



FOOT PROCESSOR MANUAL

Introduction

Foot Processor is a simple viewer and tool set for looking at ASC and CSV files, essentially XYZ data derived from either photogrammetry or optical laser scanners. The tool set enables: (1) basic visualisation; (2) simple rotations, reflections and translation of the data; (3) data cropping; and (4) simple measurements via landmark determinations and associated data export. The tool set is designed specifically for use with foot print and foot wear data but may be applicable to other applications.

Licencing Information

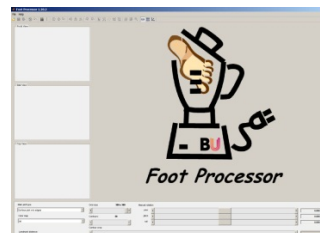
In downloading and installing this software you agree to the following:

The Foot Processor software has been developed using, and requires for its operation, third party software licensed to Bournemouth University (i.e. Matlab Software). You are only permitted to use such Third Party Software in connection with the operation of the Foot Processor software. In return for us permitting you to download and use the Foot Processor software and Third Party Software: A) you acknowledge and agree that you shall only download and use the Foot Processor software and any Third Party Software for the sole purpose of accessing and running the Foot Processor software for your own research and private study; B) you must not make any other copies of the Foot Processor software or Third Party Software and/or make the same available to anyone else; and C) you must not disassemble, decompile, reverse engineer or create derivative works based on the Foot Processor software or Third Party Software.

Foot Processor was written at Bournemouth University by Dr Marcin Budka as a contribution to the NERC Grant (NE/H004211/1). Any problems or development suggestions should be directed to Dr Budka (mbudka@bournemouth.ac.uk).

Installation

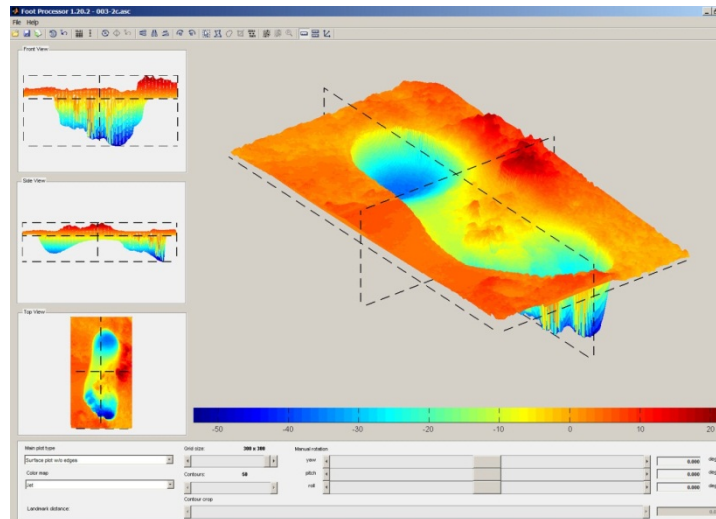
In order to run Foot Processor you will need to install the MATLAB Runtime Environment version 7.11 which can be obtained along with Foot Processor from <http://footprints.bournemouth.ac.uk>. Once this is installed, double click on the Foot Processor icon and the programme will launch. Please note that this can take some time depending on the machine specifications being used.



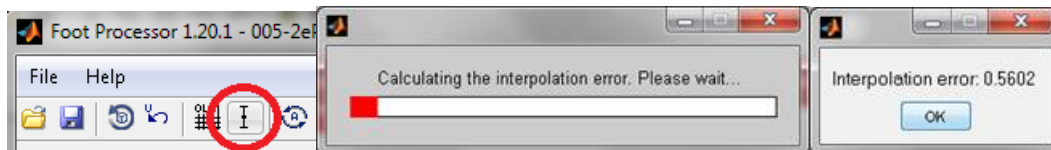
Basic Operation

On launching, the programme opens with three plot windows and a top and bottom tool bar.

