IN Cell Analyzer

Acquisition Software, Version 5.0

Release Notes

1 December 2014

Introduction

Version 5.0 of the IN Cell Analyzer software contains new features and also fixes and optimizations. Many of the improvements involve field-of-view placement and DataReview mode.

Upgrading from version 4.6 to version 5.0 requires minimal training. The new features and interface changes should be intuitive for experienced users.

User's Manuals and Service Manuals from version 4.6 are mostly applicable to version 5.0.

The following release notes describe the primary changes and feature enhancements from release 4.6-12218 to release 5.0-13098 of the IN Cell Analyzer software. Additional information can be found in the release notes from version 4.6.

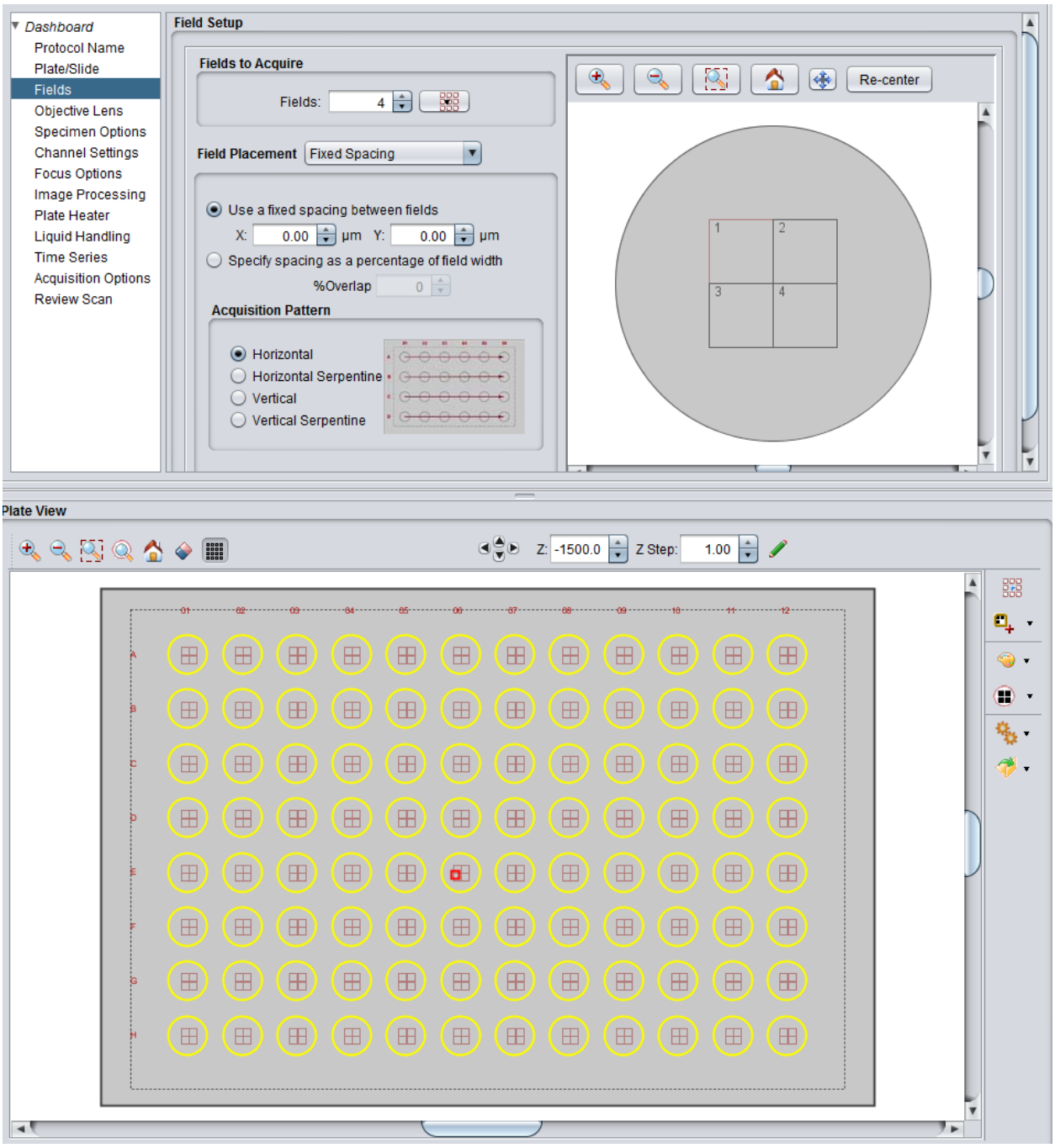
New Features

New Methods for Placing Imaging Fields

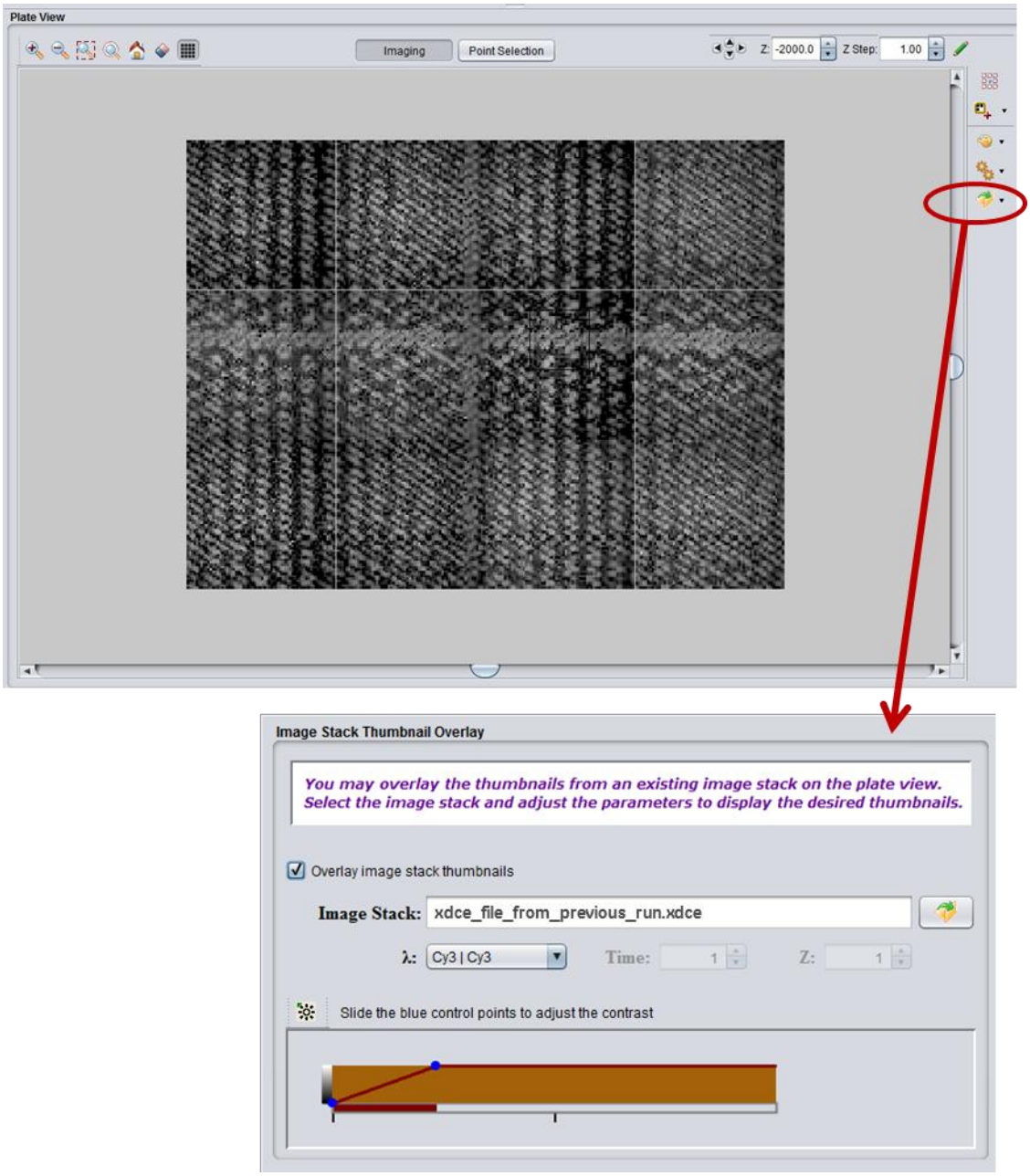
New methods of defining field-of-view locations have been added to the protocol designer, as shown in the following screenshot. Four types of "Field Placement" are available: "Fixed Spacing", "Randomized Placement", "Custom Placement", and "Point List".

> **Note:** Image stacks generated with the "Point List" placement method may be incompatible with IN Cell Investigator. Similarly, wells that contain one or more excluded fields will be considered fully excluded by Investigator and therefore not processed. If you plan to use Investigator for image analysis, avoid using the "Point List" feature and ensure that all fields are included within each well that needs to be processed.

Unlike previous versions of INCell, field acquisition will default to a "raster" pattern rather than a "serpentine" pattern. Fields acquired with a raster pattern will be more accurately positioned than fields acquired with a serpentine pattern. (Well scanning will still default to serpentine acquisition, as controlled within the "Acquisition Options" page of the protocol designer.)



To help position fields over regions of interest, thumbnails from previous scans can be loaded into the Plate View. Select the folder icon shown within the red oval of the following screenshot.



Thumbnail Quality Improvements and Controls

The overall quality of thumbnails used within the AssayDevelopment and DataReview modes has been improved. For special situations, certain thumbnail properties can be adjusted to meet application requirements. Note that increasing the thumbnail resolution consumes additional memory and may lead to noticeable performance issues. Use the controls shown here to adjust the way thumbnails are generated. To regenerate thumbnails on previously acquired data, remove (or hide) the subfolder titled "thumbs".

