OASIS Application Note

Configuring the OASIS Software for Leica DM Control

One feature of the OASIS control library software is the ability to control other hardware using common functions. For instance, the OASIS-4i library command for stepping the focus a given distance is:

OI_StepZ(double dStep, int iWait);

In most instances, this command will be routed to the Z-axis of the OASIS-4i controller, which will perform the move via a motor connected to the focus drive of the microscope. Microscopes with built-in focus drives are also available, and in these situations, the microscope has some control electronics of its own. Typically, the microscope control system is interfaced to a host PC via an RS-232 serial communications port, and in order for an application to execute control functions on the microscope, a software developer kit (SDK) is used.

The Leica Microsystems DM range of stands represent one example of automated microscopes. These automated microscopes have been available for some time, and Leica offers an SDK to support software applications development. The OASIS software supports the Leica SDK, allowing standard calls such as the **OI_StepZ** shown above to be executed either on the OASIS-4i controller or, among other options, the Leica microscopes with built-in focus drives.

Switching between options is simply a matter of configuration within the OASIS software. This application note describes the steps needed to setup the Leica SDK and configure the OASIS software to use it.

What You Need

The following items are required to use the Leica DM microscopes via the OASIS software:

- A Leica microscope with automation, such as the DMRXA, DMIRE2, DM6000, etc.

- The latest Leica DM SDK software, which may be downloaded from the Leica website at www.light-microscopy.com.

- The OASIS-4i SDK software, which may be downloaded from the Objective Imaging website at www.objectiveimaging.com.

- An OASIS-4i controller (required by the OASIS-4i SDK).

- A computer running Microsoft Windows with a spare serial port.

Since the OASIS software communicates to the Leica DM microscope via Leica's SDK, it is required that the DM SDK be installed, configured and tested before attempting to use the OASIS software control. The main steps required to install and configure the software are:

1. Install the Leica DM SDK.

2. Install the Objective Imaging OASIS SDK.

3. Run the Leica DM SDK's Microscope Configuration utility and define your settings.

4. Run the Leica DM SDK's Microscope Control application to test and verify your settings.

5. Run the Objective Imaging SDK's OASIS Controller application to configure and test the OASIS software library.

Once these steps are complete, the OASIS library will be ready to use the Leica microscope's supported facilities such as focus and lamp control. Details of these steps are given below.

Configuring and Testing the DM SDK

Once the Leica DM SDK has been installed, you first need to define your particular microscope configuration. In Windows 2000 or Windows XP, click on the Start button, and navigate to the Programs option labelled "Leica DM SDK <version>", where <version> indicates the particular version of the SDK that has been installed. Then, click on the "Mic Conf" option as shown below:

Selecting "Mic Conf" will launch the Leica Microscope Configuration application, as shown below:
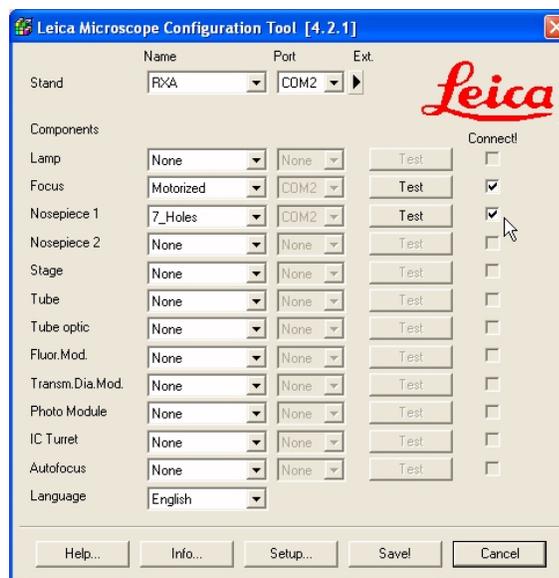
This application allows you to specify the type of microscope and the particular configuration you have. Note that you must have already connected the Leica serial cable between the microscope stand or controller and the PC's serial port before configuring the Leica DM SDK software.

To use this dialog, follow these steps:

1. Select the type of microscope you have in the "Stand" and "Name" option. For instance, in the example above the stand had been set to "RXA", i.e., the Leica DM RXA motorized upright microscope.

2. Select which serial port to use for communication with the microscope in the "Stand" and "Port" option.   In the above example, the port has been set to "COM2".

