Batch Coordinator V 1.0
User Manual

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1 Introduction

Batch Coordinator is an easy to use software designed specially for the effective image processing and analyses. It simplifies and automates image processing and analysis by executing the specified and customized commands on each image within a multiple image data set.

By applying the specific command sequence to a large numbers of images, Batch Coordinator allows benefits of:

- Significantly reducing multiple image analysis and processing time
- Increasing the reproducibility of repetitive procedures by decreasing risk of inconsistency
- Facilitating comparison and evaluation of multiple data sets by standardized output
- Improving and optimizing the overall system utilizations by reducing resource consumption
- Increasing the flexibility of the system and reusability by decoupling the software components

1.1 Preface

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Batch Coordinator User Manual V 1.0

1.2 Product Overview

Batch Coordinator collects commands, that you might ordinarily issue in Imaris, into a single batch job and execute them together, rather than entering each command individually and processing each image separately.
Batch Coordinator ensures that image analysis and processing is carried out in exactly the same way, every time for every single image in a large data set.

The Batch job has four stages:

1. To start Batch processing a command sequence is created in Imaris with customized and adjusted parameter values. By default, commands will be submitted to the Batch Coordinator automatically each time they are submitted using Imaris.
2. Selecting images for processing and analysis using Batch Coordinator. Images are placed in the input file list and added to the Processing Queue. Output file names and directory were automatically generated and placed in the output file list.
3. Running Batch Coordinator, executing the complete command sequence on selected input files and collecting results in the output file list.
4. Reviewing the results.

Batch Coordinator Features

The Batch Coordinator has following features:

- Customize and standardize command sequence executed on each input file within a large data set.
- Automatically generate a new directory and output file names for each Batch job
- Pause, resume, cancel, and obtain the status for any submitted batch and/or any individual job
- Manage batch job by add or delete commands and fine-tuning parameters values
- Launch externals applications to inspect input / output data files (i.e. Imaris, or Excel)
- Runs both on Mac and Windows.

Command Sequence

A command sequence can include following commands:
- Flip, rotate, invert, convert, crop Data Set, etc.
- Crop, resample, add / delete, swap channels and time points etc.
- Change the data type, voxel size and time stamps
- Apply a Gaussian or Median filter
- Threshold Adjustment by Baseline and Background Subtraction, Threshold Cut-off, Connective Baseline
- Contrast change by Linear Stretch, Gamma Correction, Normalize Intensity
- Display Adjustment
- Spots and Surfaces analysis with Detection, Tracking and Statistics

1.3 About this Manual

This User Manual describes all the features of the Batch Coordinator software. The manual provides a description of all menu entries, display modes, functions and parameters. It is arranged into 14 Chapters as follows:

Chapter 1: Provides an introduction to Batch Coordinator, describing its function and demonstrating its basic capabilities and features.

Chapter 2: Describes the installation procedure, system requirements and licensing options.

Chapter 3: Displays the Main Screen and gives an overview of the principal areas and toolbars.

Chapter 4: Provides details of Batch Job creation. It describes the principles of Command Sequence design, explaining the benefits of creating Command Sequence using Imaris. An example with screenshots, describing how to create a Command sequence and execute a Batch job, is also included in this chapter.

Chapter 5: Describes the Menu File. This section examines the techniques for saving and implementing existing Command sequences, as well as the options for submitting and executing a Batch job on different machines.

Chapter 6: Contains information about the Menu Edit. It describes creation/deletion of Batch as well as addition/removal of Batch files.

Chapter 7: Gives an overview of Menu Control and explains how to execute a Batch job.

Chapter 8: Describes the Menu Help. It presents the commands for displaying documentation or other information about Batch Coordinator.

Chapter 9: Provides details of Batch Area and summarizes the specific elements of Batch Jobs.

Chapter 10: Discusses frequently used commands found in Batch Control Toolbars.

Chapter 11: Describes the Command/Parameter Area. It defines all the commands recognized by Batch Coordinator. In addition, it gives guidance on modifying parameter values and emphasizes the importance of ensuring correct parameter values.

Chapter 12: Discusses control shortcuts in Command/Parameter Toolbars used for managing commands in the Command Parameter area.

Chapter 13: Explains the unique features of the Spots and Surfaces commands.

Chapter 14: Describes the Output Statistics File. It provides a screenshot example of managing statistical files after executing a Batch job with the Spots and Surfaces commands.

2 Getting Started

This chapter describes:

2.1 Installation

The software is delivered on a standard CD or downloaded from www.bitplane.com. The CD includes a folder containing the necessary manuals, or the manuals can be downloaded.

Minimum hardware/software requirements are:

- Windows XP, Vista or higher
- Mac OS x10.40 or higher
- CD-ROM
- Network facilities for image import from the microscope
- 512 MB RAM (> 1 GB recommended)

Bitplane also recommends:

- A database for storing images (e.g., Image Access)

Installation

To install the software, please proceed as follows:

- Insert your Batch Coordinator CD-Rom in the computer.
- Follow the instructions on the screen.
- The installation is completed automatically.

2.2 Licensing Options

Batch Coordinator is designed as a high-throughput high-availability software that targets both individuals as well as large institutes and corporate. It provides the confidence of high-assurance trustworthy systems, in addition to the benefit of low-cost software support and maintenance, plus guaranteed long-term support through participation from a booming Imaris community. The Imaris community benefits from frequent updates, better portability to different computer systems and the ability to directly contribute through software enhancements and improvements.

Stand Alone

This licensing option allows Batch Coordinator to be placed on Mac or Windows computer system. Imaris does not have to be present and this version of Batch Coordinator does not use or depend on the licenses of Imaris. Stand alone Batch Coordinator is available in the following configurations:

- Stand-Alone up to 2 parallel jobs
- Stand-Alone up to 4 parallel jobs
- Stand-Alone up to 8 parallel jobs
- Stand-Alone up to 16 parallel jobs

- Stand-Alone up to 32 parallel jobs

Imaris Dependent

This licensing option allows Imaris batch to be placed on Mac or Windows computer system, but utilizes licenses of Imaris and its modules as part of its operation. For example, if you want to perform batch job that require tracking and the output of the statistics from those tracks, this version of Batch Coordinator would use the Imaris, Imaris MeasurementPro, and ImarisTrack licenses. The advantage of this option is that it is lower cost than the stand alone version. The Imaris dependent version of Batch Coordinator comes in two configurations:

- Imaris dependent – up to 2 parallel jobs
- Imaris dependent – up to 4 parallel jobs

2.3 Starting Batch Coordinator

Starting Batch Coordinator

It is advisable to start the Batch Coordinator either before or concurrently with the Imaris.

To open Batch Coordinator double-click on the Batch Coordinator icon.

The software opens with the main screen.

Supported File Formats

Batch Coordinator can read the following file formats, i.e. it can read the image and the parameters.

- Andor: Multi-TIFF series (*.tif, *.tiff)
- Applied Precision, Inc: DeltaVision (*.i3d, *.dv)
- Biorad: MRC-600, MRC-1024 (*.pic)
- BioVision: IPLab Mac (*.ipm)
- Bitplane: Imaris 5.5 (*.ims)
- Bitplane: Imaris 3.0 (*.ims)
- Bitplane: Imaris 2.7 Classic/Old (*.ims)
- Bitplane: Imaris Scene File (*.imx)
- Carl Zeiss: LSM 510 (*.lsm)
- Carl Zeiss: LSM 410, LSM 310 (*.tif, *.tiff)
- Carl Zeiss: Axiovision (*.zvi)
- Image Cytometry Standard: ICS - used by Nikon, Huygens, and others (*.ics, *.ids)
- Leica: TCS-NT (*.tif, *.tiff)
- Leica: LCS (*.lei, *.raw, *.tif, *.tiff)
- Leica: series (*.inf, *.info, *.tif, *.tiff)
- Leica: Image File Format (*.lif)
- Molecular Devices: Metamorph STK (series) (*.stk)
- MRC - primarily electron density volumes as in cryo-EM (*.mrc, *.st, *.rec)
- Olympus: FluoView TIFF (*.tif, *.tiff)
- Olympus: FluoView 1000 OIF (*.oif)
- Olympus: FluoView 1000 OIB (*.oib)
- Olympus: Cell^R 1.1/standard (*.tif, *.tiff)
- Open Microscopy Environment XML (*.ome)
- Open Microscopy Environment TIF (*.tif, *.tiff)
- Perkin Elmer: UltraView (*.tim, *.zpo)
- Scanalytics: IPLab (*.ipl)
- TILL Photonics: TILLvisION (*.rbinf)

