IN Cell Analyzer

Acquisition Software, Version 6.2

Release Notes

Introduction

Version 6.2 of the IN Cell Analyzer software contains improvements, optimizations, and fixes over version 6.1.

Upgrading from previous versions should require only minimal training. The new features and interface changes should be intuitive for most users.

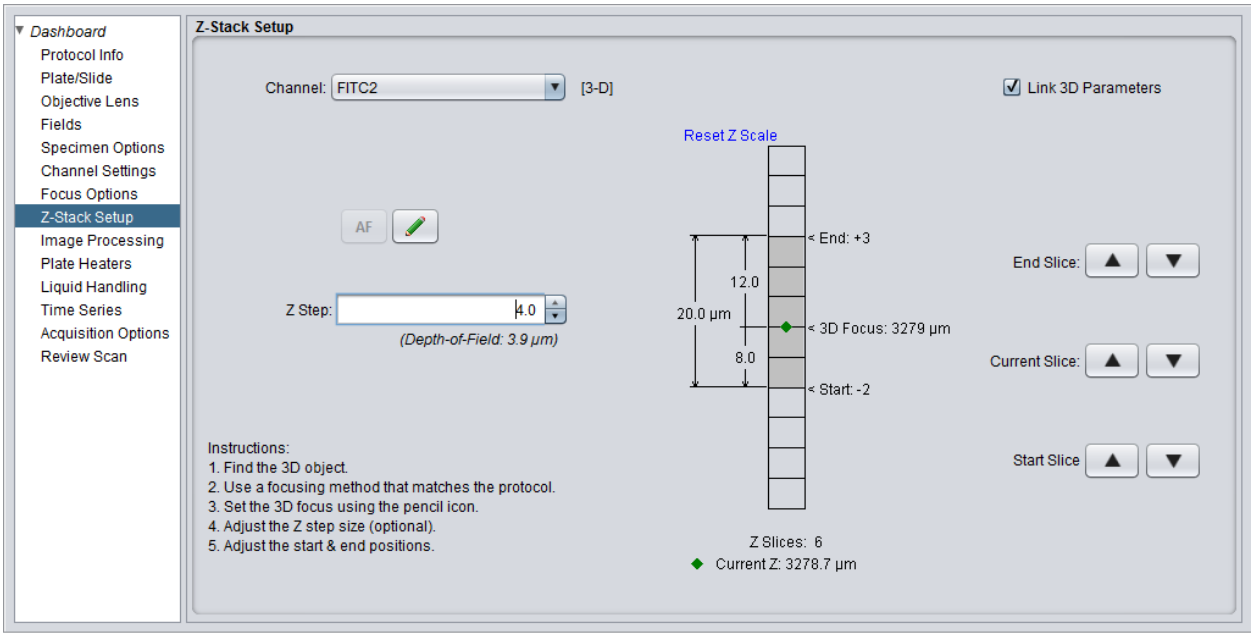
The following release notes describe the primary changes between versions 6.1 and 6.2. Additional information can be found in the release notes from previous versions of software, which are included within the 6.2 installers.

New Features

3D Acquisition Setup Page (1594)

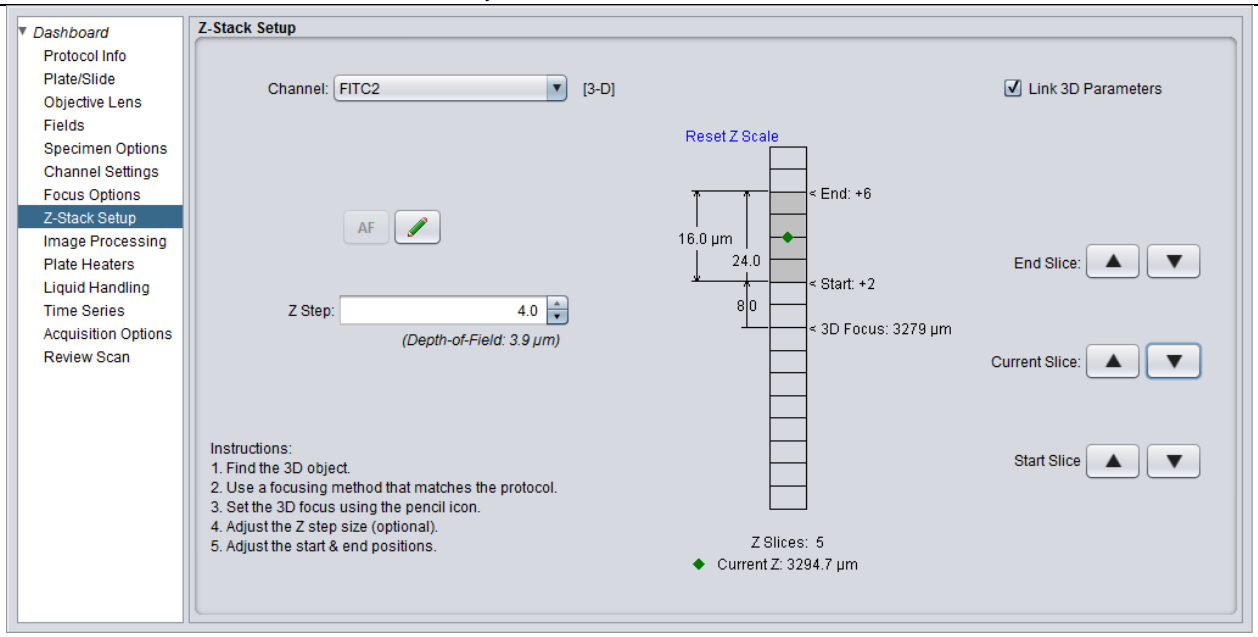
A setup page for 3D acquisition has been added to the protocol designer. Graphical controls allow the operator to define the start and end positions of the Z scan. Representative images can be acquired at any step within the Z-stack to help determine the appropriate scan range and step size. A new parameter called "Z Start Slice" enables asymmetric scanning about the 3D focus. The distances below and above the 3D focus do not need to be the same. For backwards compatibility, the default starting slice will be set to half of the scan range.

To use the new setup tool, start by choosing the appropriate 3D channel from the pull-down in the upper left region, and then following the numbered instructions in the lower left. (Use the *DashBoard* or *Channel Settings* to define 3D channels.) In the example shown below, the starting position is set to -2 steps for a Z scan consisting of 6 slices.



Z-Stack Setup: Asymmetric Scan Range, Starting Below "3D Focus", Positive Z Step

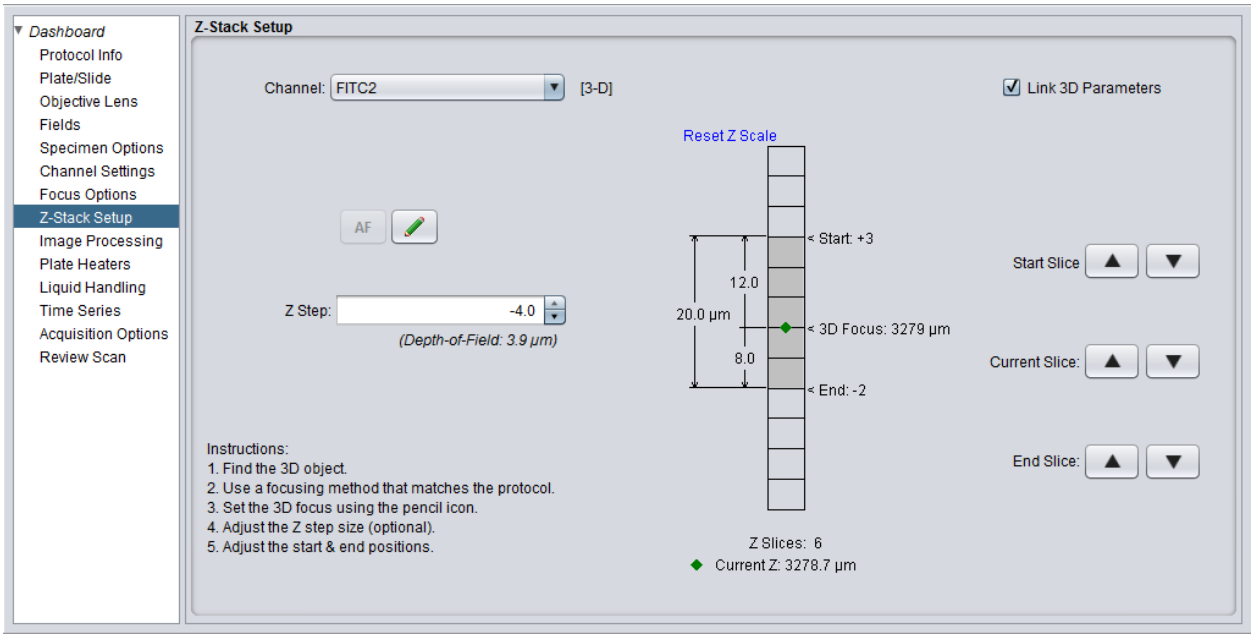
Setting the start slice to a positive value will cause the entire Z scan range to shift above the focus. Similarly, the start slice can be used to shift the entire Z scan range below the plane of focus. Both possibilities are allowed. An example is shown below.



