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Dongle



A dongle is a small USB connector that plugs into a USB port on your computer. For many ProSail machines, a dongle is required for the software to run.

USB to Serial converter



With the ProSail plotter mkIII or the ProSail digitiser, the dongle is an optional extra and is not supplied as standard. With these machines the software will run so long as the USB cable from the "USB to Serial converter" is plugged into the computer (the machine does not need to be turned on, just the USB cable plugged in to the computer).

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This manual covers both the Nesting software and the PanelMaker software. If you only have the Nesting software please disregard the sections of this manual relating to Shaping, Scaling, Divide and Triangulation which are only in PanelMaker.

Whether you have PanelMaker or just Nesting, the program name is the same :
PanelMkr.exe

Nesting

The Nesting software is used for arranging (nesting) 2D panels (patterns) on the fabric. Panels can be moved around, flipped and rotated. There is also a semi-automatic compaction facility and optionally (if enabled) a fully automatic nesting facility.

It can control a ProSail plotter, plotter/cutter or digitiser.

DXF, HPGL and NTV files created by other CAD software such as AutoCad, CorelDraw, MPanel, ForTen etc can optionally (if enabled) be imported.

DXF and NTV files can optionally (if enabled) be exported.

PanelMaker

PanelMaker is a 2D patterning program where 2D panels (patterns) can be generated and modified. There are 3 basic modes to shaping in PanelMaker :

Panel Mode



Considers the global dimensions of the panel.

Curve Mode



Considers the local shape of individual curves in the panel.

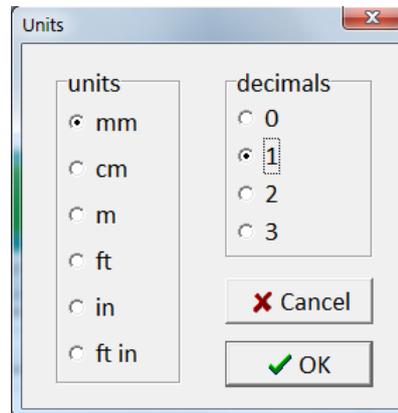
Seam Mode



Considers the seam widths around the panel.

Additionally panels can be scaled, divided or digitised.

Selecting **Units** from the **File** menu :



This dialogue determines the current units and decimal places displayed in all of the dialogues throughout the program.

Although this determines the units that will be displayed, you can enter values using any units. For example if you want to enter 1.5 feet into a dialogue, you can enter 1.5f or 1.5' or 1f6i or 1'6". Then after pressing the Enter key it will be converted to the current units you selected in the Units dialogue. e.g. 457.2mm

If the current field is already displayed in the units that you want then when you enter a new number there is no need to add the units letters after the number. Just type the number.

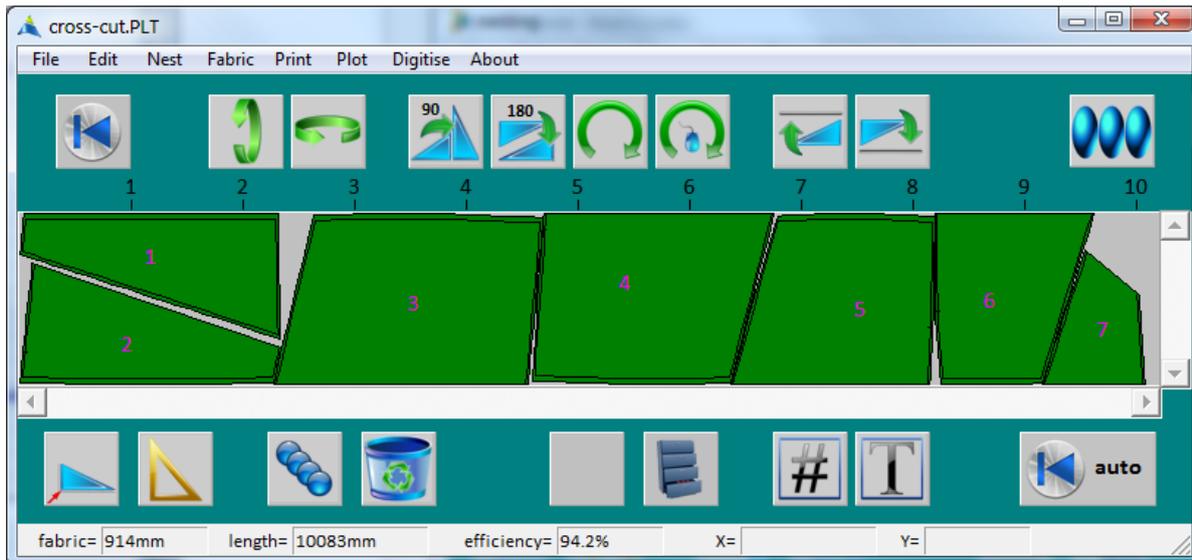
Most dialogues have a % button that toggles between % and the current units when you click in it.

If for example mm is displayed in the % button then fields in the dialogue will be displayed in mm.

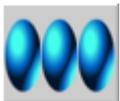
If however % is displayed in the % button then some fields will be displayed as a %. Then if you enter a number into these fields it will be assumed to be a % unless you add the units letters to the end of the number.

Some examples

<u>entered</u>	<u>converted</u>
4.2f	1280.2mm
1.4m	1400.0mm
4.2f - 7mm	1273.2mm
10i	254mm
100+10.7	110.7mm

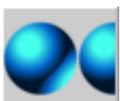


The Nesting Window shows the panels on the fabric. The icon near the top far right of the screen has two modes that govern the display of the Nesting Window :



In this mode, the view of the panels is distorted horizontally so they can all be seen on the screen.

Clicking on this icon (or pressing the F4 key on the keyboard) will produce a dotted rectangle inside the Nesting Window. Using the mouse, position this rectangle at a location you wish to zoom in on. You can change the zoom scale by typing a number on the keyboard between 1 and 5. Then click the mouse to zoom that rectangle. The icon will then look like the following :



In this mode, the view of the panels is drawn undistorted. The horizontal and vertical scroll bars around the Nesting Window can be used to move around the nesting lay to see all the panels.

Clicking on this icon (or pressing the F5 key on the keyboard) will revert to the mode above so all the panels can be seen on the screen.

fabric= 914mm length= 13259mm efficiency= 93.5% X= 6680.7mm Y= 425.3mm

(x,y) coordinates of the mouse cursor on the fabric. **x** is the distance along the table. **y** is the distance across the table. (0,0) corresponds to the bottom left corner (Home).

length = total length of fabric required.

efficiency = (total panel area) / (length x fabric).

Click on a panel to highlight it. To re-position a panel, click on it, and with the mouse button still down drag it to the required location. To highlight several panels, either hold the Shift key down while clicking on them or click the mouse outside a panel and with the button still down drag a dotted rectangle around the desired panels. Another way to select a panel is to use the left or right arrow keys on the keyboard.

The following icons apply to the highlighted panel(s) :



Flip the highlighted panel(s) vertically. A flipped panel will have a rectangle drawn around its panel number to identify it is on the other side of the fabric. This may be important if the fabric has a different texture on each side.



Same as above except flipped horizontally.



Permanently remove the highlighted panel(s) from the nesting window. To undo the operation use Ctrl+Z or **Undo** from the **Nest** menu.



Duplicate the highlighted panel(s). If **Rename after Duplicate** is ticked in the **Preferences** dialogue from the **Nest** menu, the duplicated panels will have a new number. Otherwise they will have the same number.



Highlight all panels of this colour and style. To first display a colour in this icon, click the mouse in any panel. This icon will then become the colour and style of that panel.



Will display a dialogue where the panel(s) number can be entered. If you don't want the panel(s) to have a number, enter 0.



Will display a message asking for the panel(s) text to be entered. The Text will be plotted next to the panel number in a seam. Note that if you enter too much text, it may appear off the edge of the panel.



Will remove the highlighted panels and save them to a specified file. These files can later be read using **Open** from the **File** menu.

The colour or style of the highlighted panels can be changed by selecting **Colour** or **Style** from the **Nest** menu.

Rotation



Rotate the highlighted panel(s) clockwise by 90 degrees.

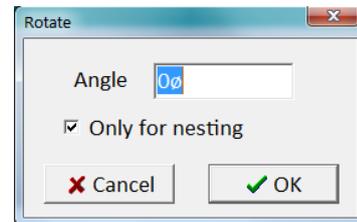


Rotate the highlighted panel(s) by 180 degrees. Alternatively you can right click on one of the panel(s) using the right mouse button and select **rotate180**. Or simply right double click on the panel(s).

If you just want to swap two panel positions (with rotating), highlight one then right click on another and select **swap**.



Rotate the highlighted panel(s) clockwise by the specified angle (-ve for anticlockwise). The following dialogue will appear :



If **Only for nesting** is ticked, the panel(s) are rotated on the Nesting Window but not in the Shaping Window of PanelMaker. This is probably the most useful mode especially if a panel has been digitised and you don't want its (x, y) coordinates rotated in the Shaping Window. The rotate 90 and rotate 180 icons use this method.

With this method the cumulative angle the panel has been rotated is remembered and is displayed in this dialogue. Setting the angle to zero will rotate the panel back to its original orientation (the same orientation seen in the shaping window).

If **Only for nesting** is not ticked, the panel is rotated in the Shaping Window as well as on the Nesting Window.

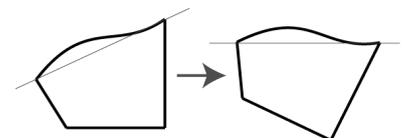


Rotate the highlighted panel visually using the mouse.

Click and release the mouse button on this icon to display a dotted line drawn between the centre of the panel and the mouse. Move the mouse to a location on the screen (away from the panel), then click the mouse and (with the mouse button still down) drag the mouse to rotate the panel. When the mouse button is released the panel will have been rotated. The further from the panel you do the dragging, the more control you have.



Rotates the highlighted panel(s) so the end points on the top curve becomes parallel with the fabric edge.



Rotates the highlighted panel(s) so the end points on the bottom curve becomes parallel with the fabric edge.

Separating Colours

To separate panels of different colours and style (fabric) into separate files :

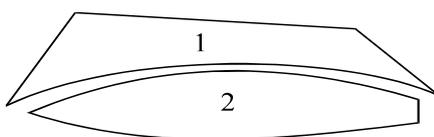
- (i) Click on one panel of a given colour and style to make the following icon that colour and style.
- (ii) Then click on this icon  to highlight all panels of this colour and style.
- (iii) Then click on this icon  to save all those highlighted panels into a file.

Enter a suitable file name. If a message comes up telling you that the file already exists and asks you if you want to overwrite it, either say **Yes** and overwrite it or say **No** and then use a different name.

Repeat the above process until there are only panels of one colour and style left on the Nesting Window. They can then be nested and plotted. To plot the panels we previously saved, select **Open** or **Add** from the **File** menu and open one of those files, nest and plot. Continue until all panels have been plotted.

Group (Ctrl+G) / Ungroup (Shift+Ctrl+G)

Sometimes it is useful to link panels together so they act as though they are one panel on the Nesting window. i.e. So they compact, flip, rotate etc as one panel. For example, if the following two panels are grouped together they will not be separated after clicking the compaction icon (which otherwise they would have been) :



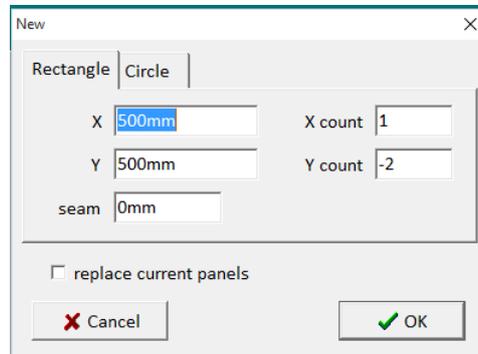
To group panels together, highlight the desired panels and select **Group** from the **Nest** menu. To ungroup panels, click on any one of the panels in the group and select **Ungroup** from the **Nest** menu.

Undo (Ctrl+Z) / Redo (Shift+Ctrl+Z)

Keyboard Ctrl+Z/Shift+Ctrl+Z will undo/redo the last operation. Alternatively these can be selected from the **Nest** menu. Multiple Undo/Redo are allowed.

New Panel

Selecting **New** from the **File** menu:



Create a new rectangle or circle of the specified size.

If **seam** is non-zero a seam will be placed all the way around the panel adding to the size of the panel.

If **X count** is +ve, the panel width will be $X * Xcount$ and there will be vertical cut lines with a spacing of **X** dividing the panel. If **Xcount** is -ve, the panel width will be **X** with **Xcount** evenly spaced sections.

E.g. if **X count** is 1 the panel width will be **X** and have no divisions.

E.g. if **X count** is 2, the panel width will be $2 * X$ and will have 1 vertical division.

E.g. if **X count** is -3, the panel width will be **X** and will have 2 vertical divisions.

Y count works the same as **X count** but in the vertical direction.

*If **draw internal curves** is ticked in **Preferences** from the **Nest** menu, these divisions will be visible on the Nesting Window.*

If **replace current panels** is ticked, the current panels on the Nesting Window will be replaced with this panel. Otherwise this panel will be added to the current panels.

Adding panels

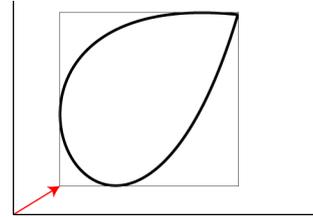
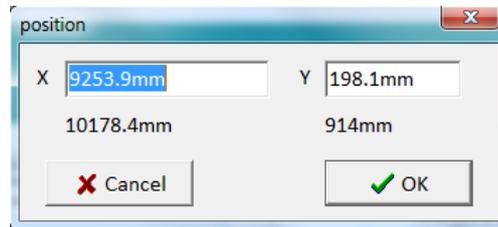
When you select **Open** from the **File** menu, the current panels on the Nesting Window are replaced with the panels from the file you are opening. If instead you select **Add** from the **File** menu the panels in the file you are opening will be added to the end of the current panels on the Nesting Window. These files will be highlighted and hence if you wish can easily be renamed with a letter next to their number by clicking on the **T** icon.

Multiple files can be selected in the Open or Add dialogues by holding down the shift or Ctrl key on the keyboard while you click on their name. This is a quick way to add several files to the Nesting Window.

Panel Origin



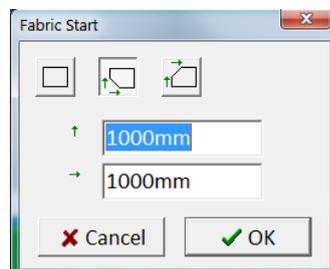
Specify the lower left (X, Y) coordinates for an imaginary rectangle enclosing the highlighted panel. The top right coordinates are also displayed.



Fabric Start



Displays the following dialogue allowing you to define the starting edge of the fabric for fabric that has been cut at an angle. After selecting **OK** to this dialogue, select the compaction icon to re-compact the panels to the new starting edge of the fabric.



This icon will restore the fabric to a rectangular edge.

Save a Copy...

Sometimes you want to save a copy of the nested panels to a different place (for example a memory stick to take to another computer). You could use **Save As...** from the **File** menu but you will have to change the directory each time you do this between this new directory and the directory you normally save your files. Also after saving, the software will think any changes have been saved and will not prompt you to save the file to its normal place later.

To get around these problems use **Save a Copy...** from the **File** menu.

There are 3 ways to compact panels:

- (i) Horizontally**
- (ii) Individually**
- (iii) Autonesting (Extra module)**

Compaction : Horizontally



Compacts all panels towards the left. The vertical position of the panels is not changed. You need to arrange the panels in a left to right order before clicking this icon.

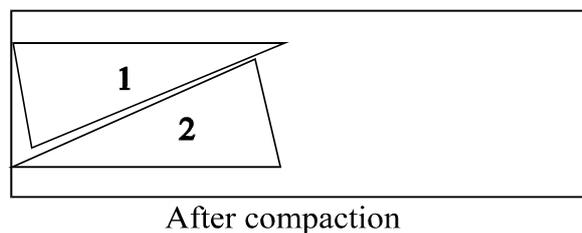
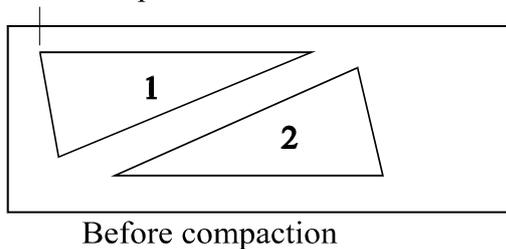
When you click in this icon, the software imagines all the panels are down the far right of the screen. It then moves one panel at a time as far as possible to the left until it either hits the left of the screen or another panel. The order in which it chooses the next panel to compact depends upon each panel's left edge. First it compacts the panel which has the left most left edge. It moves this panel as far to the left as it can. Then the next panel with the left most left edge is pushed as far to the left as possible. This is repeated until all panels have been compacted.

So it is up to you to arrange the panels in the desired left to right order before clicking this icon. Compaction horizontally does not care if a panel overlaps other panels at the time you click the icon. It only cares about the left edge of each panel.

In the following example the panels are in the correct order before compacting.

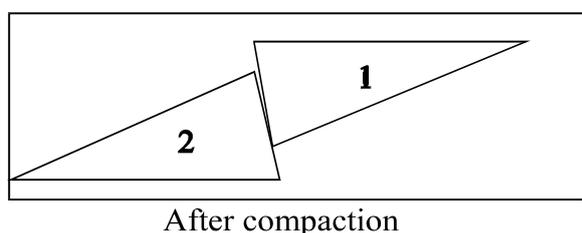
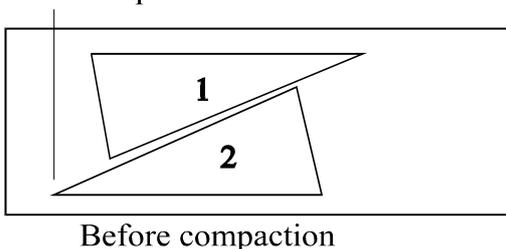
i.e. The left edge of panel 1 is to the left of the left edge of panel 2 :

Left most point

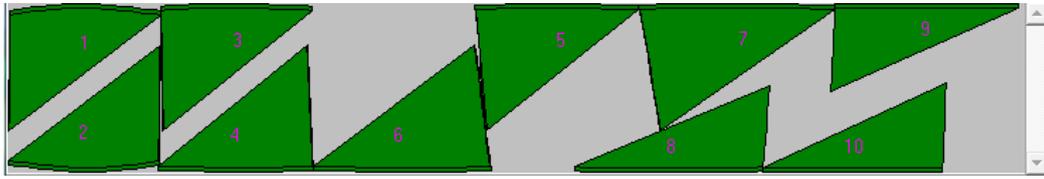


In the following example the panels are not in the correct order before compacting :

Left most point

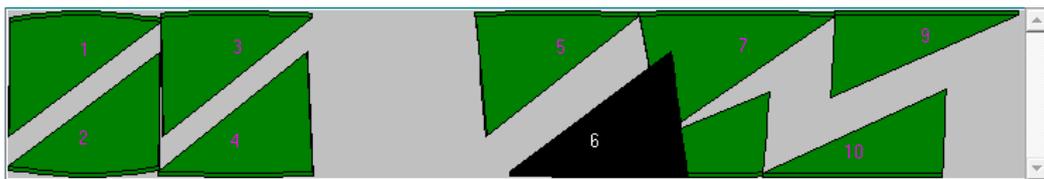


The following example is a nesting lay of panels that have been compacted using the compaction horizontally icon. However panel 6 has ended up in the wrong place.

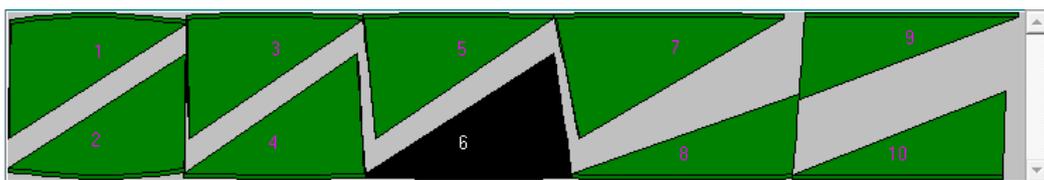


To solve this we need to move panel 6 until its left edge is to the right of the left edge of panel 5 but before the left edge of panel 8. (*alternatively we could have moved panel 5 so it is in front of panel 6*). It doesn't matter if panel 6 overlaps panel 8. The nesting software is only interested in each panel's left edge. If you want to see a vertical line showing the left most edge of a panel when you drag it, click the right button on the mouse rather than the left button when you drag the panel. Another useful feature of using the right button is that it makes sure the panel does not move vertically when you drag the mouse.

Note : if you want a panel to be hard up against the edge of the fabric, make sure you move the mouse toward that edge. The nesting software won't allow you to push the panel off the fabric.



Now click on the compaction horizontally icon :



Reset Compaction: Often you might arrange panels to have the correct left edge before clicking compaction horizontally. However after the compaction the order may change. This would indicate that if you click it again it would then give a different result.

To prevent this happening, the software remembers the order of the panels before its first compaction and uses that order each time you compact. If you later drag a panel it will recalculate that panels order based on its new left edge.

However because the software is using this combination of original panel positions and new panel positions to determine the order in which panels are compacted it can start to behave unpredictably if panels are repeatedly shifted and then compacted. To solve this problem, periodically select **Reset Compact** from the **Nest** menu.

Compaction : Individually

Panels may also be compacted individually. While holding down the Ctrl key on the keyboard, click in and drag the panel you wish to compact. As usual a dotted outline of the panel is drawn as you drag. However when the panel intersects another panel, the dotted outline attaches itself to that panel and does not move until you have moved away. If you release the mouse, the panel will stay in that position hard up against the other panel. Panels can be compacted in any direction with this method. e.g. Useful for compacting rectangles vertically.

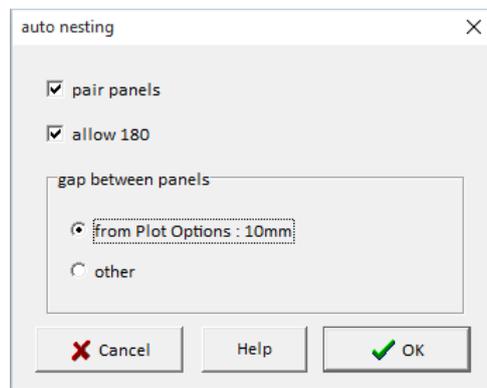
Panels may also be moved and compacted using the arrow keys on the keyboard. Hold down the Ctrl key and click any of the four arrow keys to move a highlighted panel in that direction. The panel will stop moving when it hits another panel.