3. Select the type of options you have fitted on your stand. For instance, indicate whether you have focus motorization, the type of objective nosepiece, etc. In the example above, the "Focus" has been set to Motorized, and "Nosepiece 1" is set to 7 holes.

4. Make sure the "Connect!" checkbox is ticked for those components that you want to control. This ensures that commands will be sent from the PC to the microscope controller. If this box is not ticked, the DM SDK will be working in a simulation mode, with no effect on the actual microscope settings.

5. Once you have configured your options and checked that they are set to "Connect!", click on the "Test" button to attempt to communicate. You will see a message indicating success or failure. In the event of problems, please refer to the Leica documentation for details on possible causes and corrective actions.

6. Once the system has been configured and tested successfully, click on the "Save!" button to store the settings and close the application.

Once these steps are complete, the Leica DM SDK will have been configured for the basic setup of your particular system.

You may wish at this point to run the Leica DM SDK's microscope setup wizard. You may launch this from the Leica SDK's programs menu:

The Mic Wizard guides you through further detailed configuration of your microscope, such as specifying which objectives are fitted in each position on the nosepiece, defining the parfocality between lenses, and other options.

Testing Using the Mic Control Application

After configuring the Leica DM SDK using the "Mic Conf" and "Mic Wizard" utilities, you may wish to run Leica's microscope control application to further test and validate your configuration. To start the Mic Control application, launch it from the DM SDK's programs menu:


This will launch the Mic Control application, displaying a toolbar dialog as shown below:

To access a particular feature of the microscope, click the corresponding tool. In the example above, the Z focus, lamp supply 1, and objective turret have been configured as available. To open the focus control dialog, click on the Focus Drive tool to display the corresponding dialog, as shown below. Similar dialogs are available for each component.

For further details on using the Mic Control application and troubleshooting, see the application's help system (the "Help" button on the main toolbar), or contact Leica.
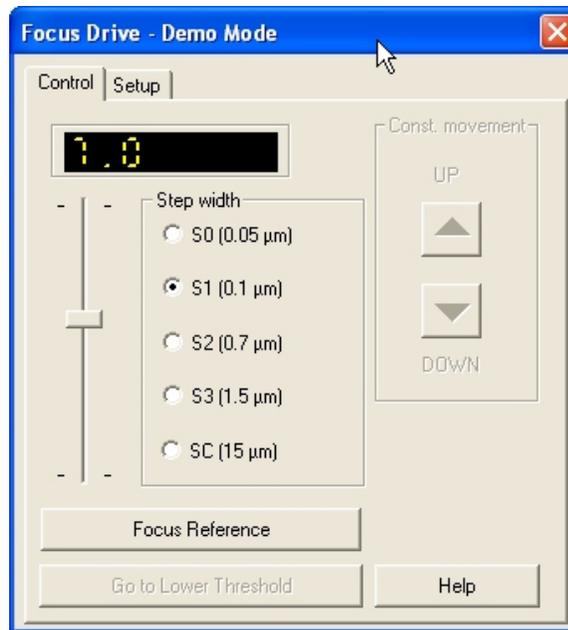
Configuring the OASIS Software

If the Leica SDK has been successfully installed, tested, and verified, the next step is to configure the OASIS software to use the various components. This is accomplished using the OASIS Controller application (OASIS.EXE). Launch the OASIS Controller application, either via the desktop icon or from the Objective Imaging menu under program files:

To configure the OASIS library, follow these steps in the OASIS Controller application:

