is easier to draw a perpendicular/parallel line to a line or a tangent line/circle to a circle. Please note that the graphs that support the 4th type magnets are mainly included in the "Plane geomtry" category ( )

2.7.2 Use of magnets

The second and third types of magnets lattices are displayed in the canvas as small cross marks, with blue and green color respectively. The first type of magnetic point is not shown separately because it is a control point on the graph itself.

When you edit a graph with a mouse drag, the focus of the mouse automatically absorbs nearby magnetic points for precise positioning. Note that the magnetic point grabing of AxGlyph is independent in both the horizontal and vertical directions. As long as one of the x and y coordinates enters the grabing range of the magnetic point, it is adsorbed.

In some cases, if you do not want the mouse point to be grabbed when dragging a knot point or a glyph, then hold down the CTRL key to temporarily cancel the feature.

In addition, you can also use the magnets lattice editor to temporarily turn off some magnets lattice groups, or use the context menu in the canvas area to disable the first and third types of magnetic point grabing.

Magnets lattices can also be used to create animation motion curve. See Chapter 6 for details.

2.8 Hotkeys

2.8.1 Define a Hotkey

Hotkeys, or keyboard accelerators, allow the users to create graphs directly by keyboard, without clicking on the toolbox panel. You can assign a hotkey for any button of the toolbox panel. Right-click on any one button of the panel to popup the context menu, then select the entry "**Set Hotkey**" to open the dialog for setting the hotkey.

Generally, a hotkey is made up of one primary key, or a primary key together with a secondary key. The secondary key can be Ctrl, Alt, Ctrl+Shift, Alt+Shift or Ctrl+Alt+Shift. The primary key can be a character, a number, a punctuation or a direction key. The primary key is not case-sensitive.

Note: Some hotkeys are system reserved and should not be defined as custom hotkeys. For example, "Ctrl+C" is regularly to mean "**copy**". See section 2.2.2 for more details about system reserved hotkeys.

If you forget which hotkey has been assigned to a button, just right-click on the button, the hotkey definition will be shown in the context menu. You can also review all user-defined hotkeys in the "**Hotkeys**" tab of the "**AxGlyph Settings**" dialog which can be opened by clicking on the toolbar button (⚙).

2.8.2 Default Hotkeys

Some system defined hotkeys are given in Tables 2.1~2.2. The other definitions are shown in Table 2.4.

Table 2.4 System-defined fixed shortcuts

Key Definition				Function
			ESC	Unselect
			Enter	Open graph property editor dialog
			Tab	Switch tabs of the right sidebar
			Home	Bring the selected graphs to front
			End	Send the selected graphs to back
			Space	Rotate the selected graphs anti-clockwise by 90°
			Arrow Key	Move the selected grahphs by 5 coordinate unit
			+/-	Zoom canvas
			F1	Help
			F3	Find similar graphs with the same major class
			F4	Find similar graphs with the same minor class
			F5	Open the megnet dialog
			F6	Create path-based magnets
			F7	Delete all temporary megnets
			F8	Use knot nodes as megnets
			R	Repeat your last command
Ctrl			Arrow Key	Move selected graphs by 1 coordinate unit
Ctrl			Enter	Save and Exit for OLE Server Mode
Ctrl			`	Copy the selected graphs to a new layer
Ctrl			1~9	Copy the selected graphs to the nth layer, n = 1~9
Ctrl			A	Select all
Ctrl			B	Capture bitmap picture
Ctrl			C/X/V	Copy/Cut/Paste
Ctrl			E	Export picturre
Ctrl			F	Reset the zoom scale of the canvas
Ctrl			G	Capture EMF picture
Ctrl			N/S	New/Save
Ctrl			Y/Z	Redo/Undo
Ctrl			+/-	Zoom in/out the canvas
		Alt	Space	Rotate the selected graphs clockwise by 90°
		Alt	Arrow Key	Rotate the selected graphs (See 2.1.4 for detail)
		Alt	`	Move the selected graphs to a new created layer
		Alt	1~9	Move the selected graphs to the nth layer, n = 1~9
		Alt	B/E/M/L/R/T	Align the selected graphs bottom/vertical center/horizontal center/left/right/up
		Alt	C	Save the format of the master selected graph to format painter
		Alt	V	Apply the format from the format painter to the selecte graphs
		Alt	H/W/S	Make the selected graphs the same height/width/size
Ctrl		Alt	Arrow Key	Rotate the selected graphs (See 2.1.4 for detail)
	SHIFT		Arrow Key	Change the size of the selected graphs (See 2.1.4 for detail)
Ctrl	SHIFT		Arrow Key	Change the size of the selected graphs (See 2.1.4 for detail)

3. General Setup Tools and Controls

This chapter describes the features and usage of some commonly used setup tools or controls in AxGlyph, including line caps, fills, color picker, ASCII import and export, array calculators, and more.

3.1 Setup tools for line

AxGlyph supports a variety of line styles and caps, and there are 2 setup tools.

The first type is as shown in Fig. 3.3. When a graph that contains line elements is in the master selected state, the line cap, line style and width, and color picker button on the right sidebar are activated. By clicking the corresponding button, you can pop up the pending option and click on the desired option to setup. The graphs in the canvas will be re-rendered simultaneously to feedback the effects of the setup.

There are some graphs in AxGlyph, such as scientific charts, which need to be set in a dedicated property setting dialog. The second type of line setup tools are embedded in this dialogs. Such setup tools are provided in a triplet form consisting of a combo box (line type), a text box (line width), and a button (color).

3.2 Setup tools for fill

AxGlyph supports kinds of fill styles and has 2 setup tools.

The first type, as shown in Figure 3.3, is activated when a graph with fill characteristics is in the master selection state. The fill field selector, fill mode, and color picker on the right sidebar are activated. Click the corresponding button to pop up the option, then click on the desired option to setup. The graphs in the canvas will be re-rendered simultaneously to feedback the effects of the setup.

There are some graphs in AxGlyph, such as scientific charts, which need to be set in a dedicated property setting dialog. The second type of fill setup tools are embedded in this dialogs. Such setup tools contains a pull box (fill mode) and a button (color).

There are some fill modes that need 2 or 3 colors, so you will see that there are 2 or 3 buttons for opening color picker sometimes.

3.3 Color picker

The color picker is one of the most widely used controls in AxGlyph, as shown in Fig. 3.3.

The basic working principle of the color picker is to pick the color in the color card in the center of the control and support multiple color cards. You can quickly switch between the buttons on left and right side of the color card, or use the buttons below to select a color card.

The slider above the color card is used to set the transparency of the color. Transparency is expressed as a percentage in AxGlyph, 0% means completely opaque, and 100% means completely transparent.

A set of buttons is placed below the color card, their functions are illustrated in Fig. 3.4, A straw tool used for picking up color anywhere on the entire system desktop is aslo provided.

The color picker is a non-modal dialog box. It does not include a close button. When you finish the color picking operation, you can turn it off by clicking the right mouse button anywhere in the selector, or by clicking anywhere outside the dialog.
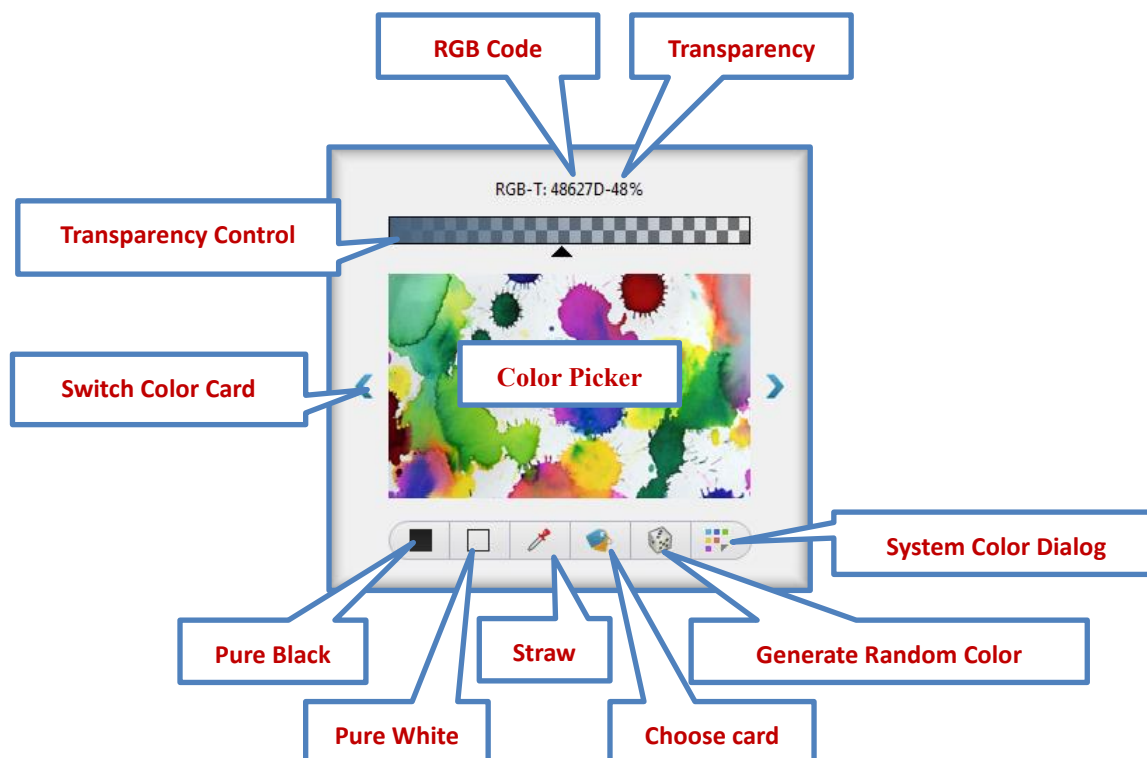
Figure 3.1 Color picker

