# Surveyor Well Plate Scanning

## Image Formats

There are options for different output of scanned images in the Surveyor software.

Surveyor by default generates scanned images in the Surveyor Workspace (.sws) format. This is a tiled image format comprising of:

- a folder on disk with the individual high resolution image tiles of the scan,
- low resolution thumbnail images, which are either individual.thb files or single .bin file,
- some metadata files e.g. tile position information,
- a single .sws file.

The software also allows export of scanned images into other mainstream formats such as BMP, Tiff, BigTiff, and these are saved as single file "mosaic images".

## Single Field of View Acquisition

Some users are interested in acquiring a single camera image at each well location. Surveyor scan patterns can be configured to position the fields at spacing suitable for a particular well plate arrangement on the stage, as shown in Figure 1.
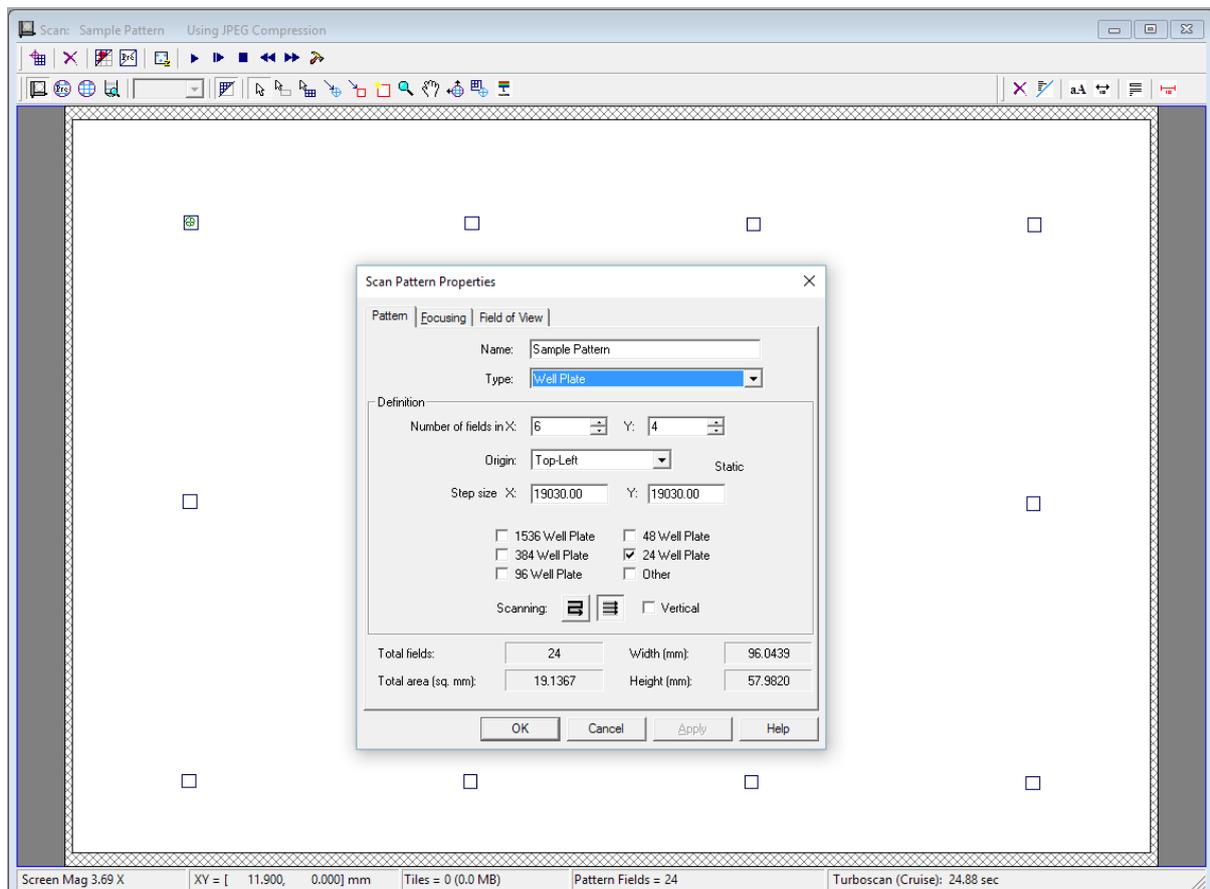


*Figure 1 - Well plate scan pattern setup*

When the final workspace is saved, the resulting output contains the individual tiled images at each well, and the text file XYZPositions.txt contains the XYZ position information for correlation purposes, as shown in Figure 2.



*Figure 2- XYZ data for well plate images*

For focusing of samples there are a few options. Predictive Focus can be used, where a focus height map is setup by the user, or autofocusing can take place at each field or every $n$-th field of the scan. See Surveyor manual for details.