Z-Stack Setup: Shifted Scan Range, "3D Focus" Position Not Scanned

As with previous versions of software, the "3D focus position" is a result of applying the acquisition protocol's autofocus settings during the scan. Determination of an appropriate focusing procedure is an essential step before using the Z-Stack Setup tool.

To fully enable the new 3D scanning features, the polarity of the Z step is now used to determine the direction of the Z scan. A positive Z step will scan the objective lens in the upwards direction during acquisition. The objective lens will be closer to the substrate at the end of the scan than it is at the start of the scan. A negative Z step will scan the objective lens in the downwards direction (see example below). Prior to V6.2, the Z step was treated as an absolute value and the instrument always scanned in the negative Z direction.



Z-Stack Setup: Asymmetric Scan Range, Starting Above "3D Focus", Negative Z Step

The changes introduced in V6.2 have two ramifications to be aware of:

1. the default scan direction will now be positive, which is preferred for a number of reasons. Most notably, the focusing mechanism works better when moving against gravity.

2. the scan direction of existing acquisition protocols will be the opposite of before. The default Z step has always been a positive number, and the values stored in pre-existing acquisition protocols are also positive.

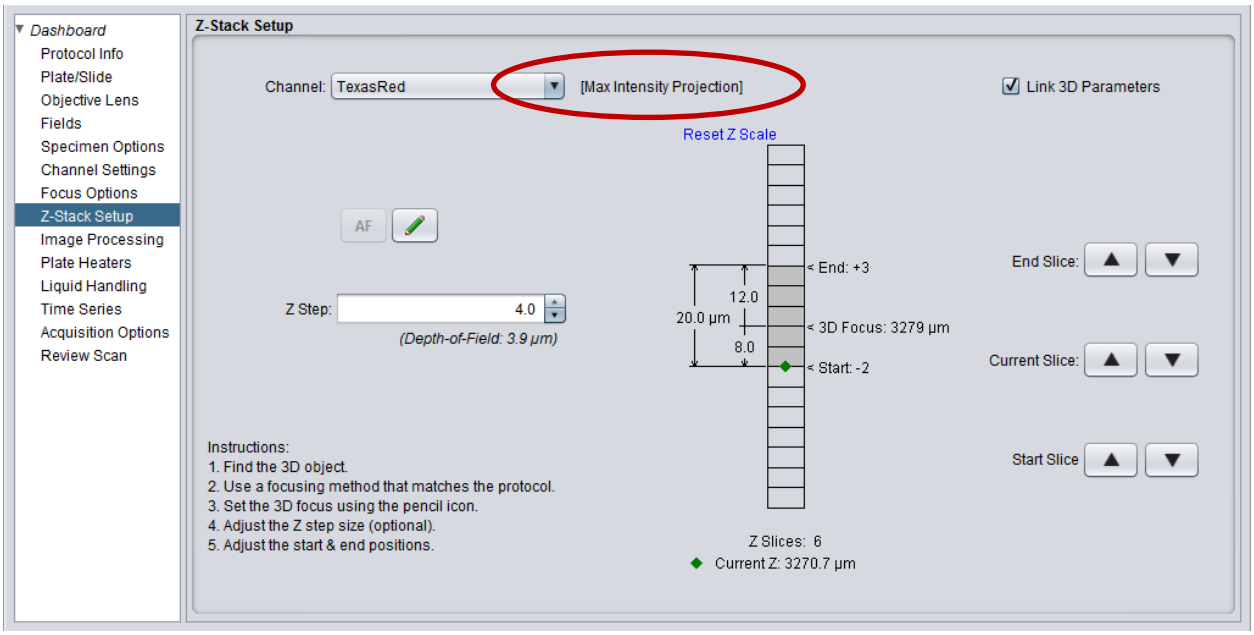
GE recommends the new method of scanning in the positive direction. In the case where scanning in the negative direction happens to be important for a pre-existing assay, the quick fix is to load the acquisition protocol and then reverse the sign of the Z step.

In summary, the interactive, 3D setup tool enables three new capabilities:

1. visual confirmation of the Z-stack settings
2. asymmetric scan range about focus
3. scanning in the positive or negative direction.

Maximum Intensity Projection (1859)

The Z-Stack setup described above can also be used to define the scan range for a new acquisition method called "Max Intensity Projection". The method is similar to the 2.5D imaging mode, except that each pixel of the final, 2D image is formed from the maximum pixel intensity along Z. The 3D information within the Z-stack is projected onto a single 2D image.



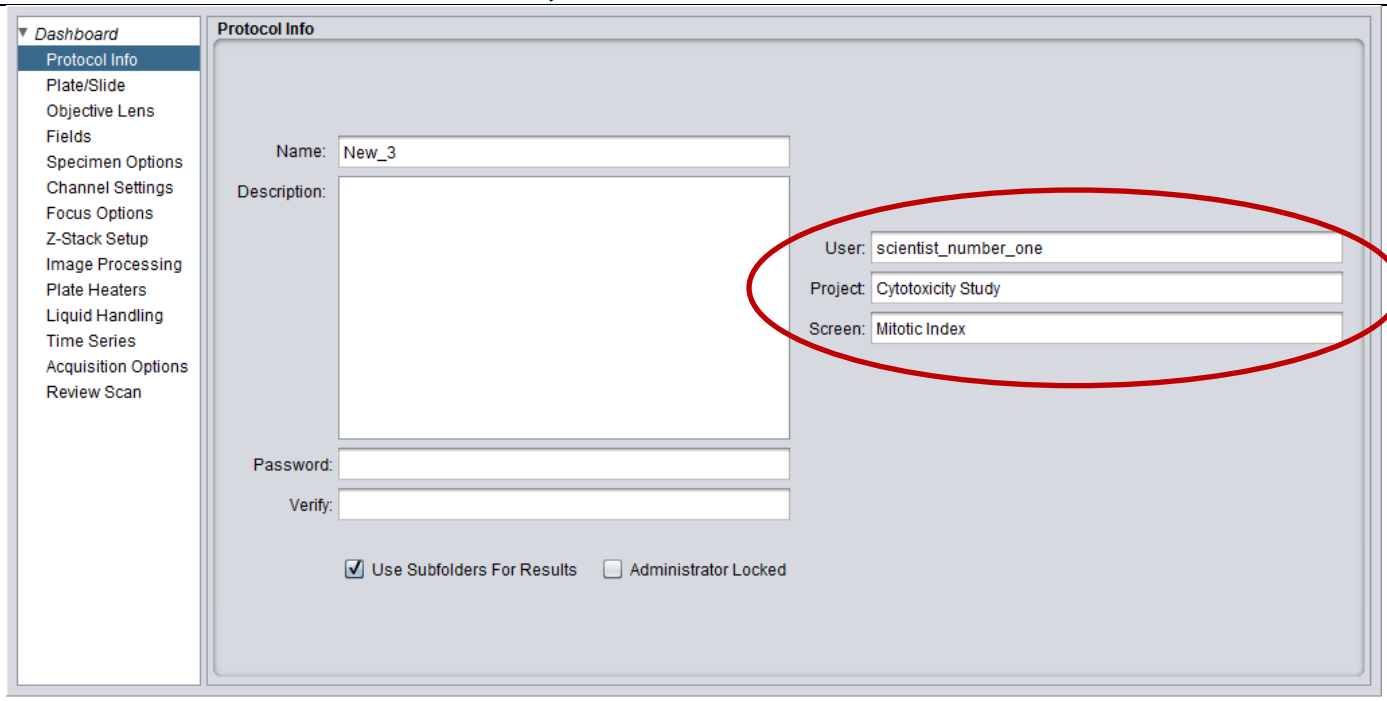
Z-Stack Setup: Maximum Intensity Projection

Maximum intensity projections are useful in situations where a 2D representation of a 3D object is desired. Maximum intensity projections also provide some tolerance for focusing inconsistencies. Recognize that forming images from the maximum intensity is a non-linear process. The resulting images should not be used for certain types of quantitative analysis.