3.4 ASCII file import and export

In AxGlyph, many places need to use arrays (columns of numbers) as parameters or reference data, such as magnets lattice, scientific chart and animation motion definition. AxGlyph supports to create such arrays by importing external ASCII text files.

In the related dialogs, you can find a button in the toolbar ( ), click this button, and select the file to be imported in the file dialog box, then the text import setting dialog box will pop up, as shown in Fig. 3.2.

On the left side of the ASCII import dialog, the content preview of the top row of the file to be imported is displayed. Generally, the structure of the file header can be understood through the preview. According to this, it is possible to set where the data starts and the column count of the data to be imported. This import method provided by AxGlyph is well compatible with ASCII data files generated by many other applications.
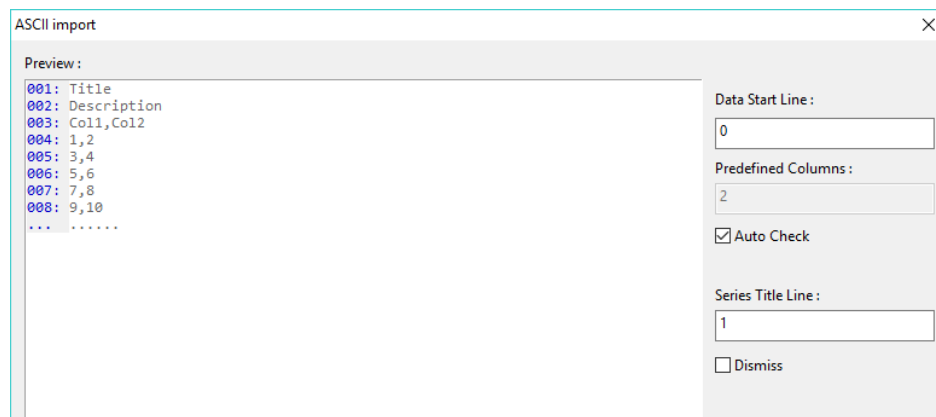
Figure 3.2 Preview and setting of ASCII data file import

3.5 Data series calculator

In addition to data import, you can use the data series calculator provided by AxGlyph to create a series of columns. In the dialogs that need an array (number of columns) as a parameter or reference data, you may find the button ($f(a)$) in the toolbar. Firstly select a column from the data table below it, and then click this button to open the series calculator, as shown in the Fig. 3.3.
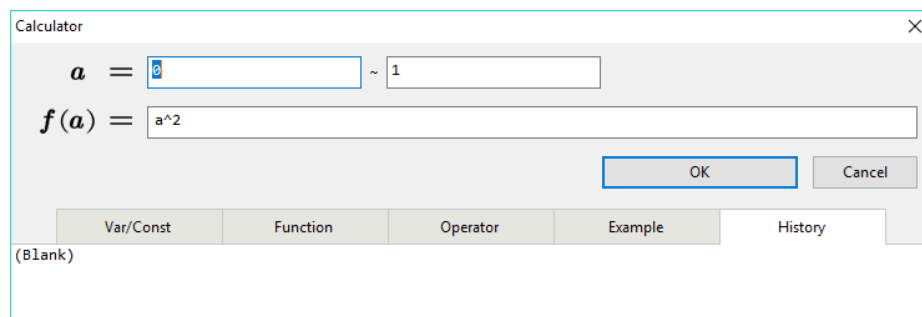
Figure 3.3 Data series calculator

At the top of the calculator there are three text boxes. The two text boxes in the first row are used to generate an arithmetic progression column that can be referenced by the variable a in the function expression. The longer text box in the second row is the function expression. After setting the three text boxes, click OK to generate a data seires based on the corresponding expression. The function uses the regular expression of C-like grammar. In addition to the arithmetic progression (represented by a), the function can also use the data in the table of the previous dialog as the variables, that are represented as "$c1$", "$c2$", etc., in the function expression.

There are five tab pages below the function expression box, where shows some demonstrations of variables, constants, functions, operators that can be used in the expression, and also gives examples and history items. The item in the history list can be fetched by double-clicking.

4. Text and Formula

AxGlyph integrates a concised version of AxMath for inserting text or formulas into AxGlyph document. AxMath is a professional formula editing software, please visit www.axsoft.co for more information.

The AxMath formula can be inserted into a document as a stand-alone object or as a property of a basic graph.

4.1 Basic editing operation

4.1.1 WYSIWYG

WYSIWYG is the basic editing method of AxMath. In the formula editing area, you can edit the formula like the general text editing software. You can insert special mathmatic symbols or expression-building structures by clicking on buttons of the toolbox panel, or by pressing hotkeys, or by typing in LaTeX language.

A two-dimensional caret, blinks in the AxMath's workspace to indicate the current edit position. You can use the mouse click and Home key, End key, and the four direction keys to change the edit position.

4.1.2 Active Font Style

Check status of the buttons (**B** *I*) decides the active font style, which may be regular, *italic*, **bold** or ***bold-italic***. You can check them on/off by pressing the button or the hotkeys Ctrl+B and Ctrl+I respectively.

4.1.3 Modify Font Style

If you want to change the font style of a segment of the existing text, select them firstly, then popup the right-click menu and select the corresponding command, or click on one of the toolbar buttons (¹A ²*A* ³**A** ⁴*A*), or press the hotkeys Ctrl+1~4.

4.1.4 Change the Workspace View with the Mouse Wheel

When the mouse cursor is inside the workspace area, you can scroll the view vertically by rolling the mouse wheel, or scroll the view horzontally by rolling the mouse wheel with the Shift key pressed, or zoom the view by rolling the mouse wheel with the Ctrl key pressed.

4.2 Toolbox panel

In this document, all elements for building equations are divided into two classes: a) symbols that represent variables, matrices or vectors, function names, numbers, operators, labels, etc.; and b) expression-building structures that are subdivided into general Layout, script and limit, tabular math and elementary math schemata, etc. A expression-building structure typically has one or more sub fields as nests for child elements.

AxMath adopts a kind of scrollable toolbox panel to present all these symbols and expression-building structures. Any particular piece of equation can be built out of them. Refer to Section 2.2 of this document for operations or features related to the toolbox panel.

4.3 Hotkeys

You may refer to [Section 2.3](#) of this document about how to define hotkeys. The following table shows the default hotkeys in AxMath.