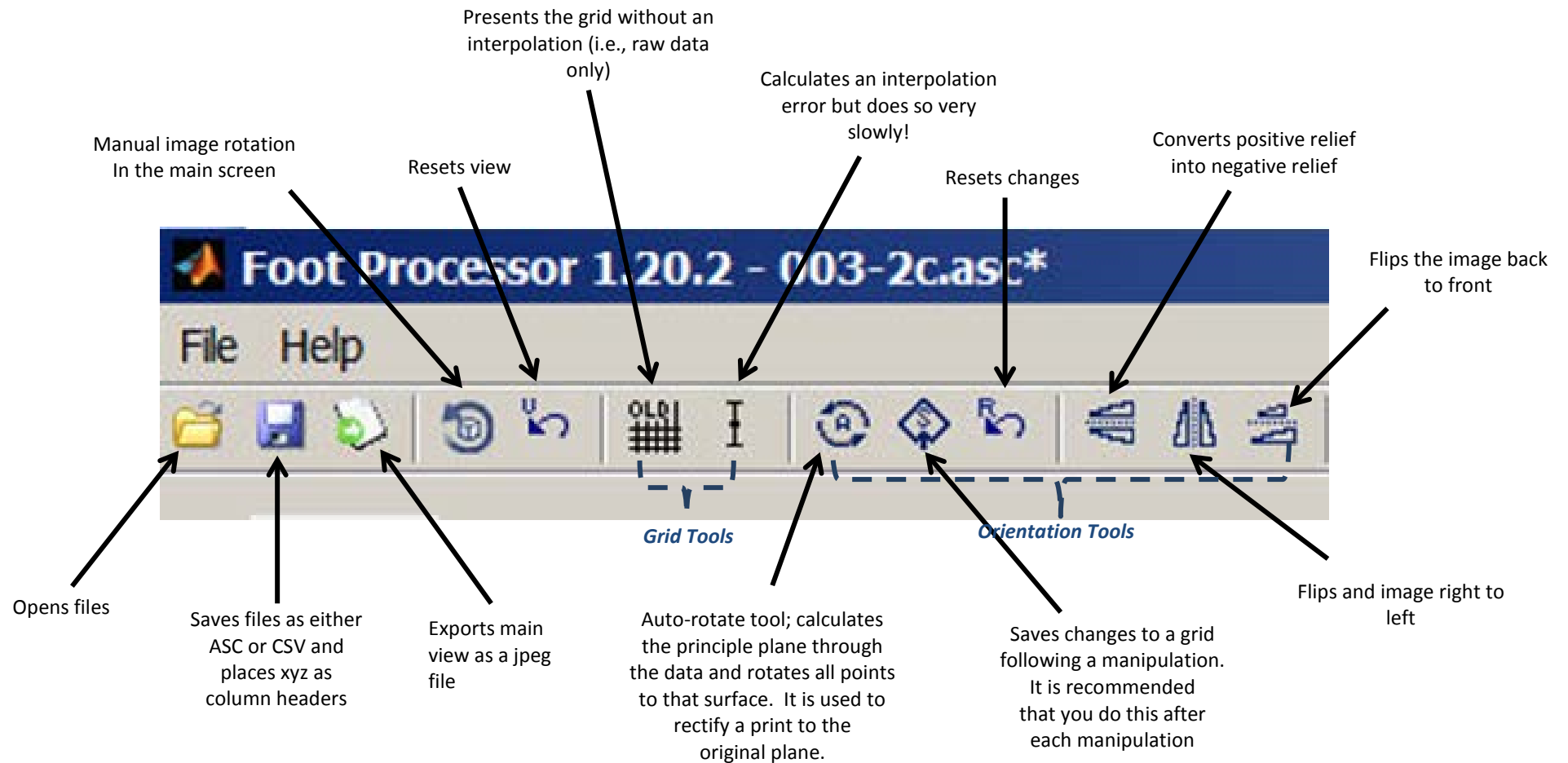
By clicking on the 'file icon' a dialogue box opens which allows you to navigate to an appropriate input file. Standard file formats are ASC or CSV. Files open with an isometric projection in the main window and to the left two side-views and a vertical view. The grid size and, therefore, the sampling resolution used to produce the plots are controlled by the slide bar on the bottom toolbar. The maximum grid size is 300 by 300.