This optional module will take panels off the Nesting Window and move them to the autonesting window where it automatically arranges them horizontally and vertically to minimise waste. It uses a genetic algorithm that progressively produces a better result over time.

Because it runs in the background you can continue using PanelMaker/Nesting with other panels during this process. This process will continue until you tell it to stop. It will then move the panels with their new positions back to the nesting window.



Moves panels to the autonesting window. They will be removed from the nesting window (so you can work on other panels).

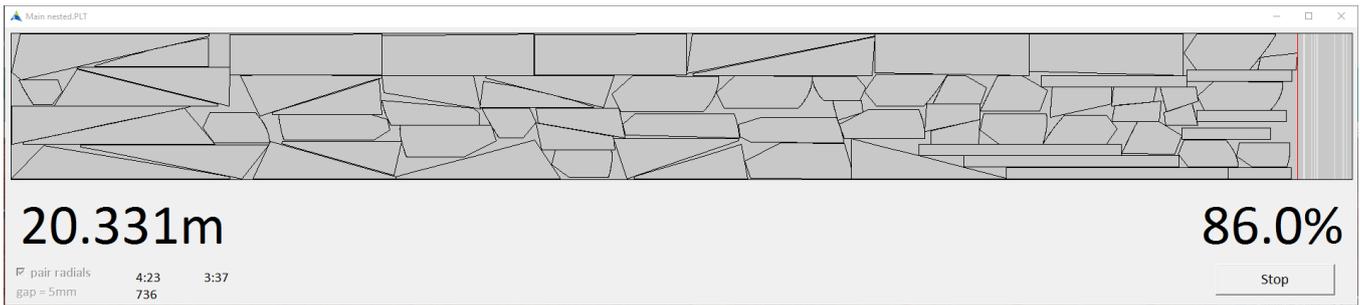


If **pair panels** is ticked (recommended), autonesting will first pair similar panels (typically one panel rotated 180 degrees and placed next to a similar panel) before it starts autonesting. This normally produces the best results but occasionally does not if there are only a few panels.

If **allow 180** is ticked (recommended) autonesting is allowed to rotate panels by 180 degrees.

Gap between panels is the minimum gap allowed between panels. Normally this will be the same gap specified in the **Plot Options** window from the **Fabric** menu (recommended). However you can override this if you wish and specify **other**.

It is usually more efficient to specify a **gap between panels** of at least 1mm(0.04") even if you are using a plotter and can have the panels touching each other. This is because the autonesting method is much slower when a value less than 1mm is used. If using a cutter you will probably want at least 10mm anyway due to the vacuum table.



Autonesting will continue searching for more efficient arrangements until you tell it to stop. While it is doing this you can continue working on the nesting window as normal with other panels (or if using ProSail, Pagoda etc continue designing).

Each time it finds a better solution it will display it on the autonesting window.

When you click **Stop** it will then move the panels with their new positions back to the Nesting Window. If you have since placed other panels on the Nesting Window it will ask you if you want to save them first.

If instead of **Stop**, you click the go away icon at the top right of the window, autonesting will ask you to confirm if you want to discard the changes made by autonesting. If you say Yes, whatever is currently on the nesting window will remain. Warning: if you hadn't saved the panels before you entered autonesting, they will be lost. You might possibly get them back by using **Undo** from the **Nest** menu.

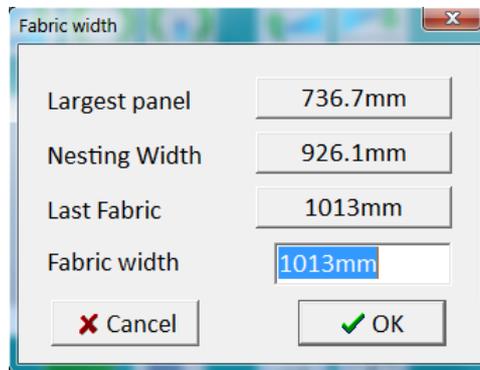
Compatibility with "Compaction : Horizontally"

If you click the compact horizontally icon with panels that were previously compacted with autonesting it will probably change their order. However if you re-arrange the left most order of the panels (use the right mouse button to drag horizontally) you will probably be able to get them in the correct order for it to work. You would however have to have used at least the same gap between panels in autonesting as you have in the Plot Options window.

Exceptions can occur especially if for example one panel has been pushed up into the hollow bottom side of another panel (like the panels drawn on [page 9](#)). In which case they would need to be grouped.

Fabric Width

Select **Width** from the **Fabric** menu:

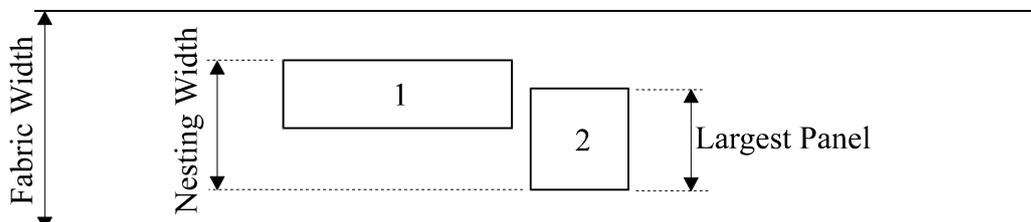


Enter the **Fabric width** the panels are to be nested on. Alternatively you can click the mouse on any of the following three buttons to use that width :

Largest panel : The width of the largest panel in the file. Hence this is the minimum possible **Fabric width** that can be used. Clicking in this button will place this value in the **Fabric width**.

Nesting Width : The width of the nested panels. A **Fabric width** less than this will necessarily shift the panels vertically to keep them on the fabric.

Last Fabric : The last **Fabric width** the panels were saved with.

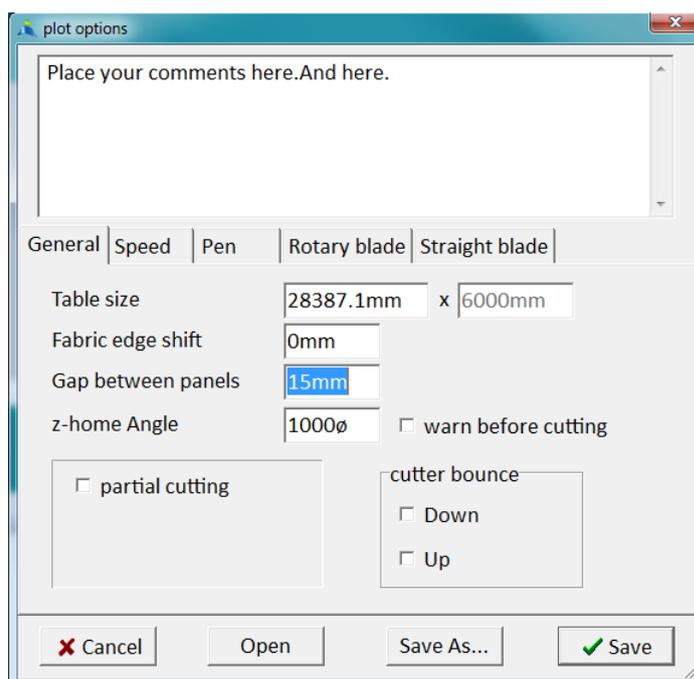


Different fabric files can be saved for different types of fabric. For some fabric you might want a slower plotting speed or have a larger gap between the panels etc.

These fabric files are specified, opened and saved in **Plot Options** from the **Fabric** menu.

Alternatively you can simply ignore these files and just change the information each time for different fabrics. In this case the software will store this information in the default file called untitled.pst.

General



Comments

The large edit field at the top of the window is useful for saving any comments regarding this particular fabric file.

Table size

Sets the maximum plottable length for your plotter. Usually set at 100% but can be reduced if required (if for example some rails are removed from the plotter). The maximum plottable width is set and can not be changed.

Fabric edge shift

This moves all of the plotting and cutting across the table. This will of cause reduce the maximum fabric width that can be used. Usually set to 0.

Gap between panels

When panels are being compacted (see [pages 12 to 16](#)) panels are pushed close together. How close they are allowed to get is specified by **Gap between panels**. A value of at least 10mm is recommended if using a cutter. Anything smaller than this and the resulting strip between panels probably won't be held down hard enough by the vacuum resulting in the fabric moving when cutting. For a pen plotter, any value can be used but it is recommended to use at least 1mm.

z-home Angle

Cumulative angle of rotation that the cutter z-axis will rotate before it will automatically do a z-axis homing cycle. That is to say after the cutter head has rotated by this amount it will check its position to make sure it is in the correct direction. The smaller this angle the more often the cutter head does this check. For a cutter mkIII, this can be kept very large (say 10,000). For a cutter mkI or II it should typically be about 1000.

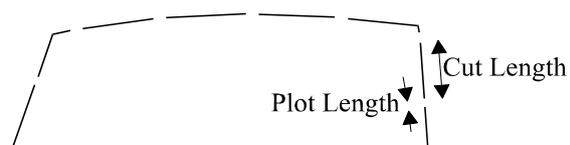
warn before cutting Plotter/cutters first do plotting and then cutting. If **warn before cutting** is ticked, a message will be displayed before cutting starts asking you if you want to start cutting.

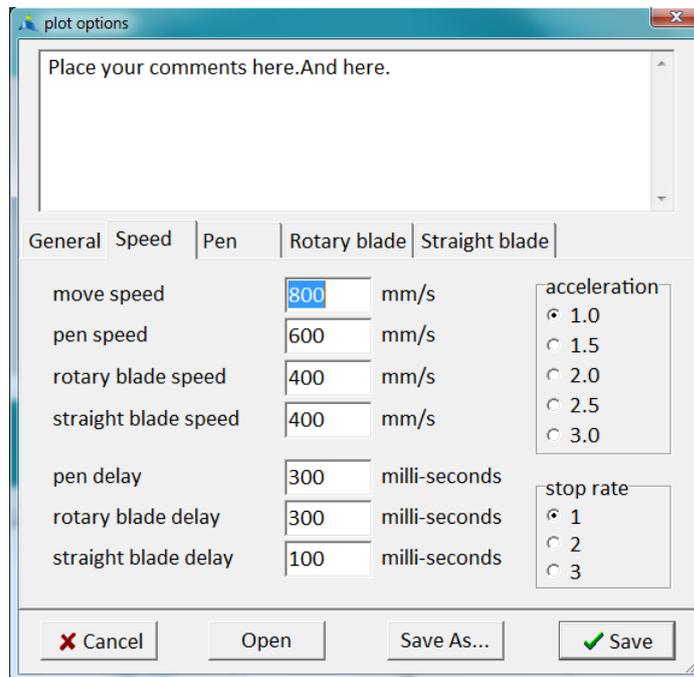
cutter bounce

This is an old method only used by old ProSail plotter/cutters to reduce how hard the cutter head comes down and hence increase the life of the plastic table surface. If **cutter bounce** is ticked and a non-zero value is entered, the cutter head will not come down so hard. The more you increase the value, the softer the head will come down. However, over a certain value, the head will come down hard and then go up again and then down again. (*The method used by **cutter bounce** is to send the signal for the head to go down, then after a delay equal to the cutter bounce value you have entered, a head up signal is given which slows the downward movement. This is then followed after another delay by the down signal again to continue the downward movement*). The optimal value will vary from machine to machine but around 30 seems to produce a soft movement for most machines.

partial cutting

This is very rarely used. If **plot** is non-zero, the external cut lines of the panels will be cut in sections. The length of each section will be equal to **cut** and the gap between each section will be equal to **plot**. This is useful for example if you want to roll up the panels after cutting and send them to another company.



Speed

move speed Speed the plotter will move when the pen and blades are up. This is normally high.

pen speed Speed when the pen is down. This is normally quite slow. Pen speeds depend upon the fabric being used and the type of pen. For example for Kevlar you will probably need to reduce the **pen speed** to prevent the pen from jumping as it goes over the fabric.

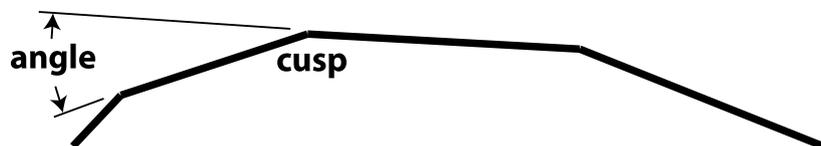
blade speed Speed when the corresponding blade is down. This is normally a medium speed.

pen delay Time in milliseconds the plotter waits for the pen to go up or down after giving it the signal to go up or down. If for example the pen is taking too long to go down, the plotter may start moving before the pen has gone down or may continue plotting for a short time before the pen has come up. Hence to allow more time for the pen to go up or down, specify a larger (not smaller) **pen delay**.

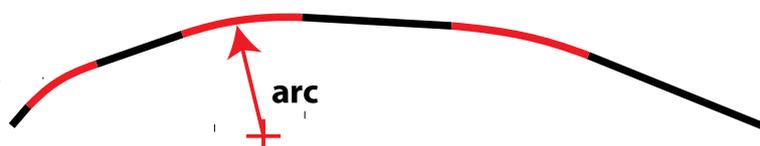
blade delay Similar to pen delay but for the corresponding blade.

acceleration Defines how quickly the plotter gets up to speed. 3 is the highest acceleration, 1 is the lowest. It is not recommended that both speed and acceleration are both set to their highest level. Doing so risks the possibility of the plotter stalling.

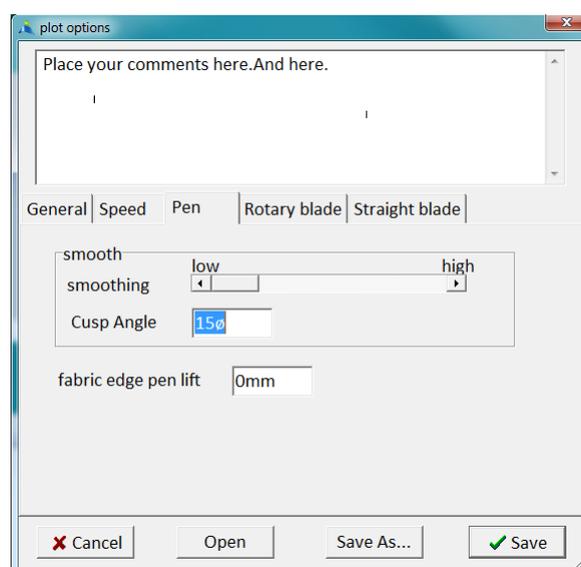
Files which are generated from 3D moulding software (or other CAD design software and read as DXF files) are typically made up of a series of straight line segments. Even if the design curves are smooth splines or circles they will often be exported from the design software as straight line segments. Depending upon the design software sometimes these can be quite coarse with relatively large angles between each segment.



If the plotter was to plot these curves like this, the plotter speed would have to start and stop at each cusp. Not only would this take a long time but would also give a jagged curve. To avoid this the plotting software uses smoothing where each cusp is replaced by an arc. The larger the arcs the smoother the curve will become but the more the curve departs from the design point. If however the arcs are too small then the plotter will need to slow down then speed up while doing the arcs.



Pen



smoothing

The size of the arcs used for smoothing when using the pen. **Low** corresponds to small arcs, **high** corresponds to large arcs.

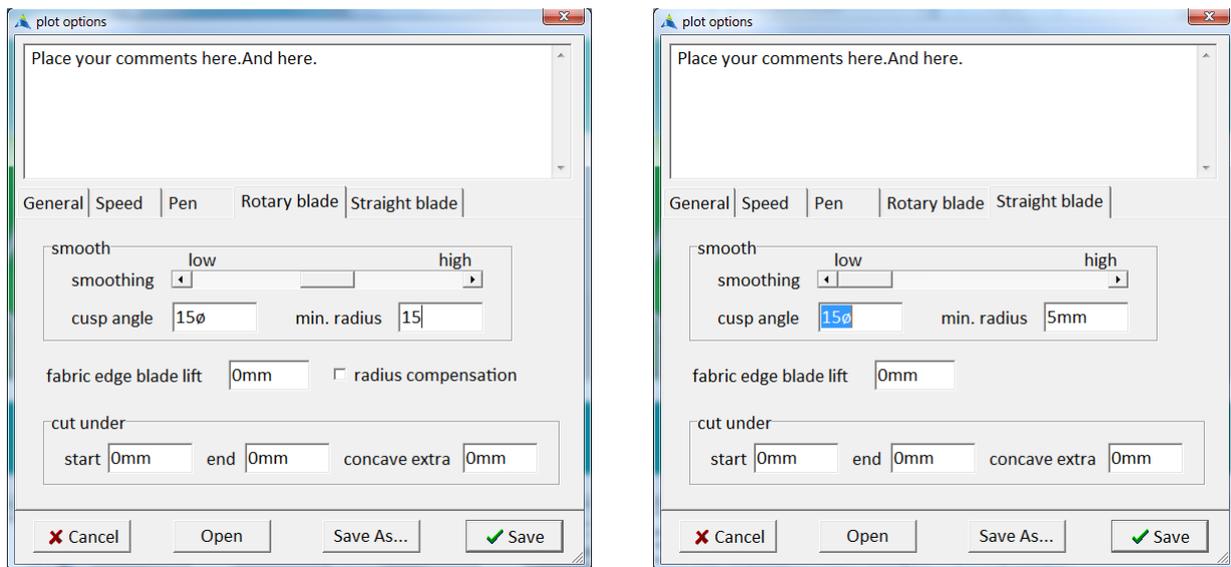
cusp angle

If the angle for any cusp is greater than **cusp angle**, no pen smoothing is applied at this cusp. This is to make sure that corners that are supposed to be corners remain as corners and are not smoothed. A typical value would be 15 degrees.

Fabric edge pen lift

If the pen comes close to the edge of the fabric, the pen will lift (not plot this part of the curve) to prevent the pen from catching on the edge of the fabric. See [page 24](#).

Rotary blade / Straight blade



The ProSail cutters can use one of 2 blade types. A rotary blade or a straight blade. The **Rotary blade** and **Straight blade** tabs specify the cutting characteristics for each. When you select **Plot** from the **Plot** menu, you then specify which of these 2 blades has been mounted.

If you are only ever going to use the Rotary blade you can go to **hardware** from **setup** from the **plot** menu and deselect **straight blade** (see [page 70](#)) . Otherwise you need to have it ticked to see the **Straight blade** tab in **Plot Options**.

smoothing

The size of the arcs used for smoothing when using the corresponding blade (see explanation on top of previous page).

cusp angle

If the angle of any cusp is greater than **cusp angle**, no blade smoothing is applied at this cusp. This is to make sure that corners that are supposed to be corners remain as corners and are not smoothed. At these locations the cutter will have to stop, lift the blade, rotate it and then put it down again. A typical value would be 15 degrees.

min. radius

If the radius of the arc the software has used on any cusp needs to be smaller than **min radius**, the cutter will draw this arc with the pen rather than the blade. This prevents the blade from blunting or snapping. It is tempting to make this very small to prevent this from happening but you run the risk of blunting or snapping the blade. Typically the **Rotary blade** needs at least 15mm. The **Straight blade** can be closer to 5mm.

fabric edge blade lift

If the corresponding blade comes close to the edge of the fabric, the blade will lift (not cut this part of the curve) to prevent the blade from catching on the edge of the fabric. See [page 24](#).

radius compensation *Only applies to Rotary blades:* when cutting circles or arcs the blade tends to be steered outward by the plastic table surface. Ticking **radius compensation** will try to adjust for this by over steering the blade inwards slightly. This only offers an improvement, it does not solve the problem which of course is a physical limitation relating to the length of blade that is cutting into the plastic. The problem does not exist for straight blades.

cut under *Although can be used with Straight blades, this is most applicable to Rotary blades:* A Rotary blade will overcut the start and finish of lines because of the length of the blade in the plastic. Namely the blade is not a point. If needed this overcut can be reduced by entering a value for **start** and **end**. e.g. If you find the cutter over cuts by 5mm at the start of a line and 4mm at the end of a line, you might try entering up to 4mm for **start** and up to 3mm for **end**. Normally these are just set to 0 since the over cutting is not normally a problem for most applications. For a straight blade you probably want to specify -ve values to force overcutting.

concave extra For concave corners on the outside of a panel or any corners on cutouts inside a panel it might be beneficial to reduce the amount of overcutting by even more to make sure there is no overcut. For these corners, **start** and **end** are effectively increased by **concave extra**.

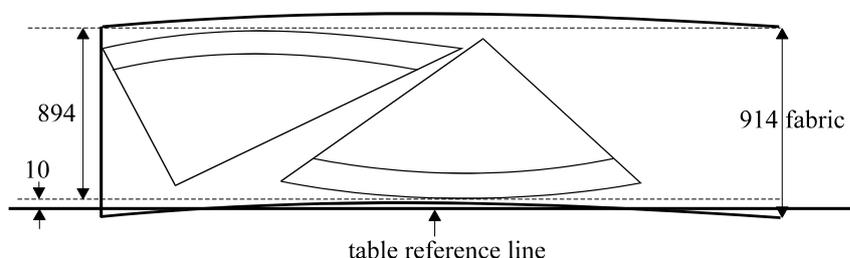
If you find the blade has to go up and down too often when cutting curves then you probably need to increase **cusp angle**. Though if too large it will smooth corners.

If you find some tight sections of curves are plotted rather than cut you could reduce **min. radius**, though if too small it will blunt the blade. You could also decrease **cusp angle** but then you will have more blade ups and downs.

Since the straightness and width of fabrics vary over their length, it may be necessary to take measures to allow for this and also to prevent the pen or blade from catching on the edge of the fabric.

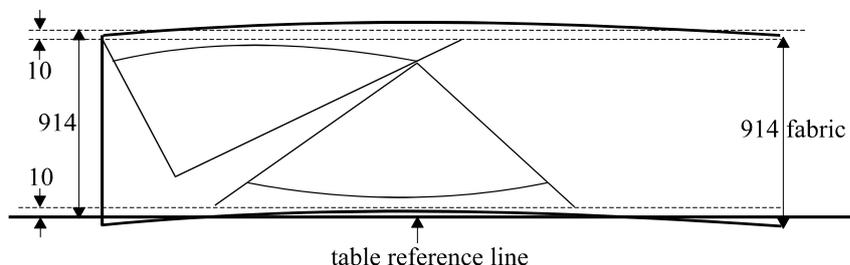
Method 1 : fabric edge shift

Tell the nesting software that the fabric is smaller than it actually is. For example you may be using fabric that is 914mm wide but you tell the nesting software that the fabric is really 894mm wide by specifying 894mm in the **Fabric Width** dialogue. Hence we are wasting 10mm of fabric each side. The fabric should be laid so the edge of the fabric averages the reference line marked on the table (some inside and some outside the line). We then need to tell the software to shift its plotting 10mm (50% of 20mm) in from that reference line. This is done by setting **Fabric edge shift** in the **General** tab of **Plot Options** to 10mm :



Method 2 : pen lift/blade lift (most common method)

The second method is to tell the nesting software the fabric width is the actual width of the fabric but tell the plotter not to plot when it gets to within say 10mm from the edge of the fabric. This is done by specifying 914mm in the **Fabric Width** dialogue and specifying 10mm for **pen lift** (and maybe a value for **blade lift**) in the **Pen** tab of **Plot Options** (**blade lift** is specified in the **Rotary blade** and **Straight blade** tab).