Key Definition				Function	System Reserved
			ESC	Erase Highlights of Search Results	Yes
			F1	Help	Yes
			F2	Save	Yes
			F3	String Find and Replace	Yes
Ctrl			F3	Find the Similar Segment	Yes
			F4	User Symbols	Yes
			F5	Re-calculate the Current Line	Yes
			F6	Re-calculate All Lines	Yes
			Home	Move the Edit Position to the Line Head	Yes
			End	Move the Edit Position to the Line Tail	Yes
Ctrl			Enter	Save and close AxMathLite dialog	Yes
Ctrl			1	Modify Font Style of the Selected Text to Be Regular	Yes
Ctrl			2	Modify Font Style of the Selected Text to Be Italic	Yes
Ctrl			3	Modify Font Style of the Selected Text to Be Bold	Yes
Ctrl			4	Modify Font Style of the Selected Text to Be Bold-italic	Yes
Ctrl			A	Select All	Yes
Ctrl			B	Font Bold	Yes
Ctrl			C/X/V	Copy / Cut / Paste	Yes
Ctrl			G	Temporarily Switch to Greek Keyboard	Yes
Ctrl			I	Font Italic	Yes
Ctrl			N/S	New / Save	Yes
Ctrl			T	Copy Text	Yes
Ctrl			Y/Z	Redo / Undo	Yes
Ctrl			Tab	Switch Edit Mode	Yes
Ctrl			Home	Move Edit Position to the Document Head	Yes
Ctrl			End	Move Edit Position to the Document Tail	Yes
	Shift		Enter	Convert the Code in the LaTeX Editor to Equation	Yes
		Alt	C	Set the Color of the Selected	Yes
		Alt	Up	Insert a Row above the Edit Position, for Matrices	Yes
		Alt	Down	Insert a Row below the Edit Position, for Matrices	Yes
		Alt	Left	Insert a Column before the Edit Position, for Matrices	Yes
		Alt	Right	Insert a Column after the Edit Position, for Matrices	Yes
Ctrl		Alt	Up	Delete the Row above the Edit Position, for Matrices	Yes
Ctrl		Alt	Down	Delete the Row below the Edit Position, for Matrices	Yes
Ctrl		Alt	Left	Delete the Column before the Edit Position, for Matrices	Yes
Ctrl		Alt	Right	Delete the Column after the Edit Position, for Matrices	Yes
Ctrl			D	$\circ$	
Ctrl			F	$\frac{\square}{\square}$	
Ctrl			H	$\square^{\blacksquare}$	
Ctrl			J	$\square_{\blacksquare}^{\blacksquare}$	
Ctrl			L	$\square_{\blacksquare}$	
Ctrl			P	π	
Ctrl			R	$\sqrt{\square}$	
Ctrl	Shift		I	$\int_{\blacksquare}^{\blacksquare}$	
Ctrl	Shift		P	∂	
Ctrl	Shift		S	$\sum_{\blacksquare}^{\blacksquare}$	

4.4 Typing Greek Characters

Greek characters are very common in technical and scientific equations. Besides clicking on the toolbox panel, AxMath offers more ways to input Greek characters.

1. Switching the keyboard to the Greek mode temporarily by pressing "Ctrl+G". Here the word "temporarily" means that after entering one Greek character, the keyboard will automatically restore to the original mode. Fig.3.1 shows the Greek keyboard layout. For example, press "Ctrl+G", "d" and "e" in turn, and you will get "δe".

2. Using the interactive LaTeX language, e.g. input "\alpha", and you will get "α" after pressing the Enter key. See section 4.5 for more details about LaTeX.

Q	W	E	R	T	Y	U	I	O	P
$\Theta\,\vartheta$	$\Omega\,\omega$	$E\,\varepsilon$	$R\,\rho$	$T\,\tau$	$\Psi\,\psi$	$U\,\upsilon$	$I\,\iota$	$O\,o$	$\Pi\,\pi$

A	S	D	F	G	H	J	K	L
$A\,\alpha$	$\Sigma\,\sigma$	$\Delta\,\delta$	$\Phi\,\phi$	$\Gamma\,\gamma$	$H\,\eta$	$\Theta\,\varphi$	$K\,\kappa$	$\Lambda\,\lambda$

Z	X	C	V	B	N	M
$Z\,\zeta$	$\Xi\,\xi$	$C\,\chi$	$\varsigma\,\varpi$	$B\,\beta$	$N\,\nu$	$M\,\mu$

Figure 4.1 Greek keyboard

4.5 LaTeX Language Support

TeX is a typesetting language invented in the late 1970's by Donald Knuth, a computer science professor of Stanford University. It is a powerful document processor, especially for documents containing equations. TeX is widely used for the production of technical and scientific documentation because of its exquisite effect in publishing, and also used by many web applications for equation prenstations because it is easy to type in web forms. There are several branched versions of TeX, LaTeX, or AMS-LaTeX, being one of the most popular. Please visit http://www.ams.org/publications/authors/tex/amslatex for more information on AMS-LaTeX.

AxMath's translator is mainly based on AMS-LaTeX, but it is not very strict on syntax as other applications. Some commands originated from other branchs, such as Mathjax, are also valid in AxMath. It is notable that AxMath is designed for processing equations, LaTeX commands those are not commonly used in math equations may be unrecognizable in AxMath.

The following is an example of LaTeX language for quadratic formula:

$$ \frac{-b\pm \sqrt{b^2-4ac}}{2a} $$

And the corresponding equation would appear in AxMath's workspace:

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

The conversion from an to LaTeX code can be achieved by interactive LaTeX typing or clipboard in AxMathLite.

4.4.1 Interactive LaTeX Input

You can edit equations by typing in LaTeX language directly in the workspace, as shown in Fig.4.2. The string after the first " \ ", " ^ " or " _ " will be rendered in blue color, means that it is assumed to be a piece of LaTeX code. After pressing Enter key, the string will be replaced by the conversion result.

You can turn on/off the interactive LaTeX language in the "**TeX Language & Hotkeys**" tab of the "**AxMath Settings**" dialog which can be opened by clicking on the toolbar button (   ).

$$\text{\\frac\{-b\\pm\\sqrt\{b^2-4ac\}\}\{2a\}}$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Figure 4.2 Interactive LaTeX input formula

4.4.3 AutoComplete Suggestions

AutoComplete Suggestions make it easier to type equations in TeX language. In AxMath, when you type a " \ ", indicating that you will input some LaTeX code in the following, a prompt bar will pop up. AxMath suggests candidates according to the string nearby the caret and dialplays them in the prompt bar, as shown in Fig.4.3. You can select a candidate by pressing Space key, numeric keys or mouse clicking to complete the LaTeX code automatically. If you do not intend to select a candidate from the prompt bar, just press Enter key to ignore it, or press ESC key to close the prompt bar. Users can use the arrow keys, the PgUp/PgDn keys, and the comma/dot keys to turn the page of the prompt bar.

If you do not need this feature, you can turn it off in the "**TeX Language & Hotkeys**" tab of the "**AxMath Settings**" dialog which can be opened by clicking on the toolbar button (   ).
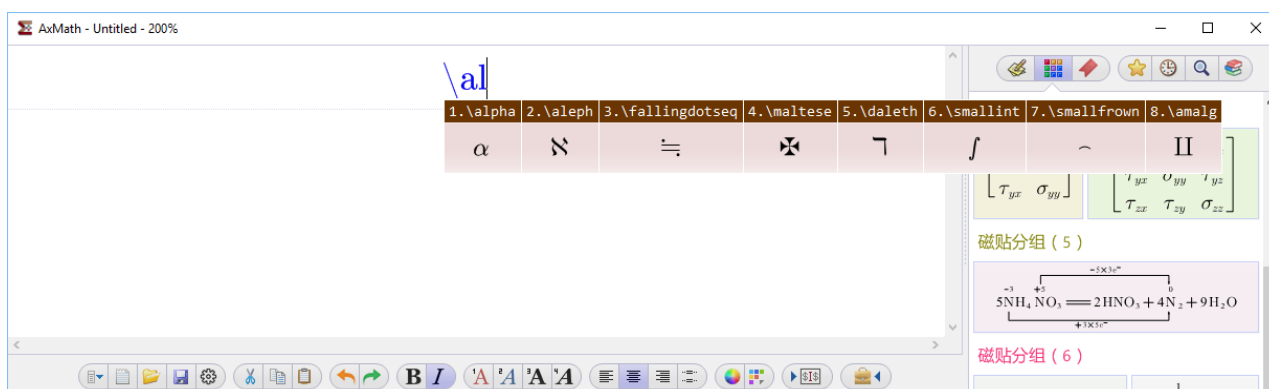

Figure 4.3 LaTeX prompt and auto completion

4.6 Assistants

4.6.1 Recognize and Auto-Correct

In AxMath, you can format text with 4 font styles, i.e. regular, *italic*, **bold** and ***bold-italic***. Italic is the default font style in AxMath and the most frequently used one, since a italic character usually represents a variable.