```
<!-- thumbnail parameters
Width and height are the width/height of the thumbnail produced. Larger values of
width and height produce better thumbnail image quality but may adversely affect
performance.
```

```
max_type is the strategy used to determine the maximum value of the images and is used
in auto-scaling. Values of 'maxofmax' and 'avgofmax' are understood. Default is
'maxofmax'.

normalization_type determines whether thumbnails are placed on a consistent contrast
scale or are scaled independently. Values of 'normalized' and 'unnormalized' are
understood. The default is 'normalized'.
-->
       <thumbnails width="64" height="64" max_type="maxofmax"
       normalization_type="unnormalized"/>
```

DataReview Improvements

The main purpose of the new DataReview mode is to provide additional methods of comparing images acquired with multi-dimensional acquisition protocols. The following table summarizes the improvements, according to the image dimension.

Dimension/Feature	Improvement
Color/wavelength	The primary display panel is now presented in color. Secondary panels contain grayscale images for separate channels. By default, both color and grayscale images are shown at the same time. Panels can be rearranged in a variety of ways. Single clicking on a panel will cause the panel to become the primary panel. Double clicking on a panel will result in a single panel. Individual channels can be easily turned on/off within the color panel. Likewise, adjusting the contrast controls for individual channels is now more straightforward.
Wells	Double-click or drag-and-drop fields within a well to display the image in the active panel.
Fields	Field locations are now represented accurately in the heat map. Fields can be selected for display in the same way as wells, and also by using the scroll buttons. Use "Display All Fields" within the heatmap pull-down menu to control how fields are displayed.
Z and Time	Use the "WFTZ" Image Selector to control which Z section and time-point are displayed. WFTZ also provides controls for selecting the wavelength and field.
Multiple Display Areas	All of the features described above can be replicated in up to four display areas. Users can select which display areas are affected using the display controls presented along the top of the DataReview. By default, only a single display area is presented.
Thumbnails	Thumbnail display contrast can now be adjusted. The default thumbnail contrast scaling matches the full size image display.