Note that the grid is generated using bilinear interpolation by default. There is, however, an option retained from earlier versions allowing the grid to be plotted without interpolation. The programme will also calculate an interpolation error defined as a mean Euclidean distance of an interpolated point to the 4 nearest input data points, averaged over all interpolated points. Note, however, that this is time consuming depending on the grid resolution and the input data size.



All tools can be accessed from the upper toolbar.



Upper tool bar cont'd:

This allows you to crop a print by elevation. Once pressed a contour view appears in the main screen. Select the number of contours via the slider on the bottom tool bar. By moving the large slider the print is then cropped by elevation. Select the desired level and press the crop button to enact.

When a print is cropped using the polygonal cropping tool, the deleted points can either be displayed as having a 0 z-value or NAN; whichever mode is selected will carry forward when saving the files.

This brings up a new window with 3 panels. 1) A thumb nail of the contour map with the labelled landmarks. Note this can be copied to the clipboard via the icon in the top left and onward to your notes. 2) A table showing xyz co-ordinates of all the labelled landmarks. 3) A table of all the inter-landmarks distances. The 2 data tables can be exported as CSV files by pressing the save button in the top left hand corner.

Rotates the print through 90°

Crop tool

Removes all landmarks

Orientation Tools

Crop Tools

Contour Tools

Guides

Crops a print via a rectangle; main print view automatically changes to an overhead view; drag the cursor to define a box which on release will turn blue; then clip the crop button.

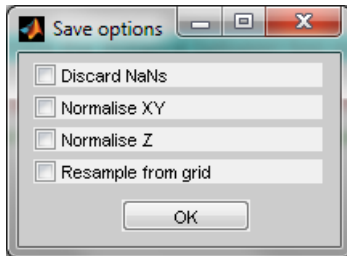
Crops a print via a series of polygons. Place points with the cursor (which becomes circular) around the print then right click with the mouse to close the polygon. Edit points on the polygon by hovering over a point which will turn red, allowing it to be moved. Insert a new point on a line by clicking on it. Again, once satisfied with the polygonal crop area use the crop tool to enact.

This gives a contour view of the print in the main window. Select the number of contours via the bottom tool bar. This also allows you to place landmarks on the contour map. Landmarks are labelled consecutively L1, L2, etc. Left mouse click places the landmark, right click removes a highlighted landmark (i.e., red).

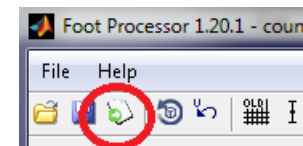
A series of tools that show the bounding boxes and axis for the original point cloud and the principle planes; gives an indication of the amount of rotation required to correct the plane.

There are five broad groups of tools:

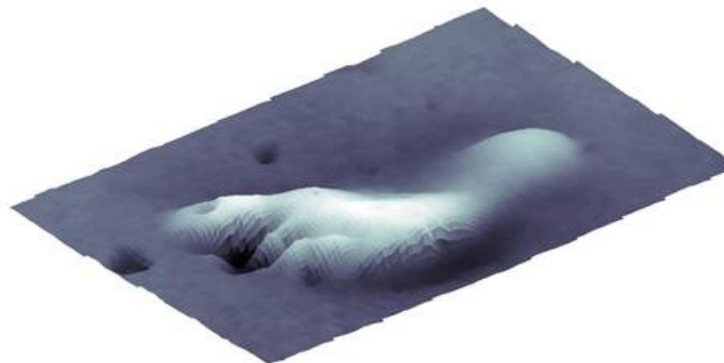
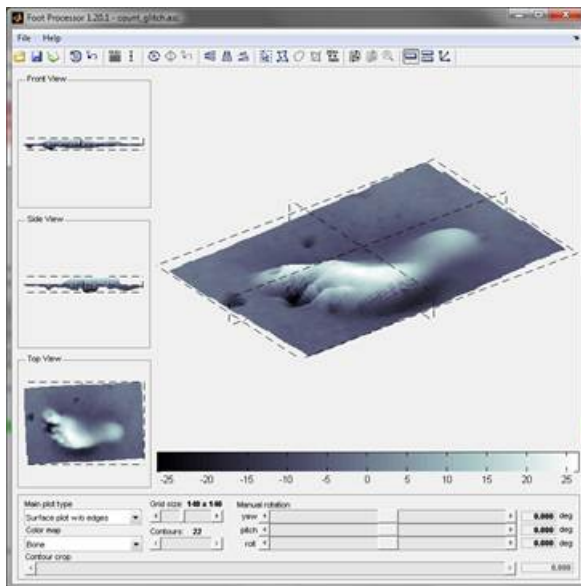
1. Operation Tools. The tools consist of the navigation, file opening and saving tools. They also include an export function to export the main image as a JPEG file. Files are saved in either ASC or CSV formats and a dialogue box gives you a range of options. Normalise Z maps the data into a 0-1 interval, while Normalises XY subtracts the minimum value from X and Y, so the minimum is now always (0,0). Resampling from the grid ensures the output file is drawn from the interpolated data; effectively this will fill any gaps or imperfections in the data.