AxMath presents several ways to set font style. In addition to the basic ways described in section 4.1.2 and 4.1.3. You can pre-define expressions and assign a special font style for each of them. In editing process, AxMath will recognize the expressions and format them with the pre-defined font style automatically. For example, if you have pre-defined "sin" with regular font style, once you input the expression "sin", the font style of the "sin" will be formatted with regular font style automatically, regardless what the active font style is.

To add new pre-defined expressions, use the context menu in the "**Assistants**" tab of the "**AxMath Settings**" dialog, which can be opened by clicking on the toolbar button (⚙). Some common expressions has been collected in AxMath, you can load them using the context menu.

4.6.2 Other Assistants

AxMath also provides assistants to auto-correct the font style of Chinese characters, numbers and punctuations, and to display separator lines in workspace, etc. For more details about AxMath assistants, explore the "**Assistants**" tab of the "**AxMath Settings**" dialog which can be opened by clicking on the toolbar button (⚙). All of these assistants can be turned off if you want.
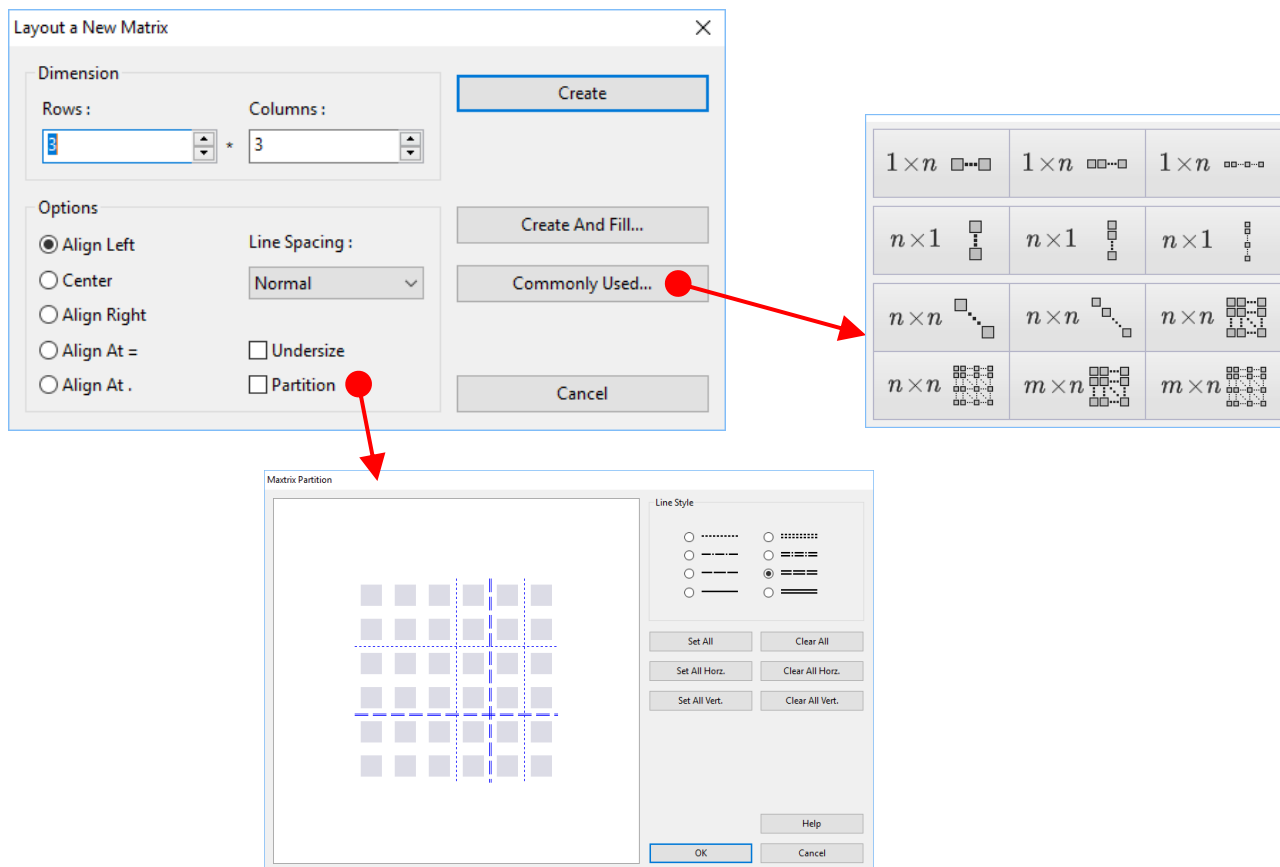
4.7 Matrix

4.7.1 Create a Matrix

When you click on one of the buttons inside the red-edge rectangle as shown in Fig.4.4.A, the dialog for laying out matrices is opened. Here you can decide the matrix's dimension, make partition and set typeset options. AxMath also provides a matrix template picker and an auto-fill tool to facilitate the subsequent work after the creation, since a matrix usually has a series of repetitive elements with incremental subscripts.

If you want to create a blank matrix of fixed dimension without opening the matrix building dialog, click on one of the buttons above the red-edge rectangle, as shown in Fig.4.4.A.

Eight special-typset matrix templates are provided on the right side of the matrix palette. They are usually used in an expression of piecewise function, or an expression that is too long to be aligned in one line. Some of them is mentioned in the tutorial chapter.

A

B

Fig.4.4 Tools for Matrix Creation

4.7.2 Modify a Matrix

You should select the matrix before modifying it. Then right-click inside the workspace to pop up the context menu, and you will find a series of submenus, that can be used to modify the matrix's typset, follows the entry "**Modify the Matrix's Typeset**", as shown in Fig.4.4.

When you right-click on an element of a matrix as you wish, the submenus of "**Change the Matrix's Dimension**" will pop up. You can also using hotkeys (see section 4.3.2 for more details) to change the dimension when the caret is inside the matrix.
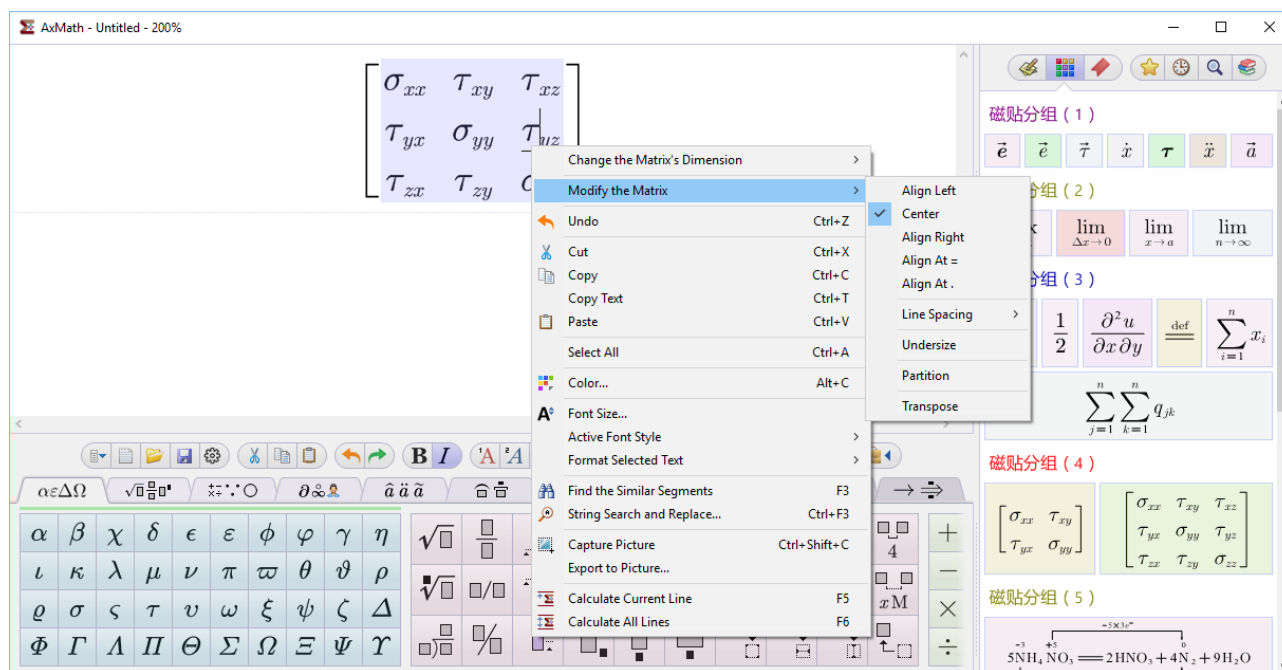
Fig.4.5 Modify a Matrix's Typeset

4.8 Font and Style

AxMath basicly renders equations on the standards of AMS-LaTeX. AMS-LaTeX has involved a well-designed scheme on the font and style, but there are still different requirements on that.