Other improvements to the DataReview mode include:

- better data handling performance
- default heatmap has been changed to "Mean Intensity"
- average and standard deviation have been added to the heatmap display
- focus related diagnostics have been added to the list of heatmap selections

Image Size / Region-of-Interest Control

The camera's region-of-interest (ROI) can now be reduced to a smaller size. Experiments that do not require the full image size will benefit from faster acquisition and reduced file size. Analyzing and viewing images is faster with small images than with full size. To select the ROI, look for "Image Size" in the "Channel Settings" page of the protocol designer.

It is possible to customize the list of image sizes by modifying the main configuration file. Sample settings are as follows:

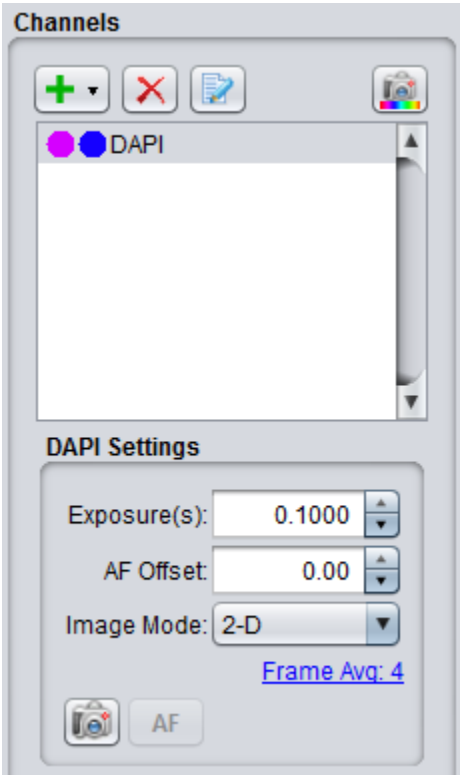
```
<!-- ROI choices that will appear in the image size menu on the
     Channel Settings page -->
<roi_map>
   <roi rows="1024" columns="1024"/>
   <roi rows="512" columns="512"/>
```

```
    <roi rows="256" columns="256"/>
</roi_map>
```

Note that only square image sizes have been fully tested by GE. Use caution when creating ROIs with an unequal number of rows and columns.

Frame Averaging for Improved Sensitivity

Frame averaging is a common technique for improving sensitivity and dynamic range. Use this method when the sample contains both dim and bright objects within the same field-of-view. Frame averaging will reduce image noise by a factor of 1/Sqrt(number_of_frames). To enable and configure frame averaging, press the link titled "Frame Avg:". By default, only one frame is used. Available only for "2-D" imaging mode.

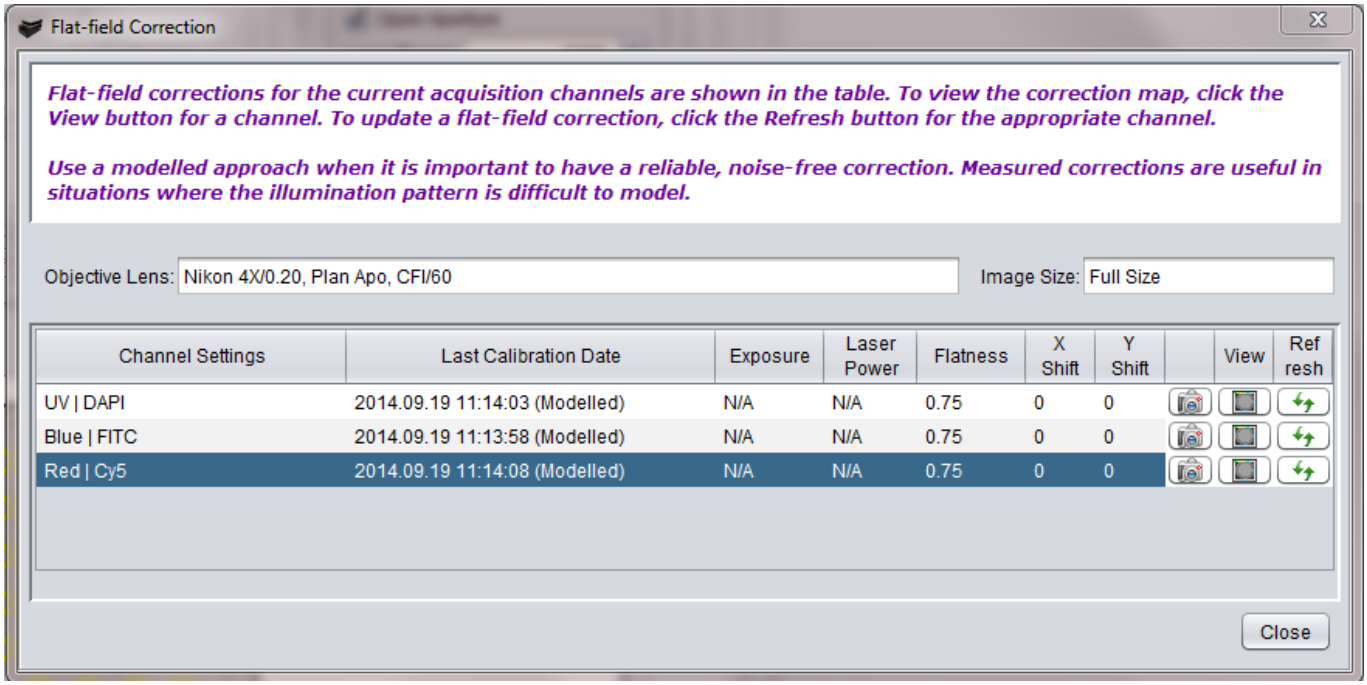


Flat-field Calibration (FFC) Modelling

Flat-field calibration maps can now be modelled. Three basic parameters are used to model the FFC map, as follows:

1. Illumination flatness. Defined to be the ratio of the corner intensity over the central intensity.
2. X shift of the central intensity, as measured in pixels.
3. Y shift.

To generate modelled FFCs, select "Refresh" from the FFC dialog and then select "Modelled". Enter the appropriate modelling conditions. The ReviewScan analysis called "Flatness" can be used to help determine the modelling parameters.



Modelled FFC maps are good for situations where it is difficult to measure an accurate flat-field calibration. Modelled FFC maps do not contain noise, which means that the calibration process will not affect image quality.