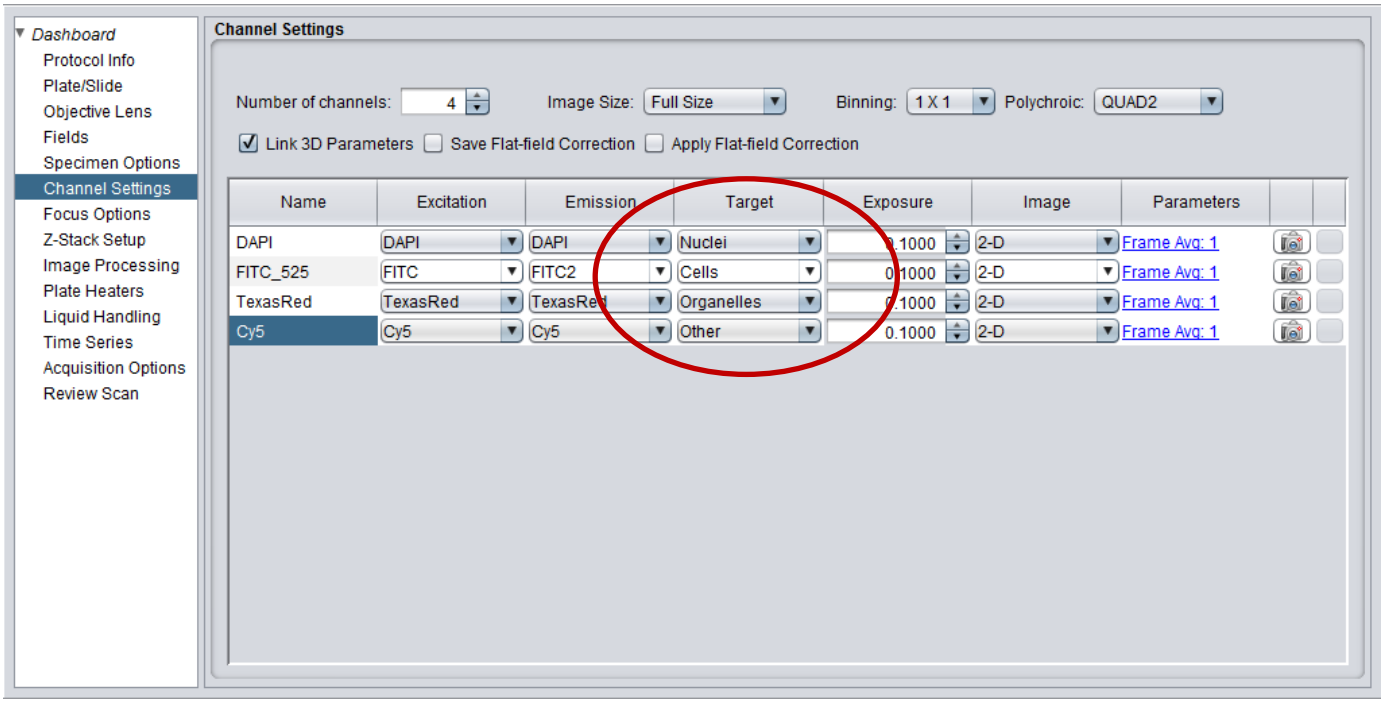
The imaging mode is available on both the 6000 and 2200.

Project Information Options (1658, 1730)

Acquisition protocols can now be configured to contain information about the User, Project, Screen, and Biological Target. Project information is recorded in the resulting XDCE files (in XML format) after every scan. Use the "Protocol Info" and "Channel Settings" pages to define the project information, as demonstrated in the following figures.



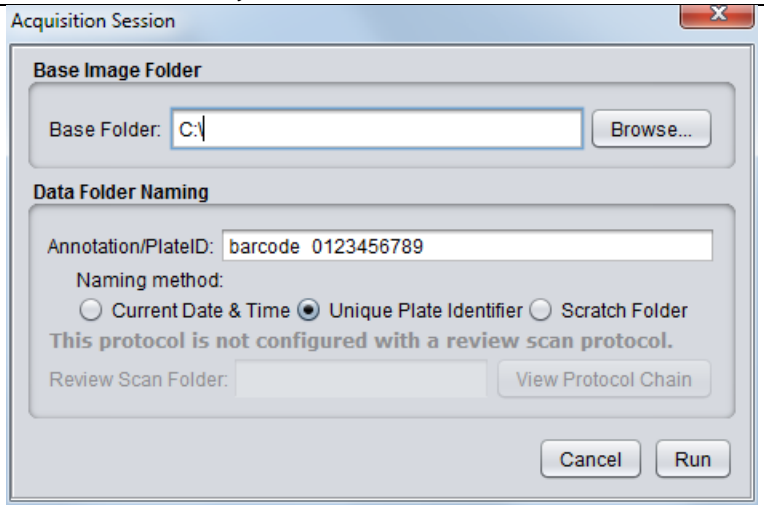
Protocol Information Page - User/Project/Screen



Channel Settings Page - Biological Targets

Project information stored in XDCE files is intended for analysis programs such as IN Cell Investigator. Naturally, the information is also available for third party software as well.

In addition to storing project information, XDCE files will now record barcode strings that are provided in the Annotation field at the start of every run. Plate barcodes are handled differently than project information, because every plate has a unique identifier.



Annotation Field for Barcode String - Recorded in "PlateID" Tag

Annotations are recorded in a new tag called "PlateID" (see #1730). Remote control clients that use the corresponding remote control command (**m:Annotation**) will also be able to store barcodes. (Previous versions of software only recorded annotations as part of the output folder name. Annotations were not stored within the XDCE file.)

Summary of the new XML Tags recorded within the XDCE File:

```
<ImageStack PlateID="barcode_0123456789">

<ProjectInformation>
  <User name="scientist_number_one"/>
  <Project name="Cytotoxicity Study"/>
  <Screen name="Mitotic Index"/>
</ProjectInformation>

<TargetType type="Nuclei"/>
<TargetType type="Cells"/>
<TargetType type="Organelles"/>
<TargetType type="Other"/>
```

Autofocus Improvements

Comments about the Autofocus Scan Range

Automatic determination of the ideal scan range can be difficult when the plate/slide parameters are not known in advance. Simply scanning a large range is undesirable for two reasons:

1. the objective lens is more likely to collide with the plate/slide when scanning a long distance, and
2. unnecessarily long scans take longer than appropriately sized scans.

A number of factors are taken into account when defining the scan range, including:

1. expected bottom height
2. variability of the bottom height about its mean value
3. bottom thickness
4. objective lens working-distance

It is not always possible to combine these parameters into an ideal Z range that will work under all conditions. To help improve focus quality, it is important that the expected bottom height and thickness are pre-determined to a reasonable level of accuracy. It is also important that the uncertainty and variability of the bottom height do not exceed the working-distance of the objective lens.

Certain parts of the GUI assume that the plate/slide parameters are approximately correct. For example, the interactive LAF on the main toolbar and the button used to measure channel offsets.

Other parts of the GUI are designed to work with plate/slide parameters that are not as well known. For example, *VerifyLAF* and the *TraceTool*.

Software autofocus methods typically assume that the object is already close to focus.

INCell V6.2 contains a number of improvements related to the autofocus scan range and the method of finding surfaces with the laser focusing optics. The changes fall into two basic categories, as described below.

First Surface Detection for Laser Autofocus (1400, 1851, 1871)

In certain circumstances, the laser autofocus (LAF) will look for the first surface (peak 0) before attempting to scan for the second surface (peak 1). The new approach allows the LAF to safely search a large focal range with less risk of collision between the objective lens and the bottom of the plate/slide. The new approach is also useful for limiting the final scan range to the appropriate distance through the plate/slide bottom.

There are two main places where the LAF starts by looking for the first surface:

1) the *VerifyLAF* tool on the *DashBoard*
2) the first well of each scan.

In both cases, the new method will reduce the need to have a perfectly determined bottom height (as defined in the plate map). The LAF will start at lower Z position than in previous versions of software, and the total Z range can be as large as needed to find the first surface. At the same time, the actual Z range may turn out to be small if the first surface happens to be close to the starting point.

Other places that use LAF will continue to rely on plate parameters like the bottom height and thickness for determining the scan range.

Scans that involve objective lenses with a short working-distance will benefit most from the first surface detection method. Finding the first surface before scanning for the second surface will help avoid collisions between the tip of the objective lens and the bottom of the plate/slide.

Software Autofocus Z Range (1836, 1853, 1860)

The maximum allowed Z range for software autofocus is now a function of the objective lens' working-distance and the Z stage travel. Previous versions of software arbitrarily limited the Z range to 100um, which was potentially too small for long working-distance objectives (like the 4X/0.20 or the 2X/0.1) and too large for short working-distance lenses (like the 20X/0.75). Software autofocus is now allowed to use up to 80% of the working-distance and 50% of the Z stage travel, whichever is smaller.