This method does not waste material and since the lines it does not draw are usually only seam lines it is not so important to plot them. One exception to this rule is for panels that come from a cross-cut sail. In this case the straight edge of each panel will only be approximated by the curved edge of the fabric.

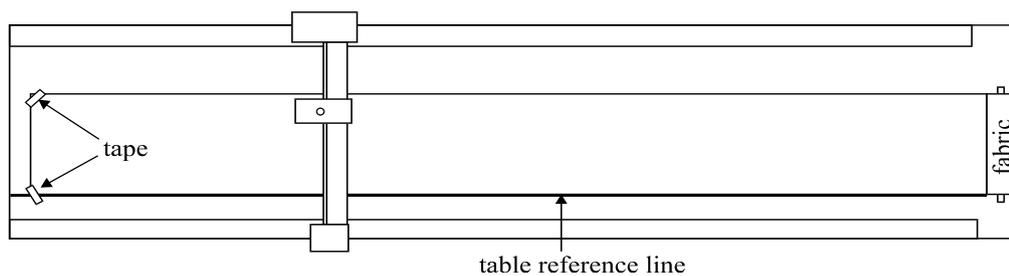
Lay the fabric out and tape it to the table. Masking tape is good for this. Usually it is sufficient just to tape the cloth at the start of the table. If using a cutter some people prefer to tape the entire side of the cloth to prevent air escape from the vacuum. Use the reference line on the table nearest you to lay the fabric to.

Cloth Bow : Because fabric sometimes has a bow in it, it is recommended that you try to average the cloth edge on the line so at some places the cloth edge is inside the reference line and at others it is outside.

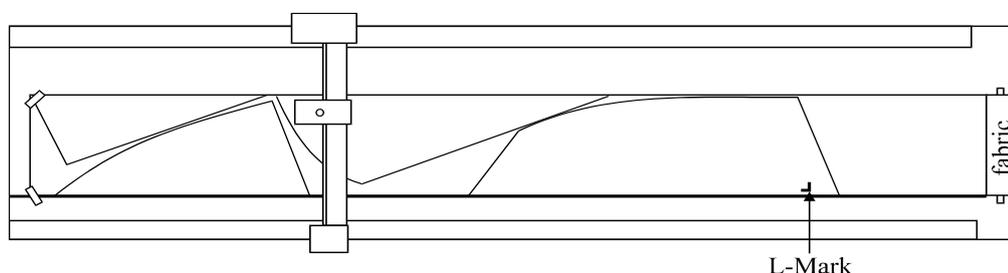
Cloth Curl : If using a cutter with fabric that has a tendency to curl, it is recommended that the roll of fabric is turned upside down to prevent the edges from curling up and possibly catching on the cutter.

Vacuum : If using a vacuum table with a cutter it is important to cover the remainder of the table that is not being used. Any holes that are left uncovered will dramatically reduce the power of the vacuum. For some materials it may be necessary to tape the entire fabric edge to prevent air escaping or the edge of the fabric moving when the cutting blade is near it.

For porous materials it may be necessary to cover the entire fabric with a thin layer of plastic. Very thin plastic is available and is quite cheap.



After telling the plotter to plot, the plotter will plot the first table lay (frame). If there is more than one frame the plotter will draw an **L-Mark** down the end of the table and a dialogue will appear on the screen asking you if you want to "continue next frame?".

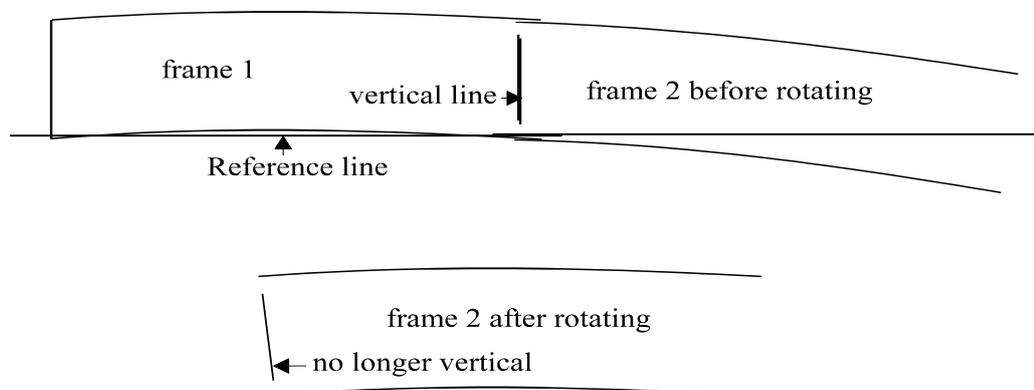


Pull the fabric down the table until the **L-Mark** drawn on the fabric lines up with the start line on the table. The corner of the **L-Mark** needs to be a specified distance up from the table reference line. This distance (typically 10mm) is specified by **L-Mark** in the **Hardware** dialogue (see [page 70](#)). Pushing a pin through the fabric to line up with a preset **L-Mark** hole on the table is a convenient way to do this.

It is quite acceptable to push the plotter by hand if you find it is in the way. Tape the cloth down again and when ready select **Yes** to the dialogue to continue the next frame. The plotter will now plot the next frame.

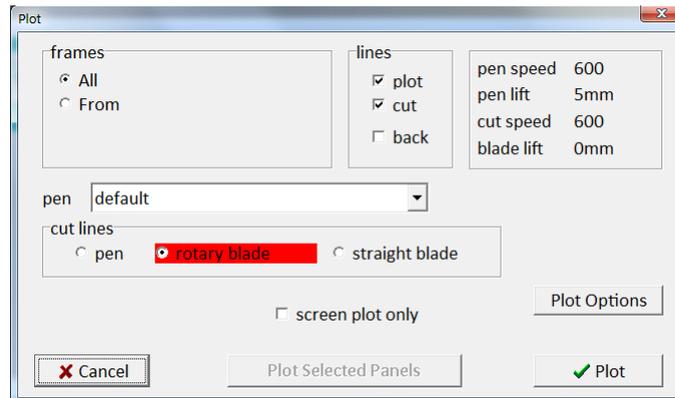
Problem of fabric with extreme bow

Although **fabric edge shift** and **fabric pen lift** explained on [page 24](#) can largely adjust for fabric bow, there still exists a problem when lining the fabric up for the next frame. Namely a line drawn directly across the table down the end of the table will no longer be directly across the table when the fabric has been pulled to the front of the table. This is because by pulling the fabric along the table and lining it up to the reference line on the table again, you in effect need to rotate the fabric slightly to keep it on the reference line.



However, this effect is not so important if **Plot complete panels only** is ticked in **Preferences** from the **Plot** menu.

Select **Plot** from the **Plot** menu :



To plot all the panels for all frames (tables) make sure the **All** radio button is selected and click the **Plot** button.

If you only want to plot some of the frames click the **From** radio button and enter the frame number for the first frame and the frame number for the last frame you want plotted. They can be the same number. The distances to the right give the position along the cloth that plotting will start and end. You can compare these with the ruler drawn on the Nesting Screen. Then click the **Plot** button.

Plot Selected Panels This is an alternative to the **Plot** button. It will only plot the panels that are selected (black) on the nesting screen.

lines This determines which type of panel lines are sent to the plotter. If **cut** is ticked, all lines that are defined as cut lines (for example all external lines in a panel are cut lines by default) will be sent to the plotter. This is unrelated to whether your machine is a plotter or a plotter/cutter. For example if you have a plotter (not a cutter) and want the external panel lines to be plotted, you need to make sure **cut** is ticked.

Normally both **plot** and **cut** are ticked but sometimes you may want to redo just the plotting or just the cutting and so only one would be ticked.

Tick **plot** if you want panel plot lines (most internal panel lines are probably plot lines) to be sent to the plotter.

back is a special case and is described on the next page. Normally it is not ticked.

screen plot only If ticked, selecting **Plot** or **Plot Selected Panels** will only draw the lines on the screen. It will not send the information to the plotter. This can serve as a useful check if there is a problem.

cut lines Specifies what tool is used to cut the cut lines. Selecting pen is useful if there is a problem with the cutting mechanism on the cutter. The **straight blade** option is only available if it has been enabled in the Hardware dialogue (see [page 70](#)).

Plot Options Displays the Plot Options window for changing speeds etc (see [page 18](#)).

Special case of plotting on both sides of the fabric

On rare occasions you may want to plot on both sides of the fabric. To do this you must first tell PanelMaker which lines/text are on the back of a panel. This is done in the shaping window by selecting a line/text and selecting **plot back** in the popup menu. See chapter titled "Shaping : Panel Mode".



First we plot the back lines/text by turning the fabric over and rather than placing the fabric on the usual reference line on the table, place it on the reference line on the other side of the table (i.e. the line indicating the maximum plotting width). Select **Plot** from the **Plot** menu and tick **back**. It doesn't matter if **plot** and **cut** are ticked. Then click the **Plot** button. The plotter will now plot only those lines marked as **plot back**. When the plotter has finished, turn the fabric over and place against the normal reference line. Select **Plot** from the **Plot** menu again. You will notice that **back** is no longer ticked. Make sure **plot** and **cut** are ticked and then click the **Plot** button to plot and cut out the panels.

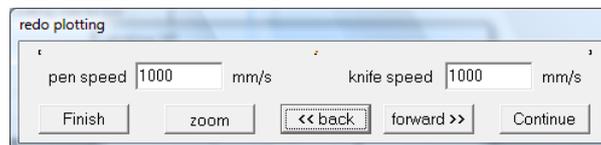
Stopping

If the plotter has a stop button, press the stop button to quickly stop the plotter.

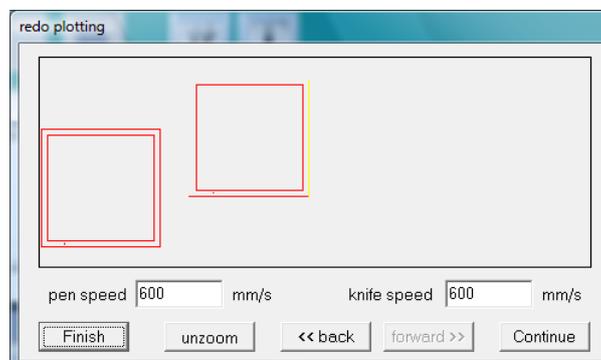
If using a ProSail plotter or cutter you can also stop them by either clicking the mouse on the Stop button on the screen or pressing any key on the keyboard.



When it has stopped, a message will be displayed on the screen asking you if you wish to continue plotting. If you select **Yes**, the following window will appear :



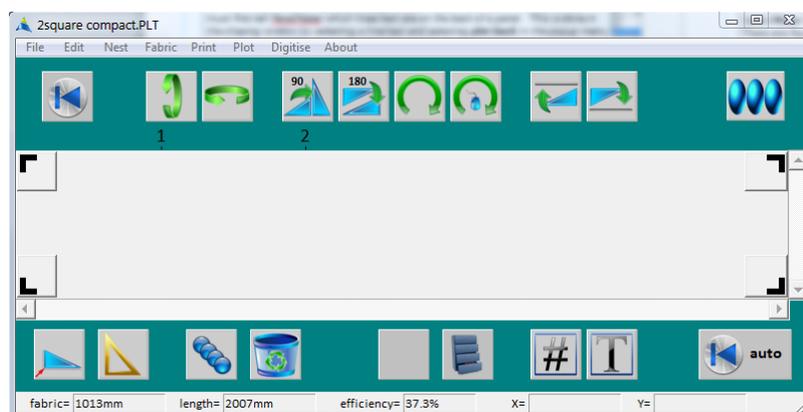
Clicking the **<<back** button will scroll back through the lines that have been plotted. As you scroll, the desired line is highlighted on the nesting screen. To see its location better click on the **zoom** button to see the following :



Click **Continue** to continue plotting from the highlighted line. You can also change speeds at this time if you wish.

Move To

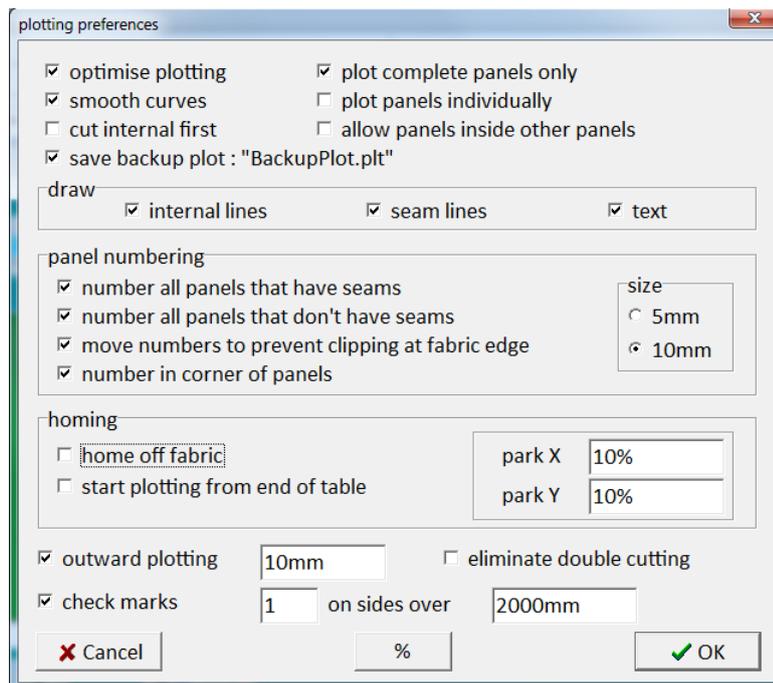
Select **Move To** from the **Plot** menu. This is an alternative to pushing the machine by hand. There are four buttons identifying the corners of the table. Clicking one of them will make the machine move to that corner. Pressing the Esc key on the keyboard will cancel.



Accuracy

At the end of plotting a frame, the ProSail plotters and cutters test to see that they have come back to the exact position they are supposed to. If they have not, a message will be displayed stating the accuracy giving figures for X, Y (and Z if applicable). On rare occasions this may occur as a result of resonance that can not be avoided. More commonly it will occur if the plotter is bumped or has caught the fabric or hit something on the table. If the inaccuracy keeps occurring then there is a problem and you should contact Armstrong-White Automation telling us exactly what numbers were displayed for each of X, Y and Z. Also select **Bug Report** from the **About** menu. This will create a file called "bugger.dat" that can be e-mailed to us.

Select **Preferences** from the **Plot** menu :



optimise plotting

After plotting or cutting a curve, the plotter will move to the next nearest curve to plot or cut. If not ticked the plotter may choose a curve that is a long way from where it currently is. Hence **optimise plotting** is usually ticked.

smooth curves

Sometimes curves on panels may not be as smooth as they should be and are made up from a relatively small number of flats. This is often the case when reading panels from other CAD programs using HPGL or DXF. If **smooth curves** is ticked the software will smooth these curves out by adding extra points on the curve. If you want the curve to be plotted as a set of flats, then turn **smooth curves** off.

plot panels individually

Plotter will totally plot and cut each panel before it moves on to the next panel. This might cause problems with the pen catching if using a cutter and the cloth curls up after cutting. If not ticked, a plotter/cutter would first plot all panels, then cut all panels.

cut internal first

Plotter will cut any internal cut lines before it cuts the boundary of the panel.

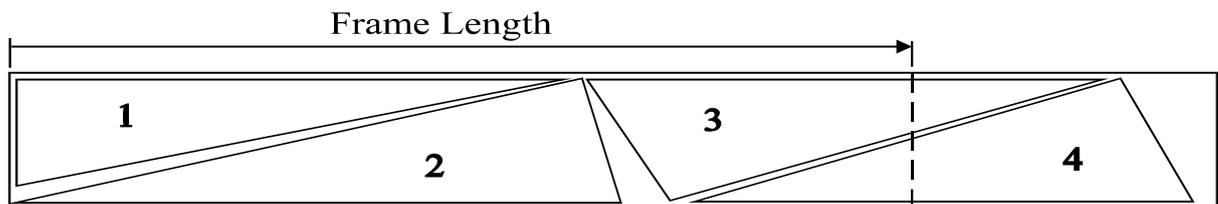
allow panels inside other panels

Software will not prevent you from plotting if one panel is totally inside another. Normally you would want to be warned of this.

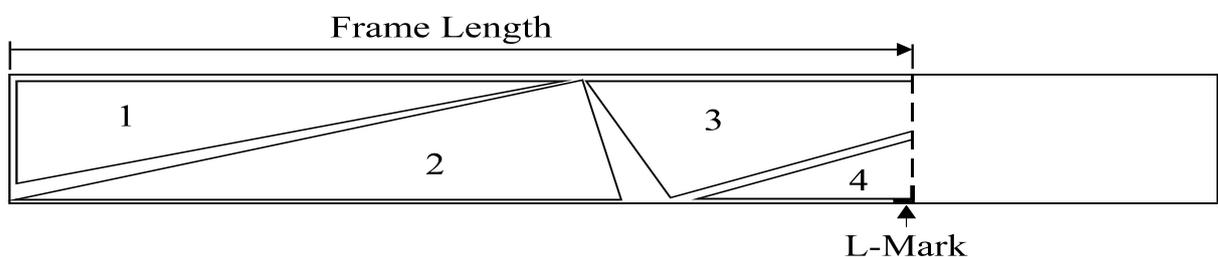
save backup plot: "BackupPlot.plt"

Software will automatically save a copy of the current nesting panels before plotting. It will be saved as BackupPlot.plt and can be opened as a normal nesting file later if for example something goes wrong while plotting.

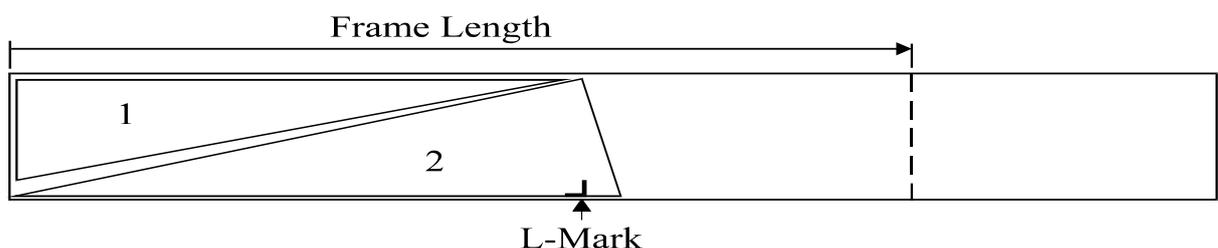
Consider plotting the following panels that do not fit totally inside the table :



If **plot complete panels only** is not ticked, only panels 1 and 2 will be completely plotted with panels 3 and 4 only partially plotted. An **L-Mark** will be drawn at the end of the table which will be the start of the next table lay. With this method, you will need to be very careful in lining up between table lays :



If **plot complete panels only** is is ticked (most common method), only panels 1 and 2 will be plotted. An **L-Mark** will be drawn to mark the start of the next table lay. This method is more accurate since you do not need to be so careful lining up the lines between table lays. However there may be more table lays required :



In the special case of a panel being longer than the table size, the panel will automatically be split regardless of whether **plot complete panels only** is ticked or not.

draw :

- internal lines** Plotter will plot (or cut) all internal lines inside the panel. Seam allowances are not considered internal lines.
- seam lines** Plotter will plot all seam allowances.
- text** Plotter will mark any text that has been created using the text shaping facilities described in the chapter titled "Shaping : Panel Mode".

panel numbering :

The following items determine how the panel numbers are plotted on the panels. If you don't want the numbers plotted turn them all off:

number panels that have seams

Plotter will draw panel numbers on all panels that have a seam and they will be drawn inside the seam.

number all panels that don't have seams

Plotter will draw panel numbers on all panels that do not have a seam.

move numbers in to prevent clipping at fabric edge

Numbers will be moved in from the edge of the panel if needed to prevent pen lift (see the "Plot Options" dialogue) from clipping them.

number in corner of panels

Put panel numbers in a corner rather than along one side.

size

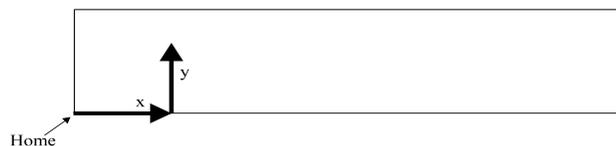
The size in mm of the panel numbers.

homing :

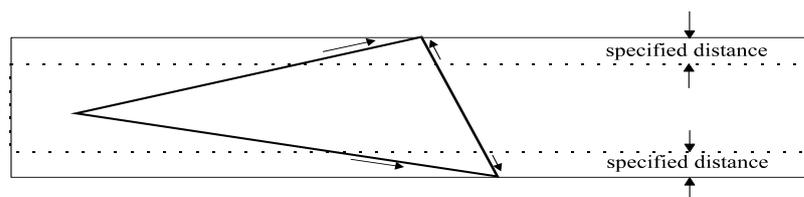
home off fabric Plotter will first move to the far side of the table width before homing. The idea is to keep the pen off the fabric during homing down the length of the fabric. This can be useful if the fabric has a tendency of curling up.

start plotting from end of table Not commonly used, but if ticked, the plotter will first go to the end of the table and start plotting from that end first. For this to work you must also have **optimise plotting** ticked.

park After plotting a table lay the plotter will come to a stop. The position it stops at is specified by **park**. **Park X** is the distance down the table from Home. **Park Y** is the distance across the table. Some people like a large **Park Y** so the pen and knife is away from the fabric when the fabric is being pulled down between table lays.