Similar to the situation with measured FFC maps, a separate FFC model is needed for every combination of objective lens, channel settings, and image size.

Improvements

Acquisition Speed

Further optimization of the acquisition procedures within version 5.0 has enabled faster acquisition. The following table compares version 5.0 with previous versions. Also shown are the acquisition rates at various image sizes.

Acquisition Benchmarks (frames/second)*:

	Software Version	Image Size	2200 Edge1	2200 Edge2	6000 Edge1	6000 Edge2	2000 K4
"As Fast As Possible"	4.0	2048x2048	4.0	NA	1.7	NA	1.2
0.001 sec exp	4.6	2048x2048	11.0	NA	4.5	NA	2.8
	5.0	2048x2048	11.2	12.6	4.2	4.4	2.8
	5.0	1024x1024	14.2	22.7	4.3	4.6	4.6
	5.0	512x512	15.3	23.3	4.4	4.7	6.8
	5.0	256x256	15.5	30.6	4.5	4.8	8.3
"Burst Mode"	4.6	2048x2048	16.2	NA	6.4	NA	2.9
3D Z Stack	5.0	2048x2048	16.8	19.7	5.8	6.3	2.9
99 sections	5.0	1024x1024	33.6	37.8	6.2	6.6	4.9
0 um Z step	5.0	512x512	59.4	64.3	6.3	6.7	6.8
0.001 sec exp	5.0	256x256	91.8	91.9	6.3	6.8	8.4
"Three Channel"	4.6	2048x2048	0.57	NA	0.68	NA	0.53
0.001 sec exp	5.0	2048x2048	0.94	0.97	0.68	0.68	0.53
	5.0	1024x1024	0.95	1.03	0.68	0.70	0.68
	5.0	512x512	0.96	1.07	0.68	0.70	0.79
	5.0	256x256	0.97	1.12	0.68	0.70	0.86

*Benchmarks are approximate. Actual performance will depend on the workstation and site configuration.

Rectangular Wells

The plate and slide editors now support the use of rectangular wells. A screen shot of the plate editor is shown in a later section. Rectangular wells with unequal width and height are especially useful when scanning microscope slides.

Laser Autofocus (LAF) Control

Three significant improvements have been made to the LAF control software. Before reviewing the LAF improvements, be sure to read the following, important note.

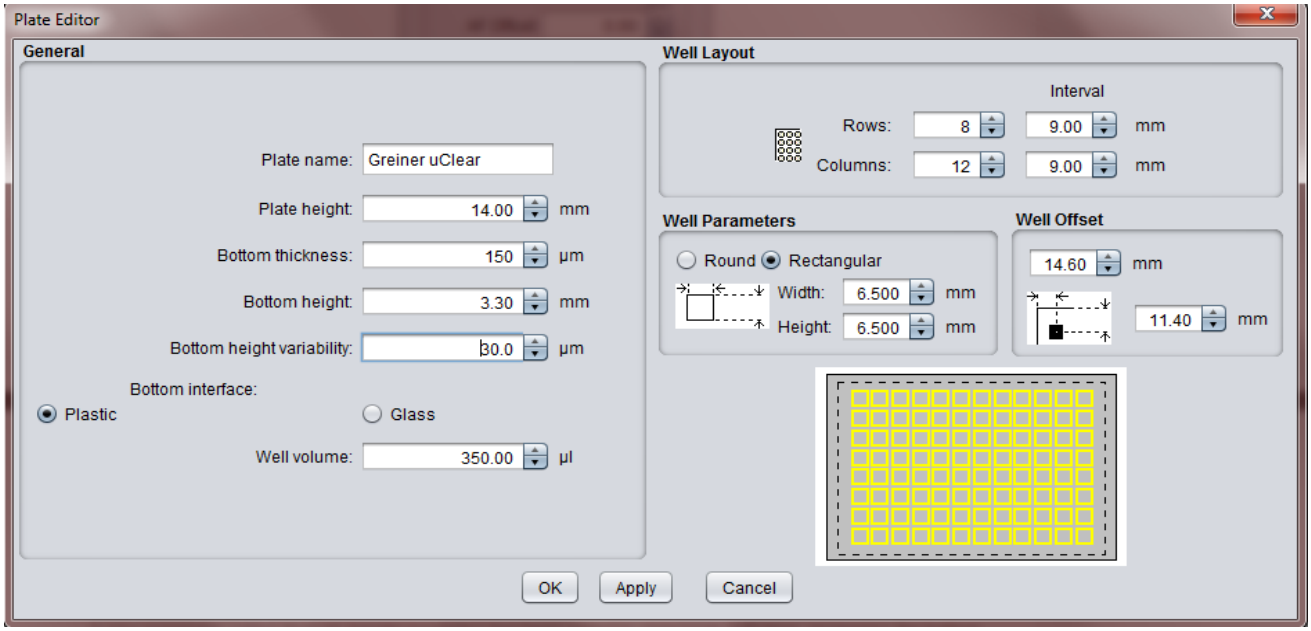
> **Important**: A side-effect of the LAF changes in V5.0 is that the bottom thickness must be approximately correct. LAF may fail when using plate types that have an artificially small bottom thickness. Bottom thickness values should be reset to a nominally correct value.

LAF improvement 1:

A new parameter called "Bottom Height Variability" has been added to plate/slide definition. Increasing the bottom height variability will result in larger range autofocus scans. By default, the variability is set to zero. Previous versions of software effectively used zero all the time, and there was no easy way to increase the LAF scan range.

Measure the variability by comparing the focal plane of adjacent wells. Alternatively, determine the variability from a DataReview heatmap of a successful scan. An approximate measure of the variability should be sufficient. Thin bottom, plastic plates often have a large amount of variability. Use the Plate Editor (or Slide Editor) to set the variability for the necessary plate type(s). Avoid using variability settings that are larger than necessary. Over-scanning in the positive Z direction can lead to additional, unwanted peaks in the LAF trace. For example, the top surface of the fluid within the well may create a peak that might be confused with a real focal plane. Over-scanning can also result in collisions between the objective lens and the sample plate.