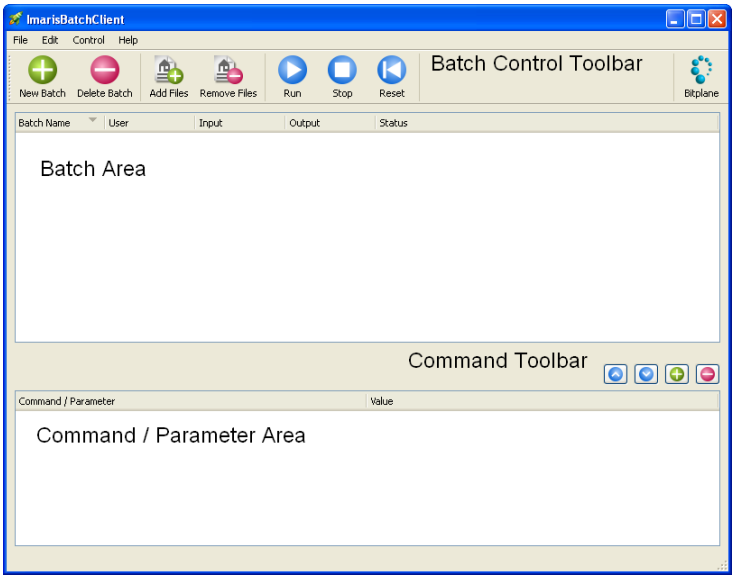
Plus it can read general TIFF series (or BMP series).

3 Main Screen

The main screen in Batch Coordinator provides the facility to build, submit and process batch jobs. The main screen is divided into two areas and has two Toolbar buttons sections:

- **Batch Area**
- **Command/Parameter Area**
- **Batch Control Toolbar**
- **Command Toolbar**

From this screen all of the batch component can be accessed, edit and managed. The menu bar at the top of the window contains the entries: File, Edit, Control and Help.
Each Main screen component is documented in more detail in the following sections.
The figure below presents the Main screen for the Batch Coordinator.



Batch area

The central area of the screen is Batch area. Batch area provides detailed specification of Batch. It contains all the information of Batch: Batch name, input and output files names, user name and Batch status information.

Batch Control Toolbar

Batch Control Toolbar contains shortcut buttons named New Batch, Delete Batch, Add Files, Remove Files, Run, Stop, Reset. These shortcuts represent the core tools available to the user. The same action can be accessed via the menu File, Edit or Control.

Command-Parameter Area

In the Command/Parameter area, for selected Batch, the Commands Sequence with the command-specific parameter Values is displayed.

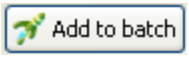
Command Toolbar

The Controls toolbars let you add or delete commands or edit the command sequence arrangement.

4 Batch Creation

Batch consist of **Command Sequence** executed on the selected **input files** as a singe command unit, and the **output files**, collected in a newly created image file or statistical files. Command sequence contain the commands with the specified parameters values. A command describes the operation you want execute on an input dataset and specifications that a command uses to perform its action are called parameters. Batch Coordinator offers a variety of available commands for Batch processing, some most frequently used ones for image processing (Gaussian filter, Threshold adjustment) and some more complex like Surface and Spot detection.
A Command sequence can be created either using Imaris or directly in Batch Coordinator.

4.1 Creating Command Sequence using Imaris

From Imaris commands with **Add to Batch button** 

can be submitted for Batch processing.

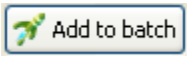
Imaris command that can be submitted to Batch are in the menu **Image Processing** and menu **Edit**. For Commands Surfaces and Spots, Imaris Creation Wizard must be used for selecting and adjusting parameters and the Tab **Creation** for submitting.

Using following procedure, Command sequence is set up in Imaris and submitted to Batch Coordinator.

1. Open an image in Imaris.

2. Select the first command that will be applied to all images.

3. Adjust the commands parameters either in the Command's window or throughout the Creation Wizard for Spots and Surfaces. The effect of the modification and parameter adjusting can be seen instantly in the image as changes are applied.

4. Submit the adjusted command to Batch coordinator by click on the **Add to Batch button** 

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- **Add to batch** button is available at the bottom of the command window.
- For Spots and Surface select the Tab Creation and **Add to batch** button is available at the bottom of the Tab **Creation** panel.

5. Repeat process for a series of command that you would like to be execute in Batch Coordinator.

Note: Bear in mind that in the Batch Coordinator commands are submitted in the Command Sequence by the order they are entered in Imaris. For example, if the command Flip and Rotate were add to the batch, the Flip action will be executed first and then the Rotate. So before progressing to the next step make sure the batch commands are ordered properly and all parameters are confirmed.

6. The last step is selecting the command **Save as** and submitting the command Save in the Batch command sequence.

7. Open Batch Coordinator.

In Batch area a New Batch will be created with automatically created User name and Batch Name. A Batch Name always match the name of the first submitted Imaris command (default option). In the Command/Parameter area the Command Sequence will contain the list of Imaris selected commands following the command Open. The last command in the Command Sequence should be the command Save.

4.2 Creating Command Sequence using Batch Coordinator

Batch job can be created alternatively in Batch coordinator, rather than selecting the commands from Imaris. Select the command New Batch in the menu File or click on the New Batch button 

and default command sequence is created. In command/parameter window the command sequence will contain the command Open.

To add a new command in the New Batch click on the Add command button  in Command/Parameter Toolbars. The default new added command is the command Open. To modify the commands of New Batch double click on the command line. An arrow appears indicating a drop down window.

From a list of commands select a new command. The command sequence is changed in accordance with the selection.

Note: In contrast to the command sequence creation by Imaris, creating a command sequence directly by Batch Coordinator sets parameters at default values. As a result, parameters will not be adjusted and optimized to fit the Batch process and analysis specific requirements. Therefore, it is highly advisable to create Batch job with a command sequence and adjusted parameters using Imaris. Please refer to the Chapter Values for the additional reference.

4.3 Batch job

To complete Batch job the input files must be added by clicking on the button Add Input files. All selected files will be added to the Input and Output files will be generated automatically and added to the Output file list.

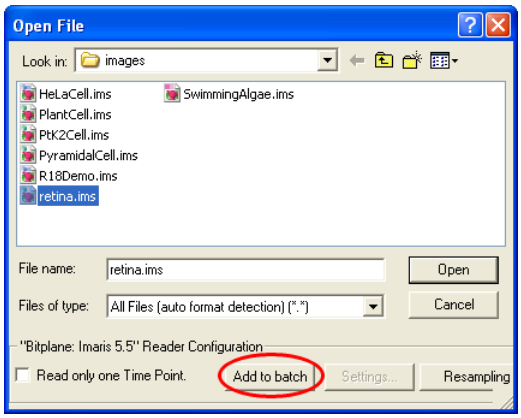
To initialize a Batch select the command Run. The Command sequence will be executed on the all input files. The resulting image and statistical files will be collected and saved in the output file list.

4.4 Example

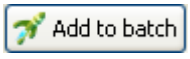
In this example the compete procedure for setting and executing Batch will be presented. You will start with creating the Command sequence containing the commands Rotate and Gaussian Filter with adjusted parameters in Imaris. Than selection of the Input files and output file list creation will be described, followed by description of starting a Batch job. The last part will illustrate how the batch resulting files can be reviewed.

Command Sequence Creation

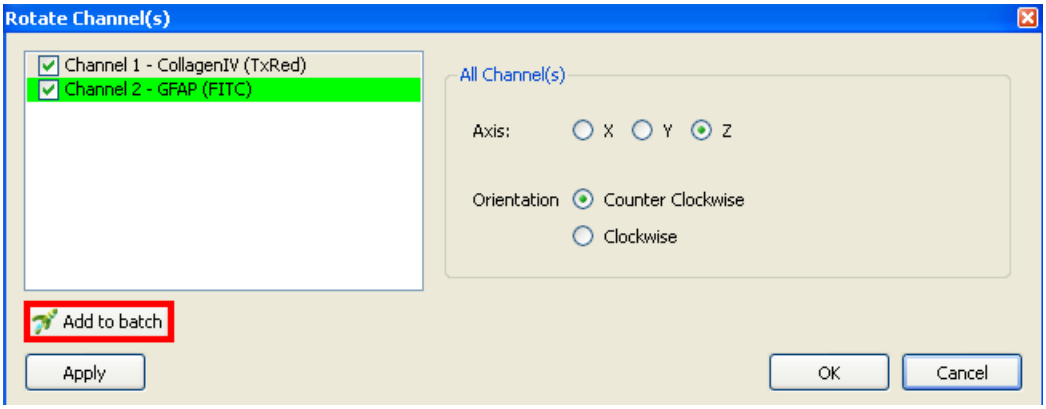
Open Imaris. In the menu File select the command Open. Select the data set Retina. Click on the **Add to Batch** button and than open the image Retina.
A Retina image is displayed in Imaris Main screen.