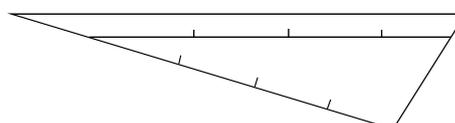


outward plotting Plotter will always make sure the pen and knife are moving outward toward the edge of the fabric for lines that are within the specified distance from either edge of the fabric. This prevents the edge of the fabric from possibly being pulled in by the pen or knife. However it does take the plotter longer since it needs to do extra moves so its plotting/cutting can be in this direction.



eliminate double cutting Horizontal and vertical lines on adjacent panels that touch will be cut only once. Useful if rectangles are nested close together. Note : This does not apply to angled lines or curves.

check marks Plotter will draw the specified number of evenly spaced check marks on all panel sides that are over the specified length. These can be used as an aid in sticking panels together :



Select **Shaping** from the **Edit** menu or double click on a panel on the Nesting Window to display the Shaping window. This is enabled if you have PanelMaker. This window has three modes depending upon which of the following three icons is selected :

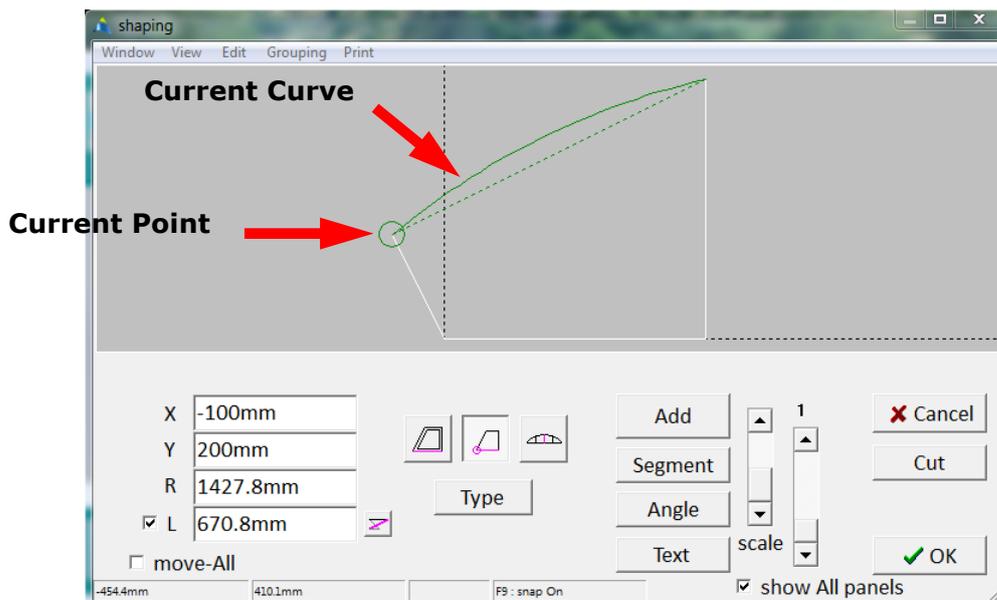


Panel Mode

Shows the panel sides and any internal curves for the current panel.

The **X** and **Y** coordinate displayed corresponds to the "Current Point" which is encircled. To select another point click the mouse near it.

The curve which is green corresponds to the "Current Curve". To make a different curve the Current Curve click the mouse near the dotted line connecting its end points.



X, Y : There are two ways to change the **X** or **Y** value of the Current Point :

- (i) Type in a new **X** or **Y** value using the keyboard. Then hit either the Tab key or Enter key on the keyboard to recognise the change. The Enter key will keep you in the same field. The Tab key will take you to the next field. Before entering a value into a field you need to make sure that field is highlighted. If it isn't, hit the Tab key on the keyboard until it is highlighted or double click in the field.
- (ii) While holding the Ctrl key down on the keyboard click the mouse as close as possible to the Current Point and with the mouse button still down drag the point to the desired location. See [page 45](#) regarding the need to hold down the ctrl key or not.

- R** If the Current Curve is an arc or a circle, the radius can be changed.
- L** Displays the straight line length between the ends of the Current Curve.
(To see the girth around the curve you need to be in Curve Mode. The girth will then be displayed at the bottom of the window)
- If **L** is ticked, the length can be changed.
- The icon to the right of length determines how the Current Point will move if you change the length. Click on this icon to toggle between the two options:

 The Current Point will move parallel with the dotted line between the Current Curve end points. Hence the length of the curve next to the Current Curve (common Current Point) will have to change.

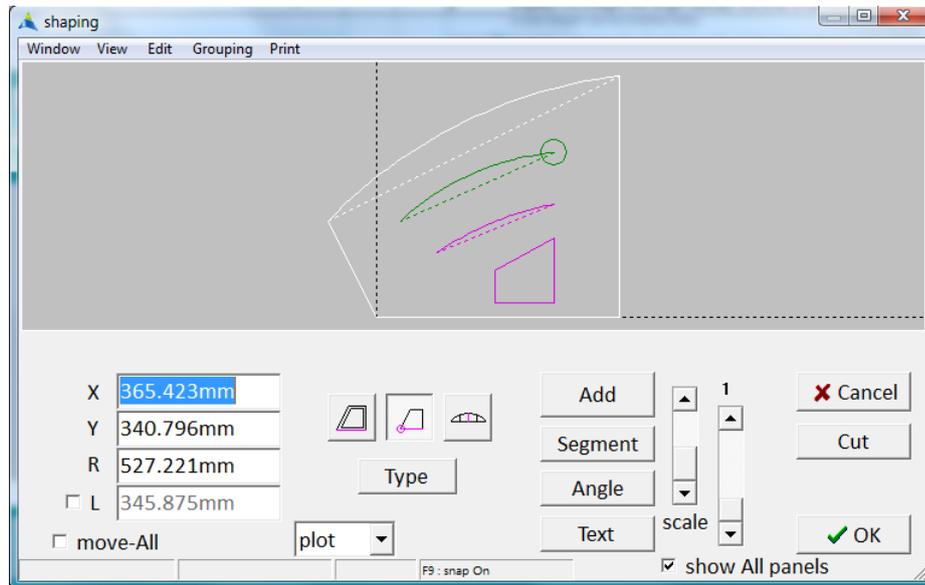
 The length of the curve next to the Current Curve will not change. Instead it will rotate so its length remains the same.

*If you are unlikely to want to change lengths you can untick **L**. This makes using the Tab key more efficient and prevents accidentally changing length.*

- move-All** If ticked and the Current Point is on the boundary of the panel, changing **X** or **Y** will move the entire panel. Rather than just moving the Current Point the entire panel is moved so the Current Point is at that location.
- If however the Current Point is on an internal curve (rather than the panel boundary) only the selected curves will move.
- Remember to untick **move-All** when you are finished with this mode.

Shaping : Panel Mode

IMPORTANT : It is important to note that although the points can be placed at any location, they should not be changed to the extent that the panel folds over itself. Even though it may look correct on the screen the panel will have been inverted and will cause problems in PanelMaker. If you hold down the right arrow key on the keyboard, the Current Point should move around the panel in an anticlockwise direction.



You can select multiple internal curves by dragging a rectangle around them (click the mouse and with the button still down drag the resulting rectangle around)

or

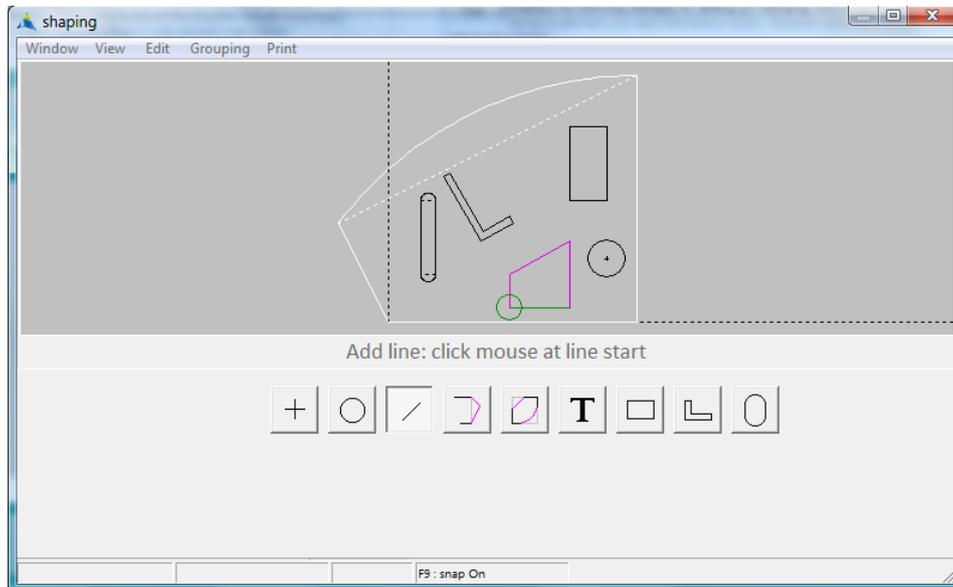
holding down the Shift key on the keyboard and click on curves (in a similar way to selecting multiple panels on the nesting screen).

All operations : dragging, scaling, deleting, copying, rotating, duplicating, changing curve type or pen type will apply to all selected curves. In the picture above, the purple and green curves are all selected. Although there are several selected curves, there is still only one Current Curve and one Current Point which are green.

Shaping : Panel Mode

Add Add a new object. The resulting display will show a selection of object types. The last object type that was added is currently selected. If this is not the object type you want to add now, click the mouse on the desired one. If its already the desired type, there is no need to click on it. *If you want to cancel press the Esc key on the keyboard.*

Just above the object types are instructions on how to proceed.



Adds a cross.



Adds a circle.



Adds an internal curve or several connected internal curves. To add a single curve, click and release the mouse at the desired start of the curve and then click and release again at the desired end of the curve.

To add several connected internal curves (e.g. to make a window), the Shift key needs to be held down. With the Shift key held down, click the mouse at the desired locations. Before clicking the last point, release the Shift key.

To produce a closed set of curves, the last point should be close to the first. All these internal curves can later be shaped in Curve Mode.



Adds a rectangle.



Adds an L section.



Adds a slot.

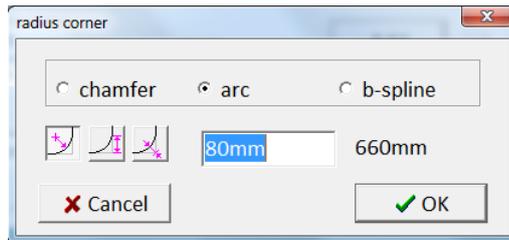
Shaping : Panel Mode



Adds another side to the panel or another side to an internal set of connected curves. Click the mouse near a corner to add another curve at that point.



Adds a chamfer or round to a corner. Click the mouse near a corner to display the following dialogue giving a choice of **chamfer**, **arc** or **b-spline** :



If **arc** is selected, an arc will round off the corner. If **b-spline** is selected, a b-spline will round off the corner. Unlike an **arc** a **b-spline** has the advantage of adjusting its shape so it remains tangential to the sides if their angle is later changed. However a b-spline is not a true arc and hence not perfectly circular.



Chamber width



Length along each side where chamfer starts



Depth of chamfer



Radius



Length along each side where radius starts. If sides are curved then this distance will necessarily be slightly different on each side



Depth of radiused corner

The arc, b-spline or chamfer can later be changed by selecting **Change Round** from the **Window** menu.

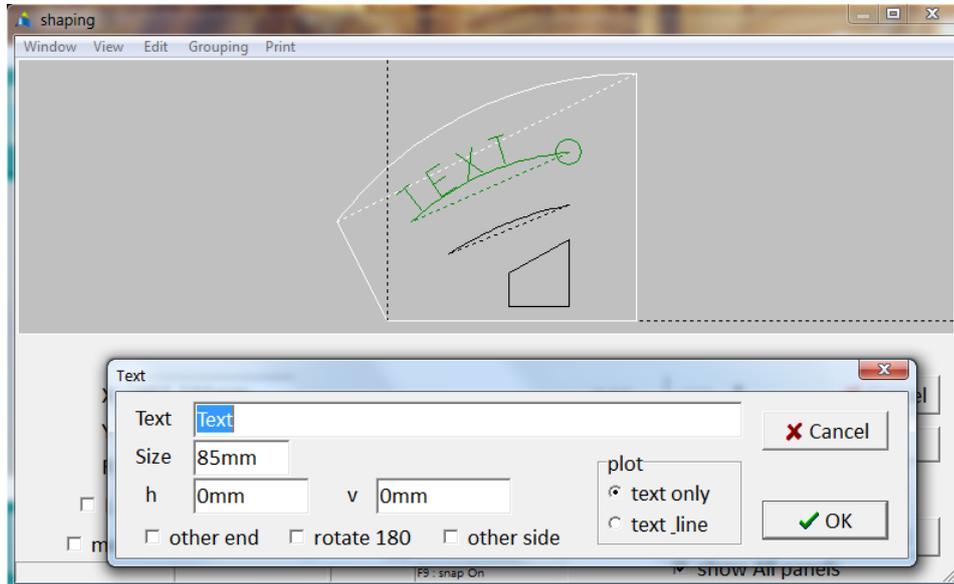


Adds an internal curve with text on it. This is the same as selecting a curve and then clicking the **Text** button (see next page).

Shaping : Panel Mode

Text

Displays the following dialogue for adding (or changing) text to the current curve. Hence to add text you must first have a curve. However optionally these curves do not need to be plotted.



Text desired text.

Size height of text.

h start distance along curve.

v distance out from curve.

other end if ticked, **h** is the end distance from the end of the curve (*rather than start distance*).

rotate 180 rotate text by 180 degrees.

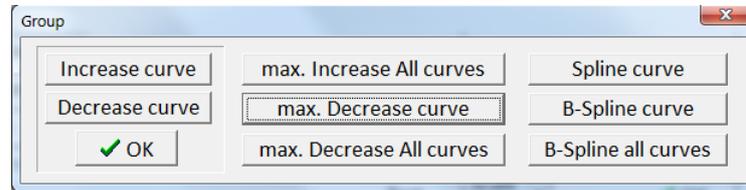
other side text is on the other side of the curve.

If **text only** is selected (most common) only the text will be plotted, the curve it is attached to will not be plotted even though it appears on the computer screen. If **Text_line** is selected both the text and the curve will be plotted.

The plotting of text can be turned on or off using the **draw:text** check box in the **preferences** dialogue from the **Plot** menu. See [page 31](#).

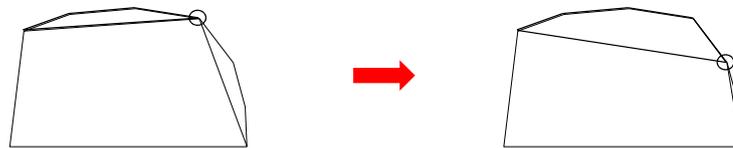
Shaping : Panel Mode

Segment In PanelMaker, panels are made up of curves which in turn are made up of a set of Adjustment Points. **Segment** changes the distribution of these Adjustment Points into different curves. Clicking the **Segment** button displays the following dialogue :



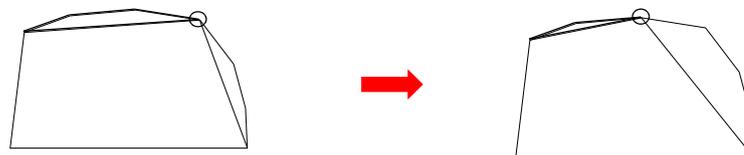
Increase curve

Each click of **Increase curve** will increase the Current Curve by taking the next Adjustment Point from the adjacent curve.



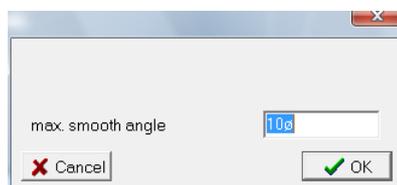
Decrease curve

Each click of **Decrease curve** will decrease the Current Curve by removing the current point from it.



max. Increase All curves

Automate the Increase curve method for all curves based on a specified **max. smooth angle**.

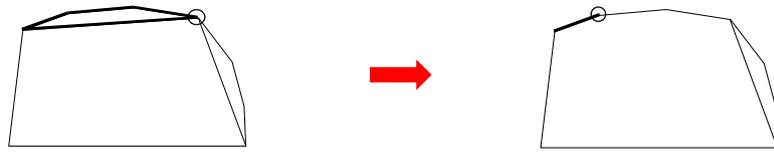


With **max. Increase All curves** PanelMaker looks at the angle between all adjacent lines. If this angle is less than **max. smooth angle** it will assume these two lines are part of a curve. Otherwise it will assume they are separate lines forming a corner. The trick is to specify a **max. smooth angle** that is large enough to combine the segments you want combined but small enough to not include the corners.

Shaping : Panel Mode

max. Decrease curve

Fully reduces the Current Curve into flat segments. This is the same as repetitively clicking the **Decrease curve** button.



max. Decrease All curves

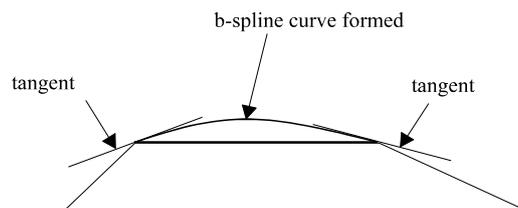
Fully reduces all curves to individual segments.

Spline curve

Turns the current curve into a spline curve. This is the same as clicking on the **Type** button and clicking on the spline icon.

B-Spline curve

This is not commonly used but can be useful in special situations. If a curve is simply a straight line (i.e. a point at each end) as it would be if **max. Decrease curve** was used, **B-Spline curve** will make the curve into a b-spline curve with an angle (tangent) at its ends. PanelMaker will choose the angle of these tangents based on the length of each adjacent side. The greater the length of the adjacent side, the closer the tangent will be to parallel with that adjacent side. If all three sides are the same length the tangents will equally bisect the corners.

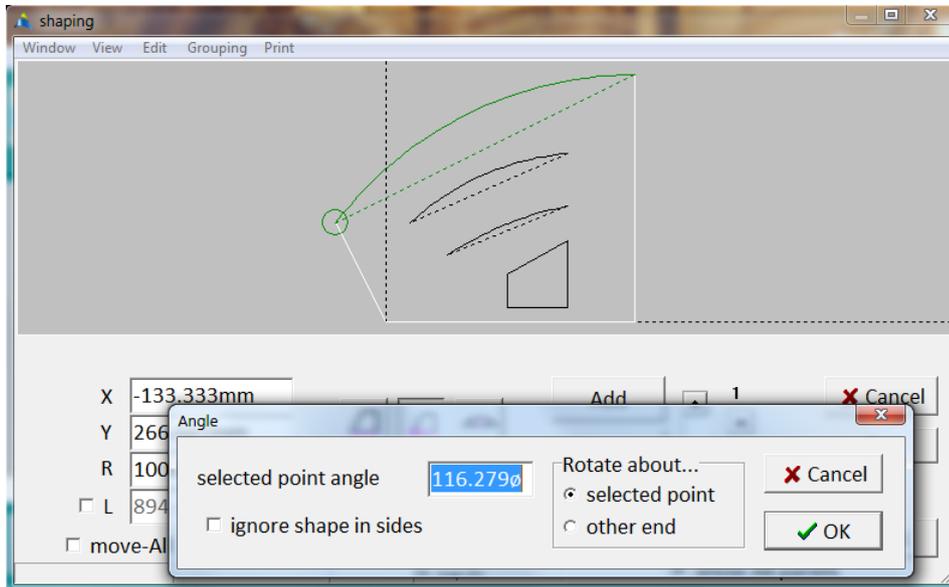


B-Spline all curves

Again not commonly used. Makes all the straight line curves in the panel into b-splines as above. This is useful for smoothing a panel. Curves other than straight line curves will remain the same.

Shaping : Panel Mode

Angle The internal angle of a corner can be specified. Highlight the desired point (you also need to consider which side of the point you want highlighted as this will be the side that is rotated). Then click on the **Angle** button to display the following :



The angle specified is the internal corner angle of the selected point. If **ignore shape in sides** is ticked it will not include the shape in the adjacent sides in its calculation of the angle. Otherwise it will.

If **selected point** is ticked, the other end of the highlighted curve will move to achieve the specified corner angle at the selected point.

If **other end** is ticked the selected point itself is moved to achieve the specified angle at the selected point.

Variations :

- (i) If you have selected an internal curve and the selected point is not joined to any other curves, the angle specified is the angle to the horizontal.
- (ii) If rather than specifying a corner angle, you want to rotate the selected curves by a specified amount (or the entire panel), use **Rotate** from the **Window** menu.
- (iii) If you just want to rotate an object, see [page 44](#).

Slope continuity



Line segments and B-splines with one or more Adjustment Point can be made to be tangential to or at right-angles to its adjacent curve at the Current Point. Even if the panel shape is changed the curve will adjust to retain these angles.

- free** Current Curve will have no angle constraints at the Current Point (most common).
- tangent** Current Curve will be tangential (parallel) to its adjacent curve at the Current Point.
- right angle** Current Curve will be at right angles to its adjacent curve at the Current Point.

Plotting style



Defines the plotting style of the selected curves.

- plot** Selected curves will be plotted.
- cut** Selected curve will be cut.
- plot back** Selected curves will be marked as being on the opposite side of the panel. It will normally not be plotted or cut. To plot or cut it you need to tick the **back** check box in the **Plot** dialogue. See [page 27](#)
Another use for **plot back** is if you want to keep a record of a curve but don't want it plotted. You can later change its style to **plot** or **cut** if desired.



Loops through all the panels. The current panel's number is displayed above it. Another way to loop through the panels is with the Page Up or Page Down keys on the keyboard.

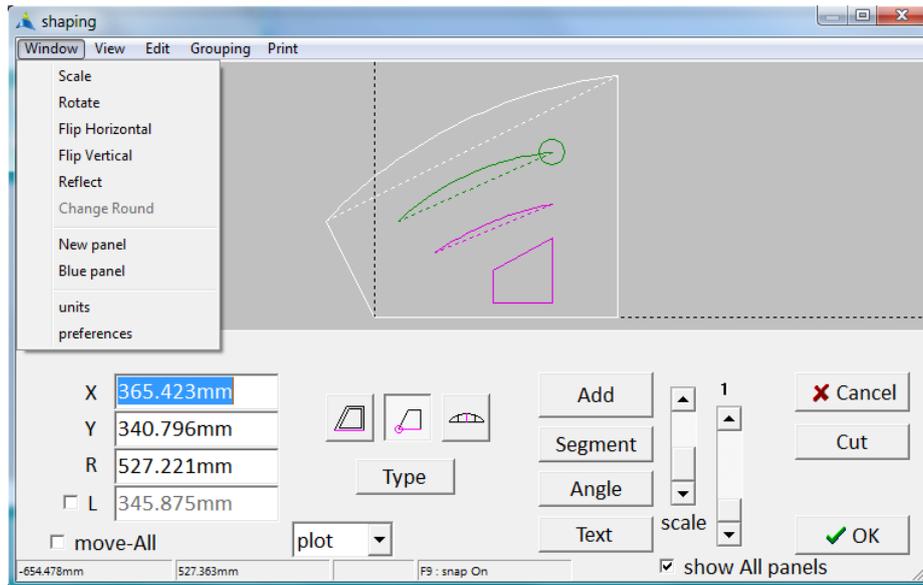
To enter the Shaping window at a desired panel double click on that panel in the Nesting Window or highlight the panel then select **Shaping** from the **Window** menu.