As a result of this improvement, it is now possible to scan thin bottom plates, like the Corning 96 well 3615/3631.



LAF improvement 2:
During scans, the algorithm used to estimate the initial focal plane at each well is now more intelligent. The short range LAF scans used to focus on wells will be more reliably centered on the actual focal plane. The LAF trace is more likely to contain the desired surfaces/peaks.

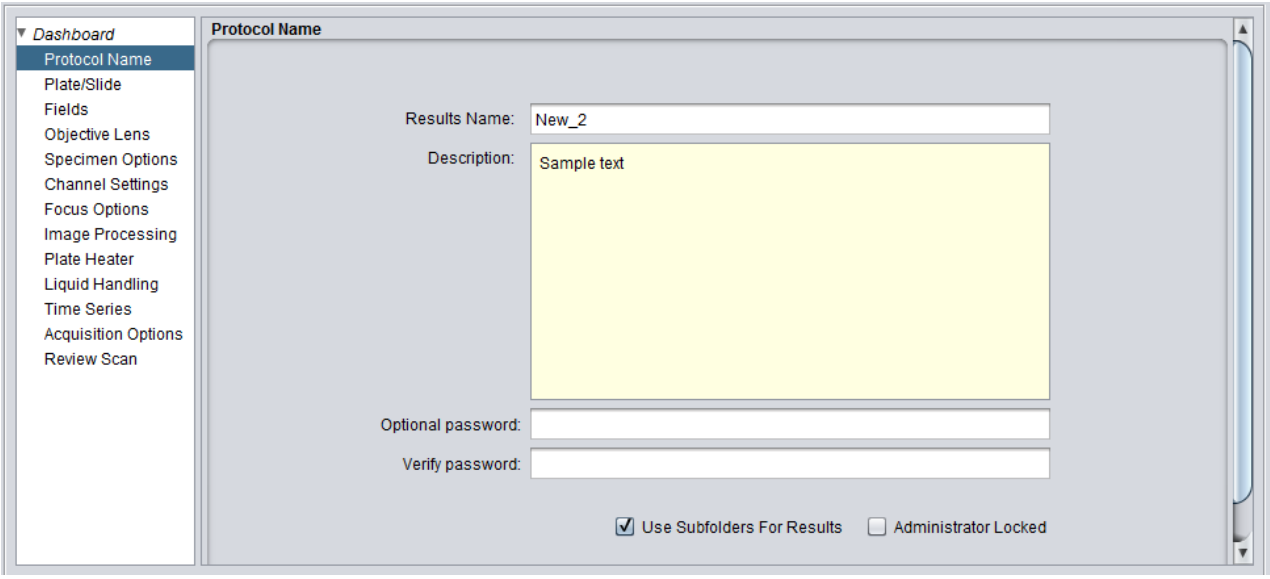
LAF improvement 3:
In situations where an expected peak appears to be absent, the LAF algorithm will now choose the previous peak if possible. Missing peaks can occur when using polystyrene plates. To determine whether the peak finding algorithm has used an alternate peak, look at the DataReview heat map titled "Selected Peak".

Liquid Handling and Objective Lens Offsets

The method used to apply XYZ offsets while switching objective lenses has been modified. For details, see item 1062 within the full list of changes.

Folder Naming for Scan Results

Version 5.0 has an option for saving scan results without an extra subfolder between the base folder and the scan results folder. For backwards compatibility, the extra subfolder will be enabled by default. Existing acquisition protocols will continue to use the extra subfolder, unless the operator chooses otherwise.



Instrument Simulator
The instrument simulator will now start automatically in the event that the real instrument cannot be found.

Software Licensing

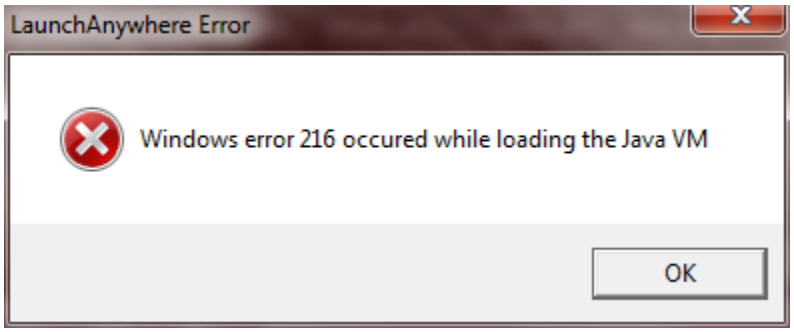
Certain aspects of the software licensing mechanism have changed since version 4.5. For information about the changes, see the release notes from version 4.6.

Installation Notes

Software packages now contain the IN Cell version number as well as the build number. For example, 5.0-12857.

Installation packages are named according to the instrument model. Be sure to choose the installation package that matches the instrument. Look for "2000", "2200", or "6000". For workstations running 64-bit Windows 7, use installation packages that contain "x64" in the file name. Packages that do not contain "x64" in the file name are intended for computers running 32-bit Windows (XP or Windows7). Attempting to install a 64-bit package on a workstation running a 32-bit operating system will result in the error message shown in the following figure.

Install Error



Note that the Java VM is bundled within the IN Cell installation package. It is not possible to switch to an alternative Java VM.

Software Configuration

For information about the files used to configure the IN Cell user interface, refer to the release notes from version 4.6.

Known Issues and Usage Notes

For information about previously reported topics, refer to the release notes from version 4.6. New items are described here.

Premature Remote Control Client Communication Time-Outs/Disconnections
Remote control clients should always wait for a sufficient amount of time before abandoning communication with INCell. The INCell workstation handles large amounts of image data and may not be able to immediately respond to remote control messages from the client.

In the event that a remote client abandons communication with the INCell, the INCell will detect that the client has disconnected from the TCPIP socket. Symptoms of such failures include:

1. the INCell software will report that the client has disconnected. This does not mean that INCell has terminated the connection, but rather that the remote client is no longer present.

2. The instrument will stop at the next state that requires input from the remote client. If the instrument is waiting for the next plate and the "PlateInserted" message from the robot, then the IN Cell door will stay open. If the instrument is waiting for the "StartScan" message from the client, then the door will remain closed.