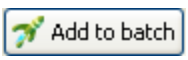


In the menu **Image Processing** and select the command **Rotate**.
A Rotate Channels window will appear and select the Counter-clockwise rotation direction of all channels along the Z axis.

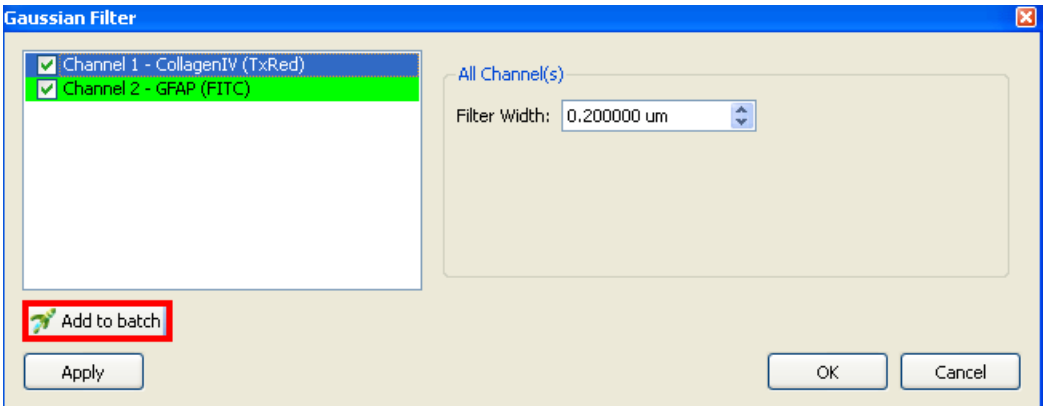
Click on the Add to Batch button 

submits the command into Batch Coordinator.

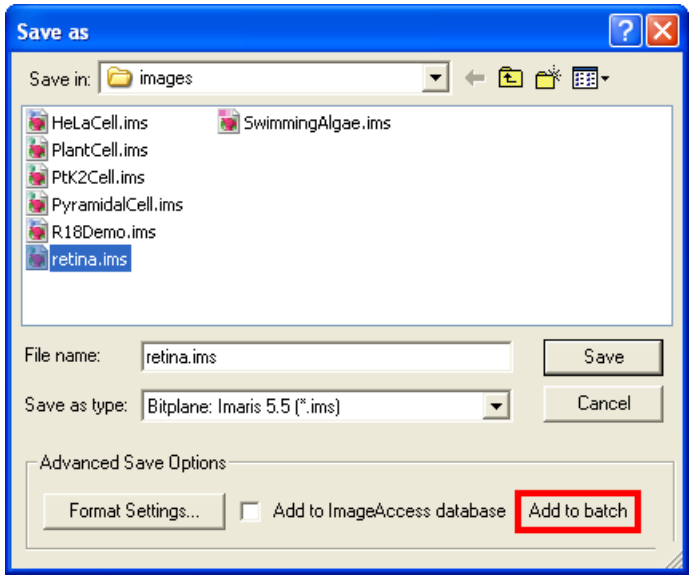


In the menu **Image Processing** and select the command **Gaussian filter**. In Gaussian filter window select both channels and enter 0.2um as a Filter Width value. Click on the Add to Batch button 

submits the command into Batch Coordinator.



The last step in creating the Command Sequence in Imaris is selecting the commands Save as. Click on the Add to batch button and the command Save is added in the command Sequence in Batch Coordinator.



Batch Coordinator

Open a Batch Coordinator 

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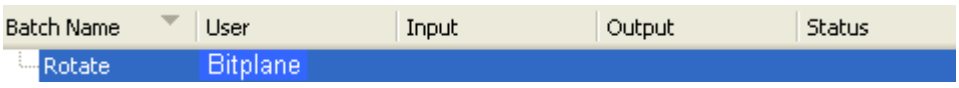
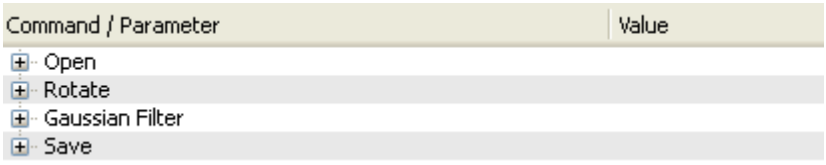
A New Batch with User Name and Batch Name-Rotate is automatically created and displayed in Batch area.

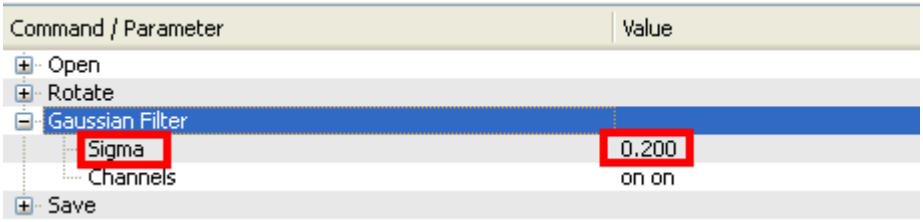


In the Command Parameter area the Command Sequence is displayed. In the command sequence the commands are in the same order as submitted by Imaris.



To demonstrate the principle of submitting the parameter values from Imaris to Batch coordinator click on the

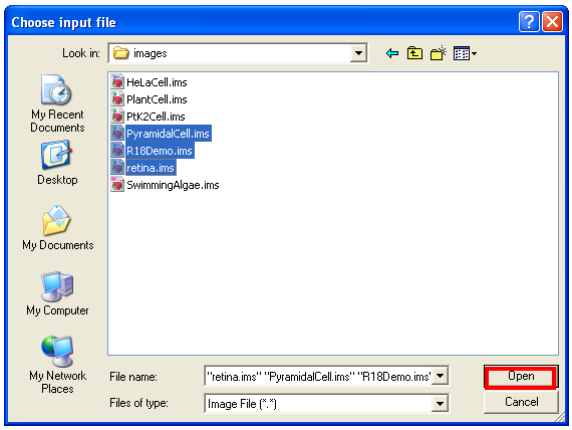
(+) symbol next to the command **Gaussian filter**. On the expanded command line all parameter values are available . The value for parameter **Sigma** is set to be 0.2 um as set by Imaris for **Filter Width** in Gaussian filter window. The value for Parameters Channel parameter is **on on** (filter be applied to the both channels).



Input files

The next step in is selecting all files that will be processed with the created Command sequence. Click on the Add files Button 

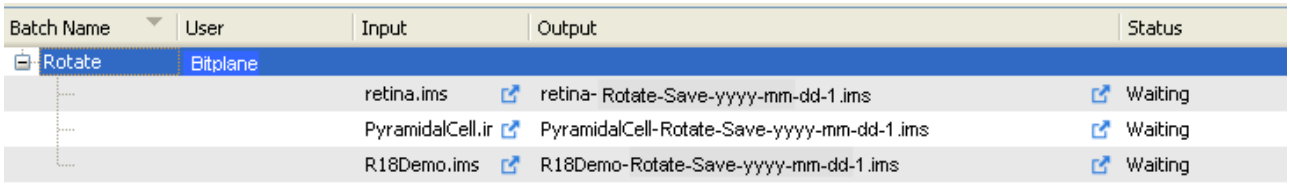
and the input files winnow appears.



Select all files for Batch execution and click on the Open. The selected files will be added to the Input list in Batch area.