Similarly, the autofocus range used by the *AutoOffset* procedure is now a function of the working-distance. Previous versions of software limited the range to the configuration setting shown below. The default value was typically 100um, which corresponds to +/- 50um. As a consequence, the *AutoOffset* procedure did not work properly for lenses that required an offset larger than 50um.

```
<software_autofocus_adaptive_range_small>
    <first_channel_range>100</first_channel_range>
</software_autofocus_adaptive_range_small>
```

Acquisition Performance

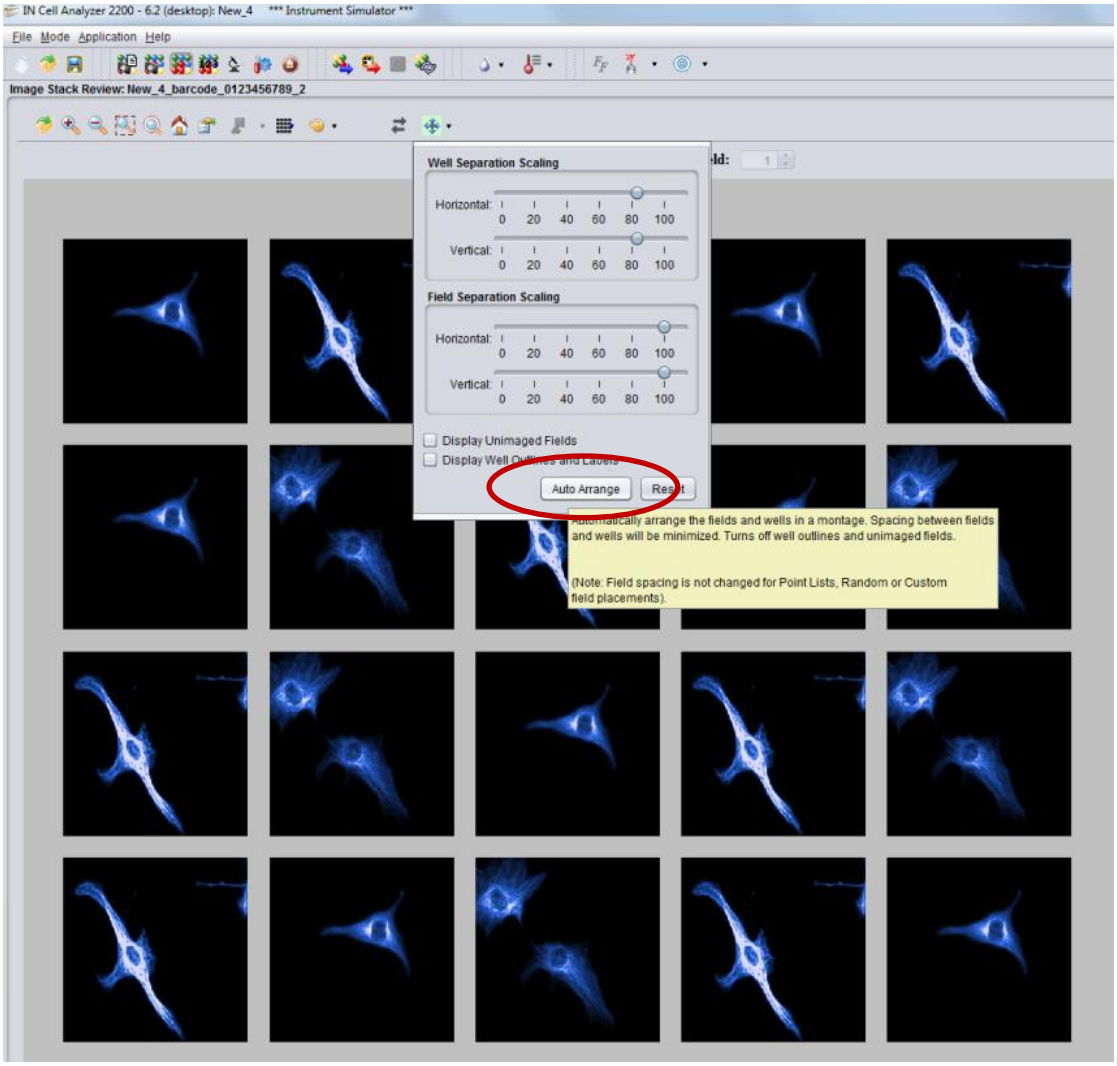
Multi-channel Acquisition Optimizations (1849, 1864, 1904, 1908, 1920)

The instrument control software used to acquire multi-channel images has been optimized for better performance. Some of the improvements are exclusive to the 6000, but other improvements will benefit both the 2200 and the 6000. The optimizations will be most noticeable in cases where the camera exposure time and EM filter position do not change between channels. (In particular, when using a quad-band emission filter to acquire multiple channels.) Conversely, if the acquisition protocol uses long exposure times, laser autofocus, long XY moves between wells, or different Z offsets for each channel, then the optimizations may be insignificant, because the timing improvements will be a small fraction of the overall scan time.

Basic Improvements

Automatic Montage Spacing (1780)

A new feature called "Auto Arrange" has been added to *DataReview* mode. Pressing the button will cause thumbnails to be automatically positioned with only small gaps in between, like a stitched image. The changes are a continuation of the improvements released in V6.1.



Automatically Arranged Thumbnails with Condensed Spacing

ReviewScan Acquisition Protocols with Different Plate/Slide Maps (1835)

To enable more applications of the *ReviewScan* feature, it is now possible for the linked acquisition protocols to use different plate types. The operator is responsible for ensuring that changing from one type to another between scans is OK.

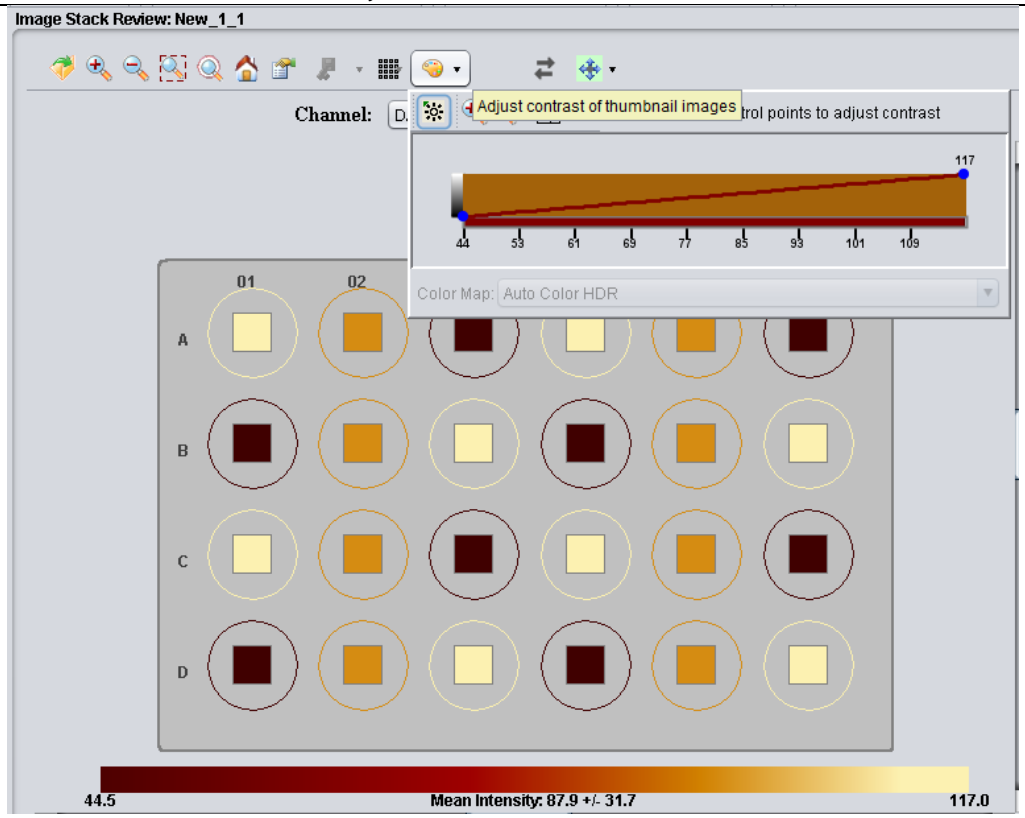
The toggle called "Select Wells Using Active Analysis" must be disabled in order to use this capability.

Allow Closely Spaced Wells (1838)

Prior to V6.2, the well spacing was limited to a minimum separation of 1mm. Certain types of experiments were not possible on account of this limitation. The minimum separation is now zero.

Adjustable Min/Max Values for the PlateView (1763)

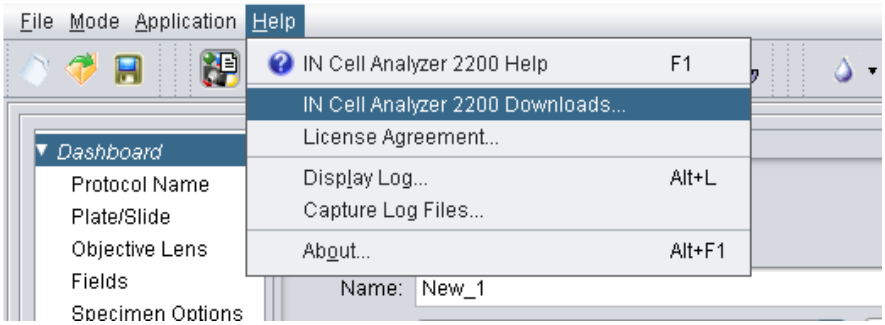
The minimum and maximum display values of the scan results represented within the *PlateView* are now adjustable. The scale can be adjusted to remove outliers or to view the results with controlled settings.