If **show All panels** on the shaping window is ticked, all panels on the nesting window are able to be viewed in shaping. Otherwise only those panels which are highlighted on the nesting window are available.



Visually scales the curves for clarity of viewing. Most useful in Curve Mode for shallow curves. Note that this is only a visual effect and does not change the shape of the panel.

Window menu

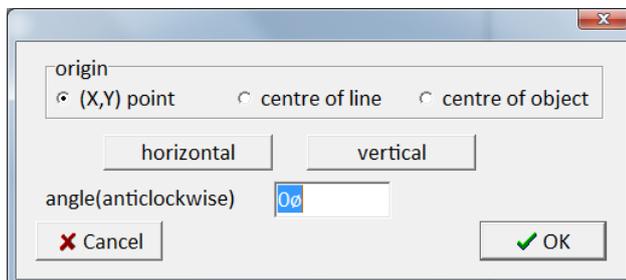


Scale

Uniformly scales the selected curves (or entire panel if the boundary is selected) by a specified amount.

Rotate

Rotates the selected curves by a specified amount. If the Current Point is on the boundary, the entire panel including internal curves are rotated.



Origin defines the centre of rotation.

Clicking **horizontal** or **vertical** will calculate the angle required to make the current curve horizontal or vertical.

Flip Horizontal Horizontally flips the selected curves (or entire panel if the boundary is selected) about the Current Point.

Flip Vertical Vertically flips the selected curves (or entire panel if the boundary is selected) about the Current Point.

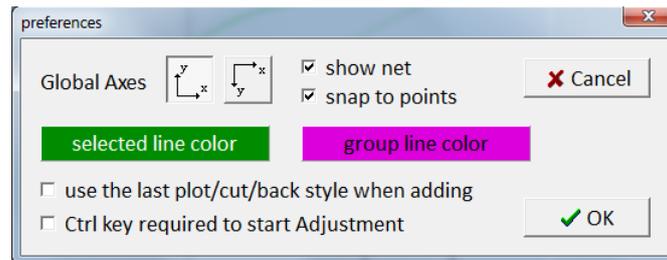
Reflect Reflects the selected curves (or entire panel if the boundary is selected) about the Current Curve. The shaping on the Current Curve is lost.

Change Round Change the current curve to a chamfer or round, see [page 38](#).

New panel See **New** on [page 10](#).

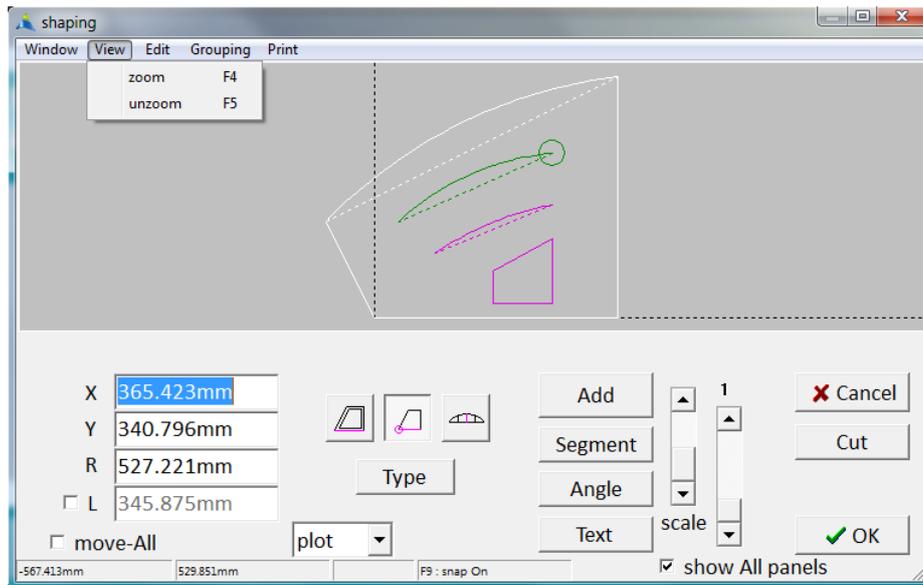
Blue panel Turns a normal panel into a blue panel. A normal panel has a boundary around it and often some internal curves. A blue panel on the other hand does not require an external boundary. DXF or HPGL panels are read as blue panels if they do not have an external boundary. Sometimes blue panels are useful when you don't want the boundary of the panel to be cut.

Preferences



- Global Axes** Determines the direction of the global Y-axis : up or down. Up is recommended.
- show Net** Draw the Net for B-Spline curves in Panel Mode. This Net may be dragged if the scale scroll bar is at the bottom. i.e. a scale of 1.
- snap to points** Makes dragging and adding of points in Panel Mode snap to horizontal and/or vertical positions of other points when the vertical and/or horizontal position of the mouse is similar. This is very useful for lining up curve end points, crosses, circles and for producing horizontal and vertical lines.
- A quick way to change this, rather than going to the preferences dialogue is to press the F9 key on the keyboard. This can be done at any time, even while dragging or adding objects. The display at the bottom of the shaping window will say either **F9 : snap on** or **F9 : snap off** to identify the current state.
- selected line color** This is the colour of the "current curve".
- group line color** This is the colour of any additional curves that might be selected.
- use the last plot/cut/back style when adding**
- If ticked, any curves that are added will be of the same style as the last added curve.
- Ctrl key required to start Adjustment**
- If ticked, you need to hold down the Ctrl key on the keyboard in order to drag the end of a curve with the mouse. It does take extra time to hold down the Ctrl key but does prevent accidentally moving points when you click near them. But if you are careful you could turn it off.

View menu



Zoom F4

Zoom in on a particular part of a panel. A horizontal and vertical line will be displayed at the mouse location. Move the mouse to the area you want to zoom in on. Click and hold down the left mouse button and drag the resulting selection box to encompass the area you want zoomed. When the mouse button is released, the selection box will be zoomed to fill the entire window.

A quicker way to zoom without having to go to the **View** menu is to press F4 on the keyboard.

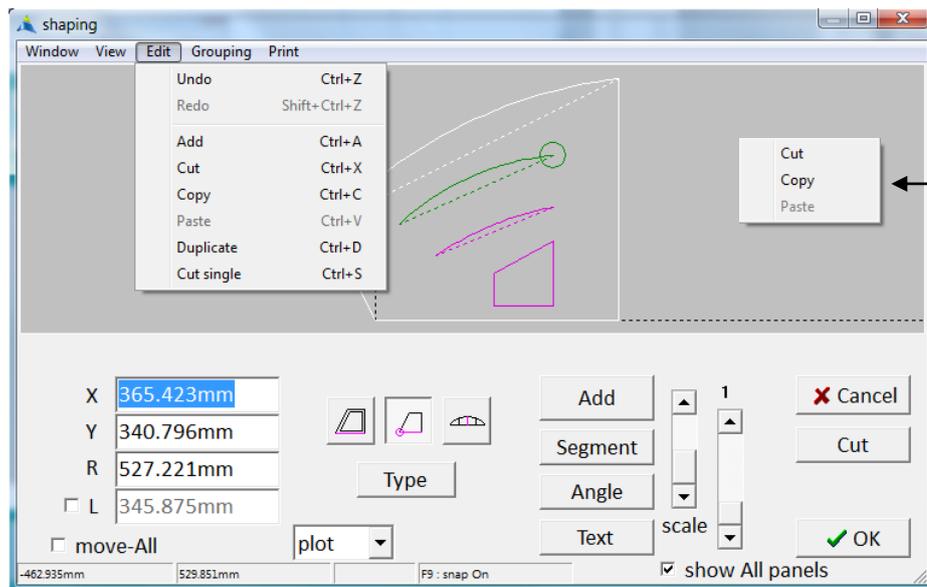
If you have a mouse wheel, an even quicker way to zoom in and out is to simply rotate the mouse wheel. Zooming will be centred around the mouse location.

Note: there are two modes when dragging the selection box. Either the click of the mouse will correspond to one corner of the selection box or the click will correspond to the centre of the selection box. To swap between these two modes, press and release the Ctrl key while the selection box is visible.

Unzoom F5

Restore the view to normal scale. A quicker way to unzoom is to press F5 on the keyboard, or simply click on any part of the scale scroll bar.

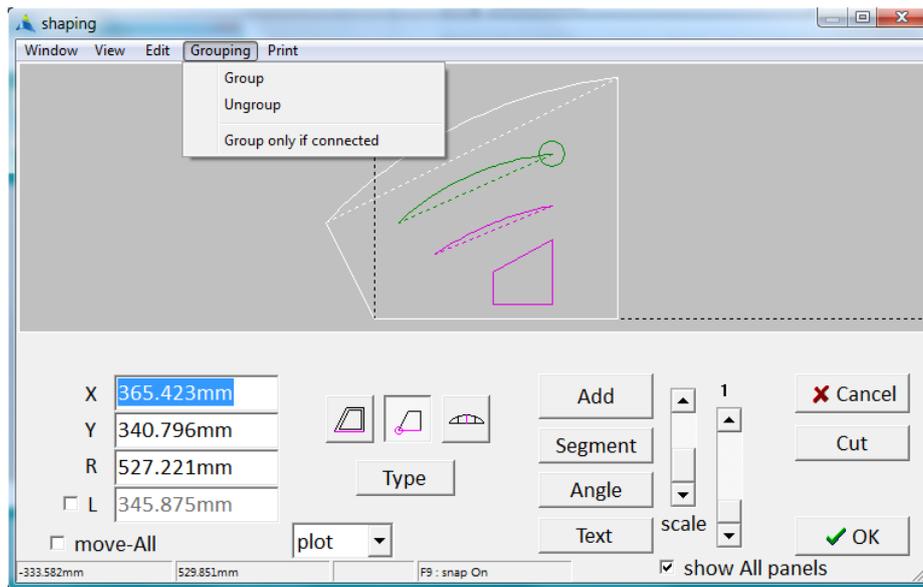
Edit menu



A popup Edit menu is also available by right clicking in the window.

- Undo Ctrl+Z** Undoes the last change you made in shaping. You can keep undoing repeatedly until all the changes you have made have been undone.
- Redo Shift+Ctrl+Z** Cancels the last undo. You can keep redoing repeatedly until all the undoes have been cancelled.
- Add Ctrl+A** See Add earlier in this chapter. This is the same as clicking the **Add** button.
- Cut Ctrl+X** Removes all of the selected curves. This is the same as clicking the **Cut** button. It also makes a **Copy** so you can later **Paste** it if you want. Alternatively, pressing the **Del** key on the keyboard removes the selected curves but without making a **Copy**.
- Copy Ctrl+C** Copies to memory all of the selected curves so they can later be pasted. This also works in Seam Mode.
- Paste Ctrl+V** Pastes any previously copied curves. These curves can also be pasted to other panels if desired. This also works in Seam Mode.
- Duplicate Ctrl+D** If duplicating internal curves, **Duplicate** is similar to using **Copy** and **Paste** except it remembers the distance between where the original curves are and where you have moved the duplicate curves to. The next time you use **Duplicate**, it will use this same distance. This is useful for creating a line of evenly spaced objects. First duplicate one, move it the desired distance from the original and then repeatedly duplicate.
- If duplicating the side of a panel, **Duplicate** will simply add another side with the same shape.
- Cut single Ctrl+S** Same as **Cut** except it only removes the Current Curve regardless of how many other curves are also selected. Useful if curves are grouped.

Grouping menu



Group If several curves are selected, **Group** will turn them into one entity. After grouping, clicking in any one of these curves will select all of them.

Ungroup

Ungroups all selected curves so they can be selected individually. It also ungroups any selected curves that are joined. In the above picture the 4 sided shape would turn into individual curves that you can move apart. If you want to keep connected curves grouped together you could select all curves in the panel and click on **Group only if connected**.

Group only if connected

Of the selected curves it will group together only those curves that join to each other.

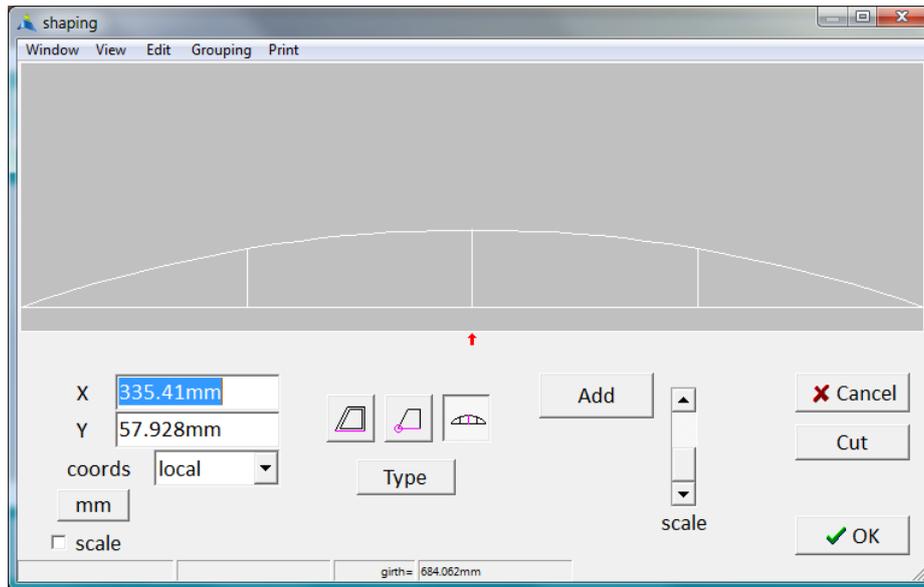
Print menu

Prints the current panel picture.

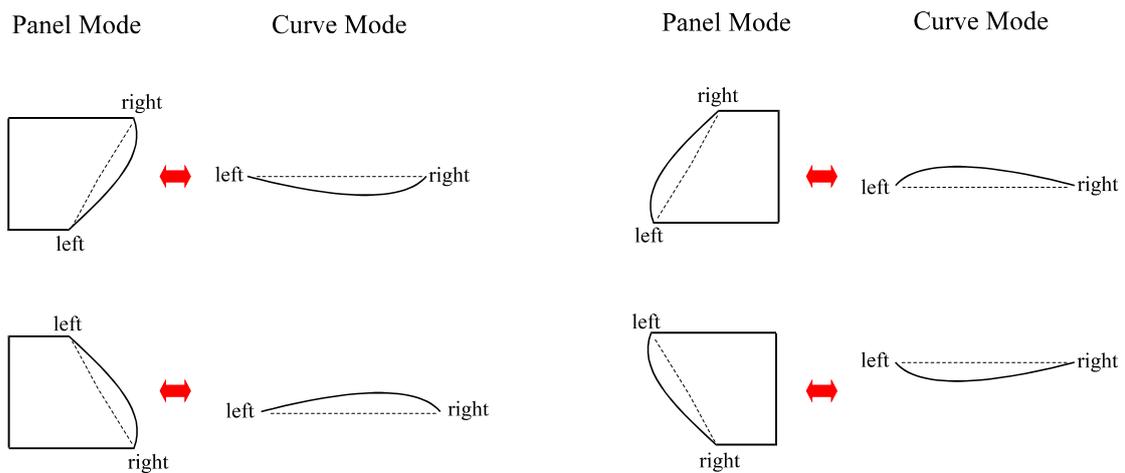


Curve Mode

Displays the Current Curve in local coordinates. You can enter Curve Mode either by clicking on this icon or double clicking near the dotted line connecting the ends of a curve in Panel Mode.



The relationship between Panel Mode and Curve Mode is summarised by the following examples. The left end of the curve in Panel Mode always corresponds to the left of the curve in Curve Mode :

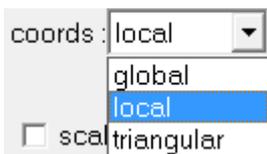


Shaping : Curve Mode

To select an Adjustment Point and display its **X** and **Y** position, click anywhere near the Adjustment Point (preferably significantly above it so as not to accidentally move it). There are three ways to change an Adjustment Point's **X** or **Y** :

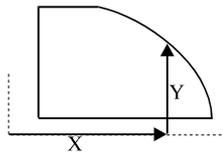
- (i) Click on an Adjustment Point and with the mouse button still down, drag it to the desired location. The point will only move vertically. To move it horizontally as well, hold the Ctrl key down on the keyboard while dragging.
- (ii) Click on the red arrow (and with the button still down) drag it horizontally to change **X**.
- (iii) Type the desired **X** or **Y** value using the keyboard. Then hit the Enter or Tab key on the keyboard.

move-All If ticked, changing the **Y** value for one Adjustment Point will uniformly change the values for all the Adjustment Points. Useful for scaling curves up or down.

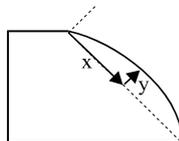


There are 3 different coordinate systems.

global : X and Y are relative to the origin in Panel Mode.



local : X and Y are in local coordinates across the curve (most common).



triangular : Similar to local coordinates except LHS and RHS is used rather than X and Y.



Shaping : Curve Mode



Adds a new Adjustment Point to the curve. After clicking **Add**, a vertical line appears at the mouse location. Move it until it is approximately where you want and click the mouse button. If the exact required **X** value is known, it can then be entered through the keyboard.



Removes the highlighted Adjustment Point.



Toggles the **X** and **Y** display between % and absolute units (e.g. mm). Both **X** and **Y** are expressed as a % of the straight line length between the ends of the curve.



If ticked, changing **Y** (or dragging an adjustment point) will scale the entire curve. *Note : the **Y** value initially needs to be non-zero for this to work.*

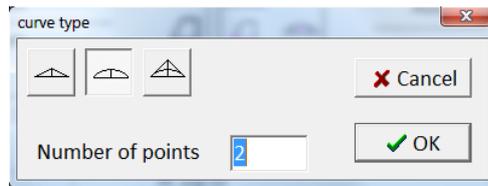
girth =

This is the length measured around the curve. Hence this is greater than the straight line length between the ends of the curve.

The vertical position of the curve in the window can be moved with the mouse if desired. This is often done if the curve is hollow and hence falls below the viewing rectangle. To move the curve, click the mouse very close to the horizontal line drawn between the ends of the curve and with the mouse button still down, drag the curve up or down. When in the required position release the mouse button. Note that this does not change the shape of the curve, it is only a visual tool.

Shaping : Curve Mode

Type



Click on one of the following icons to change the curve type :



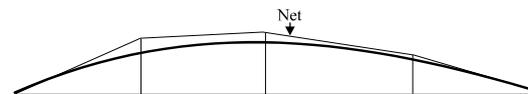
Curve is made up of line segments. i.e. Made up from a set of connected straight lines :



Curve is a Spline. This is an efficient way to produce a smooth curve. A special case applies if there is only one Adjustment Point in which case the curve is an arc. In Panel Mode this arc will have a radius field that can be changed.

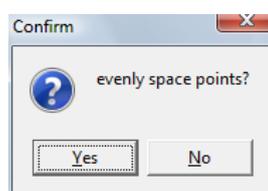


Curve is a B-Spline. B-Splines produce nice looking curves. However unlike Splines, the Adjustment Points don't lie on the curve. The straight lines connecting the Adjustment Points are called the B-Spline Net. One useful feature of B-Splines is that the ends of the Net are tangential to the ends of the curve. Hence the Slope Continuity set to **Tangent** in Panel Mode can be used on a B-Spline curve to force the curve to blend smoothly into its adjacent curve.



Number of points Number of Adjustment Points required.

If only the number of points is changed the points will automatically be evenly spaced in X. If however the curve type is changed the following dialogue will be displayed asking if you want the points to be evenly spaced :



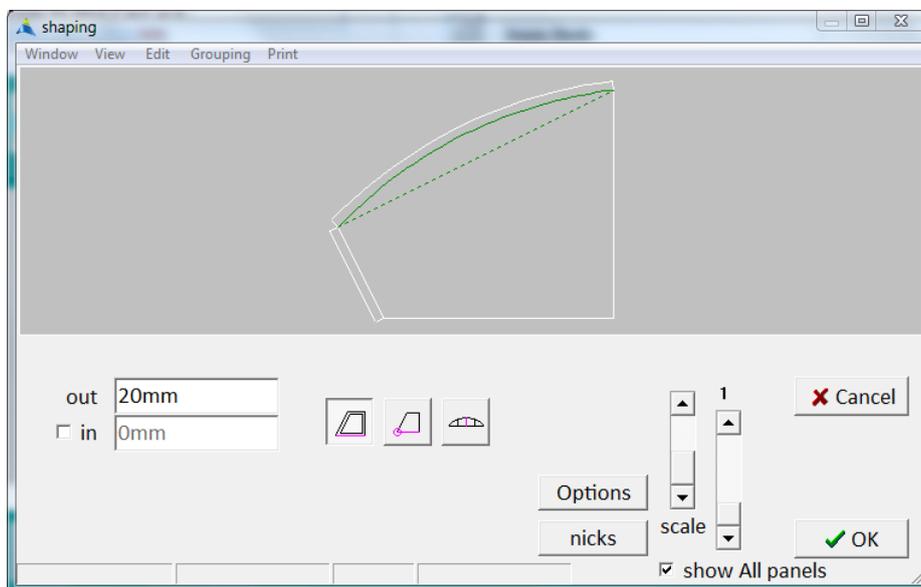


Seam Mode

Displays the seams on the sides of the panel.

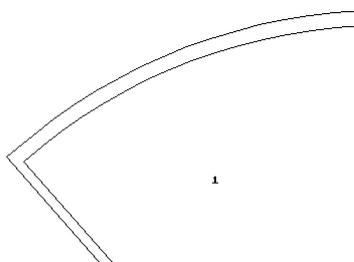
out is the seam added to the outside of the panel size defined in Panel Mode.

in is an additional line drawn inside the panel size. **in** is useful for example if you want to plot a line inside the panel that the outer seam edge will fold to. **in** can also be -ve if desired. In order to change a value of **in**, it must be ticked. If you are not likely to want to change a value of **in**, it is recommended you remove the tick to prevent them from accidentally changing.

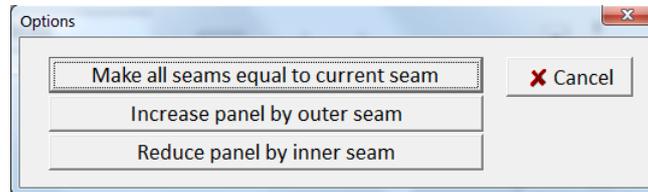


To highlight another side, click the mouse near it or use the left or right arrow keys on the keyboard.