Output Files

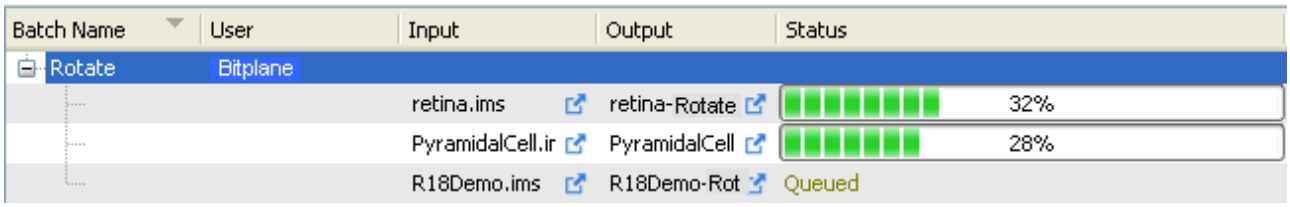
The Output files names and directory will be generated automatically and added to the Output file list. All output files will be placed in the same directory as the input file, in the **new folder**, called **batch output**. The output files names are created in accordance with the rule of output filename.



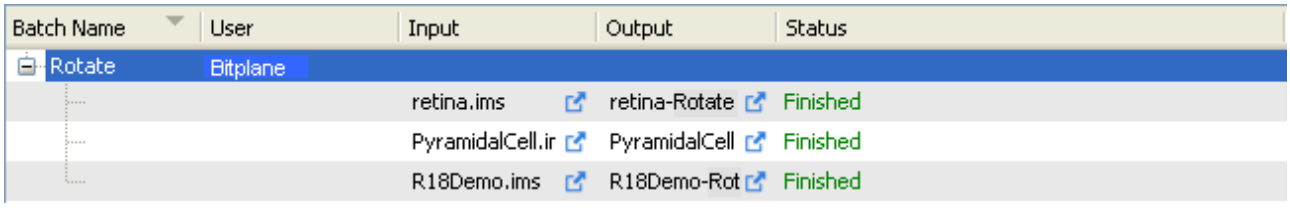
Starting Batch Job

To start a Batch job click on the icon Run 

. By Running Batch Coordinator, the complete command sequence is executing on all input files and Batch processing results are collected and stored in the output file list. In status line massage Queued for all file waiting to be executed.

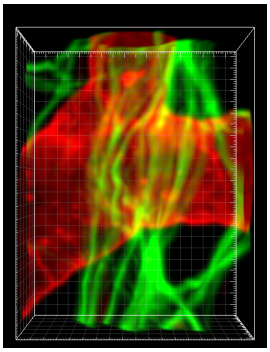


Completed batch job are marked Finished and remain in the batch display.

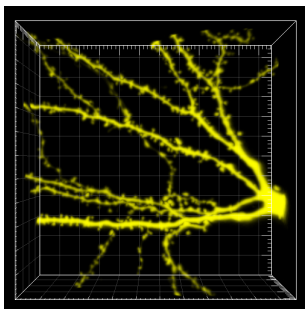


Reviewing results

To verify results click on the quick open icon  next to a Retina output file. Imaris as externals applications will be launched and processed Retina data set will be displayed.



Additionally resulting files can be open in Imaris, by selecting the batch-output folder and opening the select file. Select the PyramidallCel-Rotate-yyyy-mm-dd-1.ims and the Pyramidal cell image is displayed in the viewing area after the batch processing.



5 Menu File

The Menu **File** has the following commands and shortcuts:

New Batch	(Ctrl+N or Cmd+N)
New Batch from command Sequence	(Ctrl+O or Cmd+O)
Save command sequence	(Ctrl+S or Cmd+S)
Import Batch	
Export Batch	
Exit	(Ctrl+ Q or Cmd+Q)

5.1 New Batch

In the menu **File** click on the **New Batch.** A Batch structure will be created in the **Batch area** with automatically created Batch Name-**New Batch** and user name. In the Command/parameter area command sequence will contain the command Open. The same action can be achieved by clicking on the 

New Batch button in the Batch Control Toolbar.

Note: To initialize a Batch job the input-files must selected and added.

5.2 New Batch from Command Sequence

To set up a new Batch based on the existing **Command Sequence** select the **New Batch from command Sequence** in the menu **File**. The window Open command sequence will appear.
Select the command sequence from the list and click on **Open** or double-click on the requested file entry.
As a result, the selected command sequence is loaded. In Batch area, the Batch structure is created (Batch Name match the name of the first command) based on the Command sequence already saved.
Please refer to the Chapter Commands for more information about the organization and modification of the Commands Sequence.

5.3 Save Command Sequence

Save command sequence saves the command sequence with set of parameter values. It provides the advantage of a faster creating new **Batch** and the possibility of reusing standardized and complex Commands Sequences, therefore saving time and increasing reproducibility of data processing.
Select the **Save command sequence** option in the menu **File**. This will open the Save command sequence window.
Select the directory and enter a name for the command sequence to be saved or confirm the suggestion. Click **Save**.
The Command sequence is saved and available to be later used in creating New Batch process.
The default command sequence extension is *. **bcx**.

5.4 Import Batch

This option allow to rerun the same **Batch** or to import data from outside your Batch Coordinator system.
Select the **Import Batch** in the menu **File**. An import Batch window will appear. Click on **Open** or double-click on the select the Batch from the list.

A new Batch job is containing the command sequence with the input and output file list added to Batch area.
The default Batch file extension for is ***bjx**.

5.5 Export Batch

Export Batch allows Batch to be saved and letter executed, exchanged with another Batch user or mailed for a question for the support team.
Select the Batch you would like to **Export**. Select the **Export Batch** in the menu **File** and the Export Batch window will be open.
Select the directory and enter a name for the Batch to be exported or confirm the suggestion and then click on **Save**.
The default Batch file extension for is ***bjx.**

5.6 Exit

Terminates Batch Coordinator.

Note: Batch Coordinator saves automatically current setting (Command Sequences and files) even after exiting the program.

6 Menu Edit

The Menu **Edit** has the following commands and shortcuts:

New Batch	(Ctrl+N or Cmd+N)
Delete Batch	
Add Files...	(Ctrl+M or Cmd+M)
Remove Files	
Select All	(Ctrl+A or Cmd+A)
Select None	
Preferences	(Ctrl+P or Cmd+P)

6.1 New Batch

In the menu **Edit** click on the **New Batch.** Batch structure will be created in **Batch area** with automatically created **Batch Name-New Batch** and user name. In the Command/Parameter area command sequence will contain the command Open. The same action can be achieved by clicking on the 

New Batch button in the Batch ControlToolbar.

Note: To initialize a Batch job the input-files must selected and added.

6.2 Delete Batch

This option allows deleting selected Batch.
Select the Batch to be deleted. The batch will be highlighted in Batch area.
In the menu **Edit** select the option **Delete Batch**. Selected Batch will be removed.
The same action can be achieved by clicking on the 

Delete Batch button in the Toolbar.

6.3 Add Files

To Add files for Batch processing select in the menu **Edit** and choose **Add Files**. The **Choose input files** window appears. Select the single file to batch or multiple files with ctrl or shift key. The selected files will be added to the Input list and the output files will be generated automatically and added to the Output file list.
Refer to the Chapter Preference for the further information about modifying output file name and directory.
The same action can be achieved by clicking on the 

Add Files button in the Toolbar.

To modify the input file files list click on the line to select the file and either click on the Remove File Button or in the menu Edit select the option Remove File.

Note: The input files added to the Batch Coordinators have properties defined by acquisition. These image properties effect how files could be processed.

6.4 Remove Files

This option allows deleting of the files.
Select the Batch and within the files to be deleted. The files will be highlighted in Batch area.
In the menu **Edit** select the option **Delete Files**. The selected files will be removed from the Input and Output columns.

The same action can be achieved by clicking on the 

Remove Files Button from Batch Toolbar.

6.5 Select All

The **Select All** command will create a new selection that includes all the Batch jobs in **Batch Area**.

6.6 Select None

Select None cancels all selections. If nothing is selected, this function will perform no action.

6.7 Preferences

The Preferences dialog allows you to customize various settings and to customize Batch environment setting.
Any changes you make to the Batch Preferences settings take effect in image processing.

Batch Agent Path

The preference option is set in conjunction with Imaris at the time of installation. It is advised that only the system administrator has access to it, since any change can have serious effect on the system if incorrectly set.

Browse

Click **Browse** to choose the new directory

Number of commands

Number of commands will verify altered directory of Batch Agent Path.