Contrast Adjustment of Scan Results

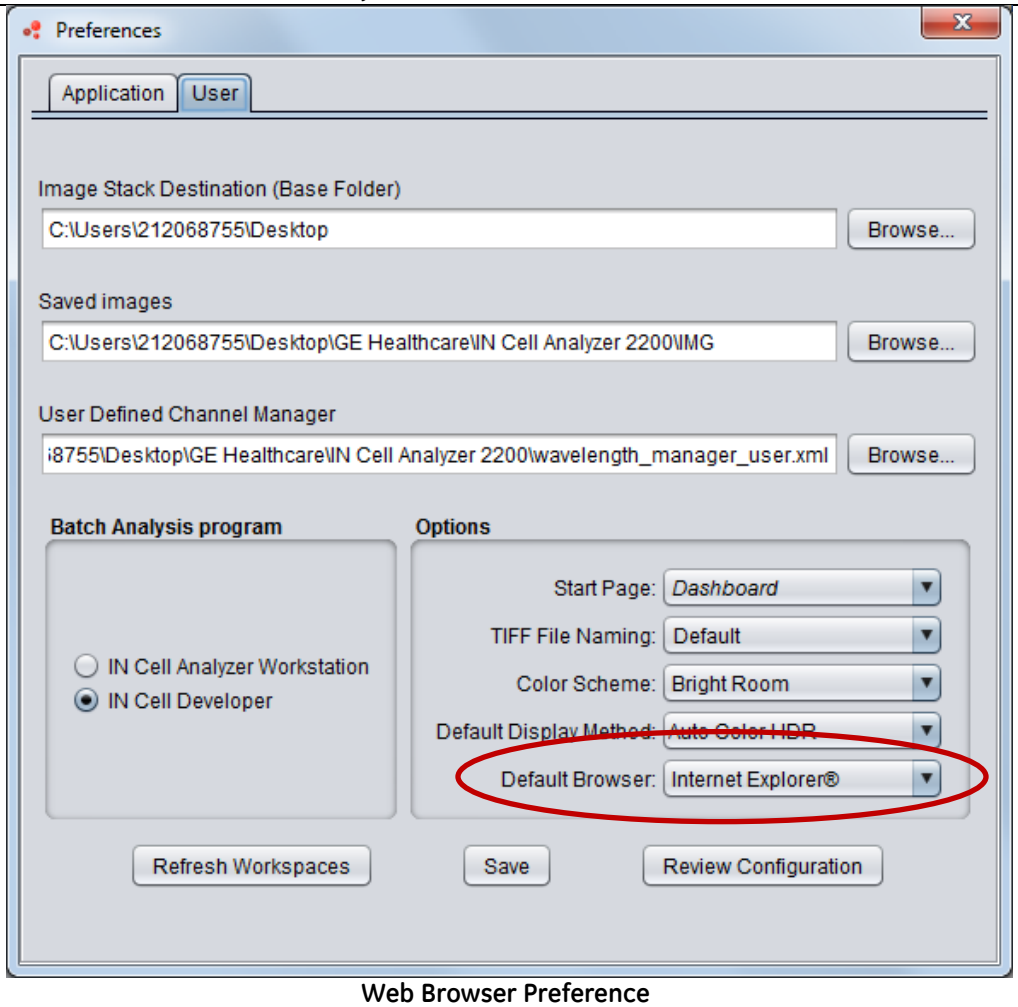
Software Download Site Accessible from Menu (1861)

Use the menu selection shown below to access the download site. Refer to the on-line information for help selecting an appropriate installation package. For best results, GE recommends using the most current version of software.



Launch Web Browser to Access the INCell Download Site

To run a different web browser, use the preferences dialog, as shown below. The list of web browsers can be modified by editing the GUI configuration file.



Web Browser Preference

Better Use of Objective Lens Properties (1852, 1853, 1855, 1860, 1863, 1866, 1867, 1871)
The depth-of-field, working distance, and magnification are now used more intelligently for determining Z-step sizes and Z scan ranges. A number of improvements were made throughout the software.

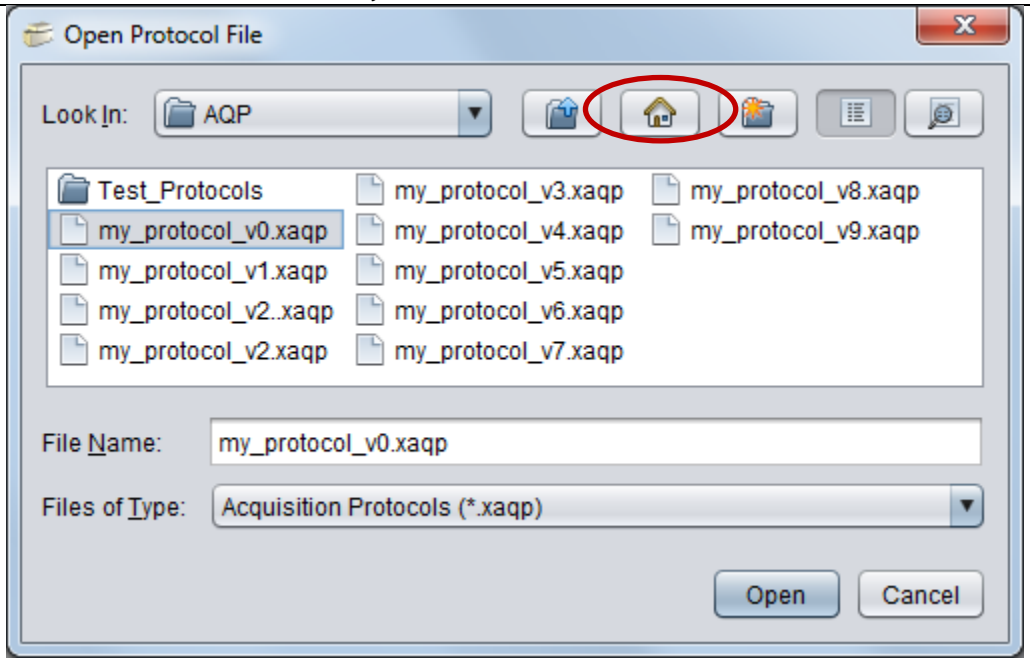
MATLAB® Sample Scripts for Processing XDCE Files (1892)
The sample scripts demonstrate how to read XDCE files and process TIFF images using MATLAB. In one of the samples, results from a basic image processing algorithm are written to a CSV (comma separated value) file. In another sample, MATLAB is used to generate an INCell style point list (an XFPF file). It is expected that the scripts will need to be modified in order to become useful for specific applications. Scripts can be found in the "thirdparty" sub-folder of the INCell software.

Brightfield Imaging (TLED) Now Enabled Without License (1825)
Basic brightfield imaging is now enabled on all instruments without the need for a separate license from GE. All sites that upgrade to V6.2 will be able to acquire unprocessed, transmission images with the LED that is positioned above the plate/slide.

"BF" Icon in Lower Right Corner

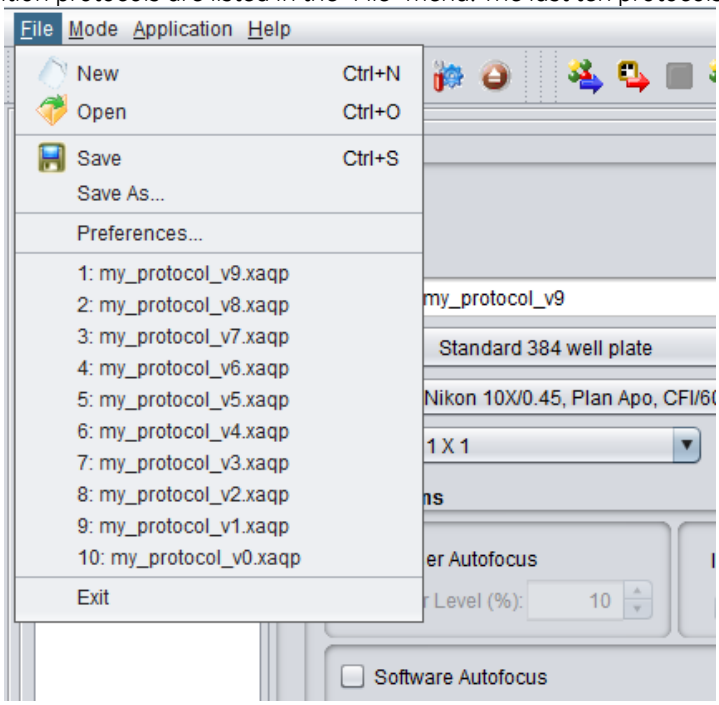
A license for the "transmitted light" feature is still required for the imaging modes that use Iatia's proprietary algorithms for calculating "Phase Contrast" and "DIC" images from multiple Z sections.

Acquisition Protocol File Management (1813)
The home button is now connected to the standard location for acquisition protocols, as defined by the application preferences.



Home Location for Acquisition Protocols

In addition, recently used acquisition protocols are listed in the "File" menu. The last ten protocols are remembered.