Plate Lid Heater Reports Unexpected Temperatures Values
Recent changes to the GUI software have provided more opportunities to change the plate and lid heater temperature settings. At the same time, the estimated temperature is being displayed more frequently than it was with previous versions of software. As a result, the estimated temperature is being displayed to the operator before the time when the temperature modelling algorithm has stabilized.

Toggling on/off the lid heater will cause the software to switch between two different temperature estimation algorithms. At this point, the calculated temperature will be unstable until the algorithm equilibrates. Large jumps in the reported temperature are possible, even though the actual temperature has not changed.

The underlying temperature control software is unchanged from previous versions. The actual temperature and estimated temperature are not different than with previous versions.

To avoid this problem, select the appropriate combination of heater settings and then wait for the temperature estimation algorithm to equilibrate.

Untested Image Dimensions May Not Be Supported By All Elements of the Software
The INCell Analyzer software has been tested with only a limited number of image sizes. Custom configurations that use other sizes may expose problems with parts of the software that are designed to work with fixed sizes. For example, rectangular images may cause issues with Review Scan analysis programs. Likewise, 3D deconvolution cannot work with images larger than 2048x2048.

Network Port Interference Can Cause Disconnections
The IN Cell software uses TPCIP sockets to communicate with other instruments. The default port numbers are shown in the following table.

Network	Instrument	Default Port
159.159.159.X (static)	incell	51234
site network	robot	9999

If any other programs attempt to use either of these ports, the IN Cell software components (incell scanner, workstation, robot) will be disconnected from one another. For example, if an outside program attempts to use port 51234 on local network 159.159.159.X, the connection between the IN Cell instrument and the workstation will be disrupted.

For sites that have unavoidable conflicts with the default port numbers, it is possible to modify the port configuration by manually editing system configuration files.

Main GUI Configuration (workstation .XML):

```
<!-- Instrument Control Service server socket port -->
<server_socket_port>51234</server_socket_port>

<!-- Automation server socket -->
<automation_server_socket host="localhost" port="9999" />
```

Instrument Controller (instrument .INI):

```
[Microscope Configuration]
Network Port=51234
```

Repeated Installation Failure

On rare occasions, the installation (and uninstallation) program can fail to run properly. The typical symptom is a stall while copying (or removing) files within the "jre" subfolder. Some sort of Java file locking issue appears to be preventing modification of the folder. To recover from this situation, manually delete the contents of the jre folder and try again. In the case of the 2200, the jre folder is located at:

C:\Program Files\GE Healthcare\IN Cell Analyzer 2200\jre

Investigator Compatibility Limitations

Acquisition protocols that use some of the new features within V5.0 may create image stacks that are not fully supported by the current version of Investigator. For example, Investigator will not recognize the following types of metadata within XDCE files:

- Images from scans that use "Point List" field placement
- Images from scans that use "Custom" field placement
- Time-stamps, as recorded in seconds.

Be sure to test the compatibility of new, V5.0 acquisition features before running large scans that require analysis with Investigator.

List of Changes Between 4.6-12218 and 5.0-13098

Original Release, 5.0-13098, 01 December 2014:

ID	Brief Description	Additional Comments
200	Image ROI control	The image size can now be selected in the Channel Settings page of the protocol designer. By default, the image size is 2048x2048. The speed improvement is most noticeable on the 2200.
304	Add more tool tips.	The percentage of GUI tools that have tool tips has grown from 65% to 72%.
492	Select/Deselect Wells in Plate View using mouse	The method of selecting wells in the PlateView has been changed to be more effective and more intuitive. Press the Shift key to deselect wells. Press the Ctrl key to select wells.
493	Add I/O board firmware to Help/About menu.	The IO board firmware version is now reported in the "Help" -> "About" dialog box.
537	Manual point list scan.	It is now possible to define lists of points for scanning. Thumbnails from previous scans can be used to determine the point locations.
583	Need the ability to change the contrast of thumbnails in Data Review.	Data Review has been improved.
591	DataReview doesn't account for un-imaged time points	The situation has been improved in two ways: 1. The time sliders and spinners now go from 1 to N, where N is the number of available time points, not the total number of time points defined. 2. The actual time value (in seconds) has been added to the labels that have the time point index.
646	Confocal slit width (AU) information should be included in the image view mode	Annotations are provided in DataReview mode. Also see #1092.
703	Expected peak locations on LAF Verify are not displayed corrected	This appears to have been fixed during routine improvements of the code..
732	Cannot load image data after creating a movie.	The problem is caused when Java runs out of memory. Use the Java memory adjustments described in the release notes to work around this issue.
753	Improvements for the Slide Manager.	It is now possible to define rectangular wells.
854	Firmware updaters for Nano3, IO Board, and sCMOS camera.	Graphical firmware update programs are now included within the installation package. The latest, official release of firmware is also included. If necessary, contact GE service for newer versions.
899	Provide more field-of-view placement options.	Field configuration is now part of the protocol designer. Many new capabilities have been added.
905	Make RGB the default color mode when viewing images.	The primary panel within DataReview is in color, by default. Secondary panels are grayscale. Panel contents can be changed by clicking within the panel.
940	48-bit RBG TIFF export.	The export procedure has been added in the form of a ReviewScan analysis. 48-bit TIFF images contain 16-bits per red, green, and blue channel.
971	Requested options for improving color and contrast controls	Many changes and improvements have been made to the color and contrast controls with the Data Review tool.
989	Zo in the FocusFinder needs to be updated when an acquisition protocol is loaded from disk.	Fixed. The FocusFinder's Zo value will be changed to the value contained within the acquisition protocols as it's loaded from disk.
1007	Lid Heater check box turns off automatically - CSSX 5774218540	Fixed.
1010	Add an option for generating modelled FFC files	Sites can now choose to model or measure FFC files. Modelled FFC are an effective method of correcting most of the intensity curvature without introducing additional noise.
1016	Nanomotion PWR errors filling up log file	Fixed in Nanomotion firmware 6.0030.
1025	Minimum peak separation (calculated from the optical thickness) should be adjustable.	The adjustment factor can now be changed using the GUI configuration file. The default factor is 0.8, as shown below. The minimum peak separation is calculated from (bottom_thickness/index_of_refraction * laser_autofocus_peak_separation_factor) <laser_autofocus_peak_separation_factor>0.8</laser_autofocus_peak_separation_factor>