1. Under the main "System" tab, select the "Configuration" option:
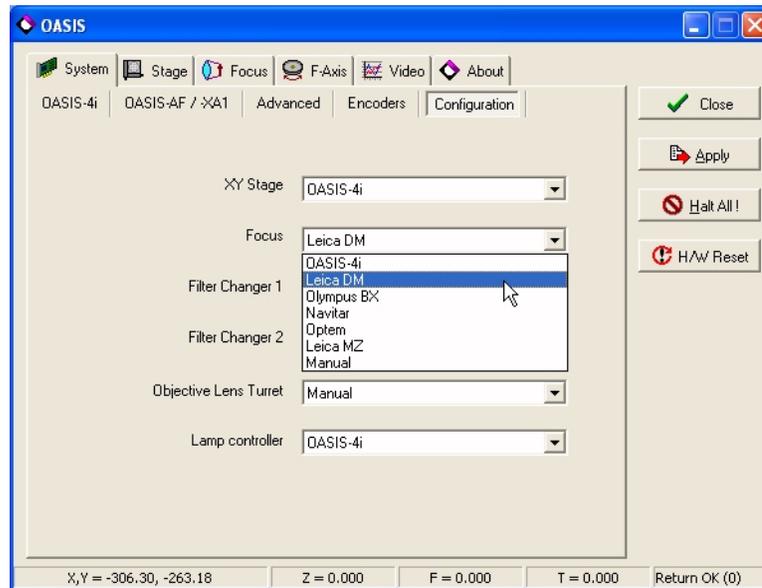
2. For those components you wish to route to the Leica DM controller, select the option "Leica DM" from the list. Note that this option is currently available only for the Focus, Objective Lens Turret, and Lamp Controller.

3. Click on the "Apply" button the dialog.

Once this configuration is completed, the OASIS software will be set to send commands to these components via the DM SDK for control execution.

You may also setup the Focus control configuration under the main "Focus" tab's "Settings" option:
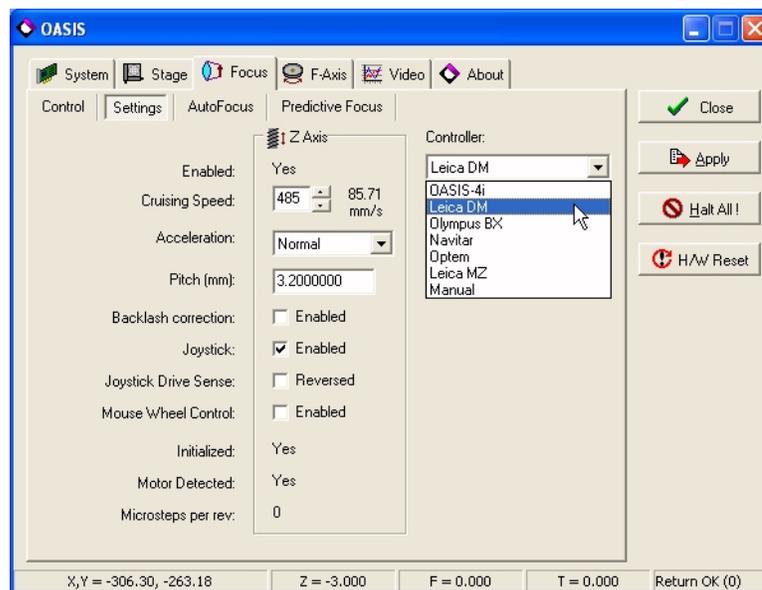
Limitations

The OASIS software library is optimised for use with the OASIS-4i controller card. However, it has also been designed to provide as much functionality as possible for support of 3rd party controllers such as the Leica DM SDK. Inevitably there will be areas where the OASIS controller's facilities provide greater functionality or performance than that available on the Leica DM, and similarly, certain capabilities offered by the Leica DM SDK are not available through the OASIS software interface.

An example is predictive focus. The OASIS-4i controller has a facility for defining the plane of focus relative to the XY stage travel, and, once defined, the OASIS-4i can maintain focus across the range of stage travel in real-time. This permits simplified use when reviewing a sample using joystick moves, or for maintaining focus at high speed such as is required Objective Imaging's Turboscan real-time mosaic imaging solution.

Though predictive focus capabilities are available in the OASIS software library—and hence in certain applications that make use if it—this facility cannot be offered for configurations using the Leica DM, because the predictive focus is specifically available in the OASIS-4i controller hardware.

Another example is automatic focus. The OASIS-4i controller has built-in facilities for high-speed video autofocus, which is built into the OASIS-4i's DSP for maximum performance. The OASIS software library also supports autofocus when using the Leica DM, but the performance and reproducibility are not as good as the OASIS-4i due to relatively slow performance of communications over a serial port.

These types of limitations notwithstanding, for basic control applications such as control and querying of Z position, the OASIS library provides a convenient means for applications to easily support both the OASIS-4i controller as well as the Leica DM range of automated microscope stands with little or no change to their application.

For assistance in finding out how the OASIS line of automated microscopy and imaging products can help with your specific requirements, please contact Objective Imaging for further information.

Innovative Solutions for Automated Microscopy