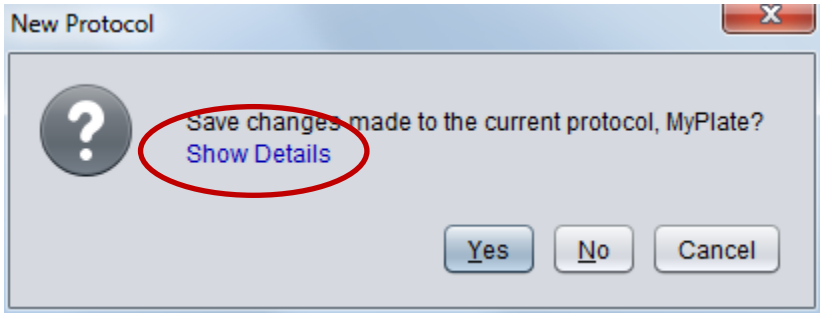


Recently Used Acquisition Protocols

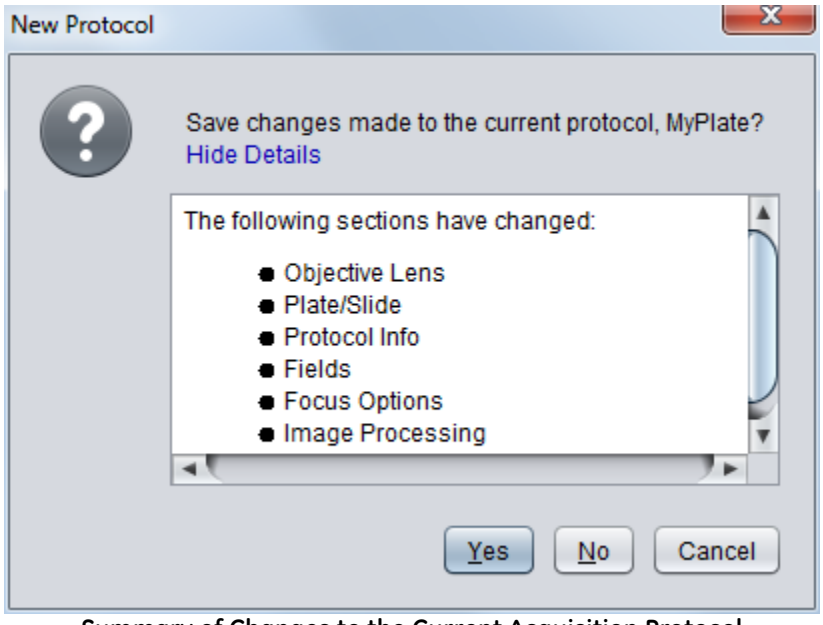
Indicator for Modified Acquisition Protocols (1757)

An asterisk is now displayed next to "Dashboard" when the current acquisition protocol has been modified. A summary of the modifications is available when making changes that might result in unsaved changes. The examples below demonstrate the situation when attempting to create a new protocol.

Asterisk Indicating that the Acquisition Protocol Has Been Changed



Dialog Box for Handling Unsaved Changes - Show Details



Summary of Changes to the Current Acquisition Protocol

Instrument Status Logging - Scanner Snapshot (1841, 1842, 1844, 1862)

The *CaptureLog* tool is now more capable. Key log files are identified by name and are always bundled in the scanner snapshot. For example, the "active" and the "last active" log files are captured by default. In addition, the log file corresponding to the last recorded failure is also retrieved automatically within the scanner snapshot.

Also, the date stamps used to identify log files have been changed. Log file names will now contain the time/date that the instrument control program was started, rather than the time the log file was renamed for archival. Finding log files that correspond to particular activities should be more straightforward with the modified date stamp.

GE suggests capturing log files whenever an error or unexpected behavior has occurred.

GUI Software Logging (1901, 1931)
The default maximum number of archived log files has been increased from ten to twenty.

Remote Control Improvements

For information about improvements to the remote control interface, see items 1833, 1891, 1897, and 1906 in the list of changes at the end of this document. For additional information, refer to the remote control protocol document "INCell_Remote_Control_Interface.pdf".

Disconnection in the Event of a Low-level Error (1833)
The INCell GUI will now disconnect from the remote control socket in the event of a low-level hardware error. For example, if the instrument experiences an encoder error, the INCell GUI will disconnect from the remote control client. Remote clients should not attempt to load or unload plates from INCell if a disconnection occurs, because the state of the instrument is unknown. (The door might be closed.) Likewise, remote clients should always test the connection shortly before loading or unloading plates.

Testing Status with Windows 10

A number of GE's in-house scanners have been successfully operating (since about January 2016) with workstations loaded with Windows 10. No obvious problems have been found with INCell Analyzer V6.1 or V6.2. Be aware, however, that unexpected issues are always possible with new operating systems. Windows 10 is potentially incompatible with older workstations.

Based on GE's preliminary testing, the performance of Windows 10 appears to be equal to or better than the performance of Windows 7. GE encourages sites to report INCell software problems related to Windows 10. For additional comments, see the release notes from V6.1.

Significant Fixes and Changes

Software Installation Prevented While INCell is Running (1869)
The installer will now check whether INCell is running before allowing software updates. Preventing installation will avoid a known problem with Java VM file corruption.

Background Information:
Java file corruption during installation has been an issue for previous versions of the INCell software. The problem is rare and is known to occur under the following conditions:

1. The INCell software is running at the time of software installation
2. The installer installs a different version of the JavaVM than the version that is actively being used by INCell.

In the event that the Java files become corrupted, neither the INCell software nor the installer will launch. The issue can be resolved by manually deleting the following folders and then reinstalling the software:

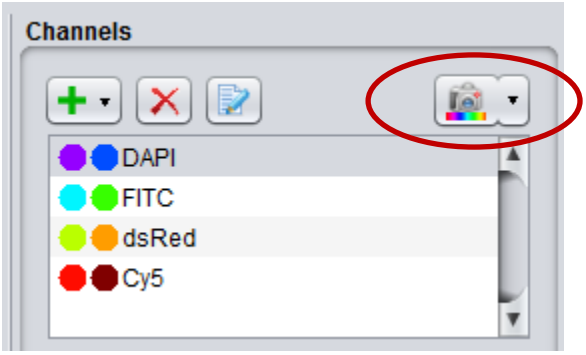
C:\Program Files\GE Healthcare\IN Cell Analyzer XX00\jre
C:\Program Files\GE Healthcare\IN Cell Analyzer XX00\Temp

Terminology Change - "Wavelength" Replaced with "Channel" (1879)
Parts of the GUI used the word "channel" and other parts used the word "wavelength" to describe the selected measurement conditions. The proper term is "channel". The word "wavelength" is now used only in places where the wavelength of light is being presented. To fully resolve this terminology issue, additional changes may be needed in future versions of software.

Although the same kind of terminology problem exists in the XML files, no changes have been made to the XML tags or values. Only the graphical user interface has been changed. There should be no compatibility problems related to XDCE or XAQP files.

MiniScan Bug Fixes (1796, 1800, 1875, 1877, 1888)

A variety of problems were fixed with the *MiniScan* feature on the *DashBoard*. The feature is now more useful and reliable.



***MiniScan* Button for Quickly Acquiring Multi-channel Images**

Shortened List of Imaging Modes (1771)

To simplify the software and improve reliability, unlicensed imaging modes will no longer be presented (as greyed-out items) in the list of imaging modes. Reducing the complexity of the software facilitates the addition of new features like "Max Intensity Projection". For information about special, licensed imaging modes, contact GE sales.

Known Issues and Usage Notes

Information about previously reported topics can be found in previous versions of the release notes, which are located in "C:\Program Files\GE Healthcare\IN Cell Analyzer XX00\manual".

List of Changes Between 6.1-14695 and 6.2-15289

Items listed in this table have been fixed in version 6.2, unless otherwise discussed in the comments.

ID	Brief Description	Comments
1400	Develop an LAF procedure for finding the first surface	The new procedure is used in situations like *VerifyLAF* and the first well of a plate scan.
1594	Provide GUI tools for setting up Z stacks	Z stack setup is now more intuitive and well controlled.
1658	Add a method of transferring project information to downstream analysis software (like IN Cell Investigator)	Acquisition protocols can now be configured with the following project information: User Project Screen Biological Target (for each channel) The information is recorded in the resulting XDCE files. Barcode information can also be stored, as described in #1730.
1730	Record the "Annotation" field in the XDCE file as "PlateID"	The "PlateID" tag is useful for recording the barcode.
1757	Indicate when acquisition protocols have modified settings	An asterisk "*" will be displayed next to the title "Dashboard" when the current acquisition protocol has been modified. A summary of the modifications will be available when unsaved changes might be lost.
1763	Adjustable min/max settings for the heat map display	Contrast controls are similar to those used for thumbnails.
1765	Highlight selected well in *PlateView* of DataReview	Highlighting the selected well makes it easier to associate the full size image displayed on the right side with the well.
1771	Add support for API softworx style licenses	The new licenses are useful for demonstrations and R&D situations. The original, FlexLM style licenses are still valid. Also see #1933.
1777	Add support for an external, hand-held barcode scanner	Small improvements to streamline the workflow when using a hand-held barcode scanner. See #1848.
1778	*PlateView* row and column labels don't adapt to montage spacing	The labels will now adjust to the spacing.
1780	Automatic montage spacing to condense thumbnail display	A new feature for quickly condensing adjacent thumbnails into a smaller space. Useful for reviewing plate scans.
1785	Well label tooltips don't appear for thumbnails or "acquisition state"	Well labels are useful for determining the origin of the thumbnail.
1791	Random pauses during rapid acquisition	Acquisition protocols that acquire data more rapidly than the hard disk can store TIFF images may experience pauses while IO buffers are emptied. The problem is more common with older workstations (e.g. HP Z220's with 3Gb/sec SATA). An inexpensive solution is to add a fast, 6Gb/sec SATA hard disk to the INCell workstation. A more expensive solution is to upgrade the workstation to a newer model (e.g. an HP Z240 with 6Gb/sec SATA).
1795	Changes to the "Field Outline Color" do not take effect until later	A minor issue with the sequence of steps involved with refreshing graphics.
1796	Thumbnail missing if using *MiniScan* with "Save To Disk" option on	Fixed.
1800	*MiniScan* resets the *PlateView* zoom and pan with "Save" is enabled	Fixed.
1807	Zoom to well tool causes navigation problems in *PlateView*	Fixed.
1808	Add IP address and all MAC addresses to the "About" page	Convenient access to MAC addresses is useful for software licensing.