A graphical designer is employed for individual preference of the font and style, as shown in Fig.4.6. It can be opened in the "**Font & Style**" tab of the "**AxMath Settings**" dialog, which can be opened by clicking on the toolbar button (⚙). Here you can modify the current scheme by checking buttons, selecting in lists or typing in edit boxes. The meaning of each control is illustrated by the surrounding picture, or text, if necessary.

Note: For the edit boxes representing a size value, positive numbers are required, while for those who representing a position value, all numbers are permitted. The unit for font size number is points (1 point = 1/72 inch), and, a trailing "%" represents a percent of the font size.
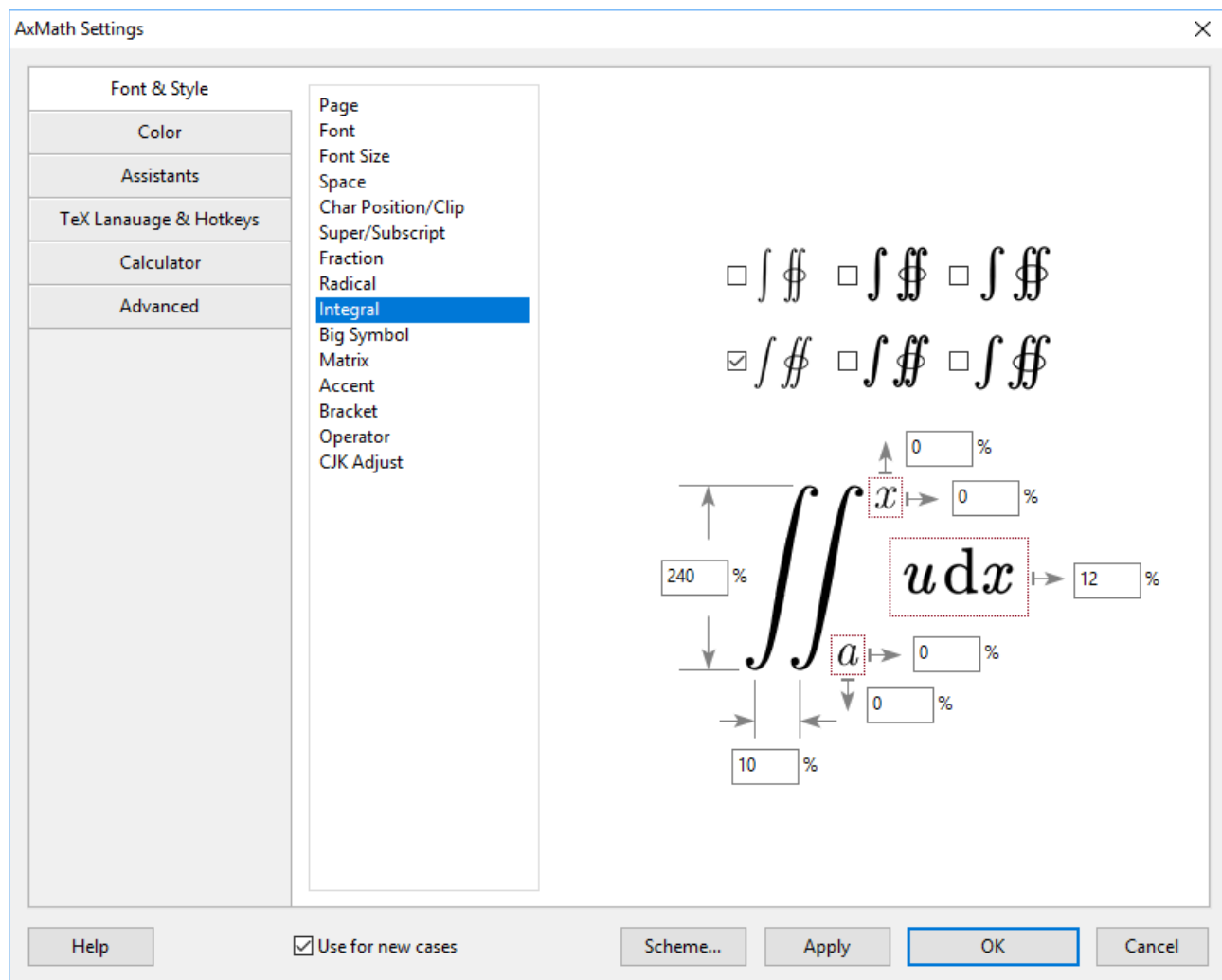
Fig.4.6. The Graphical Designer for Equation Font and Style

4.9 Color

AxMath equations can be automatically colored or manually colored. You can click on the toolbar button (🔵) to toggle.

In the manually coloring mode, you can select a segment of the equation, then click on the toolbar button (🔳) to open the color dialog from where you will pick a color for the segment of equaion. You can also find the command entry in the context menu from the work space. The hotkey is Alt+C. Another way to color the selected segment is using the hotkey group Alt+1…9. Each hotkey of the group corresponds a color.

In the automatically coloring mode, all symbols and compsite structures in the equation are colored automatically according to the color scheme

The hotkey colors and the color scheme for automatically mode can be customized in the "**Color**" tab of the "**AxMath Setting**" dialog.

5. X-Object tools

AxGlyph provides a sereis of "X-Object" tools for creating graphs that need special editing mode, other than the drag-drop.

5.1 Handling Path

The handling path tool is used for creating user defined paths. Click the button [   ] on the AxGlyph panel to insert a handling path object to the current workspace, and the editor will be opened simultaneously.

5.1.1 Create/modify path segments

A handling path contains a number of segments. Each segment can be a straight line, a bezier, an arc, or a spline. The shape and position of the segments are determined by the path coordinates, which denoted by the key points, including start point, segment joint point, segment control point and end point, as shown in Figure 5.1.

To create a new key point, firstly select a segment type by clicking the corresponding button from the toolbar ([   ]) , then click the left mouse button in the workspae area. The newly created key point will be automatically linked into a path segment. You can also use the hotkeys 1~5 to select a segment type.

Exit the new key point creating mode by right clicking or pressing the ESC key, then you can drag the key point to reposition its coordinate. If you hold down the **CTRL key** when do that dragging, all points behind it will be dragged synchronously. Similarly, if you hold down the SHIFT key to drag, all point in front of it will be dragged synchronously. You can also move a segment totally by dragging on somewhere of the segment except the key points.
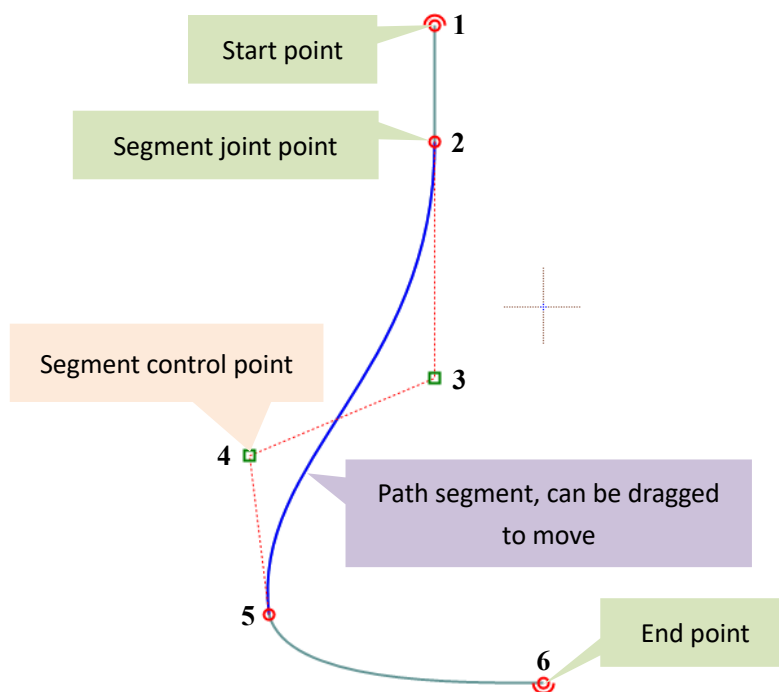

Figure 5.1 Construct of the handling path

5.1.2 Change the Segment Type

The type of a segment can be converted to another by using the context menu when the segment is selected. The hotkey is **ALT+1~5**, where the number represents the target type.