Note : The ends of the seams are only drawn in Seam Mode as 90 degree corners. This is just a display method to allow the scale scroll bar to work in a predictable way. The above panel will actually be formed as follows :



Options



Make all seams equal to current seam

Gives all the sides of the panel the same seam as the currently highlighted side.

If you only want to make some of the sides have the same seam width, use cut and paste. See [page 47](#).

Increase panel by outer seam

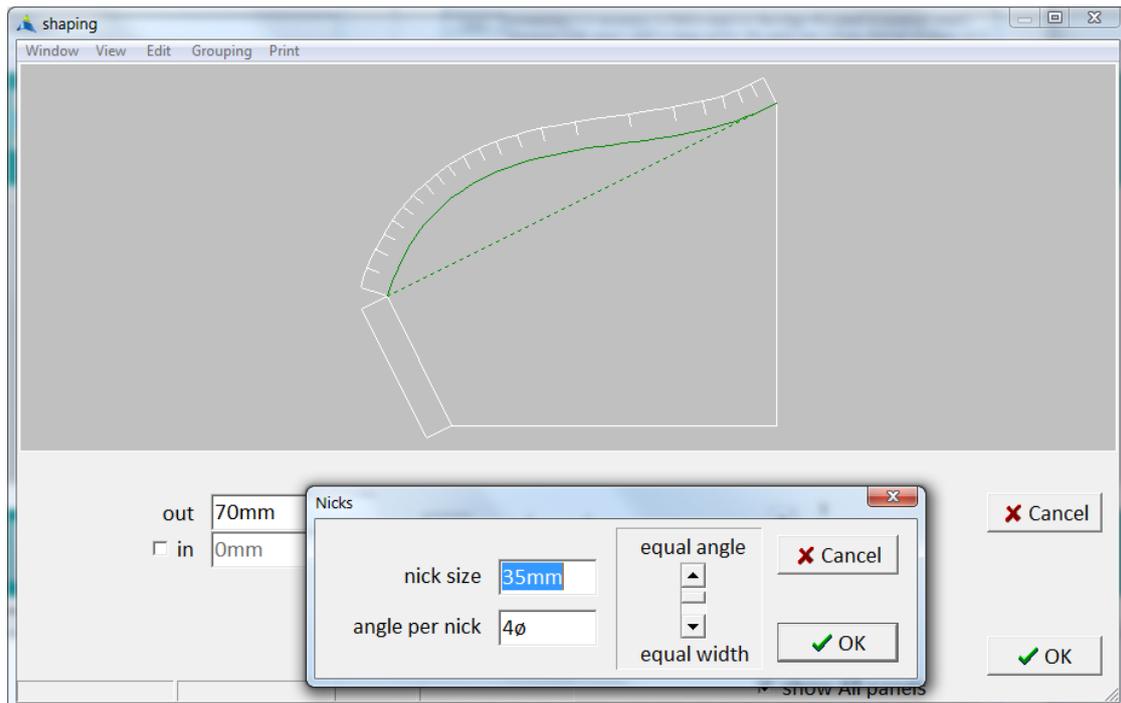
Removes the outer seams around the panel but will increase the size of the panel to take its place. Hence the overall panel will stay the same size but will have no outer seam line.

Reduce panel by inner seam

Removes any inner seams around the panel and decreases the panel size by that amount.

nicks

Sometimes it is necessary to fold a seam on the edge of a panel (a turnover seam). However if the seam width is large and/or the panel has a large amount of shape on it (as is often the case with the outside edge of an awning) it is difficult to fold the material without it creasing. A solution is to cut small nicks periodically along the seam.



nick size : Width of nicks. This can be entered as a percentage of the seam width if desired.

angle per nick : This determines the number of nicks on that curve. If the curve has a cumulative angle change along its length of 20 degrees and **angle per nick** is 5 degrees, then 4 nicks will be placed on that curve.

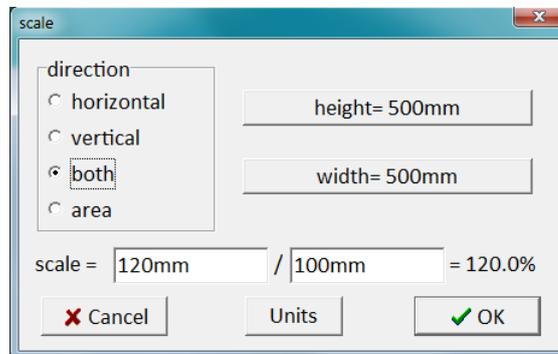
The scroll bar lets you adjust how the nicks are distributed along the curve. With the scroll bar at the bottom they will be evenly spaced along the curve. With the scroll bar at the top the nicks will be spaced based on angle so they will bunch up in tighter regions of the curve.

Regardless of where the scroll bar is the total number of nicks will be determined solely by **angle per nick**.

Once you have defined nicks for one curve, you can easily copy this to other curves in this panel or to other curves on other panels by using copy and paste (Ctrl+C and Ctrl+V or right click the mouse to display the popup menu).

Scaling will be enabled if you have PanelMaker.

Highlight the panels you want to scale on the nesting window and select **Scale** from the **Edit** menu to display the following dialogue :



Panels may be scaled horizontally (**horizontal**) or vertically (**vertical**) or evenly in both directions (**both**).

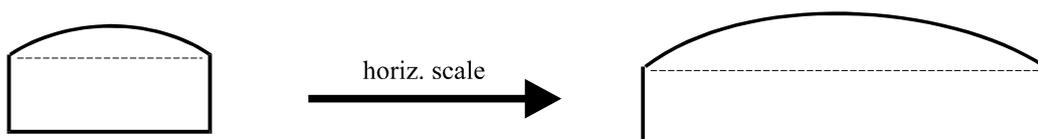
The **Scale** is calculated from the top number divided by the bottom number. The reason for doing it this way is so you can compare a current dimension on a panel with the desired.

Example 1) : If the width of the panel is currently 500.0mm (as per the dialogue shown above) and we want the panel to be scaled evenly until the panel width is 750mm : Click the **width= 500mm** button to place this value in the bottom number. Then type 750mm in the top number. PanelMaker will divide the two numbers to produce a scale of 150%. Click **Ok** to scale the panel by this amount.

Example 2) : To make a panel 20 larger, type 120 in the top number leaving 100 in the bottom number giving a scale of 120%.

If **area** is selected the panel will be scaled evenly in both directions but the scale will be based on area rather than dimension.

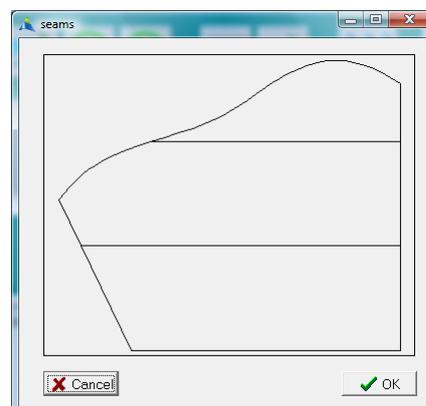
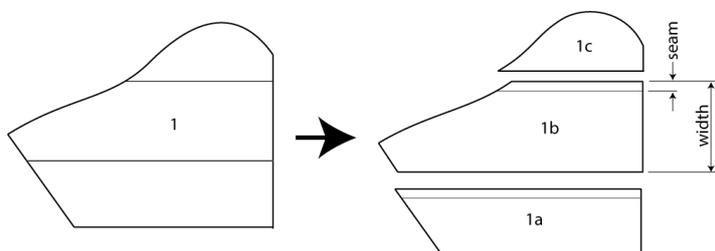
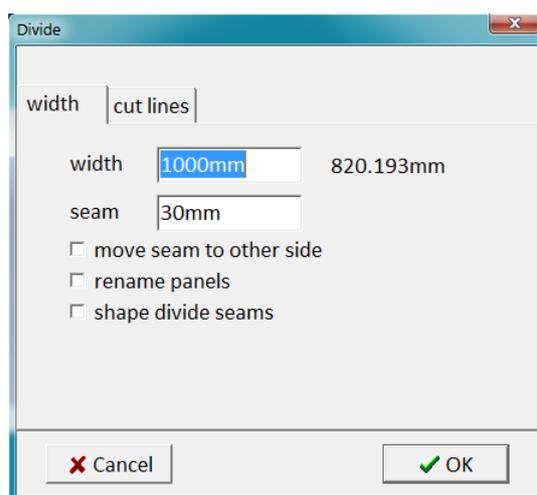
Note : If scaling horizontally or vertically, circles will not become ellipses but will remain circles. Also all curves will retain exactly their same % shape. This means that even if a panel is scaled horizontally it will change size vertically if there is a curve on the top or bottom of it (as shown below)



Divide will be enabled if you have PanelMaker.

Dividing a panel(s) based on a width

Highlight the panel(s) you want to divide on the nesting window and select **Divide** from the **Edit** menu. If the **width** tab is selected the panel will be divided starting from the bottom up based on **width** and **seam** :



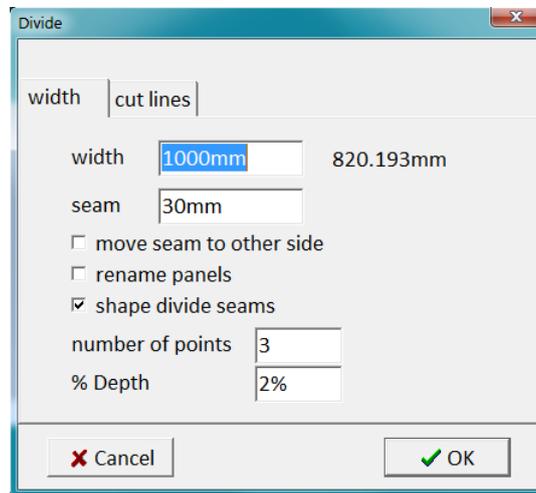
Note that panel 1c is not to the full width. If you want panel 1c to be to the full width and panel 1a to be smaller, rotate the panel by 180 degrees before dividing. If you want the seams to run at a different angle, rotate the panel by that angle before dividing.

If you desire the seam to be placed on the other side of the panels, tick **move seam to other side**.

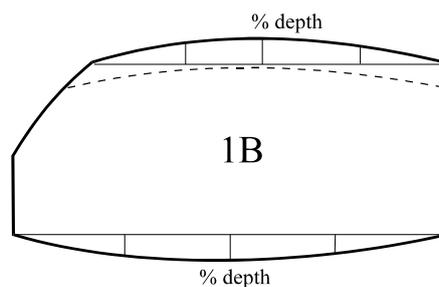
If **rename panels** is ticked, the divided panels will have an extra letter placed after their name. Otherwise they will just be the same name as the original panel.

Divide can be used to slice a large shape such as a large flat cover into panels of a specified fabric width. Use PanelMaker to first generate the full size of the cover (the triangular co-ordinate system in Curve Mode can be useful for this) and then use **Divide** to create the panels. After Dividing, it is sometimes more efficient to rotate every 2nd panel by 180 degrees before compacting them.

If a small amount of shape is required on each of the seams, this will be done automatically if **shape divide seams** is ticked :



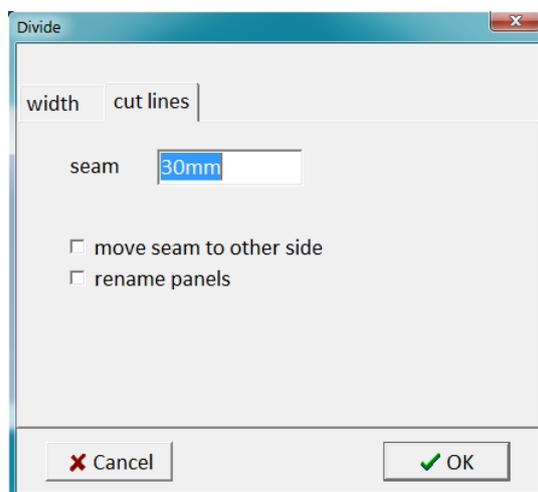
A spline curve with the same shape as an arc will be placed on the top and bottom of each panel with a **% Depth** as specified. Hence the longer the panel side, the greater the actual depth of the curve. The spline will have the **number of points** specified which can be used for adjusting the shape in PanelMaker later. Note that this will increase the width of the panel and hence the **width** specified will need to be smaller than the fabric width to allow for this.



Dividing a panel(s) based on defined curves

First you need to create lines that you want the panel divided along. Go to the shaping window of PanelMaker and add internal lines in the usual way by using the **Add** button. These lines must completely cut the panel. Namely both ends of the lines must be outside the panel. Then mark these lines as "cut" lines.

As many lines can be created as you wish. Leave the shaping window, highlight the panel(s) and select **Divide** from the **Edit** menu. If the **cut lines** tab is selected, the panel(s) will be divided along these lines.



A seam is added to one side of each cut line. The side it is added to depends upon the direction used to create the cut line. If the cut line was created by dragging from left to right for example, the seam will be placed below the line. However if **move seam to other side** is ticked, the seam will be on the other side.

If **rename panels** is ticked, the divided panels will have an extra letter placed after their name. Otherwise they will just be the same name as the original panel.

If desired a cut line can also be a shaped curve. The only requirement is that the ends of the curves end outside the panel.

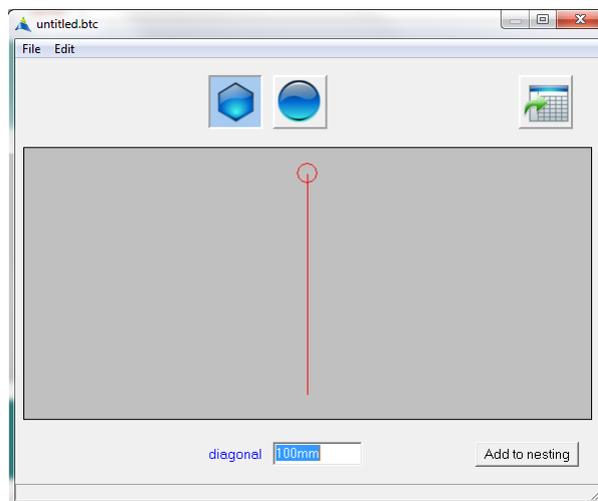
Triangulation will be enabled if you have PanelMaker.

Triangulation uses connecting triangles to define the size and shape of a panel. The size of each triangle is defined by the length of its 3 sides.

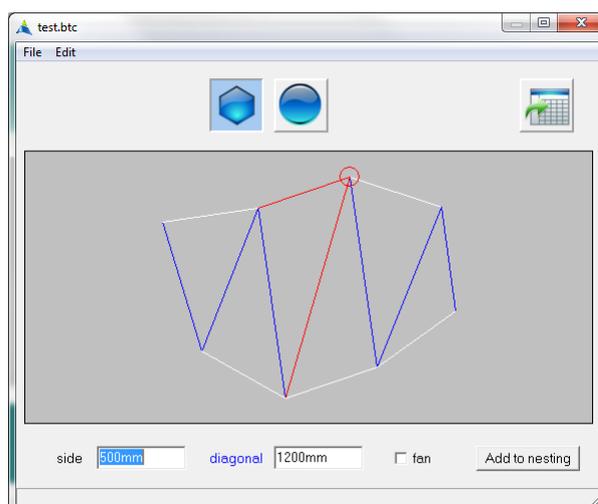
If triangles are drawn over a 3D shape and their sides measured, they can be entered into this window to develop the corresponding panel required to cover that 3D shape.

An example would be a boat cover. You can think of the adjacent sides of the triangles as being hinges that unfold to form a flat panel.

Select **Triangulate** from the **Digitise** menu:



Initially only a vertical line is displayed. To add triangles, repeatedly select **Add** from the **Edit** menu. (or use **Ctrl+A** on the keyboard as a shortcut)



Clicking the mouse near a corner of a triangle will highlight the right most sides of the triangle and the **side** and **diagonal** dimensions can be entered for that triangle.

Triangulation



This icon displays the Table window with the **side** and **diagonal** measurements for all triangles. These can be changed and extra triangles added by simply entering more data.

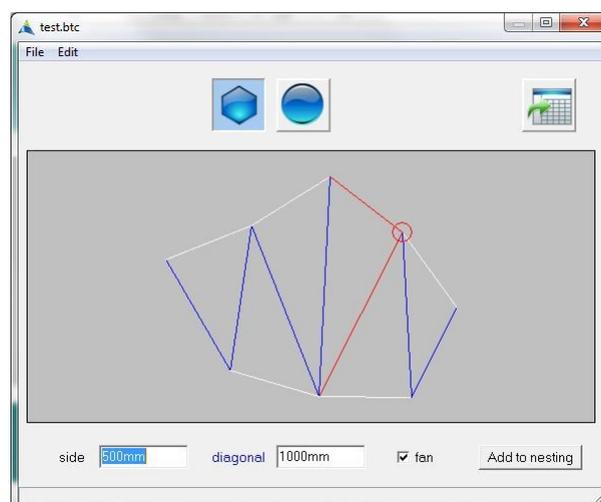
This is an alternative and much quicker way to enter the data than using **Add** from the **Edit** menu.

It can also be useful to identify if any erroneous dimensions have been entered.

Note that the first line does not have a **side** measurement.

	side	diagonal
1		700.0
2	500.0	800.0
3	500.0	1000.0
4	500.0	1200.0
5	500.0	1000.0
6	500.0	900.0
7	500.0	550.0
8		
9		
10		
11		
12		
13		
14		
15		
16		

By default each triangle is flipped relative to the previous triangle. If you want 2 or more triangles with the same "fanned" orientation, highlight the triangle and click on the **fan** check box:

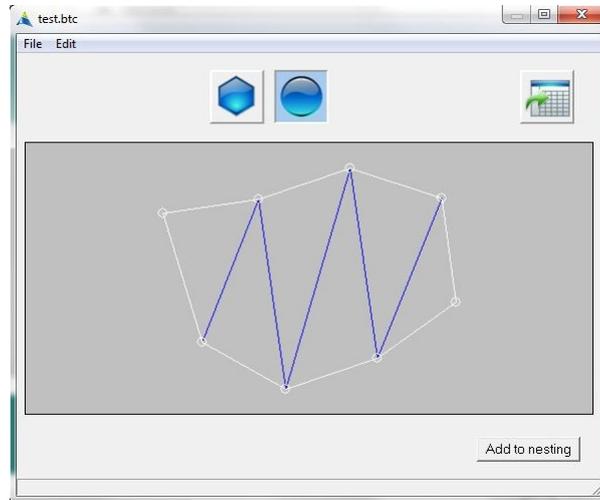


The Table window identifies which triangles are fanned by displaying a -ve diagonal measurement.

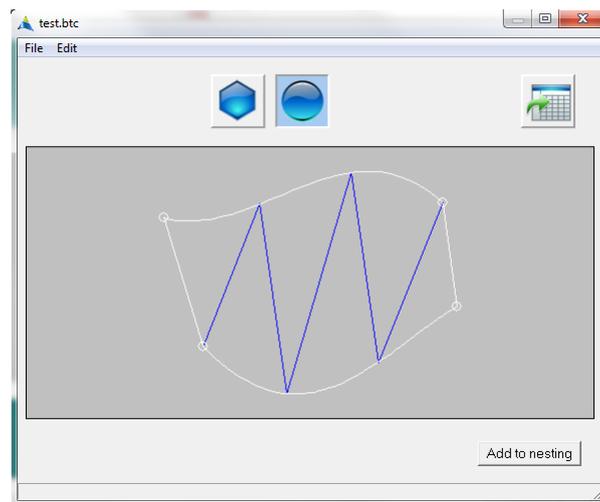
Triangulation



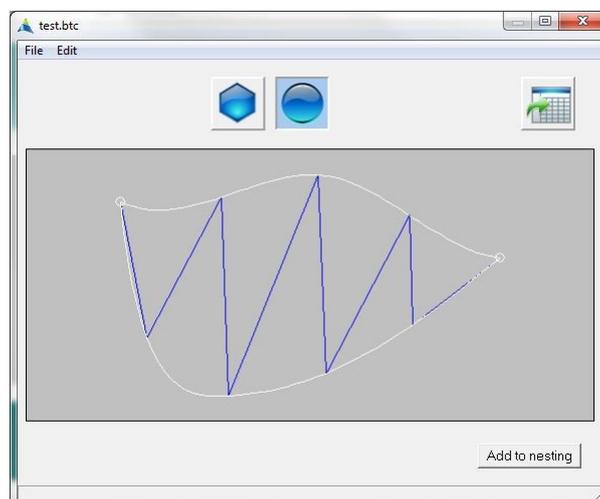
This icon displays the curved boundary of the panel. The small circles indicate that this point is a cusp. To replace a cusp with a smooth curve (spline), simply click the mouse near the circle. Clicking again will turn it back into a cusp.



Typically for most panels you will probably just want 4 cusps in the panel:



Below is an example of a panel with 2 cusps. Any number of cusps from 2 upwards is possible.





This icon will take you back to the triangle display.

The information entered into the Triangulation window can be saved in the usual way using the **File** menu. These BTC files are only for use with the Triangulation window and are separate from the PLT files used in the nesting window.



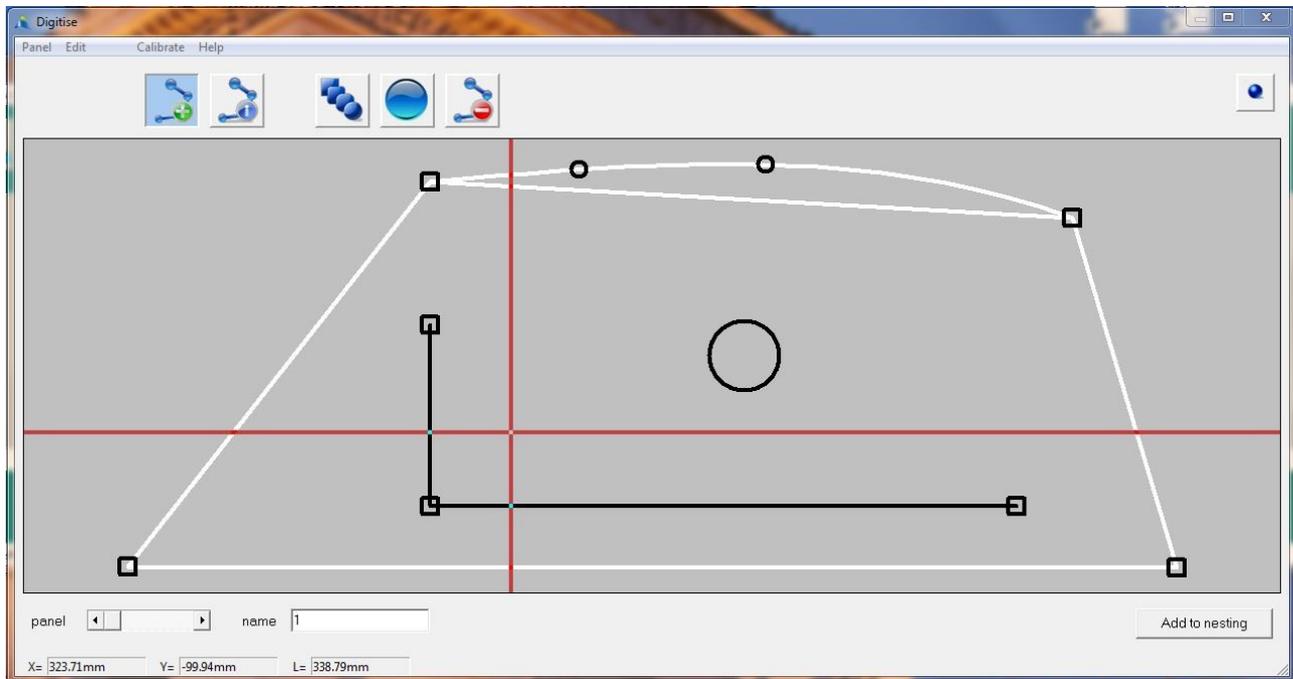
Click this to add the panel (including splines) to the nesting window and leave the Triangulation window.