Reload

Data Cache limit (MB):

Batch Coordinator uses a data caching mechanism that allows you to process images that are significantly larger than the physical memory (RAM) installed in the computer system. This mechanism writes image data blocks to the disk and reads them back into the physical memory when they are needed.

Memory Limit (MB)
The value of “data cache” limit controls the amount of data blocks Batch Coordinator will keep in memory at any time.

Maximum Number of instances

Default setting defined by license type and by default is set to be maximum available number. Inserting a smaller number limits the numbers of CPU and permitting use of another applications.

Batch setting

Batch Job path

The preference option is set in conjunction with Imaris at the time of installation. It is advised that only the system administrator has access to it, since any change can have serious effect on the system if incorrectly set.

Browse

Click **Browse** to choose the new directory

Coordinator path

The preference option is set in conjunction with Imaris at the time of installation. It is advised that only the system administrator has access to it, since any change can have serious effect on the system if incorrectly set.

Browse

Click **Browse** to choose the new directory

Remote address installation

The preference option is set in conjunction with Imaris at the time of installation. It is advised that only the system administrator has access to it, since any change can have serious effect on the system if incorrectly set.

Default output name

This preference can be adapted and changed by all users. Preferences allow you to define default directory of output files as well default output file name. The default location is the input file directory. In a input file directory, a new folder is created with the name is **batch output**. The default output file name is created by the input file name with addition of Batch and the command name, date stamp and file number. The output file extension is predetermined by the type of batch file being created.

<source_path>/batch-output/<source_name>-<batch_name>-<command_name>-<year>-<month>-<day>-<file_no>.<default_ext>

Select the option **Default Output Name** and you can save output file in the directory you specify.

All Output filename will be changed according to the rule user has selected.

Note Both forward (/) and backward slashes can be used (\) and be mixed in the same filename without problems.

Jobs file name

The preference option is set in conjunction with Imaris at the time of installation. It is advised that only the system administrator has access to it, since any change can have serious effect on the system if incorrectly set.

Browse

Click **Browse** to choose the new directory

OK button

To confirm any changes in Preference setting click on the **OK** button.

Cancel

If you make changes but decide not to use them, click on **Cancel**.

7 Menu Control

The Menu **Control** has the following commands and shortcuts:

Run	(Ctrl+R or Cmd+R)
Pause	(Ctrl+U or Cmd+U)
Stop	(Ctrl+T or Cmd+T)
Reset	(Ctrl+D or Cmd+D)

The **Control** commands will be performed on the selected entry (either files or entire Batch job).

7.1 Run

Start an execution of batch process by selecting the command **Run** in the menu **Control**. The Command sequence will be executed on all of the input data set files.

The same action can be achieved by clicking on the 

Run Button in Batch Toolbar.

7.2 Pause

Pause a batch process by selecting the command **Pause** in the menu **Control**.
When batch is running, it can be paused by selecting the **Pause** command. As a result the percentage of finished job and message Paused will be displayed in the Status column.

7.3 Stop

When batch is running by selecting the option **Stop** in the menu **Control** an execution of batch process is stopped. Currently running Batch jobs will be canceled and returned to "un-executed" state. In the Status column Waiting will be displayed.

The same action can be achieved by clicking on the **Stop button** 

in Batch Toolbar.

7.4 Reset

In the menu **Control** select the option **Reset** and finished batch process will be restored to an "un-executed" state. This option allows modifying Batch job by inserting a new command in the command sequence or new input files.

The same action can be achieved by clicking on the 

Reset button in Batch **Toolbar.**

8 Menu Help

The Menu **Help** has the following commands:

User Manual

Bitplane AG

About Batch Coordinator

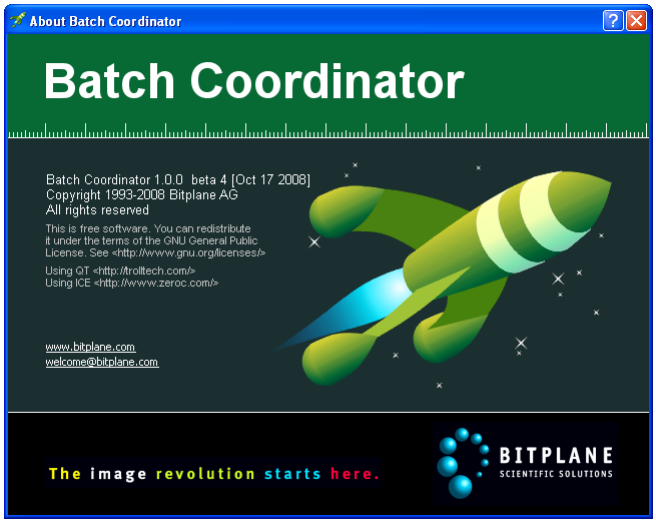
8.1 User Manual

The User Manual provides you with the basic information about Batch Coordinator: The menu(s), the different Batch Coordinator views and all adjustable parameters in the program. To find a specific parameter use the "Search function" in the online version of the User Manual.

8.2 Bitplane AG

If your computer is connected to the Internet, Batch Coordinator can directly open the Bitplane AG homepage (www.bitplane.com).

8.3 About Batch Coordinator



9 Batch Area

Batch area summarize all information related to Batch jobs. It contains following columns:

Batch Name
User Name
Input file list
Output file list
Status column

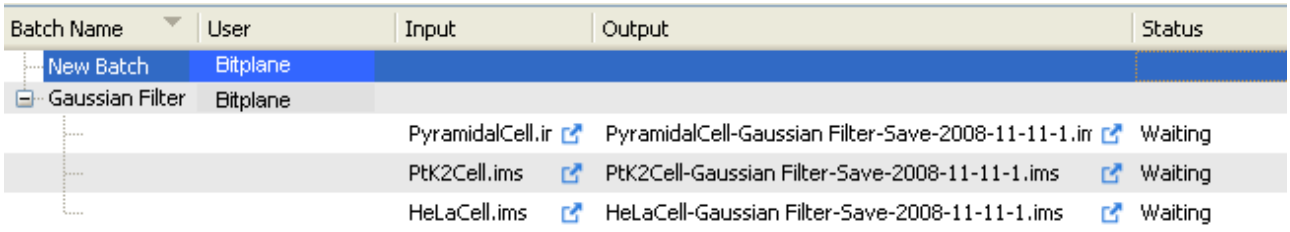
9.1 Overview

In **Batch Area** the hierarchical structure provides information on existing and completed batches.

To expand the Batch and display Batch specific details, click on the plus symbol (+) next to **Batch Name**. The selected Batch is expanded, displaying the batch name, all input and output file names within the batch, the name of the user who submitted the batch, and status line.

Click on the minus symbol (–) next to Batch name to collapse the content and only Batch and user names will be displayed.

The Command Sequence of the currently selected Batch is displayed in the Command Parameter area.



9.2 Batch Name

When Batch and Command sequence is created using Imaris, by default a **Batch Name** is corresponding to the name of the **first** selected **command**.

In the case when Batch and Command sequence is directly created Batch coordinator using the menu File, Edit or New Batch button, default option for Batch name is **New Batch.**

In order to change **Batch Name** double click on it and enter a new, customized name.

9.3 User

Automatically generated each time when new batch is created by user login session.

9.4 Input file

Displays the list of all the files selected for the Batch processing.

To verify and confirm the input file selections double click on the quick open icon next to file name. The input file is open in Imaris in a new window.

To remove file from the input file list click on the line to select the file and either click on the **Remove File** button or in the menu Edit select the option Remove File.

Advance users option

Input files column could be also modified in the Command Area. Expend command line Open by clicking on the plus symbol (+) next to command name. The command is expended and Parameter **File** displays the file name in **Value** column.

Input file name or directory could be changed either by:

1. Entering in the **Value** column the full path to the new directory along with a new file name, or
2. Double click on the open file icon . Open File Window will allow selection of the new file name or new destination folder.

Please refer to the Chapter Commands-Open for the additional information about the input files.

9.5 Output File

The Batch Coordinator can generate a variety of different output files and therefore rule must be adopted to prevent output file names from colliding. Secondly, in the Batch Coordinator the organization of creating output file names differ.

These two issues have combined resulted in the sophisticated but straightforward method in which Batch Coordinator handles the output file names creation.

Output file column

Displays the list of all pending or created files as a result of Batch processing.

To view and re-examine the changes in output file double click on the quick open icon  next to file name.

It open output files by launching external application in a new window.