5.1.3 Canvas View

You can **hold down the right mouse button and move the mouse to pan the canvas** (The mouse shape then appears as).

When the mouse is inside the canvas, you can **scroll the mouse wheel to zoom the view**. The zoom percentage of the current view is shown in the title of editor window.

5.1.4 The Spline Segment

You can add points to, or delete points from, the spline segments in the editor by clicking on the toolbar button ( ). Another way to do this is keeping the Alt key pressed when clicking the mouse.

You can weld two neighboring spline segment into one by clicking the ajoint point with the Shift key pressed, or split one spline segment to two segments by clicking a control point with the Shift key pressed.

5.1.5 Transformation

The following table instructs how to transform the path.

Transform		Method	
Scale	Scale up by 20%	SHIFT + Mouse wheel up	SHIFT + Plus key
	Scale down by 20%	SHIFT + Mouse wheel down	SHIFT + Minus key
	Scale up by 2%	CTRL + SHIFT + Mouse wheel up	CTRL + SHIFT + Plus key
	Scale down by 2%	CTRL + SHIFT + Mouse wheel down	CTRL + SHIFT + Minus key
Rotation	Rotate anti-clockwise by 90°	Space key	
	Rotate clockwise by 90°	ALT + Space key	
	Rotate anti-clockwise by 15°	ALT + Scroll up the mouse wheel	
	Rotate clockwise by 15°	ALT + Scroll down the mouse wheel	
	Rotate anti-clockwise by 10°	CTRL + ALT + Scroll up the mouse wheel	
	Rotate clockwise by 10°	CTRL + ALT + Scroll down the mouse wheel	
	Rotate anti-clockwise by 5°	ALT + Left arrow key	
	Rotate clockwise by 5°	ALT + Right arrow key	
	Rotate anti-clockwise by 1°	ALT + Up arrow key	
	Rotate clockwise by 1°	ALT + Down arrow key	
	Rotate anti-clockwise by 0.5°	CTRL + ALT + Left arrow key	
	Rotate clockwise by 0.5°	CTRL + ALT + Right arrow key	
	Rotate anti-clockwise by 0.1°	CTRL + ALT + Up arrow key	
	Rotate clockwise by 0.1°	CTRL + ALT + Down arrow key	
Translation	Move left by 5 coordinate unit	Left arrow	
	Move up by 5 coordinate unit	Up arrow	
	Move right by 5 coordinate unit	Right arrow	
	Move down by 5 coordinate unit	Down arrow	
	Move left by 1 coordinate unit	CTRL + Left arrow	
	Move up by 1 coordinate unit	CTRL + Up arrow	
	Move right by 1 coordinate unit	CTRL + Right arrow	
	Move down by 1 coordinate unit	CTRL + Down arrow	

5.1.6 Path Pattern

You can click the toolbar button ([icon]) then set the path pattern.

5.1.7 Hotkeys

Key Definition				Function
			Space	Rotate the selected graphs anti-clockwise by 90°
			Arrow Key	Move the selected grahphs by 5 coordinate unit
			+/-	Zoom canvas
			F1	Help
			F5	Open the megnet dialog
			F6	Clear all temporary megnets
			F7	Use knot nodes as megnets
			1/2/3/4/5	Enter key point creating mode with segment type of Line/Bezier/Arc/Spline
			Esc	Exit key point creating mode
			A/D	Add a new construct point into the current segment(only spline)
Ctrl			Enter	Save and close
Ctrl			Arrow keys	Translate the path by 1 coordinate unit
Ctrl			N	New
Ctrl			Y/Z	Redo/Undo
Ctrl			+/-	Zoom in/out the canvas
		Alt	Space	Rotate the selected graphs clockwise by 90°
		Alt	Arrow keys	Rotate (See 5.1.5 for detail)
Ctrl		Alt	Arrow keys	Rotate (See 5.1.5 for detail)
	SHIFT		Arrow keys	Resize (See 5.1.5 for detail)
Ctrl	SHIFT		Arrow keys	Resize (See 5.1.5 for detail)

5.2 Clipped Path

The clipped path tool is used for generating a path by clipping from the paths that already exist in the workspace. Select some graphs in the workspace and click the button [icon] on the AxGlyph panel, the clipped path editor will be opened. You will see that all valid paths of the selected graphs have been split to be a series of segments by each other. Then you can select some of them by left clicking to assemble a new path , as shown in the Figure 5.2.
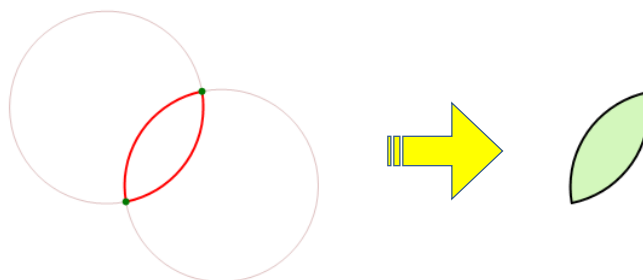

Figure 5.2. Clipped path

5.3 Affine Transformed Path

The affine transformated path tool is used for creating a path by affine transformation from the paths that already exist in the workspace. Select a number of graphs in the workspace and click the button [icon] on the AxGlyph panel, an affine transformated path graph will be generated. You will see that there are four key points around the graph, which can be dragged to make affine transformation. as shown in the Figure 5.3.
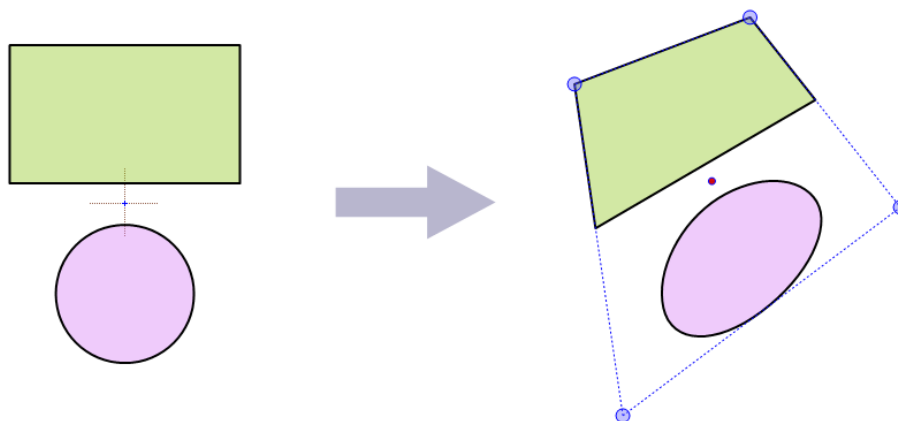
Figure 5.3. Affine transformated path

5.4 Group

From the selected graphs in the workspace, you can create a group by click the button [icon] on the toolbox panel. All graphs in the group will keep pace with each other when moving, rotating and scaling. And you can break up a group by click the same button when it is seleted.

Following the example below, you can also create a group that has pipe pads.

Example: Suppose that there are some unit have been created into the workspace, as shown as Fig. 5.4(A), then create three virtual pipe pads by the button [icon] from the category [icon] and place them to proper position. Select all mentioned units previously and create a group then you will get a register template with three pipe pads. The special pipes [icons] connected these pads will be tracked when moving the register. You can restore the template to a favorite folder (See section 2.3.2 for detailed) for future use.