If any of the dimensions are invalid (the sum of 2 sides of any triangle are less than its 3rd side), the software will display a warning and highlight the offending triangle.

When deciding where to position the triangles on the 3D object, you need to take into account the direction of the diagonals that will best generate the shape. As a general rule this will be in the direction that the fabric will be tensioned.

There is also a trade off between the number of triangles used and the accuracy. If in an ideal world you were able to measure each triangle extremely accurately, then the greater the number of triangles you used, the more accurate will be the resulting panel. However in reality there is a limit to how accurate the measurements will be and since any error in these measurements can be cumulative, it is better not to use too many triangles.

Digitiser from the **Digitise** menu will connect to the ProSail Digitiser if it is connected.



The example above is a pattern that has been digitised. It contains 1 closed group (drawn in white) which contains 4 corner points and 2 spline points. Plus 1 unclosed group (drawn in black) which contains 3 corners points. Plus one circle.

The digitising software operates in 2 modes : **Digitise mode** and **Screen mode**:



The first 2 icons control the screen with the digitiser (**Digitise mode**). Moving the digitiser carriage will move the red cross-hairs around the screen.



The next icons control the screen with the mouse (**Screen mode**). Moving the mouse will move the red cross-hairs around the screen.

Digitise mode



While this icon ("Add" icon) is highlighted, clicking the button on the digitiser will have the following effect:

Single click: Adds a new corner point.

Double click: Adds a new spline point. *Though the point will not appear curved until the next point is added. This option needs to be used with caution because a spline has to be relatively shallow. You should not try to digitise a spline curve that changes angle more than about 90 degrees from start to finish. If you need to do this split it up into multiple spline curves.*

You can also toggle digitised points between corner and spline points later using the Toggle icon explained on the next page. Hence you can just make all points corners points (Single click) initially and then change them later if you wish.

Click & Hold: Adds a final point to the current group of connected points. *The next point to be added will be on a new group and will not be connected to this point. If this final point is very near the first point on the group then the group will be considered a closed group and will be drawn in white.*

Click & Hold for 2nd time: Ends the current panel and a fresh screen will appear ready for digitising the next panel. *You can use the scroll bar to go back to this panel. If you are just digitising one panel then you never need to do this—just click the "Add to nesting" button when finished.*



While this icon ("Insert" icon) is highlighted, clicking the button on the digitiser while the red cross-hairs are near a previously digitised line, will insert a point at that location.

If double clicking, the inserted point will be a spline point.

This icon is useful for adding extra points or points that were previously missed.

Screen mode



While this icon ("Toggle" icon) is highlighted, clicking the mouse near a digitised point on the screen will toggle it between a corner point and a spline point. Note the warning on the previous page regarding spline curves.



While this icon ("Circle" icon) is highlighted, clicking the mouse near any group comprising of 2 or 3 points will replace that group with a circle. Hence to digitise circles, digitise groups with either 2 or 3 points in them (i.e. an internal line or 2 joined lines). Of course the last point in each group will need to be a "click and hold" to terminate the group. Later when you go to the screen you can use this icon to convert each group into a circle.

If there are 2 points, the first digitised point will become the centre of the circle. The software will ask for a radius. The position of the 2nd point is ignored.

If there are 3 points, a circle will be created that passes through all 3 points. The software will display the radius of the resulting circle. A different radius can then be entered if desired (the centre will remain the same).



While this icon ("Delete" icon) is highlighted, clicking the mouse near a digitised point on the screen will delete it.



Clicking this icon will toggle the display between thick lines and thin lines. Thick lines are easier to see from a distance if you want to see the screen while you are digitising.



Click this to add the digitised panel(s) to the nesting window and leave the digitising window.

If a panel has a closed shape, the closed shape will become the boundary of the panel and the panel will be drawn green.

If there are no closed shapes in the panel, the panel will be drawn blue.

If there are multiple closed shapes in a panel, the one with the largest area will become the boundary of the panel.



Scrolls through the digitised panels if there are more than one.

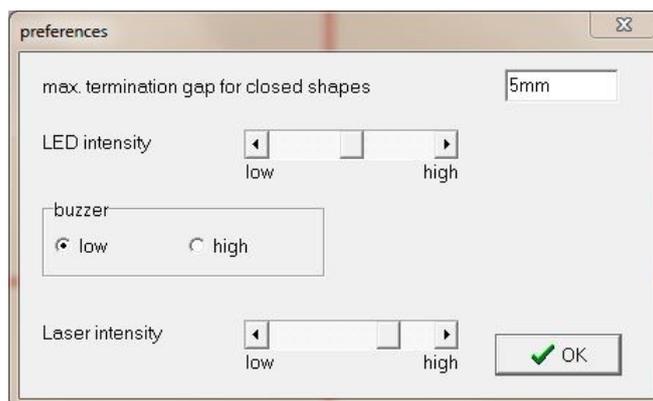
Name: Name of the current panel.

Digitiser menus

Panel / make origin

Makes the current position of the digitiser (0, 0).

Panel / preferences



When a group is terminated in Digitise mode with a “click and hold”, the software will consider the group to be closed (last point is on top of the first point) if the last point is within **max. termination gap for closed shapes** of the first point.

Normally you will want the outline of a panel to be closed. This means you will want to remember where you first clicked so you can end at that point with a click and hold.

Closed shapes will be drawn in white to identify they are closed.

Unclosed shapes are black.

If you fail to position the last point close enough for this to happen, you can select **close last point** from the **Edit** menu.

LED intensity controls how bright the led lights are.

Buzzer controls how loud the buzzer is.

Laser intensity controls how bright the laser pointer is.

Edit / undo remove

Undoes the last remove. Use if you accidentally removed a point.

Edit / close last point

Moves the last point in a grouped set of points to the first point in the group so the group becomes closed.

Calibrate / x

This calibrates the x-axis to allow for any belt stretch.

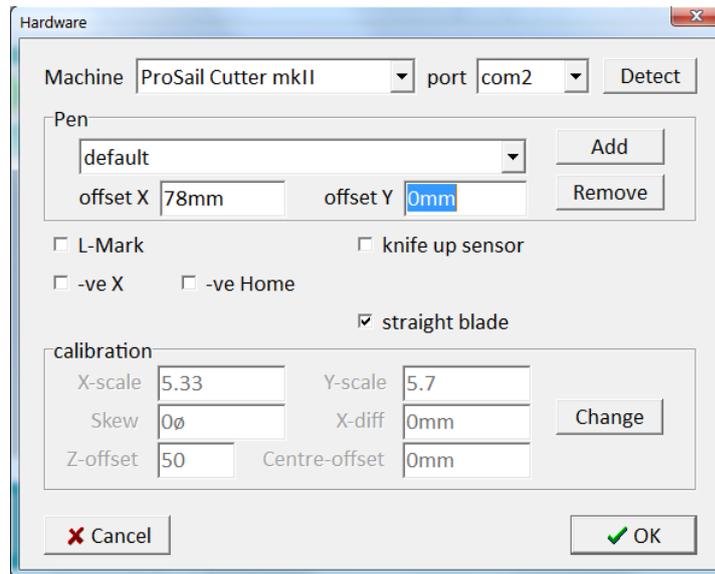
First mark 2 points on the table near the rail and as far apart as possible. Then select **Calibrate / x** and follow the on screen instructions.

Calibrate / y

This calibrates the y-axis to allow for any belt stretch and skew.

First mark 2 points across the width of the table as far apart as possible. These points must be exactly 90 degrees to the rail. Then select **Calibrate / y** and follow the on screen instructions.

Select **Hardware** from **Setup** from the **Plot** menu :



This dialogue defines the hardware of the plotter. Some of the values will probably never need changing directly. Some of the values like **x-scale** etc will be automatically changed during the calibration process and it is unlikely you will need to change them yourself.

Machine This is set for your plotter and can not be changed.

Port This is the communication port on your computer that the plotter is connected to.

Detect Click this to find out what com Y port to use for your plotter.

Pen Because different pen sizes will have a different distance between their centre and the cutting blade, it is useful to store these different values for different pens. Then when you go to plot you can select the pen you will be using in the plotter.

The **Pen** section stores this information. For each pen there is an **offset X** and an **offset Y**. **Offset X** is the distance between the centre of the pen and the cutting blade in the direction of the table. **Offset Y** is difference between the pen and blade in the direction across the table (this will be close to zero).

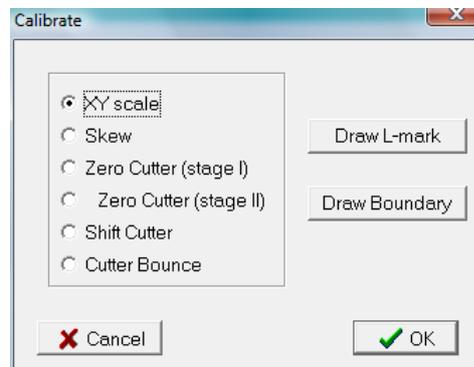
Click **Add** to display a dialogue where you can add another pen with its own name and x, y offsets. You can store up to 20 pens.

When using **Shift Cutter** in the **calibration** dialogue from **Setup** from the **Plot** menu, the software will automatically adjust these offsets for the pen you select.

To accurately test if **Offset X** and **Offset Y** are correct for a given pen, plot a **square with a seam** (**New** from the **File** menu). This should have a seam width of 10mm all the way around it. If not you can adjust **Offset X** and **Offset Y**.

- L-Mark** Distance from the edge of the plotted boundary that the L-Mark is drawn (see [pages 25 & 26](#)).
- knife up sensor** On old cutters the software will look at the sensor on the cutting head to get confirmation that the head is up or down. In this way it is able to warn you if the head is not behaving as it should. If there is a fault with the sensor this can be turned off.
- straight blade** Will display the Straight blade tab in the Plot Options window and allow the Straight blade selection in the Plot dialogue.
- ve X** Will place Home (0,0) at the opposite end of the table. Hence the cloth is loaded from the other end of the table. However the plotting on the table is necessarily reversed from the display on the screen. For that reason it is not recommended.
- ve Home** Will place Home (0,0) at the opposite side of the table. Hence the cloth is loaded from the other side of the table. However the plotting on the table is necessarily reversed from the display on the screen. For that reason it is not recommended.
- x-scale,**
- y-scale** These are the number of instructions the software needs to give the plotter for it to move 1mm. These numbers are automatically calculated when the plotter is calibrated using **XY Scale** in the **calibration** dialogue from **Setup** from the **Plot** menu. It is unlikely you would ever change these directly. Change with care!
- Skew** Tells the software how to adjust for the angle of the plotting arm not being exactly 90 degrees to the table. This number is automatically calculated by using **Skew** in the **calibration** dialogue from **Setup** from the **Plot** menu.
- X-diff** Adjusts for any difference in length between the belt on one side of the table and the other side for a plotter/cutter. This number is automatically calculated after using **XY Scale** in the **calibration** dialogue from **Setup** from the **Plot** menu.
- Z-offset** This is the value you entered while using **Zero Cutter** in the **calibration** dialogue from **Setup** from the **Plot** menu.
- Centre-offset** This was automatically calculated after using **Shift Cutter** in the **calibration** dialogue from **Setup** from the **Plot** menu.
- Change** Click this to enable making changes to the calibration data. It is unlikely you would ever do this. Change with care!

Select **Calibrate** from **Setup** from the **Plot** menu. This calibrates the ProSail plotters and cutters to allow for stretch in the belts and table movement. It needs to be done when the machine is first installed and periodically afterwards (every few months is recommended).



XY scale

This calibrates for tension in the X and Y belts. Place a pen in the plotter and click **XY scale** and then click **OK**. The plotter will draw some marks on the table. After drawing them you will need to measure between them with a tape measure and enter those measured values into the resulting dialogue. The software will then calculate new **x-scale** and **y-scale** values in the **Hardware** dialogue to adjust for belt tension. It will then return you to the Calibration dialogue. If you run **XY scale** again (thought you do not need to) the marks will probably have moved slightly.



Skew

This adjusts for the arm of the plotter not being at exactly 90 degrees to the table. The cutter could also become out of skew if one of the cogs over the rails slips. Click **skew** and then click **OK**. The plotter will draw some marks on the table. After drawing them you will need to measure between them with a tape measure and enter those measured values into the resulting dialogue. In particular you need to measure the diagonal measurement very accurately. The software will then calculate a new **skew** value in the **Hardware** dialogue to adjust for the angle of the arm. It will then return you to the Calibration dialogue.

Zero cutter

This adjusts the homing angle of the cutter blade on the ProSail plotter/cutters. This is very important and must be done as accurately as possible. A small inaccuracy in this angle can result in blades blunting very quickly on fabrics like Kevlar. The operation of **zero cutter** depends upon the version of cutter that you have. See next page.

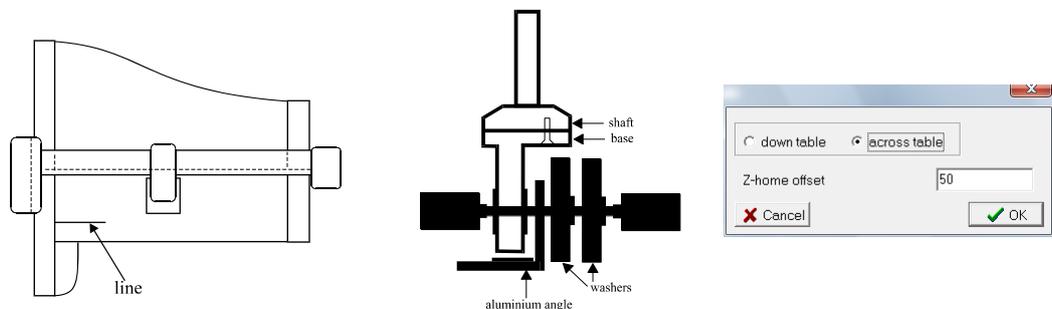
Zero Cutter for cutters MkI & MkII do the following :

Click on **Zero Cutter (stage I)** and then click **OK**. A dialogue will be displayed asking for a number. After entering a number and clicking **Ok**, the cutter head will rotate to the corresponding number. Continue this process with different numbers until the blade is pointing directly down the table. The blade will rotate approximately 0.3 degrees for each unit of number entered. When happy, click the **Esc** button to permanently store this number. To judge if the blade is straight down the table, it is recommended you take the blade off the cutter shaft, place a straight edge to the shaft face and reference this to a straight line drawn down the table.

To test (and improve) the accuracy of the blade direction select **Zero Cutter (Stage II)** and **OK**. First it will ask you for the position down the table and then position across the table you want to conduct the test. It will then do a plot and cut line. A window will then appear asking you how you want the angle of the cut line adjusted. It will continue to do test plot and cut lines (each time moved across the table by 5mm) until you are happy the two lines are parallel.

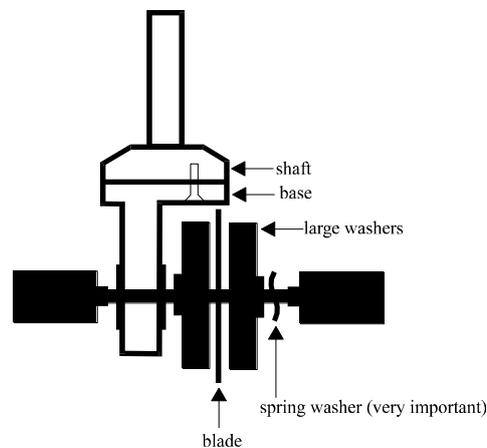
Zero Cutter for the cutter MkIII do the following :

Draw a line (at least 300mm long) near the front of the table at 90 degrees to the channel rail (see picture below). Using a set-square against the channel rail is the best way to draw this line. Mount the supplied 160mm aluminium angle to the blade holder as shown below. Do not over tighten. Note that the inner washer has its large flat side against the angle for rigidity. Move the head of the cutter so it is over the top of the 90 degree line you drew on the table. Turn the cutter shaft so the aluminium angle is roughly parallel with this line.



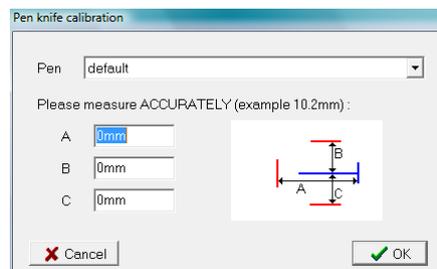
Click on **Zero Cutter** and then click **OK**. Click **ok** to the message dialogue. The next dialogue asks for a **Z-home offset**. Make sure "**across table**" is selected. After clicking **ok**, the blade will rotate and the head will come down. Then compare the blade angle with the line on the table (you can move the cutter if you wish to help visibility). The current angle of the face can be changed by entering a new number in this dialogue and clicking **ok**. The blade angle will rotate clockwise by approximately 0.1 degrees for each unit entered. E.g. If the face is 10 degrees from the line, add or subtract 100 to the current number and click **ok**. Repeatedly change this number and click **ok** until the angle is parallel with the line on the table. When happy with the direction, click the **Esc** button. The software will now return you to the Calibration dialogue. Remove the aluminium angle and the large washers (the inner washer orientation has changed). Also note the spring washer which is very important.

Mount the blade on the blade holder as follows (Note the orientation of the inner washer has changed from that used in zero cutter). Also note the spring washer which is very important.



Shift Cutter

To adjust for the distance between the pen and the blade, select **Shift Cutter** and **Ok**. It will ask you for the position down the table and then position across the table you want to conduct the test. It will then plot a cross and cut 3 short lines and ask you to measure the distance between the plot and cut lines. You need to be very accurate with these measurements (e.g. 9.7mm is better than 10mm). After doing this the software will return you to the Calibration dialogue. Note: for Shift cutter to be accurate there must be no mechanical slop in the cutter. If there is it will be necessary to plot a small square with a seam as described on the next page.



Cutter Bounce This is a method used on old ProSail plotter/cutters mkI or mkII to reduce how hard the cutter head comes down and hence increase the life of the plastic table surface. It is explained in the **Fabric** chapter. The calibration dialogue can be used to test different values for Cutter Bounce. To do this, click on **Cutter Bounce** and then click **OK**.

Draw L-Mark This draws the position of the L-Mark at the front of the table. This is the position on the table the L-Mark on the fabric should be dragged to between frames. The value used for **L-Mark** is entered in the **Hardware** dialogue.

Draw Boundary This draws the maximum plotting size of the plotter on the table. In particular the table reference line the fabric needs to be laid against.

As a final check after calibrating it is often useful to plot a small square with a seam:
Select **New** from the **File** menu and create a 100mm x 100mm rectangle with a seam of 10mm (or alternatively any small panel with a seam will do). Position the resulting panel in a position on the nesting window to do a trial cut. Load some paper on the table in this position and tape it down.

Select **Plot** from the **Plot** menu.

Make sure that both **plot** and **cut** are ticked and **rotary blade** is selected.

Make sure **screen plot only** is not ticked.

Click the **Plot** button to start plotting.

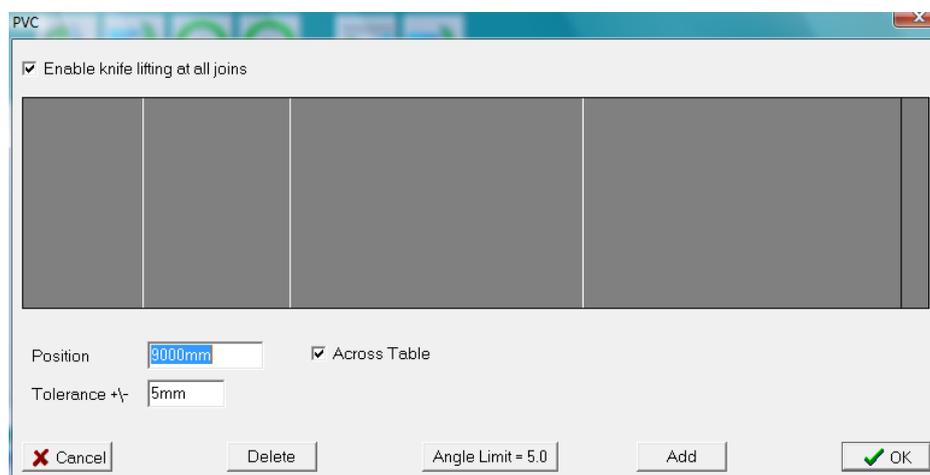
The machine should plot the inner part of the square and then cut the outer part of the square. There should be an even seam width of the requested amount around this panel.

If the seam width varies along one side it would indicate that **Zero Cutter** was not done accurately enough.

If the seam width is wider on one side of the square compared to the adjacent side, adjust the **offset X** and **offset Y** values in the **Hardware** dialogue (select **Hardware** from **Setup** from the **Plot** menu [page 70](#)) by a small amount until the seam width is the same all around the panel.

If the seam width is too large or too small, you can manually adjust for this by changing **centre-offset** in the **Hardware** dialogue (select **Hardware** from **Setup** from the **Plot** menu [page 70](#)) by a small amount .

Select **PVC Joins** from **Setup** from the **Plot** menu. This is used to prevent the cutter blade on the ProSail plotter/cutter from catching on the joins in the PVC table top.



If **Enable knife lifting at all joins** is ticked the cutter will lift the blade if it is about to cut a line (or part of a curve) which is within **Tolerance** from one of the PVC joins and at an angle less than **Angle Limit** to that join.

Use **Add** to add more joins.

Use **Delete** to delete the selected join.