Details on the image export functions:



It allows you to save a JPEG file with the current view of the main figure, see below (exported JPEG on the right):



2. Orientation Tools. These allow the print and the underlying data set to be rotated, inverted and reflected. The crucial tool is the auto-rotation tool which calculates the principle plane through the xyz point cloud and rotates the whole data set to that orientation. It is used primarily to transform a print, such that the surface is at right angles to the orthogonal axis. Note that this function may in certain cases cause a print to flip from a right to left orientation; something which can be corrected by using the other tools. After a series of rotations you should save the changes to the grid by using the 'Save Changes' icon on the tool bar – diamond with an S in it.

3. Cropping Tools. This suite of tools allows you to crop a file in order to remove redundant material. The simplest function is a rectangular cropping tool, alternatively you can crop a print using a polygonal editing tool, and also by elevation using the contour cropping function. Files can be displayed either with cropped data (i.e. missing data) represented within the grid either by '0' or 'NaN'. After cropping a file you should save the changes to the grid by using the 'Save Changes' icon on the tool bar – diamond with an S in it.

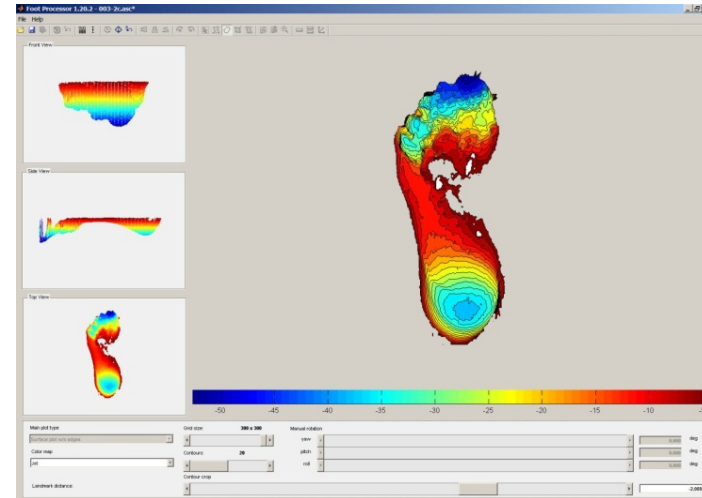
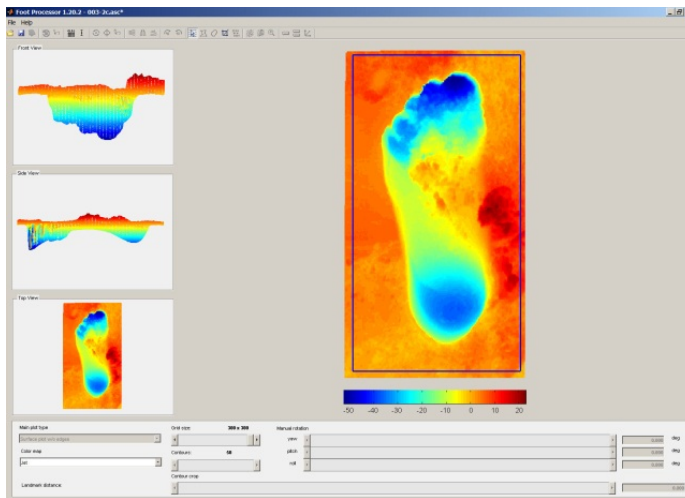
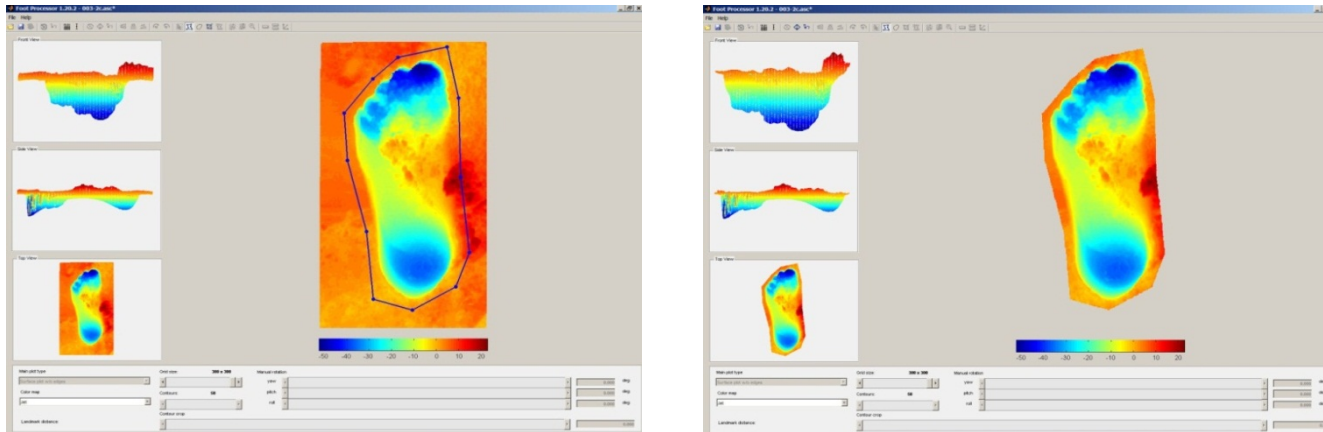


Illustration of the polygonal crop function in action:



4. Landmark Tools. The landmark tools allow you to display a print as a contour map and place labelled landmarks upon it. Landmarks can be placed, moved and edited easily and are numbered sequentially L1, L2, L3, etc. Data from placed landmarks can be exported as CSV files, either as xyz coordinates for each landmark or as inter-landmark distances. A copy of the print annotated with landmarks can also be saved to the clip board for future reference or pasting to your notes.