（A）   （B）   （C）

Figure 5.4. Create a group with pipe pads

5.5 Overlapped Path

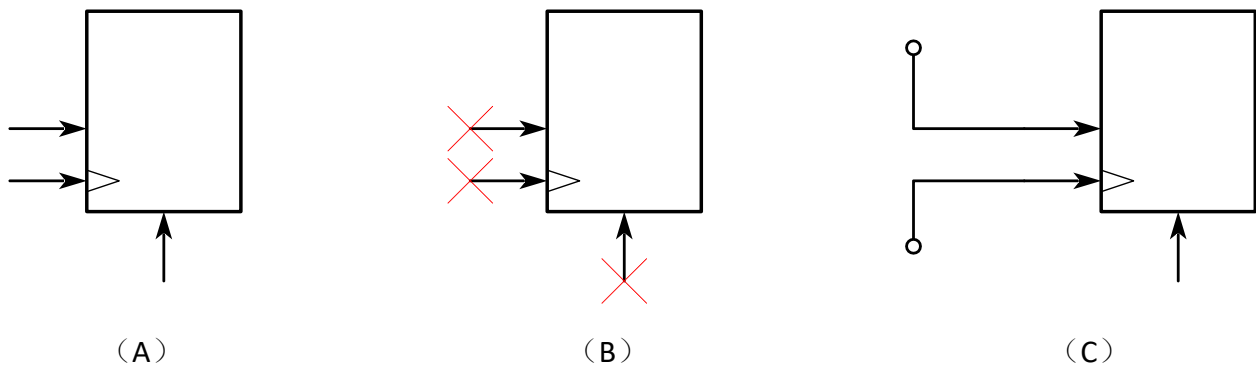The overlapped path tool is used for generating a new path from the paths that already exist in the workspace by overlapping boolean operation. In a overlapped path, areas that overlapped each other for even times will be hollowed out, as shown in the Figure 5.5.
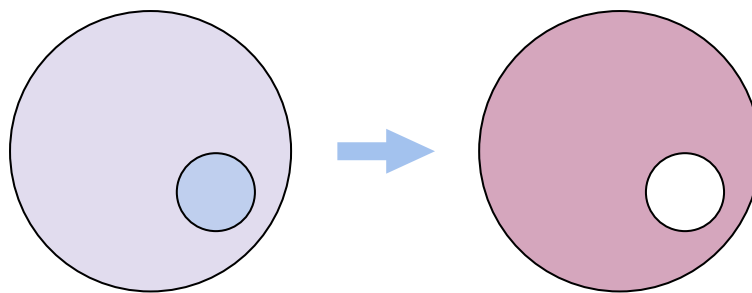

Figure 5.5. Overlapped path

6. Animation based on time series

The third tab page on the right sidebar of AxGlyph, is the graph parameter editor. It can be used not only to edit the position, shape, and size of the graph (see Section 2.1.4), but also can be used to generate animation based on time sereis.

Click the toolbar button (🕐) above the graph parameter editor to open the time series edit dialog, in which one can create time series by ASCII data import, reference to a third type of magnets lattice, or the data series calculator.

6.1 Generate Time Series

Each time series in the AxGlyph consists of several columns. When defining a specific parameter, you need to specify the time series name and column number. Before confirming and closing the time series definition dialog, ensure that the corresponding time series and columns are selected in the list control and the table display.

The time series in AxGlyph can be used in absolute mode or relative mode, and the latter can be set to incremental mode. The mode of action is shown in the table below.

Mode	Animation Action
Absolute	Use as the graph's parameter directly
Relative (Normal)	Use time series value + initial value as the graph's parameter
Relative (Incremental)	Use cumulative series value + initial value as the graph's parameter

6.2 Generate Animation

Click the button (▶) above the graph parameter editor to open the animation generator dialog. Set the total duration and frame frequency, then click "Generate Animation".

7. Using AxGlyph with Applications and Websites

7.1 Output Pictures

The sub-menus for picture export are provided both in the main menu (![menu icon]) and the context menu, and the hotkey is CTRL+E. The follwing formats are supported:

1. Windows Bitmap (*.bmp)|*.bmp|
2. Joint Photographic Experts Group (*.jpg)|*.jpg|
3. Graphics Interchange Format (*.gif)|*.gif|
4. Portable Network Graphic Format (*.png)|*.png|
5. Tagged Image File Format (*.tiff)|*.tiff|
6. Windows Enhanced Metafile (*.emf)|*.emf|

Another way to get the picture is using the clipboard. Right-click anywhere in the workspace and select "Capture Picture" in the context menu, then the clipboard will be set with the picture of the current workspace canvas. Metafile and bitmap are both available in that way, you can set the option in the "Advanced" tab of the "AxGlyph Settings" dialog.

7.2 Embedded OLE container

Object Linking and Embedding (OLE) is a technology that enables an application to create compound documents that contain information from a number of different sources. It is supported by many applications in Windows OS. They are called OLE containers in this sense and most of them have an insert object command entry in their "**Insert**" menu or somewhere else. The command opens a dialog containing a list of all types of objects that can be inserted. Then choose the item named "**AxGlyph.Document**" and AxGlyph will open an new server instance. Edit your graphs and close the window when you are done, the new AxGlyph object will appear in the container's document. Any time you want to edit the graphs, just double-click it, or right-click on it to find the "Edit" or "Open" command in the context menu.

You can also insert an AxGlyph object to an OLE container by using the Windows clipboard.

The AxGlyph object in the container is rendered as a vector diagram, although the display is ambiguous in some containers due to compatibility issues, but the quality is not affected after printing or converting to a PDF file.

7.3 Add-in for MS-WORD

By default, if MS-WORD is already installed on the system before installing AxGlyph, the AxGlyph installation package will install the AxGlyph plugin menu on the WORD's Ribbon, as shown in Fig. 7.1.
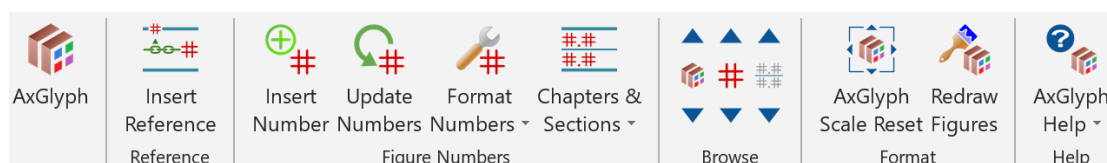

Figure 7.1 The AxGlyph Add-in Tab on MS WORD Ribbon

This add-in menu provides the ability to insert AxGlyph objects, setup AxGlyph objects, number AxGlyph objects, etc. This addin can effectively improve the efficiency of editing and managing AxGlyph diagrams in MS-WORD.

7.3.1 Insert AxGlyph diagrams

Click the AxGlyph icon on the addin menu to insert an AxGlyph object into the current WORD document and open AxGlyph to start editing the object.

7.3.2 Numbers

This set of commands is used to number the figures in MS-WORD, insert numbered references, and manage the numbers. They can be used for all types of illustrations (not limited to AxGlyph objects). When you insert a new illustration or delete an existing one, all the numbers and references will be automatically updated in the order.

Note: there is no binding relationship between the numbers of the illustration and the illustration itself. The illustration number will not be deleted if the illustration is deleted. The references are actually the references to numbers, not to illustrations.

The illustration number allows for multiple formats. You can customize the number format using the Number Format dialog. Usually, a illustration number contains the chapter number, the section number, the illustration number, a couple of delimiter, and some separators. As shown in Fig. 7.2. The elements that make up the illustration number are optional. You can set the a number such as (1.1.1), [1.I.A], or you can simplify it to (1.1), 1.1, or even just 1 or A.

When editing the document, when the order of the number and its reference changes, you may need to reorder the numbers using the add-in menu command "Update Number". When the volume of the document you are editing is huge, you can also use this command only for the selected part, to avoid the WORD process responding too slowly.

Figure 7.2 The Format Illustration Numbers Dialog

7.3.3 Chapter/Section Breaks

If you have a chapter number in the illustration number format you defined. When you open a new chapter in the WORD document, you need to add a chapter break at the beginning of the chapter. You must ensure that the chapter number is correct when you insert the illustration number in this new chapter. You can use Quick Insert (Auto increase by 1) or customize the chapter number.

The chapter breaks are hidden by default. If you need to delete or modify some chapter breaks, you can use the "Show All Breaks" in the addin menu to display them. After you have made necessary modifications, use "Hide All Breaks" to hide them.

Section breaks can be manuplated the same way as chapter breaks.

Note: The chapters and sections referred to here are relative concepts. If you only use 2-level number format, the effect of using sections instead of chapters is the same. The chapter/section breaks inserted in the AxGlyph addin menu is independent of the structure of the WORD document body, and it works for the illustration number only. Also, don't put the chapter/section breaks in the title, which will cause the document directory to be confusing and should be placed somewhere in the body before the first illustration number.