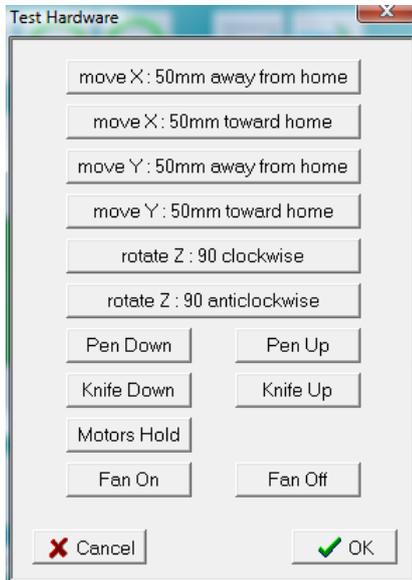
Click on a join to select it.

If the selected join is across the table, **Position** is measured from the front of the table boundary (which was drawn on the table by **Draw Boundary**).

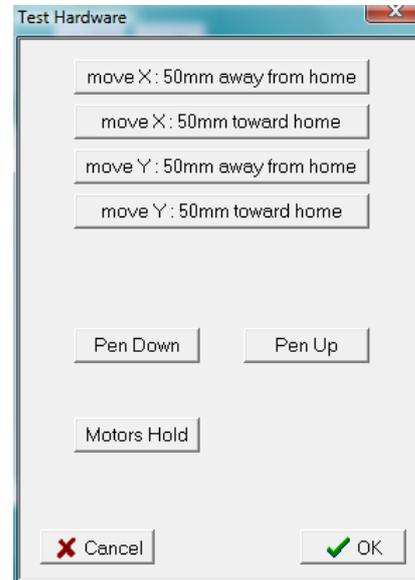
To make a horizontal join, remove the tick from **Across Table**. **Position** is then measured up from the lower boundary line (cloth load line which was drawn on the table by **Draw Boundary**).

To change the **Angle limit** for all the joins click on the **Angle Limit** button.

Select **Test Hardware** from **Setup** from the **Plot** menu. This is used to help diagnose problems with the ProSail plotters or plotter/cutters. This dialogue tests the signals going to the plotter from the computer:



Plotter/cutter



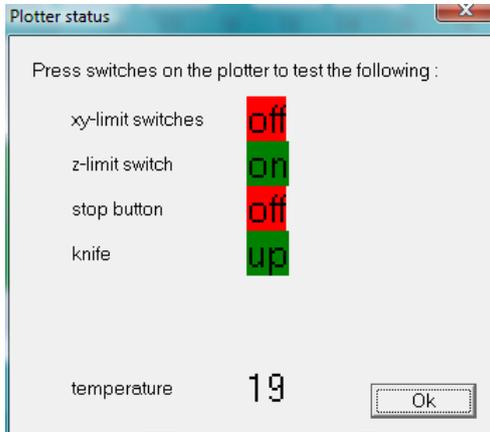
Plotter

Clicking any of these buttons should perform the associated operation. First make sure that the arm and head are sufficiently away from any limit switches. i.e. push the machine back from the front of the table and the head to the middle of the arm. Pay particular attention to the direction of travel to make sure it is correct when doing these tests.

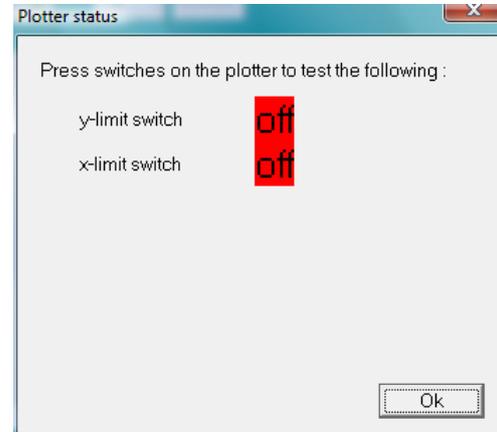
Motors Hold is useful for testing if there is any mechanical slop in the machine. After clicking **Motors Hold**, all 3 motors will hold hard (*2 motors for a plotter*). If you then physically try pushing the arm or head, there should only be a small movement that bounces back when you stop pushing. If there is too much or it feels like something is loose, check all the belts and pulleys to see if there is some mechanical slop. Of course if you press too hard, it will overcome the power of the motors and the machine will move (but don't worry, this does not harm the machine).

*(**Fan On** and **Fan Off** are only for the cutter mkIII and controls the fans inside the controller box. There is also a fan in the power box but it is always on).*

When finished, click **OK** to display the next dialogue which tests the signals coming from the plotter to the computer :



Plotter/cutter



Plotter

The **xy-limit switches** box should say **ON** when you physically press either the x-limit switch at the back of the cutter over the channel rail or the y-limit switch at the back of the cutter head.

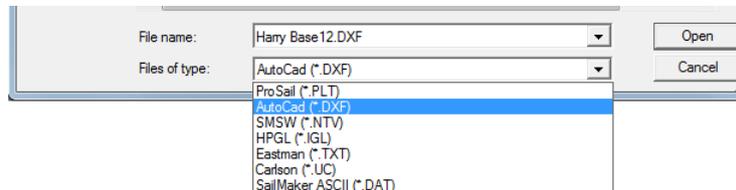
The **z-limit switch** relates to the limit switch inside the cutter head itself (remove the cover on the cutter head to see and press it).

On old cutters, **Knife** should say **up** when the head is up and **down** when you physically push the head down by hand.

(temperature is only displayed on the cutter mkIII and shows the temperature of the controller drives).

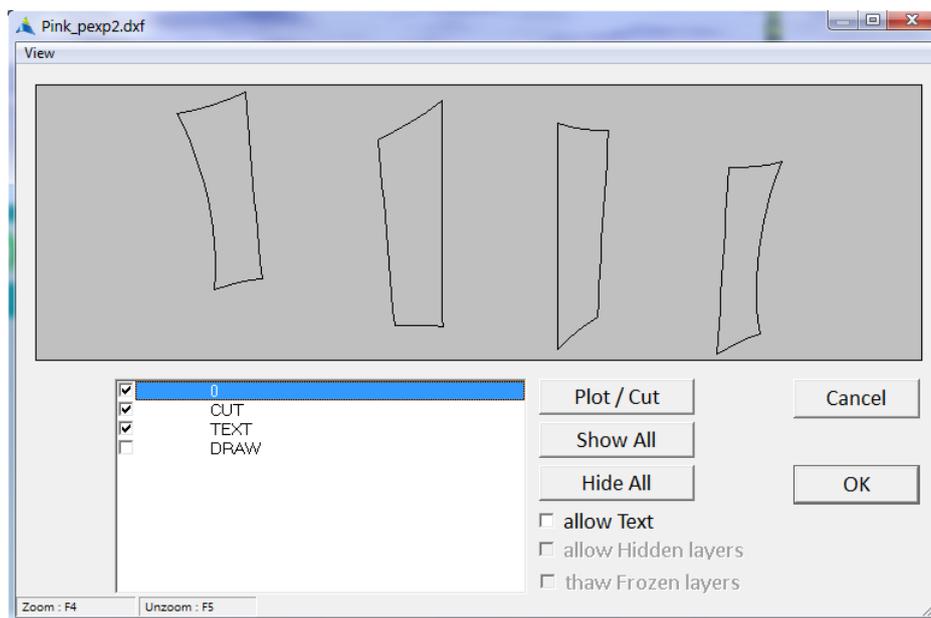
DXF is the most popular file exchange format between CAD programs. An example of a program that will save in the DXF format is AutoCad. You will need to tell your design software to save or export a DXF file. If it gives you an option of ASCII or Binary, you need to select ASCII.

To import a DXF file into PanelMaker select **Open** from the **File** menu and select "AutoCad (*.DXF)" for **File of type** :



If you are familiar with AutoCad or similar software you will probably understand what layers are and how some can be hidden or frozen.

If however you only use membrane design software (like M-Panel or ForTen etc) then you might not be aware of these finer details. However all you really need to know is that the DXF files they generate will contain the information describing your panels but the information will be distributed on different layers. Typically one layer is used for cut lines, one layer is used for plot lines and another layer is used for any text. However this can vary and there can be a lot more layers (some of which might not be needed) or even just one layer for everything.



When you open a file it will list the name of all the layers in the file.

All the layers that have a tick before their name will also be drawn. If they are not all ticked you can tick them individually or you can click the **Show All** button.

To see which layer name relates to the drawing click the mouse on the name to highlight it. This layer will then be highlighted on the drawing. Alternatively if you click on part of the drawing, the corresponding layer name(s) will be highlighted. This is useful if for example you see some objects you don't want. You can click on the drawing to highlight its layer name and then untick the name.

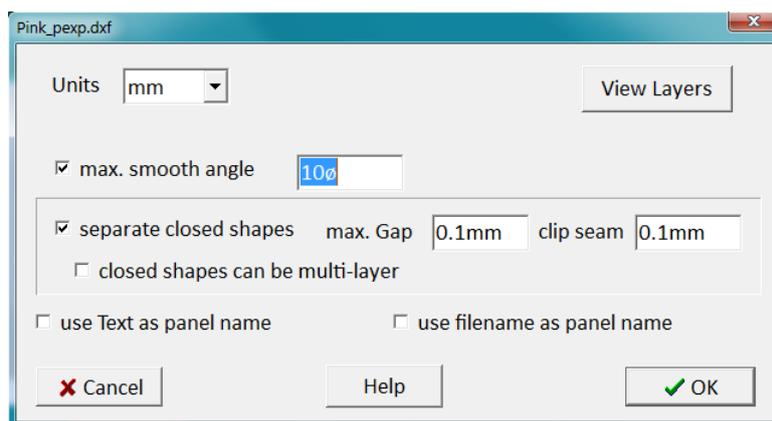
To zoom the drawing to see more detail you can either select **Zoom** from the **View** menu or press **F4** on the keyboard to define a zooming rectangle or more simply you can use the mouse wheel on your mouse to zoom. If using the mouse wheel, zooming will be centred around the mouse location. To reset the scale press the **F5** key on the keyboard.

Some layers may have text on them. Some layers may have both text and lines. To allow text to be included in the panel, make sure **allow Text** is ticked. If **allow Text** is not ticked, no text will be included in the panel, even if a layer containing text is ticked.

If the drawing shows discrete panels like the drawing on the previous page and you have unticked any unwanted layers then you can proceed. PanelMaker will be able to see the discrete panels and will automatically know that the boundary of each panel will be cut lines.

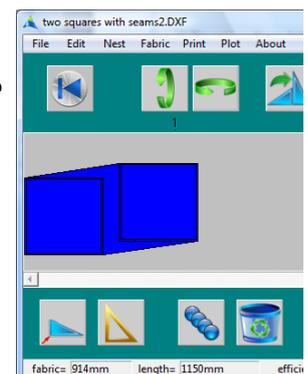
If however there are more lines you want to identify as cut lines then you will need to tell it by highlighting the layer name and clicking the Plot/Cut button. Clicking the button again will put it back to a plot layer.

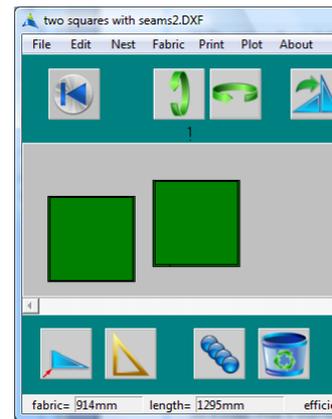
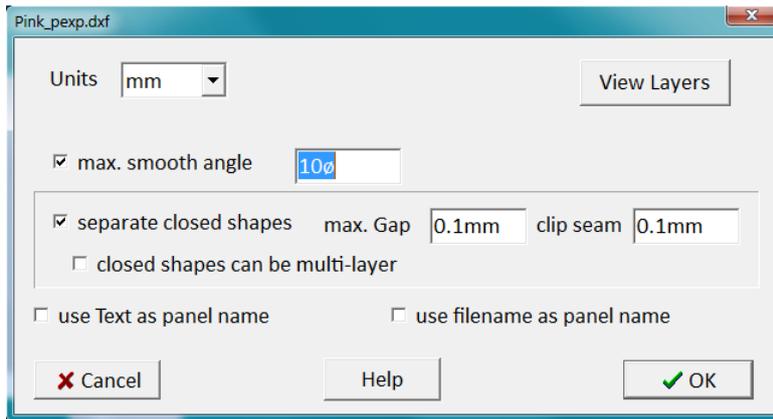
When you have only the layers you want ticked and any extra cut layers are identified as cut layers click **OK** to display the following:



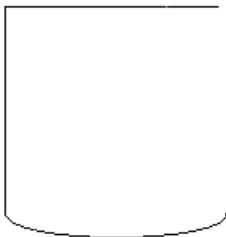
DXF files are simply a collection of lines and text. The DXF format does not contain any information to identify panels. Hence it is the job of PanelMaker to try to determine which lines define a panel. If **separate closed shapes** is ticked (most common) PanelMaker will try to do this by looking for closed shapes which will then become separate panels on the nesting window.

*If however you just want to read the entire drawing in as one large object without the ability to see separate panels then leave **separate closed shapes** unticked. A non-plotting envelope is placed around the drawing so it behaves as one panel. This envelope is only there to allow you to select the drawing with the mouse. It is ignored by the plotter and by other panels which can be compacted against the drawing inside this envelope. To identify that this panel has a non-plotting envelope around it, the panel will be coloured blue.*



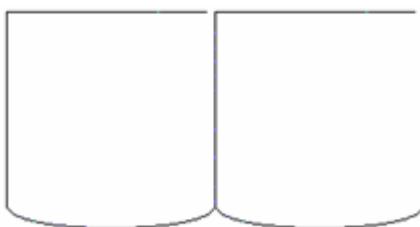


Closed shapes are shapes that you can entirely trace with your finger from a start point back to the same point. If there are any gaps in this path they need to be smaller than the **max Gap** value you have specified.

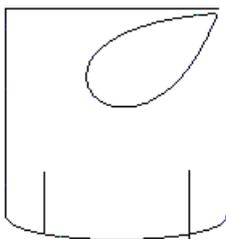


This example would cause problems if the gap at the top right is larger than **max Gap**.

Keep **max Gap** as small as possible. Usually 0.1mm is enough. If it is too large, lines that are closer than **max Gap** to the closed shaped (including other closed shapes) will become part of it.



Closed shapes must not touch each other. They must be at least **max. Gap** away from each other. This example would be seen as a single panel.

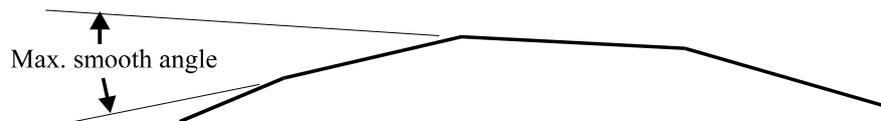


Lines inside closed shapes (including any other closed shapes that completely fit inside) will become internal lines for that panel. To allow for any internal lines that might slightly cross outside closed shapes (as seen at the bottom right), you can specify a **clip seam** allowance. This is an imaginary seam around the outside of each closed shape. Any lines within this seam will be considered to be inside the closed shape.

Units DXF files are usually saved either in inches or mm. If you find after reading the DXF file it is too small or too large try changing **Units**.

max. smooth angle

Often DXF files approximate curves as a series of straight line segments and are hence read by the importing software simply as straight line segments. However if after reading these files you want to edit the shapes in PanelMaker it is more useful if these straight line segments are recombined as a curve. If **max. smooth angle** is ticked, PanelMaker will look at these lines and decide whether some of these should be part of a curve or remain as distinct line segments. It does this by looking at the angle between adjacent lines :



If this angle is less than **max. smooth angle** it will assume these two lines are part of a curve. Otherwise it will assume they form a corner. A typical value would be 10 degrees.

closed shapes can be multi-layer

Click this if any closed shapes are made up from lines coming from more than one layer. This is uncommon and would normally not be ticked.

use Text as panel name

Tick this if your DXF file has the name of the panel inside each closed shape. This will allow you to see the name of the panel on the nesting window. For this to work you would have to have had **allow text** ticked in the previous dialogue.

use filename as panel name

If multiple DXF files need to be added together (perhaps one panel per file), multiple files can be selected in the open file dialogue by holding down the **Ctrl or Shift keys** and clicking the desired files.

To select all files in the folder, first click on one and then press **Ctrl+A**

If **use filename as panel name** is ticked, the panels in each file will be given the same name as the file it is read from. This is useful if **separate closed shapes** is off and multiple files are opened at once.

If there are any lines left over that don't fit inside closed shapes (including **clip seam allowance**), they will be placed inside an extra panel (blue panel) with a non-plotting envelope around it.

If some of the closed shapes cross over themselves, they will still be considered a panel but the panel will be coloured red.

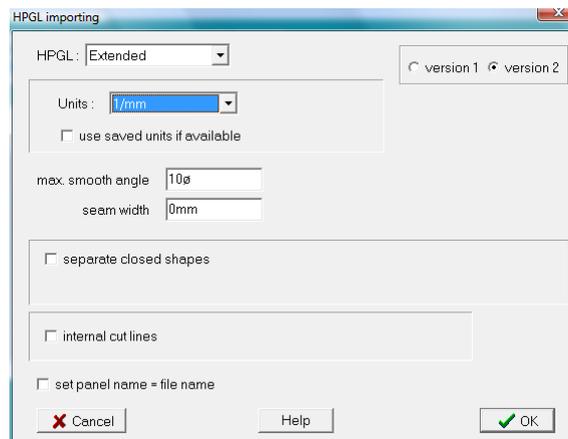
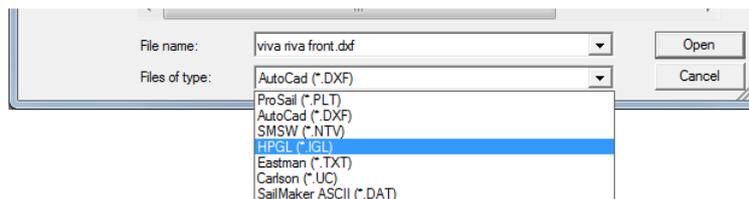
Hence if a blue panel or red panel(s) are generated you will know that there was a problem with some lines.

Although not as popular as DXF, HPGL is still a common format.

To import an HPGL file you need to first rename the extension of the file. Initially the extension will probably be ".PLT". This needs to be renamed to ".IGL" since PanelMaker uses the extension ".PLT" for its own file type which is a different format.

To be able to rename file extensions in windows, you need to make sure windows is displaying the file extensions. To do this, look at the prosailw folder in windows and select "folder options" from the "tools" menu (or go to the "Control Panel" and open "Folder Options"). Then click on the "view" tab and make sure "hide extensions for known file types" is NOT ticked. This will tell windows to display the entire file name including the extension.

Select **Open** from the **File** menu and select "HPGL (*.IGL)" for **File of type** :



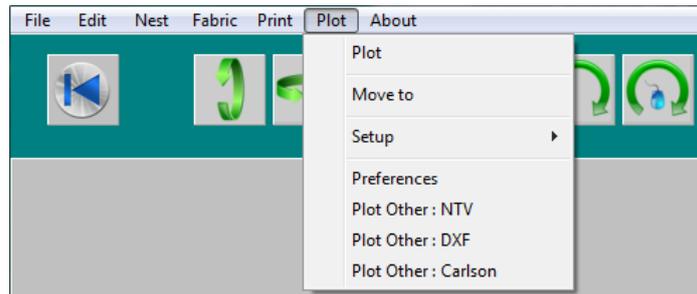
Make sure **HPGL** is set to **Extended**.

HPGL files are read in a similar way as DXF files. Hence please refer to the previous chapter regarding DXF Import from the middle of [page 80](#) onwards.

The main differences are :

- 1) There are no layers in HPGL files, only colours.
- 2) Any **unit** scale can be used. **1016/inch** is the most common. If **use saved units if available** is ticked, the software will look to see if the hpgl file has the units specified in the file. If it does it will use those. Otherwise it will use the units you specify.

Plot Other



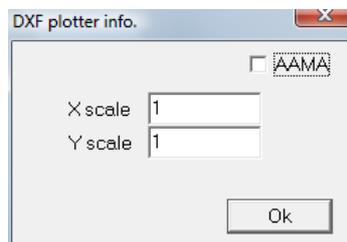
These optional export modules allow you to create files of different formats required by other CAD software.

Plot Other : NTV

This format is used by PlotterPilot, Dimension Sailcloth and others.

Plot Other : DXF

This is the most common CAD format. Most CAD software will read this format.



X scale and **Y scale** are the scale used by the importing software. A value of 1 corresponds to inches. 25.4 will correspond to mm.

Tick **AAMA** if the importing software requires the AAMA format.

Plot Other : Carlson

For use with a Carlson plotter.

File

New		Create a new rectangular or circular panel.
Open	Ctrl+O	Open an existing panel file.
Add	F2	Add an existing panel file to the current panels.
.....		
Save	Ctrl+S	Save the changes made to the current panels.
Save As...	Shift+Ctrl+S	Save the current panels with a new name.
Save a Copy...		Save a copy to a different directory (usually to an external device like a memory stick or network).
Zoom	F4	Zoom the current view.
Unzoom	F5	Reset the current view.
.....		
Units Preferences		Display the Units Preferences dialogue. Display the general preferences dialogue.
.....		
Quit	Ctrl+Q	Leave PanelMaker.

Edit

Shaping	Ctrl+F	Enter the Shaping Window.
.....		
Scale		Scale the highlighted panel(s) up or down.
Divide		Divide the highlighted panel(s).

Nest

Group	Ctrl+G	Group the highlighted panel(s) together.
Ungroup		Ungroup the highlighted panel(s).
.....		
Colour Style		Change the colour of the highlighted panel(s). Change the style of the highlighted panel(s).
.....		
Select All/Invert	Ctrl+A	Invert the current selection of panels.
.....		
Undo	Ctrl+Z	Undo the last changes.
Redo	Shift+Ctrl+Z	Redo the last changes.
.....		
Reset Compact		Reset compaction memory.
.....		
Preferences		Display the Nest preferences dialogue.

Fabric

Plot Options
Width Ctrl+W

Displays the Plot Options dialogue.
Width of fabric.

Print

Offsets
.....
Screen

Print panel offsets for hand plotting.
Print the window

Plot

Plot
.....
Move To
.....
Setup
.....
Preferences

Start plotting.
Move the plotter to a corner of the table.
Calibrate and test dialogues for the Plotter.
Plotting preferences dialogue.

Digitise

Digitiser
Triangulate

Connect to the ProSail 2D digitiser.
Triangulation window for manual digitising.

About

About
.....
Bug Report

Check Preferences

Display information about software version etc.
Creates a problem report file that can be e-mailed to
Armstrong-White for problem support.
Check all preferences for unusual settings.