1027	Brightfield display contrast settings need improvement	The automatic display contrast settings have been improved to work better with both brightfield images and with fluorescence images that have high background.
1033	LAF graph should show the min peak separation and optical thickness	Peak locations, peak separation, and expected optical thickness are now represented with vertical lines.
1034	LAF graph labels don't always update properly	This appears to have been fixed during routine improvements of the LAF trace tool.
1036	Reduce acceleration of turret motor channels (objective lens & polychroic)	The lens and polychroic turrets now operate more smoothly as of Nanomotion firmware 6.0030, which is included within the installation package.
1040	Strange behavior when closing remote control dialog box using upper right "X".	The "X" in the upper right corner of the remote control dialog box has been disabled.
1045	Lid heater temperature appears to rise above set point.	The real problem is that the algorithm used to estimate the temperature has not stabilized. The GUI will now avoid showing the temperature estimates.
1046	AVI movie generation problem.	The problem is caused when Java runs out of memory. Use the Java memory adjustments described in the release notes to work around this issue.
1047	Color image save problem in DataReview mode.	Fixed. The problem was caused by excessive memory use.
1050	DataReview mode reports actual scanner Z position rather acquisition location	Fixed.
1051	Remote control "Enable"/"Disable" button responds to the enter key	The enter key has been disabled in the remote control dialog.
1053	Add support for the PCO "Edge2" camera and the AD4 adapter card.	The Edge2 is slightly faster and has lower noise than the Edge1. The new AD4 board and the original VD4 board are interchangeable. Likewise, the Edge1 and Edge2 are interchangeable. Also see #1090 and #854.
1055	Display scaling tool always needs to be moved because it blocks the image	The tool will now open in a different location.
1056	Acquisition program is holding file handles from previous runs	
1059	Improve the IC RPM and GUI installer version numbering methods	Instrument controller RPMs will now contain the SVN number in the package name. GUI installation packages will contain the version number in the file name. For example, controller-mk2-5.0-23201.i686.rpm install_incell_analyzer_2200_5.0-12532_x64.exe
1060	Plate heater target temperature input has different limits	The limits are now the same.
1061	Add ability to retrieve the IO board firmware version	The GUI will report the IO board firmware version in the "Help" -> "About" dialog box. Two lower-level methods have been added: 1. IC command "GET_IOB_FW_VERSION" 2. Embedded controller command line "get_ioboard_fw_version.sh"
1062	Improve the LH behavior when XY stage offsets are in effect	To adjust the minimum move length (in um) used during liquid handling operations, look in the GUI configuration file for the settings shown below. The needle will be moved to the middle of the current well if either of the following conditions are true: 1. the necessary move is larger than the minimum move length. 2. the necessary move is larger than the indicated fraction of the well size. If neither of these conditions is true, then the XY stage will not be moved. <liquid_handling_minimum_move_length>200 </liquid_handling_minimum_move_length> <liquid_handling_minimum_move_fraction>0.1 </liquid_handling_minimum_move_fraction>
1063	Review and improve display scaling workflows	The DataReview tool now provides more ways to review scan data, with an emphasis on image comparison.
1064	Continuous acquisition for LAF tool.	Useful for alignment and consistency testing.
1065	Inform the operator when running with the instrument simulator	The GUI title bar now indicates whether the instrument is being simulated.

1066	Automatically launch the Simulator if connection attempts are unsuccessful.	Done. The operator is now notified when the Simulator is being used instead of a real instrument.
1073	Upgrade to Java8	Switched from Java 1.7u5 to 1.8u20. Java8 contains performance and security improvements over Java7.
1076	Multi-mode channels do not get stored correctly when using the Microscopy page of the protocol editor.	Whenever an operator sets up a channel in the MIcroscopy page, the software mistakenly marks the channel as 'user-defined'. Also, the channel index is incorrectly defined for user-defined channels. The channel is only marked incorrectly when set up via the Microscopy page. If you add the channel via the Dashboard, it works fine. Although this issue was reported with 4.6-12159, the bug has existed since version 4.5. Workarounds: 1. Use the Dashboard instead of the Microscopy page. 2. Save the protocol and re-open it. When reloaded, the channel will not be marked as user-defined.
1077	Unnecessary warnings are reported when setting the plate temperature. For example, ""Failed to run command: SET_PLATE_TEMP,45.0"	Benign warning messages are reported in the status area (lower left corner) of the GUI. The warnings are a result of a misplaced control command, but do not correspond to a real failure. The warning message was removed by rearranging the internal control commands.
1089	add support for the Nikon 100X/0.85 objective lens	Basic support for the 100X/0.85 has been added to the lens database and GUI configuration files.
1090	Bundle PCO Edge2 firmware with the controller RPMS	The Edge2 firmware is compatible with Edge1 cameras. The opposite is not true. Also see #854.
1092	Need an easier way to know which imaging mode was used to acquire images	Annotations are provided in DataReview mode. Also see #646.
1093	Add new folder naming method(s) when running an acq protocol	Scan files can now be saved without an extra subfolder. By default, the folder naming method will be the same as it was in previous versions.
1094	Add release notes to version control and to the installation packages	Release notes will be part of the installation package. The document will contain information from the time that the installation package was created. In the event that the release notes need to be updated, newer versions may become available through other means.
1099	LAF parameters cannot be adjusted to account for focal plane variability	A parameter called "Bottom height variability" can be used to help scan plates that aren't flat. Variability is represented in microns.
1100	Scan cancellation doesn't work.for ReviewScans that involve an endless chain.	ReviewScans that create an endless, circular chain can now be cancelled.
1103	File server problem involving MacOSX and Samba	A fall-back mechanism has been added to the software that attempts to retrieve file lists from remote storage devices. If the file list returned from the file server is null, then IN Cell will try a different method. Null lists originate from certain file servers under certain conditions.
1104	6000 laser power level 1000%, CSSX 594768950	Laser power levels loaded from acquisition protocol (.xaqp) files are now limited to values between 0% and 100%. CSSX case 594768950 was caused by an invalid .xaqp file from an INCell 6000. The original source of the invalid setting is unknown.
1105	Rework the DataReview tool	The DataReview tool now provides more ways to review scan data, with an emphasis on image comparison.
1106	Improve calculation used to determine LAF scan range during plate scans	The formula used to create the expected Z position is now more intelligent. The LAF scan range will be more reliable.
1108	Connection time-outs used by instrument software updaters are unnecessarily long.	The previous time-out was 30 seconds, which is too long. The time-out has been reduced to two seconds.
1109	The image stack (XDCE) file name should be recorded in the IC log file.	Recording the XDCE file name in the instrument log file can help diagnose scanning problems.
1110	The instrument control software installer should automatically try to connect with the instrument.	Automatic connection reduces the number of steps. If the instrument is not found at the default IP address, an alternative address may be used.