7.3.4 Browse the content created by AxGlyph in WORD

This set of commands helps users quickly locate the AxGlyph creations, including illustrations, numbers, and chapter/section breaks. When you browse the chapter/section breaks, the original hidden breaks will be displayed. After you finish browsing or modifying, you can hide them with the "Hide All Breaks", as mentioned before.

8. FAQ

Q-01. Why does the antivirus software alarm when installing AxMath

The first version of AxMath was released at the end of 2014, and the antivirus software may be sensitive to a new software. The installation package downloaded from our official website (http://www.axsoft.co) is guaranteed being safe. To ensure security, you can use antivirus software to scan the installation package before installing.

The installation and running of AxMath requires to read and write the system's registry, if the antivirus software alarm for that reason, please select "allow all operations" or a option like that.

Q-02. The illustration in WORD is displayed as { EMBED AxGlyph.Document }

This is related to a display setting of the MS-Word. To display the illustrations normally, do the following steps:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the option "Show field codes instead of their value" in the "Show document content" group and turn it off.

You can also use the hotkey Alt + F9 to do the operation directly.

Q-03. Illustrations appear as empty boxes or shaded box in a Word document

The "empty boxes" is a feature of MS Word called "Show picture placeholders" designed to save memory of the computer. This option helps minimize the amount of computer resources required to display a page and helps Word scroll multiple pages faster on-screen. Double-clicking these boxes will launch AxMath and display the illustration, and the equations will print correctly. You can turn off the option so that the illustrations in your document display on the computer screen normally, as the following steps:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the option "Show picture placeholders" in the "Show document content" group and turn it off.

The "shaded boxes" is another feature of MS Word called "Field shading" designed to make it easier to find OLE objects, such as AxGlyph illustrations. Please do the following steps to turn it off:

1. Click the "File" tab, click "Options".
2. Select the "Advanced" catalog page in the navigation pane on the left.
3. Find the combo list that labeled "Filed shading" in the "Show document content" group and select either "Never" or "When selected" in the list.

Q-04. AxGlyph has been installed, but the add-in tab is not found or does not work

The first possible reason is that the Office's version is too old. AxGlyph's add-in is only for Office 2010 and later.

The second possible reason is that when you install AxGlyph, there are some running Word processes in the system, in which case an write failure error will be prompted during the installation. To solve this problem, you should re-install AxGlyph and make sure that all Word processes have been quit before the re-installation.

The third case is that when you insert a new AxGlyph object using the addin command, An error message with code 4198 pops up, or a message box pops up prompting: "The program used to create this object is XXX. That program is either not installed on your computer or it is not responding. To edit this object, install XXX or ensure that any dialog boxes in XXX are closed." Please try the following steps to solve this problem:

1. Click the "File" tab, click "Options".
2. Select the "Add-Ins" catalog page in the navigation pane on the left.
3. At the bottom of the page, find a combo list at the rightside of the label "Manage" and select "Disabled Items" in the list, then click on the button "Go" to open the "Disabled Items" dialog.
4. Select "AxGlyph.dotm" in this dialog and click the button "Enable".

Try the following steps if the problem is still exist:

1. Click the "File" tab, click "Options".
2. Select the "Add-Ins" catalog page in the navigation pane on the left.
3. At the bottom of the page, find a combo list at the rightside of the label "Manage" and select "Templates" in the list, then click on the button "Go" to open the "Templates" dialog.
4. Check "AxGlyph.dotm" in the list.

If AxGlyph add-in has been enabled but the problem still exists please try the following steps:

1. Click the "File" tab, click "Options".
2. Select the "Trust Center" catalog page in the navigation pane on the left.
3. Click on the button "Trust Center Settings" to open the "Trust Center" dialog box.
4. Select the "Macro Settings" catalog page.
5. Select "Disable all macros except digitally signed macros" or "Enable all macros".

In another case this problem is accompanied by a message box prompting: "'VBE6EXT.OLB' could not be loaded". VBE6EXT.OLB is Visual Basic Extensibility. It could be possible that VBE6EXT.OLB which is required to run VBA for Office is corrupted. See if you can repair the installation. If it doesn't, reinstalling it should fix the problem. A reference solution can be found at https://social.technet.microsoft.com/Forums/office/en-US/1d3e9aa0-2069-4f7b-b6cf-c47e00d637 f5/vbe6extolb-could-not-be-loaded?forum=officeitproprevious

Q-05. How to remove the AxGlyph's add-in temporarily from MS-Word

Open the Word Options dialog, and then click Add-ins. In the Manage combo list, select Templates, and then click Go. Uncheck the box next to the AxGlyph.dotm item.

Q-06. How to remove the AxGlyph's add-in permanently from MS-Word

Quit all Word processes and remove the AxGlyph Commands for Word file from Word's startup folder. You can seach the file named "AxGlyph.dotm" on your computer if you do not know where it is.

Q-07. Why the add-in's dialog box does not respond or contains warning content

AxGlyph applies HTML dialogs in the WORD addins. The dialogs will not respond if the IE disables active scripting. Please try the following steps to fix the problem:

1. Open IE, find "Tool" in the menu, the click the "Internet Options".
2. Select the "Security" catalog page.
3. Click on the button "Custom Level…" to open the "Security Settings" dialog.
4. Enable "Active Script".

In another case, a warning content is popped up: "To help protect your security Internet Explorer has blocked this website from displaying content with security certificate errors. Click here for options…". This warning appears if the IE's security level is set to the highest level. You should make sure that the IE's security level is medium high or lower. You can search for more suggestions on https://answers.microsoft.com.

Q-08. AxGlyph objects in a Word document are deformed

When you re-open a Word document that contains AxGlyph objects, you may find some of the equations have been deformed, i.e. stretched or squashed. This bug has existed for a long time in MS-Word.

Until Microsoft solves it completely, you can use the command on the add-in to restore all AxGlyph equations to their original scale.

Q-09. How to change the style (font) of figure numbers

In MS Word, the figure numbers are styled with a style named **AGDisplayFigure**. You can modify the style by "**Format Numbers**" – "**Modify the Looking Style of Figure Numbers**" from the add-in menus.

Q-10. In some applications the equations shows blurring

This is because AxGlyph has compatibility issues with the application. You can try to solve the problem by updating the software to the latest version.

Q-11. The icons on AxGlyph's UI are too small to identify

This issue is serious on those computers with a high resolution screen. The solution is:

1. Right click on the toolbox panel, select "Appearance…" from the context menu to open the

appearance settings dialog.

2. Select "Large" or "Auto" from the combo list titled "Toolbar Size".

3. Restart AxGlyph.

Q-12. The chapter/section breaks leads to a disordered catalog

This issue arises if one or more chapter/section breaks has been placed together with the chapter/section title. The chapter/section breaks should be placed at the head of the body text rather than the title.

Q-13. Some menus, buttons or controls of AxGlyph do not work in Win10

If you have upgraded your OS from Win7 or Win8 to Win10, there is a possibility of such a problem. Win10 is far away from a stable system.

You can try reinstalling AxGlyph to solve the problem. If it is still exist after that, follow the steps below:

1. Right-click on the icon of AxGlyph and select Properties in the context menu. You can do this from the AxGlyph's shortcut or by navigating in File Browser to the exe file.

2. Select the Compatibility tab, then check the box next to "Run this program in compatibility mode for ".

3. Select the version of Windows to use for your app's settings in the dropdown box, Win7 or Win 8.

4. Hit Apply, then run your AxGlyph and see if this fixed your issues.

Q-14. AxGlyph objects have become non-editable in MS-WORD

When opening a previously saved MS-WORD document containing AxGlyph objects, you may find that all or some of AxGlyph objects have become no longer editable. This issue is associated with the Auto-recovery function in MS-WORD, i.e. it is a bug of MS-WORD. The same issue happens with not only AxGlyph, but also any kind of OLE object, including MS-EXCEL charts.

Microsoft recommends turning off the Auto-save function, especially when editing a large volume document. Unfortunetly, Microsoft has not provided any way to repair those OLE objects that have already become non-editable.

Follow the steps below to disable the Auto-save fucntion in MS-WORD:

1. Click the "File" tab, click "Options".

2. Select the "Save" catalog page in the navigation pane on the left.

3. Remove the check mark from "Save Auto-recovery data every x minutes."