Single field of view acquisition in this manner has the benefit of not requiring the Navigator license option at additional expense.

## Multiple Scan Pattern Acquisition

Additional functionality for well plate scanning is available using the Navigator mode of Surveyor, which is an extra license. Navigator mode allows for multiple scan pattern acquisition, within multiple workspace acquisition, bearing in mind that the workspace is a container for multiple scan patterns. Navigator mode will be necessary if the content of the wells do not fit within a single field of view at the desired magnification, or more flexibility is needed in file output.

Shown in Figure 3 is a 3x3 scan pattern positioned at the location of each of the wells. The Navigator dialog allows the user to position the first scan pattern over the first well, and then duplicate this at the correct spacing for the other wells.
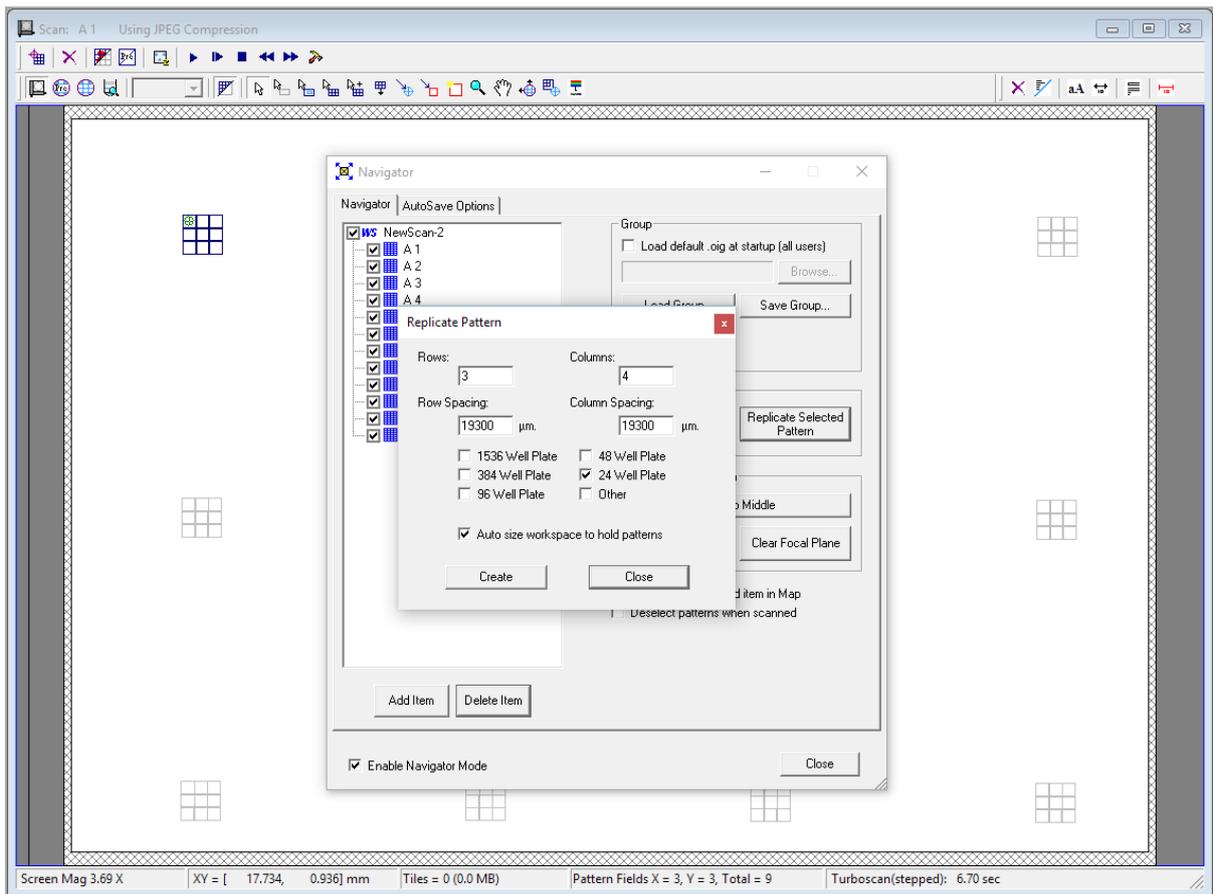
*Figure 3 -  Multiple scan pattern arrangement in Navigator dialog*

Focusing can consist of a Predictive Focus map for each individual scan pattern, one single focus map for the entire stage region, or autofocusing every *n*-th field of the scan patterns.