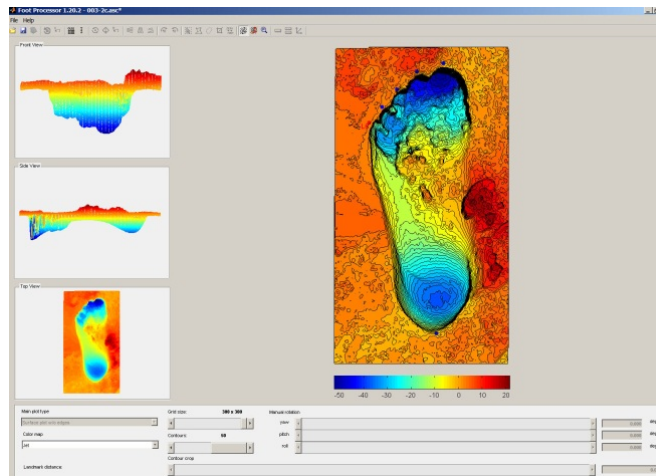
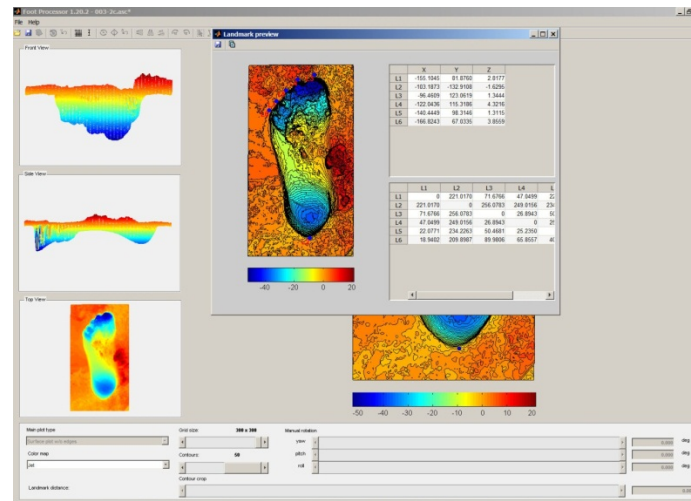
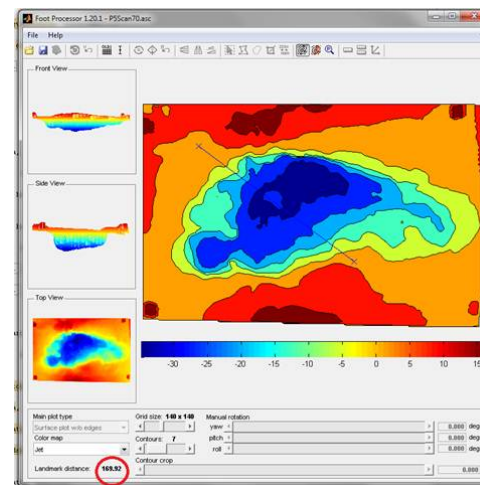


Illustration of the output window which appears when you press export landmarks, the two tools in the top left hand corner allow you to save the labelled contour map to the clipboard and into your notes while the save symbol allows you to export the two data panels:

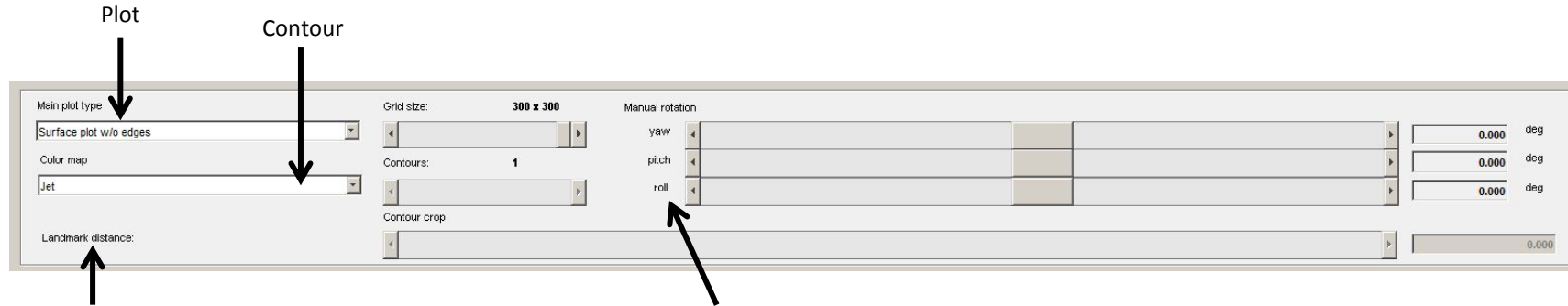


It is also possible to make a quick measurement from a contour plan along the XY plane. While on the contour map, left-click on the first point whilst holding the SHIFT key. You can now drag the mouse while holding the left mouse button and the distance will be updated accordingly.



5. Guide Tools. These are a simple set of guides and bounding boxes which may assist the user in understanding a prints orientation.

The lower tool bar allows you to change the colour ramp, plot functions, undertake manual rotations, adjust the grid setting for display and also allow you to adjust the contour interval.



Provides a quick tape measure. While on contour view, left click on the first point while holding down the SHIFT key. You can now drag the mouse while holding the left mouse button and the distance will appear

Rotates the image in the main window and all the points. If you select 'save changes' from the top bar this orientation will be saved.