1111	Install program can hang during installation and/or uninstallation	The installation procedure could stall if an IN Cell GUI was running a different JVM at the time of the installation. Removing the JVM before installation corrects this issue.
1113	INCell doesn't work properly if the ANP, PLT, and/or AQP folders are missing	A warning message will be presented if any of the folders are missing. Users will be instructed to correct the situation by finding the necessary files.
1115	Add integration protocols to the 2200 and 6000 installation packages	Standard integration protocols have been added within sub- folder "AQP/Test Protocols".
1116	Add objective lens XY offsets when moving to LAF position	The LAF will now occur in the same place the image is acquired. Related to #1062.
1119	Add standard plate types for 6, 24, and 1536 well plates.	The installation packages now contain XPLT files for 6, 24, and 1536 well plates with nominal size and shape. Also, the Plate/Slide manager can be used to create plates and slides with standard layouts.
1120	Use horizontal image layout during multi-channel acquisition	Horizontal layout is an improvement over a vertical layout, because the aspect ratio works better.
1128	Improve the LAF peak selection mechanism.	The LAF algorithm will now choose peak 0 rather than peak 1 if the expected peak appears to be missing from the LAF trace. (Missing peaks can occur when using polystyrene plates.)
1131	Add the average and standard deviation to the DataReview's heat map display.	Average and SD are useful for reviewing scan results. For example, the statistics of the Z focus position can be used to characterize the plate bottom height and the bottom height variability.
1132	Improve the well naming consistency in the GUI.	The industry standard well naming convention (e.g. "A01") will now be used for title bars, labels, and messages. File names will continue to use the previous naming methods.
1134	Change the 6000's UV laser disable time	The timeout issue associated with the 6000's UV laser has been addressed through changes to the instrument controller's configuration file. Installation of V5.0 will overwrite the existing laser configuration. For technical details, refer to the GE service bulletin (ISI) titled "291189720INCell2060020IS2010MLEiChromeTimeout.pdf".
1139	LAF trace tool zoom box only works when the mouse is started in the upper-left corner	The LAF trace zoom box will now work from any corner.
1142	Automatically launch the log file capture tool if the instrument disconnects unexpectedly.	The log file capture tool will be launched when the instrument disconnects unexpectedly. The error message has been updated accordingly.
1145	Add support for Corning/Costar thin bottom plates.	Added a plate map (XPLT file) called "Corning 3615 3631 96-well plate.xplt" with the bottom height variability set to 150um. Scanning this type of plate is now possible as a result of the feature described in item #1099.
1147	Thumbnail quality improvement	Internal changes have been made to improve thumbnail quality. Resolution and auto-contrast should be better than in previous versions.
1149	DataReview heatmap should default to Mean intensity	The heatmap (well status) default has been changed to Mean intensity.
1150	Report image statistics after every image acquisition.	Image statistics now displayed after every acquisition, rather than only when the mouse is moved over the image.
1153	Add Flatness analysis tool to the list of ReviewScan tools.	Added the Flatness analysis tool to the list of ReviewScan tools for ease of access.
1162	FocusFinder slows down when autofocus toggles are enabled.	The focus adjustment bar on the FocusFinder is now stable when using the both the laser and software based autofocus methods.
1165	Liquid handling Y axis can fail to initialize during homing.	The LH homing procedure now disables the limit switch when the homing process is finished.
1180	Adding time-points is slow.	The program will no longer pause while adding time-points to an acquisition protocol.
1182	Image centering doesn't work after using the FocusFinder.	Image centering using the left mouse button on the image didn't work with images acquired with the FocusFinder because the pixel size wasn't correct. The pixel size is now correct, and the object will move the full distance.
1191	Miniscan (on the Dashboard) doesn't work when time lapse acquisition is enabled.	Fixed.
1222	Include a basic workstation setup guide within the installation packages.	A brief guide is now installed in the folder that contains INCell manuals. The document is called "INCell_Workstation_Setup_V5.0.pdf".

1231	Data Review image display doesn't update when viewing wells with a double letter prefix.	Image display of wells with a double letter prefix (like "AA01") did not work properly. The problem has been fixed. It is now possible to use Data Review with 1536 well plates.
1240	Growing MLE error log causes the instrument control software (ICS) to stop running.	After about 332 scans, the 6000s MLE becomes unresponsive because its internal log becomes very large. The ICS shuts downs when the MLE fails to respond to a status check. The problem is unique to 6000s with newer MLEs.
1241	Installation script for setting objective offsets needs improvement.	Certain Nikon "Lambda" objective lenses have large, negative Z offsets. To avoid collision with the reticule plate during installation, the script should not attempt to focus the lens after positioning the turret. The operator will now be required to move the Z position in the positive direction when finding the focal plane offset. Hint: Use the "FocusFinder".
1265	Update the help file that goes with DataExport.	Clarifications are needed regarding the timing attributes contained within XDCE files. Information about the "Load" and "Save" feature is also needed.

Customer/Technical Support

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