9.5.1 Output File Names

In Output column file names and directory are automatically generated in accordance with the rule of output filename.

Output Files Directory

All output files will be placed in the same directory as the input file, in the **new folder**, called **batch output**.

Output File Names

The Output file names generated by using a naming rule comprised of the following:

By default the output file name is automatically generated from **input file name** using suffixes **batch name**, **command name**, **date stamp** and **file number**.

The output files inherit the **input file name** as a fist part of output file name.

The next part in output file name will be replaced by the **Batch Name**. Please refer to the Chapter Batch Area-Batch Name for the complete details on setting the Batch name.

The next part of the output file name is the command name. Only commands linked with the generating output files can appear as a **command name**. Therefore, only the commands **Save**, **Spots** or **Surfaces** (which generate output files) can appear as the command name in the output file name. Please refer below to Output file types and formats for more details.

The output file name is determined by **date stamp**, the year (yyyy), month (mm) and day (dd) of the files

added in the Batch in format **yyyy-mm-dd**, and **number** of the output files crated.
User can change value of this column by changing the rule in the menu Edit-Preference, or edit items one by one in the Command/Parameter Area.

Output file types and formats

Output file types and formats depend on the commands specified to be executed in Batch job. Formats the output files are:
1. Images with extension IMS for Imaris files
2. Images with extension IMX for Imaris Scene
3. Statistical files with the extension XLS for Excel files
4. Statistical files with the extension CSV for data presented as comma separated values.

All files with extension IMS are generated by the command Save regardless of preceding commands in the command sequence. The output file name of files with extension IMS will contain Save as the command name.
All files with extension IMX and XLS are generated either by the command Spots or Surfaces regardless of preceding commands in the command sequence.
The output file name of files with extension IMX and XLS will contain Spots or Surfaces as the command name.
All files with extension CSV are statistical files and generated after executing the command **Merge Csv Statistics** [**Post**].
Please refer to the Chapter Output Statistics File for more information about the statistical files.

Advance users option

Files in Output column could be also modified in the Command/Parameter Area. Expend the command line Save by clicking on the plus sign next to the command name. The command is expended and Parameter **File** displays the file name in **Value** column.
Output file name or directory could be changed either by:
1. Entering in the **Value** column the full path to the new directory along with a new file name, or
2. Double click on the open file icon . Open File Window will allow selection of the new file name or new destination folder.

Multiple output files (statistical files and Imaris scene) can be created by selecting the commands: Spots or Surfaces.
For further information about statistical files presentation please refer to the Chapter Output Statistics File and the Chapter Commands-Save for the output file presentation and arrangement.

9.6 Status

The Status line displays and reports the full status messages on any batch. Possible values for the status of a job include: **Waiting, Queued, Crashed** and **Finished.**
For unprocessed files in Status line message is **Waiting**.
After starting a batch job percentage of execution is displayed with bars indicating the amount of progress. When the progress bar reaches 100 percent, the file has been successfully processed, all the commands

executed and the output file saved in the designated folder. In the status line massage **Queued** is for all file waiting to be executed. Completed batch job are marked **Finished** and remain in the batch display.Unsuccessful batch and job items are marked **Crashed** and remain in the batch display.

10 Batch Control Toolbars

Batch Control Toolbars has following buttons:

New Batch 

Delete Batch 

Add Files 

Remove Files 

Run 

Stop 

Reset 

10.1 New Batch

Click on the **New Batch** icon 

. Batch structure will be created in **Batch area** with automatically created **Batch Name-New Batch** and user name. In the Command/Parameter area the command sequence will contain the command Open.

The same action can be achieved with selecting the New Batch command in the menu File or Edit.

Note: To initialize a Batch job the input-files must selected and added.

10.2 Delete Batch

This option allows deleting selected Batch.

Select Batch to be deleted. The batch will be highlighted in Batch area. Click on the 

Delete Batch button and selected Batch will be removed.

The same action can be achieved with selecting the **Delete Batch** in the menu **Edit**.

10.3 Add Files

To Add files for Batch processing click on the **Add Files** Button 

. Choose input files window appears. Select the single file to batch or multiple files with ctrl or shift key. The selected files will be added to the Input list and the output files will be generated automatically and added to the Output file list.

The same action can be achieved with the option Add Files in the menu **Edit**.

To remove input file click on the line to select the file and either click on the **Remove File** Button 

or in the menu **Edit** select the option Remove File.

Note: Input files added to the Batch Coordinators have properties defined by acquisition conditions and they affect how files could be processed.

10.4 Remove Files

This option allows deleting selected Files.

Select the Batch and files within to be deleted. In Batch area the files will be highlighted. Click on the **Remove Files** button 

. The selected files will be removed from the Input and the Output file list.

The same action can be achieved with selecting the option **Remove Files** in the menu **Edit**.

10.5 Run

Start an execution of batch process. Click on the **Run Button** 

and the Command sequence will be executed on all of the input data set files.

The same action can be achieved with selecting the Run in the menu **Control**.

10.6 Stop

When batch is running by clicking on **Stop** button 

an execution of batch process is stopped. Currently running Batch jobs will be canceled and returned to "un-executed" state. In **Status** column Waiting will be displayed.

The same action can be achieved with selecting the Stop in the menu **Control**.

10.7 Reset

Click on the **Reset** button 

and finished batch process will be restored to an "un-executed" state. This option allows modifying Batch job by inserting new a command in the command sequence or new input files.

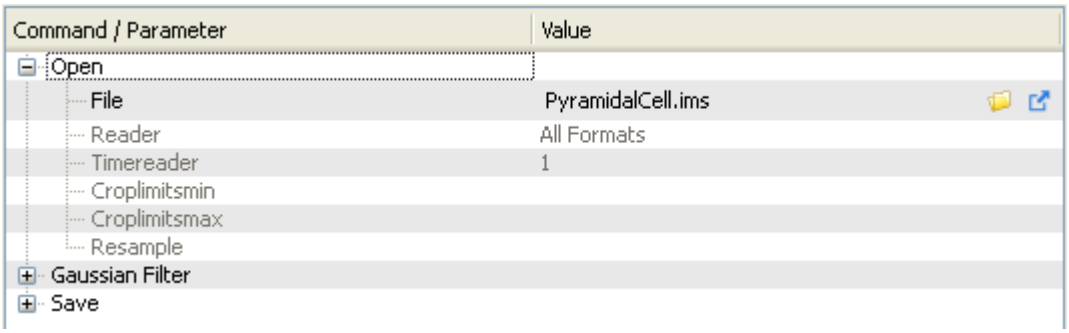
The same action can be achieved with selecting the **Reset** in the menu **Control.**

11 Command/Parameter Area

This chapter describes all commands that are recognized by the Batch Coordinator.
Commands could be defined as a set of actions executed on each file in the input file list. Information and specifications that a command uses to perform its action are called parameters. In simple terms, the command is what is done; the parameter is how it does it.
All commands supported by Batch Coordinator are closely associated with the commands in Imaris.

11.1 Overview

In the Command Parameter Area the Command Sequence of the selected Batch is displayed.
A full list of the commands is accessible by double click on the command line. An arrow appears indicating a drop down window with a list of all Batch Coordinator available commands.
In the Commands/Parameter Area the hierarchical structure of a Command Sequence provides information about the currently selected command.
To expand the Command sequence, click on the (+) symbol next to the Command Name. The selected command line is expanded, displaying the all the parameters values specific for the selected command. Click on the (-) symbol next to the Command name to collapse the content and only the Command name is shown.
To change order of Commands in the sequence the **Up** and **Down** buttons of Command/Parameter Toolbars can be used.
When the command is expanded double click on the Value column (in parameter line) to fine-tune the values within the command.
Note: For each command in the Parameters collection, a **Value** must be set from a specific list of choices. Please refer to the Chapter Values for the possibilities and risks of modifying command values.



11.2 Commands

Following Commands are available in Batch Coordinator.

Open
Save
Flip
Rotate
Channel Shift
Gaussian Filter
Median Filter
Linear Stretch
Gamma Correction
Invert

Normalize Layers
Baseline Subtraction
Threshold Cutoff
Background Subtraction
Connective Baseline
Display Adjustment
Set Coordinates
Set Time Points
Add Slices
Add Channels
Add Time Points
Delete Slices
Delete Channels
Delete Time Points
Crop 3D
Crop Time
Resample Time
Resample 3D
Change Data Type
Swap Time and Channels
Swap Time and Z
Spots
Surfaces
Matlab
Merge Csv Statistics Post

Please refer for a more detailed description of the commands and parameters to the Imaris Reference Manual .