1809	Look at all available MAC addresses when evaluating licenses	Applies to softworx style licenses only.
1812	Report MAC addresses to the log file during program initialization.	Recording MAC addresses in the GUI log file is potentially useful for software licensing and for support.
1813	AQP file management improvements	The "Home" button will now change the AQP file path to the default folder shown in the preference dialog (rather than the user's Desktop or other type of home folder).
1815	Duplicate "T" license icon in lower right corner	See #1825. Different icons will used for basic brightfield and for DIC/Phase.
1825	Enable brightfield imaging even without a license for "TRANSMITED_LIGHT" [*sic*]	Basic brightfield will now be available on all systems, without the need for a license.
1827	Dragging position of field graphics can be slow	The software used to draw the field graphics (in the field setup panel) has been optimized. Large arrays of fields (e.g. 50x50) are now drawn quickly.
1833	Remote control operation should disconnect from the client in the case where the IC isn't running.	The RC client should check whether INCell is OK before attempting to load/unload plates. Checking the connection (e.g. with a simple status check) before critical steps is good practice.
1834	BD Falcon 12 and 24 Well Plate default bottom thickness incorrect	The factory default values have been adjusted.
1835	Allow different plate/slide maps for *ReviewScan* protocols	Enables new types of acquisition.
1836	Allow larger Z range for static, software autofocus.	Software based autofocus now works better with long working-distance lenses like the 2X/0.10.
1838	Allow small, closely spaced wells. Remove minimum well size of 1mm.	Configuring the plate type with closely spaced wells is useful for special acquisition patterns.
1839	Objective loading script (load_obj.py) crashes if INI file doesn't contain objective lens #12411	A rare condition that affected only a few systems. The changes are only needed by GE service.
1841	A method is needed for retrieving instrument controller logs from abnormal shutdowns	The instrument controller will now keep track of the log file corresponding to the last failure.
1842	Archived instrument controller log files need a more appropriate time/date stamp in the file name.	The time/date stamp in the file name will now correspond to the time the instrument was started rather than the time the log file was renamed.
1844	Add "scanner_info" to the scanner snapshot.	"scanner_info" contains summary information about the instrument. For example, the camera serial number.
1848	"Acquisition Session" dialog focus should default to "Annotation/PlateID".	An important part of streamlining the manual barcode scanning workflow described in #1777. The barcode string will now go to the correct field in the run dialog, without the need for a mouse click.
1849	Optimize EX/EM channel switching performance - V6.2 summary ticket	A number of optimizations where made to improve channel switching performance on both the 2200 and 6000.
1851	*VerifyLAF* procedure does not control the LAF filter width.	The LAF trace analysis uses a spatial filter while analyzing the trace measurements. The filter parameters should have been set according to the current objective lens' depth-of-field. Instead, the filtering parameters were left-over from whatever activity preceded *VerifyLAF*. In most cases, this did not cause a problem, because either the parameters were already correct or the parameters were close enough. (The LAF results are somewhat insensitive to the filtering parameters.) The issue was potentially significant, however, when switching between two lenses with a very different depth-of-field (e.g. the 2X/0.1 and the 20X/0.75).
1852	LAF filter width should be a simple function of the depth-of-field rather than a configurable parameter.	The LAF filtering parameters should be determined from the objective lens' depth-of-field rather than from settings in the GUI configuration file.
1853	*AutoOffset* procedure needs a more intelligent method of setting the Z range for software autofocus.	The Z range should be a function of the objective lens' depth-of-field and working-distance. Previous versions of software were somewhat hard-coded.

1855	*AutoOffset* offsets should be re-measured when the objective lens changes.	The Z offsets used to improve focus between channels are typically a function of the objective lens and should probably be re-measured whenever the lens is changed. The software will now present a dialog to remind the user.
1857	Unexpected behavior when pressing "OK" after *AutoOffset* measurement	Pressing "OK" caused a background window to jump to the foreground (on top of the INCell GUI), which was disorienting.
1859	Create an imaging mode for generating maximum intensity projections	A new imaging mode called "Max Intensity Projection" has been added. Use the Z-Stack Setup page to define the Z scan range.
1860	Software autofocus Z range should not be allowed to exceed the working-distance	Limiting the Z range to the objective lens' working-distance is a good precaution. It is not known whether this improvement fixes any real issues.
1861	Add option within UI to launch a browser with download URL	The INCell download page contains a selection of installation packages, including old and new, standard and desktop. Older versions are available to help ensure backwards compatibility with existing screens. Newer versions will be added as they become available. Each instrument type (2200, 6000) has a separate download page.
1862	Motion trajectory file improvements: appropriate precision, measured current RMS.	Small changes to improve instrument support.
1863	Improve the default Z step size in the main GUI	The default Z step size is now a function of the current objective lens' depth-of-field. The step size will change to an appropriate distance whenever the objective lens is changed.
1864	Performance improvement by avoiding unnecessary galvo communication (6000 only)	Applies to scans that switch laser colors between channels.
1865	Add a parameter to control the position of a Z stack.	Part of the Z stack setup improvements.
1866	"Objective Lens" page of protocol designer uses a different approximation for the depth-of-field.	All parts of the GUI should use the same depth-of-field equation. A minor improvement for consistency.
1867	Z step settings used for software autofocus are inconsistently related to the depth-of-field.	A consistent fraction of the depth-of-field is now used for software autofocus. For certain lenses, the software autofocus performance will be improved, because the step size was unnecessarily small in previous versions of software.
1868	Objective lens loading procedure doesn't work as expected when asking whether a new lens is being loaded.	A small improvement to the tool used by GE service.
1869	Prevent the installer from running if INCell is already running.	Important for improving the reliability of software installations. Avoid file corruption problems with the Java Virtual Machine (JVM).
1870	"slide_holder.xplt" defines bottomheight=0 rather than 1.5mm	Fixed.
1871	Lower the LAF Z starting position for short working distance lenses	Increases the chances of finding the correct surfaces.
1872	Save LAF Traces doesn't work	This feature was accidentally broken in V6.0 - V6.1.
1874	Add plate type for the BD Falcon 353047 24 well	Done.
1875	Focus problem after *MiniScan* with LAF enabled	Fixed.
1877	*MiniScan* Focus Problem - Save On - AF Off	Fixed.
1879	Change "Wavelength" to "Channel" in GUI	An appropriate terminology change.
1880	Field spacing problem when loading protocols that have different well parameters.	The field spacing displayed in the GUI was not always updated when loading protocols.
1881	Add plate types for standard petri dishes	Basic plate types with a single, centrally located well have been added for convenience. Because there are many different types of dishes, customization will likely be needed.
1882	Simulated correction collar parameters don't match the actual lenses	Fixed. The Simulator is now more realistic.