It is also possible to configure circle-type scan patterns which are relevant to many well plate systems. This will scan the minimum number of rectangular fields of view for a given size of well, bearing in mind the camera field of view is always rectangular. See Figure 4 for an example.
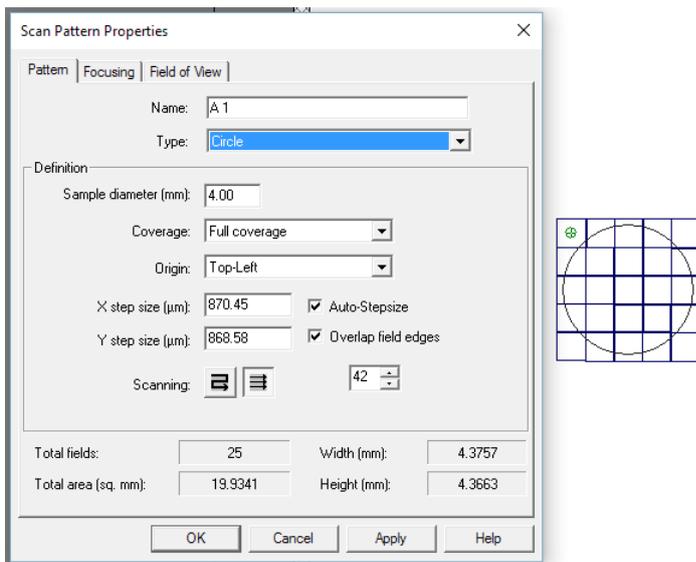


*Figure 4 - Circle scan patterns*

# Navigator Output Options

There is greater flexibility in the file output using the Navigator license. Saving of workspaces or mosaic images can take place automatically, therefore the system has the potential be unattended as the scan takes place.

Saving the workspace (.sws) will contain the contents of all of the scan patterns inside it, ie. all of the wells within an entire workspace.

The contents of each scan pattern can be output as individual mosaic images, ie. each well can be an individual image on disk.

These filenames are designated in workspace name\pattern name\pattern name.bmp arrangements, and can also contain time stamp information in the path to avoid overwriting previous scans using the same set of item names.

Navigator can also be combined with other Surveyor licenses such as Multichannel fluorescence scanning or Z-Stack scanning, and the filenames are adjusted with appropriate channel or stack designations. In this way, Navigator is a very powerful and flexible option to Surveyor. See Figure 5 for save options available in this dialog.
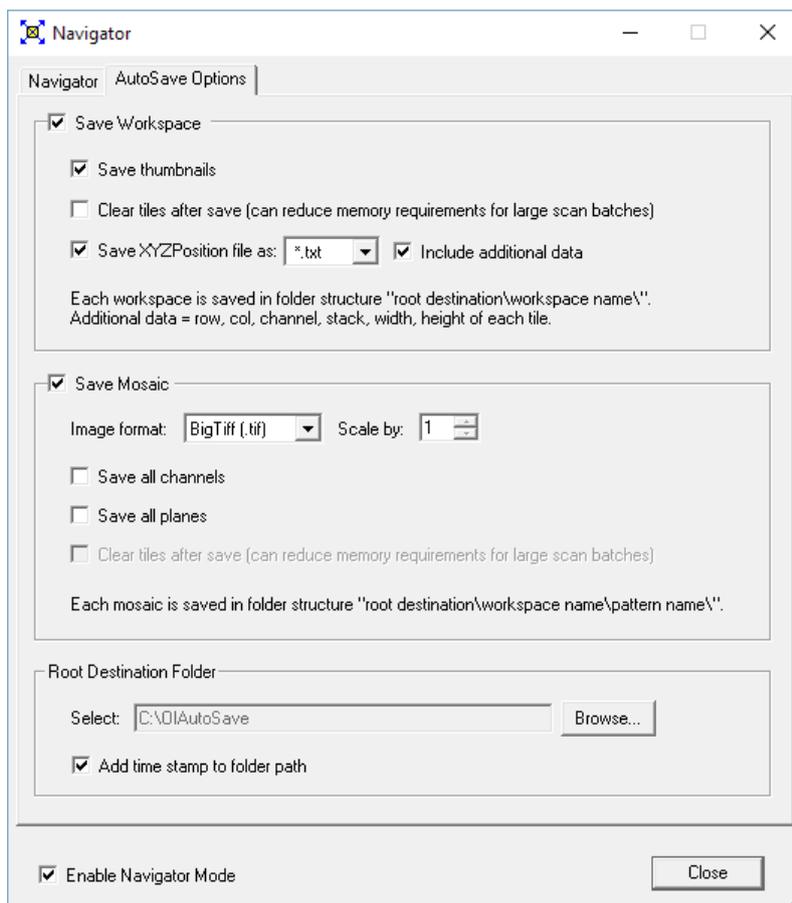


*Figure 5 - Navigator output options*