11.2.1 Open

By default set to be the first command in the command sequence created either by Batch job Creation in Imaris or directly in Batch Coordinator.

Expend the command line Open by click on the plus sign next to the command name. The command is expended and Parameter File displays the file name in the Value column.

Input file name or directory could be modified either by:

1. Entering in the Value column the full path to the new directory along with a new file name, or
2. Double click on the open file icon . Open File Window will allow selection of the new file name or the new destination folder.

To verify and confirm input file double click on the quick open icon  next to file name. It open input files with Imaris (standard application) in a new window.

11.2.2 Save

In order to save output file from Batch job it is necessary to include Save as the last command in the command sequence. The command Save is determining extension and part of the file name of the output files.

All files with extension **IMS** are generated by the command Save regardless of preceding commands in the command sequence.

The output file name of files with extension **IMS** will contain **Save** as the **command name** in the output file name.

Expend the command line Save by click on the plus sign next to the command name. The command is expended and Parameter File displays the file name in Value column.

Output file name or directory could be changed either by:

1. Entering in the Value column the full path to the new directory along with a new file name, or
2. Double click on the open file icon . Open File Window will allow selection of the new file name or new destination folder.

To verify and confirm output file double click on the quick open icon next to file name. It open output files with Imaris (standard application) in a new window.

11.2.3 Flip

Flip image channels either as a group or individual channels in x, y z direction.

11.2.4 Rotate

Rotates image channels either as a group or separately in Counter Clockwise, Clockwise orientation.

11.2.5 Channel Shift

Allows moving channels relative to one another.

11.2.6 Gaussian filter

The Gaussian filter smoothes the image. The filter value can be applied separately to any of channels or to all of them.

11.2.7 Median Filter

The Median Filter replaces the intensity of each voxel with the statistical median of the intensities of neighboring voxels. The filter value can be applied separately to any of channels or to all of them.

11.2.8 Linear Stretch

Linearly extending image contrast to the new limits. Minimum and Maximum value can be applied separately to any of channels or to all of them.

11.2.9 Gamma Correction

Intensifying the gray value of a specific range of voxels.

11.2.10 Invert

Inverting all channels individually or all together.

11.2.11 Normalize Layers

Normalize Layers individually or all together.

11.2.12 Baseline Subtraction

Baseline Subtraction subtracts the baseline value from the intensity of every voxel in the image. The value can be applied separately to any of channels or to all of them.

11.2.13 Threshold Cutoff

Threshold compares the intensity of every voxel in the image to the threshold value. The voxel intensity values below are assigned new intensity, a threshold value new. The Threshold Cutoff values for the channels may differ.

11.2.14 Background Subtraction

Applies a Gaussian filter to define the background at each voxel and then performs a Baseline Subtraction of this variable background. The filter value can be applied separately to any of channels or to all of them.

11.2.15 Connective Baseline

The Connective Baseline works with two, a lower and an upper, threshold values. It applies these thresholds to divide the image into regions and then processes each region with a Baseline Subtraction using either the lower or the upper threshold. The threshold values can be applied separately to any of channels or to all of them.

11.2.16 Display Adjustment

The Display Adjustment manages channel visibility, controls opacity and limits color contrast range.

11.2.17 Set Coordinates

Defines image coordinates.

11.2.18 Set Time Point

Manages file time stamp, modification and last accessed time.

11.2.19 Add Slices

Adding image slices. Data sets must correspond in image dimension, channels and time points.

11.2.20 Add Channels

Adding channels extend or complete the data set information. Data sets must correspond in image dimension, channels and time points.

11.2.21 Add Time points

Adding time points to the data set. Data sets must correspond in image dimension, channels and time points.

11.2.22 Delete Slices

Deletes slices from data set.

11.2.23 Delete Channels

Deletes channels from Data set.

11.2.24 Delete Time Points

Deletes time points from Data set.

11.2.25 Crop 3D

Cropping unwanted parts of an image reducing data set down to the region of interest.

11.2.26 Crop Time

Reducing the total number of time points at the beginning or end of the series of images.

11.2.27 Resample Time

Reducing the total number of time points, displaying the images at a faster speed.

11.2.28 Resample 3D

Reducing the voxel density in a data set, but keeping the original relationship between the voxels.

11.2.29 Change Data Type

Changing data type from current display to 8, 16 or 32 bit.

11.2.30 Swap Time and Channels

Exchanging the t-axis and the channels and re-formatting the image.

11.2.31 Swap Time and Z

Exchanging the t-axis and the z-axis and re-formatting the image that the time dimension is mapped onto the z-axis and the z-dimension is mapped onto the t-axis.

11.2.32 Spots

Multiple step procedure for automatic detection of point-like structures. Please refer to the Chapter Spots and Surfaces for further information and Imaris Reference Manual for Spots Creation Wizard.

The command Spots is determining extension and part of the file name of the output files.

All files with extension **IMX** and **XLS** are generated by the command Spots regardless of preceding commands in the command sequence.

The output file name of files with extension **IMX** and **XLS** will contain **Spots** as the **command name** in the output file name.

11.2.33 Surfaces

Multiple step procedure for automatic detection and creation of artificial solid objects. Please refer to the Chapter Spots and Surfaces for further information and Imaris Reference Manual for Spots Creation Wizard.

The command Surfaces is determining extension and part of the file name of the output files.

All files with extension **IMX** and **XLS** are generated by the command Surfaces regardless of preceding commands in the command sequence.

The output file name of files with extension **IMX** and **XLS** will contain Surfaces as the **command name** in the output file name.

11.2.34 Matlab

Developing and integrating of custom algorithms specifically tailored to scientific applications. A variety of function is offered: Data set, Spot, Filament, Track, Surface, Camera, Stereology functions. Available only for Windows.

11.2.35 Merge Cvs Statistics Post

Merge all batch statistical **CSV** files with matching **statistical variables** in to one combined file. Please refer for a more detailed description of the command to the Chapter Output Statistics File.

11.3 Values

Batch should be able to be run unattended. To obtain correct values for batch processing, it is important to ensure that the values are corresponding correctly to the image setting in every regard. Therefore, it is absolutely critical that values are checked in Imaris. Test and verify all the command parameter values in the

Imaris before placing them in a batch process. The simplest method of setting correct variables for a command sequence is to open Imaris and create a New Batch with the selected Imaris Commands. Please refer to the Chapter Batch Creation for the additional references.

Manual parameter value entry

Double clicking on the value will open a field, highlight it blue, into which a new value can be entered. The new selected value will be automatically displayed in the parameter lines. If the value of the parameter entered is not lying within the boundaries covered by the image processing and analysis requirements, **no error message** will be displayed. Therefore is essential to ensure that command parameters lines contain the correct value.

Risks and Cautions

Avoid editing batch commands values directly in Batch Coordinator. In order for the batch file to work correctly, parameters must be set in accordance with **image acquisition** and **exactly fitting processing** and **analysis requirements**. Replacing and adjusting variables directly in a batch file could result in Batch job not execute properly, as the batch command act in accordance with the parameters entered. Because batch process is operating automatically, if parameter values are used incorrectly, any command can stop the process without necessarily giving the user any indication there is a problem.

Note: Parameter values are **case sensitive**.

12 Command/Parameter Toolbars

Bringing users the control of the Command/ Parameter area. Use the command toolbars to move up or down commands through the command sequence or to add or delete commands in the command sequence. The changes can be seen directly in the command list.

Up

 Move the selected command up in the command sequence.

Down

 Move the selected command down in the command sequence

Plus

 Add a new command to the existing command sequence. The new added command by default is the command Open. To modify the command double click on the command line. An arrow appears indicating a drop down window. From a list of commands select a new command. The command sequence is changed in accordance with the selection. Please refer to the Chapter Values for the guidelines for modifying command values.

Minus

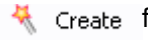
 Remove the command from the command sequence.

Please refer to the Chapter Commands Value for the additional information and advices.

13 Spots and Surfaces

The commands Spots and Surfaces have many similarities to the other Batch commands, but there are some distinct differences that need to be taken into account when creating Batch job containing the Command sequence with the commands Spots or Surfaces.