1883	Protocols with non-zero SAC collar setting get incorrectly marked as "changed"	Acquisition protocols that contained non-zero SAC collar settings were always being marked as changed.
1884	Allow higher speed Z motor settings for the 2200	The default Z motor settings are unchanged, although the software will now allow 2200 instruments to use the original, fast Z motor settings. The installation will no longer overwrite the settings. See #1893.
1885	Improve the mechanism used to track whether an acquisition protocol has changed.	The underlying mechanism has been improved, which should reduce the number of times that protocols are incorrectly marked as "changed", as mentioned in #1883 and #1886.
1886	Software AutoFocus parameters are causing "changed" protocols	Acquisition protocols that contained certain types of software autofocus settings were always being marked as changed.
1888	Double-clicking on the *MiniScan* button causes a null pointer error	Fixed. To avoid this problem with previous versions of software, use only single-clicks on the *MiniScan* button. Wait for the scan to finish before pressing the button again.
1889	Add IO board firmware version 1.0023 to the 2200 installation packages	Version 1.0023 is now the official version in use on the 2200.
1890	Software autofocus cycles through a series of different Z positions	The different Z results were within the objective lens' depth-of-field. Focus quality was OK. Nevertheless, it is better to have consistent Z results from software autofocus.
1891	Add a reconnection mechanism to the remote control port to handle network disconnections.	The software that handles the remote control port now has a reconnection mechanism, increasing the chances that remote clients can reconnect in the event of a network disruption.
1892	Provide MATLAB sample scripts for processing XDCE files.	The MATLAB scripts demonstrate how to read XDCE files, process TIFF images, save CSV files, and generate points lists (XFPF files). Scripts can be found in the Installed in the "thirdparty" sub-folder of the INCell software.
1893	Add a method of changing instrument settings from the GUI	Available in service mode only. See #1884.
1894	Improve the GUI used for installing instrument control software	Small improvements to streamline operation and to improve reliability.
1895	BD Falcon 353047 24-well plate - well centers are incorrect	Fixed.
1897	RC Dialog Title reports "Enabled" even if the socket is unsuccessfully enabled.	The title bar is now updated properly in the case where the socket is unsuccessfully enabled. The states of the title bar and the Enable/Disable button will now be consistent.
1901	Increase the default maximum allowed number of GUI log files that are stored	Up to twenty log files will now be saved. The prior limit defaulted to ten.
1904	Multi-channel optimization for the 6000.	A minor configuration problem was responsible for a small performance issue on the 6000. The EX motor channel number was improperly set to a non-zero value, causing an unnecessary HW status check. V6.2 sets the channel number to zero while installing the instrument controller RPM.
1905	Problems loading relocated image stacks (XDCE files), especially in the case where the TIFF files are absent.	XDCE files that were relocated and/or separated from their TIFF files did not load properly into *DataReview*.
1906	RC protocol improvement - auto generated message IDs	*ImagerState* messages can originate from three locations (listed below), which can make it difficult to synchronize communication. Message ID tags can be helpful when diagnosing communication problems between INCell and remote control clients. 1. RC state changes. In this case, INCell sends the message without being asked. 2. in response to *GetImagerState* 3. embedded within the response to *GetStatus*

		Use the following configuration setting to enable message IDs: <auto_gen_rc_message_ids>true</auto_gen_rc_message_ids>
1908	Speed improvement by eliminating a memory copy of the image buffer	The extra memory copy added about 6 milliseconds to the acquisition time of every full sized image. The time required to copy images is proportional to the number of pixels. The time savings will be less for smaller images.
1909	LAF expected bottom height markers are sometimes incorrectly positioned	Changed the way the location of the graphic markers is determined.
1911	*VerifyLAF* should not modify bottom thickness when using only the 1st peak.	The calculated bottom thickness value is potentially invalid in situations where the LAF trace contains only a single peak. Lenses that are configured to look for only the 1st peak should not modify the plate's bottom thickness. Likewise, the bottom thickness should not be estimated from LAF traces that contain only one peak.
1913	*VerifyLAF* should report surface detection problems	In certain situations, the LAF trace will not contain the expected number of peaks. Previous versions of software presented a dire warning message (copied below) in the status area, but the appropriate information was not presented to the operator in an obvious way. V6.2 will present a useful dialog instead. Status area message (previous versions): `"Failed to run command: LAF,2062.51,2738.14,0.02,2,0,440.51,0.00; Error Message: !Did not find enough peaks in the laser AF trace."`
1914	Simplify the splash screen by removing the scanner picture	The splash screen that is presented during initialization will now contain text only.
1918	OS Identification method doesn't recognize "Windows 10"	The problem appeared to be benign, but was still worth fixing.
1920	Eliminate unnecessary check for unexpected data from the IO board	The extra check was overly conservative and added about 1 msec to every communication with the IO board. The net benefit of removing the check will depend on the scan type and is therefore difficult to estimate.
1921	Remove unused, obsolete LAF setting "Laser AF Offset"	The HW specific LAF offset mechanism was unused, and the value was always zero. The mechanism was therefore removed as part of normal maintenance. Related INI file setting: [Boxer IO] Laser AF Offset = 0
1923	Remove unused mechanism for adjusting Z shift values based on CC setting	The mechanism was never used and may have not have even worked. Related INI file settings: [Correction Collar 12XXX] Z Shift Slope = 0 Z Shift Reference = 0.17
1925	"Zoom to Well" button in the *PlateView* should update the *PanelView*, when the displays are linked.	When the *PlateView* and *PanelView* displays are linked (double arrow button is enabled), the *PanelView* should change to the well selected with the "Zoom To Well" button (magnifying glass).
1926	"Zoom to Well" (and well label tooltips) finds the adjacent well (*DashBoard*) when displaying montages.	The well location boundary was in the middle of the image rather than in the middle of the gap between wells.
1931	Add a copy of the acquisition protocol to the log file	The current state of the acquisition protocol will be saved in the INCell log file at the start of every run.
1932	Deleting time point dialog box can be confusing when no time-points are selected.	The delete button should be disabled if no time-points are selected.
1933	Improve initialization methods used for the Image Mode list	Summary of changes to the list of Imaging Modes: - simplify the methods used to initialize the list

		- allow modes to be shown only if licensed - don't show unlicensed modes (instead of greying them out) Also see #1771.
1935	"Edit" link is missing from the 3D decon imaging parameters dialog	The "Edit" link at the bottom of the 3DD dialog is missing from V6.1.
1937	Image Mode validation differs between *ChannelSettings* page and *DashBoard*	The *ChannelSettings* page was more careful about validating the Image Mode selection than the *DashBoard*. Imaging modes like "Phase Contrast" should only be permitted with brightfield imaging rather than fluorescence. Both parts of the GUI now use the same validation methods.
1938	*DataReview* color image is inconsistent when not all channels are imaged in a time-lapse	Fixed.
1940	Image Annotations show 'Unknown' timestamp for time-points with inactive channels	Both the $TimeStamp_sec$ and $Rel_TimeStamp_sec$ reported 'Unknown' for some time-points. Other annotations seemed OK.
1941	Delete duplicate time-points warning box is confusing.	The dialog reported the duplicated timepoint in units of "min:sec", which was confusing for two reasons: 1. the dialog box incorrectly labelled the units as "sec" 2. the list of time-points is actually in secs, making it hard to compare the list with the warning dialog.
1942	Clean up border lines around GUI panels	Some of the GUI panels had extra border lines around the perimeter.
1943	Update Greiner plate maps (revise existing, add new)	Two existing plate maps have been updated with refined values. Six new plate maps have been added for 96, 384, and 1536 well, uClear and SensoPlate plate types.
1944	FocusFinder jumps to initial cursor position	The initial drag of the FF would work better if the Z position started at the current Z rather than the cursor location. The jump is most noticeable when working with high NA, short working-distance objective lenses.
1950	Acquisition stops if computers sleeps/hibernates during scanning	Windows can go to sleep even if INCell is busy scanning. Acquisition will not necessarily resume when the computer is awakened, because communication time-outs may have expired. The problem does not affect INCell workstations that go through GE manufacturing, because the sleep settings are disabled on the production systems. Workstations provided by customers or service, however, may not have the necessary settings. INCell V6.2 will disable standby settings whenever the GUI software is launched.
1959	PreviewScan thumbnails are black due to contrast settings.	Two issues were found and fixed: A. Pre-existing thumbnails (from Snapshots acquired under different exposure and binning conditions) affected the contrast settings. B. Contrast was incorrectly applied to thumbnails that were zoomed out of view. Workarounds to issue A for previous versions: 1. erase existing thumbnails before starting the preview scan 2. use the same exposure times for the snapshot and the preview scan
1962	Reloading thumbnails into assay development mode's *PlateMap* - incorrect field size when magnification changes	Under certain conditions, the size of the thumbnails drawn in the Assay Dev Mode's *PlateMap* was being determined from the current magnification rather than the original magnification. Switching to a different

		magnification after scanning and then reloading thumbnails from an XDCE file caused the field size to be incorrect.
1963	Thumbnail contrast of all channels is rescaled on *PlateView* when display settings are changed	The contrast of thumbnails in separate channels should be independently adjustable.
1966	*PreviewScan* should apply auto-contrast settings at the end of the scan.	A final update to the contrast settings is needed to ensure that the contrast settings match the state of the auto-contrast adjustment tools.
1971	Warning needed when loading an acquisition protocol that contains unlicensed 3D deconvolution.	The software will now present a warning if an acquisition protocol containing 3-D deconvolution is loaded into a workstation that does not have a license for this feature. The imaging mode will be reset to 2-D.
1973	Problems when reloading thumbnails to the *PlateView* from an XDCE.	Several issues were discovered with the procedure used to reload thumbnails into the *PlateView* (Assay Dev Mode). First, the initial XDCE file path was initialized to an old location. Second, pressing the "Cancel" button in the file browser did not actually cancel the procedure. Instead, thumbnails were loaded anyway.
1984	Change the method of delivering the Operating Instructions.	The Operating Instructions for the instrument will now be installed during system integration at GE. The instructions will no longer be embedded within the installation packages. The new method will allow GE to update the instructions independently from the acquisition software.

Notice to purchaser
IN Cell instruments are intended for research use only. The instruments are not for use in diagnostic procedures.

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