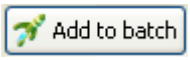
Due to the Commands complexity, it is essential to create the Commands sequence with the commands **Spot** and **Surface** using the Spots and Surfaces **Creation Wizard** in **Imaris.**

In Imaris, adjust commands parameters throughout the Creation Wizard 

for Spots and Surfaces.

The effect of the modification and parameter adjusting can be seen instantly in the image as changes are applied.

After completion of the Creation Wizard, select the Tab Creation  and all the parameters values are displayed.

Click on the Add to Batch button 

at the bottom of the Tab Creation panel.

Like other commands, Spot (or Surface) is submitted in the Command sequence and listed in the Command/Parameter area.

Please refer to the Chapter Batch Creation for the additional references.

Note: The commands Spots or Surfaces are creating **multiple output files** from a single input file.

Two generated output files are: Imaris scene with, extension IMX, and Statistical file, with extension XLS .

Please refer to the Chapter Output Statistics File for the additional information about statistical files and Chapter Output File for the output file presentation and arrangement.

14 Output Statistics File

In Batch Coordinator all files with the XLS extension are used to save statistical tabular data. Statistical files are generated either by the commands Spots or Surfaces.

XLS Statistical File Output

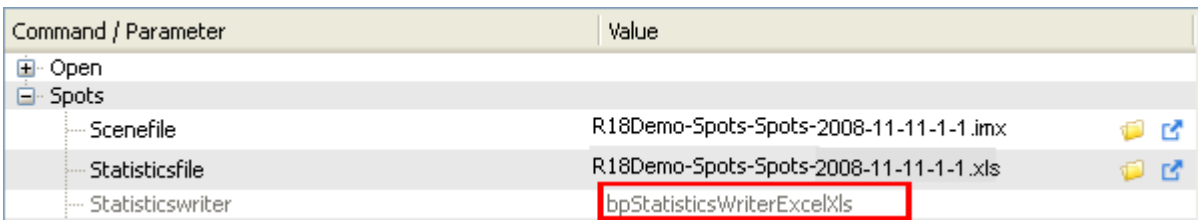
After executing Batch job all statistical files will be in the **batch output** folder. For each individual input file one new **XLS file** is created within the **batch output** folder. Excel files will be organized in spreadsheets, one for each individual statistical variable. (Refer to the Chapter Output files for the additional information about the output files name and directory). Therefore, a Batch job, containing in the Command Sequence the commands Spots or Surfaces, applied to the multiple input files, generate as a result multiple statistical files. As a consequence a large number of the statistical files must be processed and analyzed.
Batch Coordinator provides merger option of combining multiple statistical files and creating the statistical output summaries.

Merger of multiple statistical files

Merger of the multiple statistical files is possible by changing the type of statistical output files from Excel file (XLS) to comma-separated values (CSV) files.
A merger of CSV files is facilitated by the uniform structure within the **CSV statistical folders** and standardized file naming. The merge command will fuse together from all **CSV statistical folders** all **CSV files** with matching **statistical variables** (area, volume, intensity).
The following steps are used to change the statistical file output and combine **image related XLS file** into a **statistical variable clustered CSV files**. Please proceed as follows:

Statisticswriter

Expand the command Spots (Surfaces) by clicking on the (+) symbol. The parameter list is displayed.
In the Scenefile line the value is the name of batch resulting image file, Imaris Scene with extension .IMX. (Refer to Chapter Output files for generating output files name). In the Statisticsfile line the value is the name of batch resulting Excel (XLS) statistic file.
The type of **statistical output** files is defined in parameter **Statisticswriter** and value is set to be **bpStatisticswriterExceXls.**

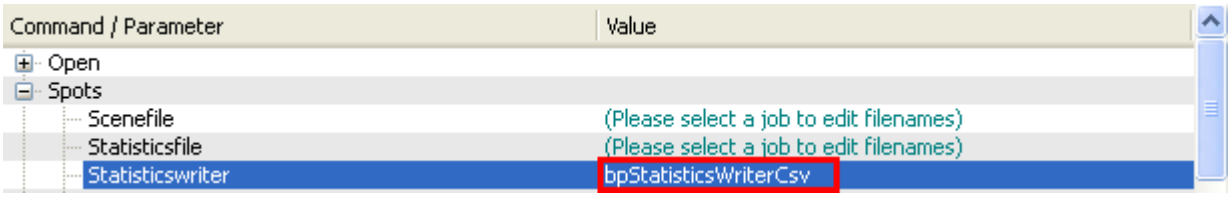


In Batch area **select Batch** containing the Command Sequence with the commands **Spots** or Surfaces. Expand the command Spots (Surfaces) by clicking on the (+) symbol.
The value of **Statisticswriter** can be changed. Double clicking on the **bpStatisticswriterExceXls** value will

open a field, highlight it blue, into which the new value can be entered.

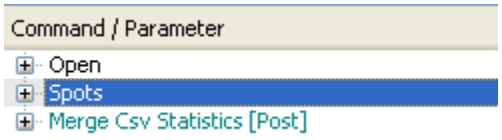
Change the type of statistical output files by entering **bpStatisticsWriterCsv** as the Statisticswriter value.

Note: Parameter values are case sensitive.



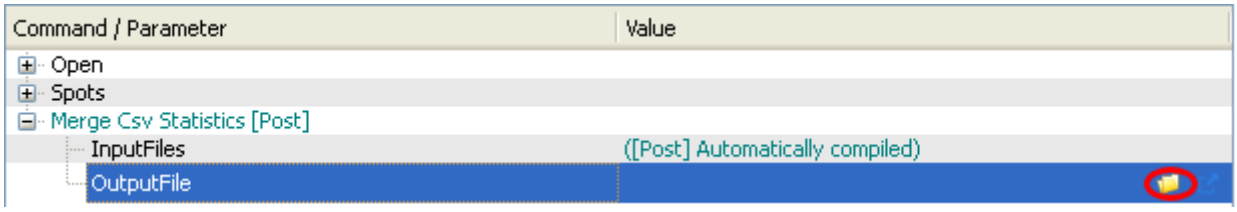
Command Merge Csv Statistics [Post

To merge the CSV Output files of all jobs within a Batch, the new command must be inserted into the Command Sequence. In the Command/Parameter Tool bar click on the **Add command** Button  and the new command (Open) is added. Double click on the added command line and an arrow appears indicating a drop down window. From the list of the commands select the command **Merge Csv Statistics** [**Post**] (very last command in the Command list).

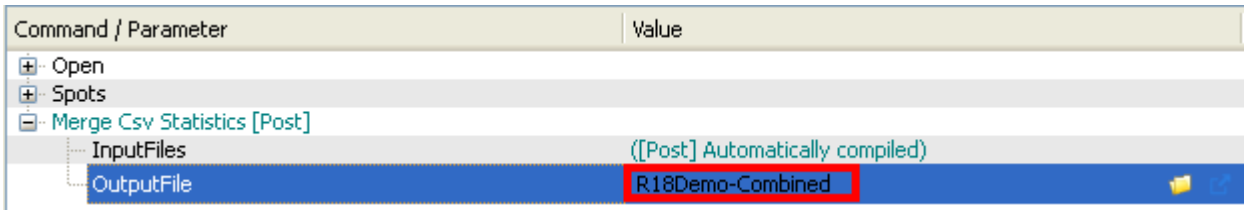


The command merge will combine datasets with the common statistical variable and incorporate them in one file containing the specific variable of all input files.

Expand the command Merge Csv Statistics [Post by clicking on the (+) symbol. Two parameters are available, **InputFiles** and **OutputFiles**.



A value for Input files is automatically generated from the individual CSV statistical files. A value for the merged Output **folder** name must be created. Select the OutputFile parameter and the entire row will be highlighted in blue. Click on the open file icon and a new window will be open. Specify the **folder** name and directory for merged Statistical CSV file and save it. Alternatively, a new folder name can be entered directly in the parameter OutputFile Value line. New statistical CSV **folder** name will be written as a value of parameter OutputFile.



The new merged folder name will be generated by appending **_Statistics** to the entered name defined by the OutputFile value. The command merge will identify and retrieve all files that share a common statistical variable and merged them in one common file. As a result, a new, merged file will be created containing specific statistical variables from all individual files. The names of new merged files will correspond to names of statistical variables.

The resulting merged folder will have the same number of files as the number of calculated statistical variables.

If the commands Spots or Surfaces are not present in the Command sequence, Merge Csv Statistics will be ignored.