QviCorfac Quick-Start Guide

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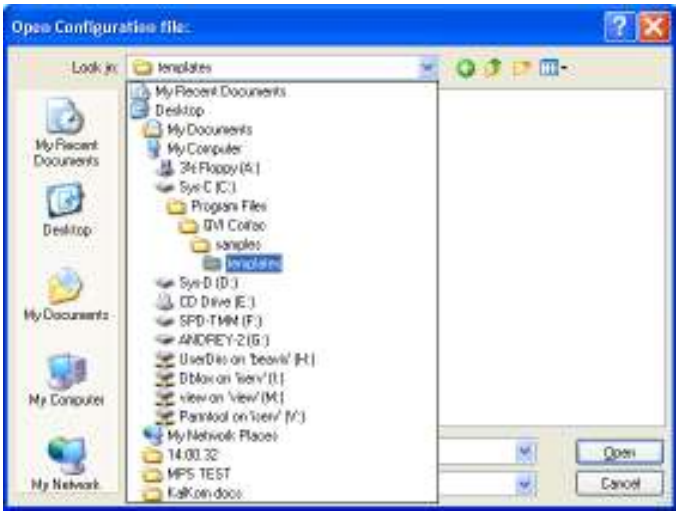
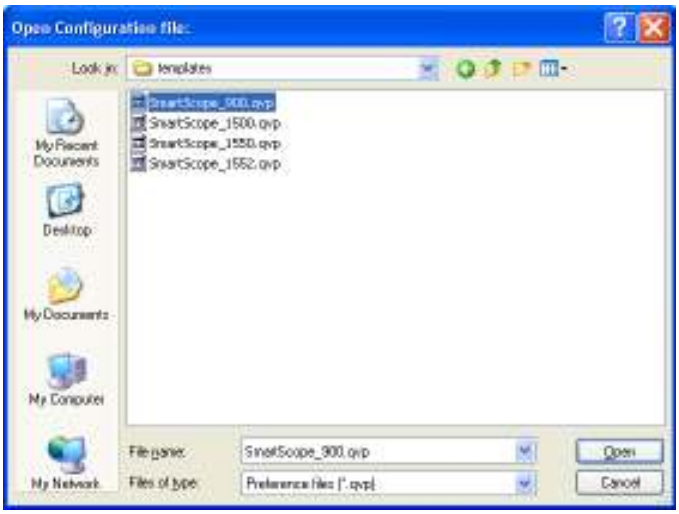
This quick tutorial will guide you through the process of calibrating a Flash 900 machine using the QviCorfac application.

Preparation

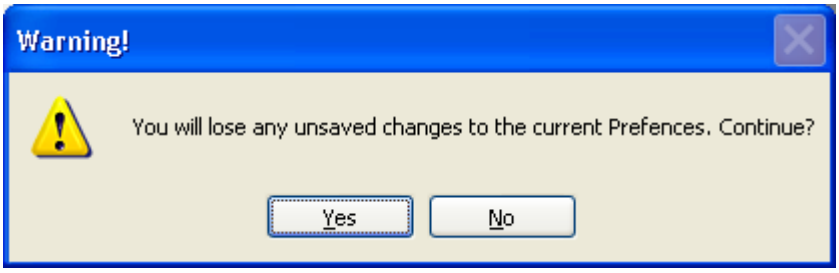
1. Start QviCorfac.
2. Select “Preferences” item in the tree of the left-hand window.
3. On the General tab, click the “Load...” button in the “Config file:” section.
4. Browse to the “samples\templates” directory in your installation path:



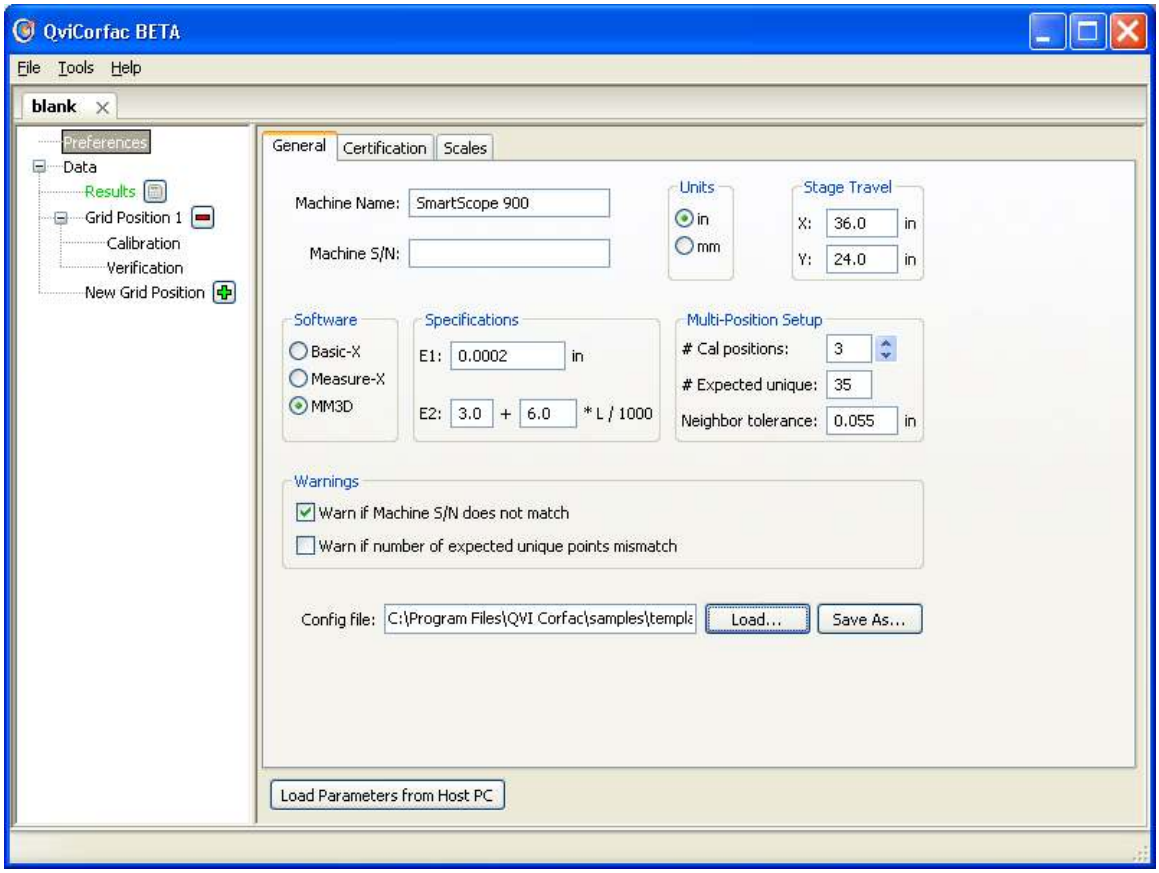
5. Select the “Flash_900.qvp” file and click “Open”:



Answer “Yes” to the warning that follows:



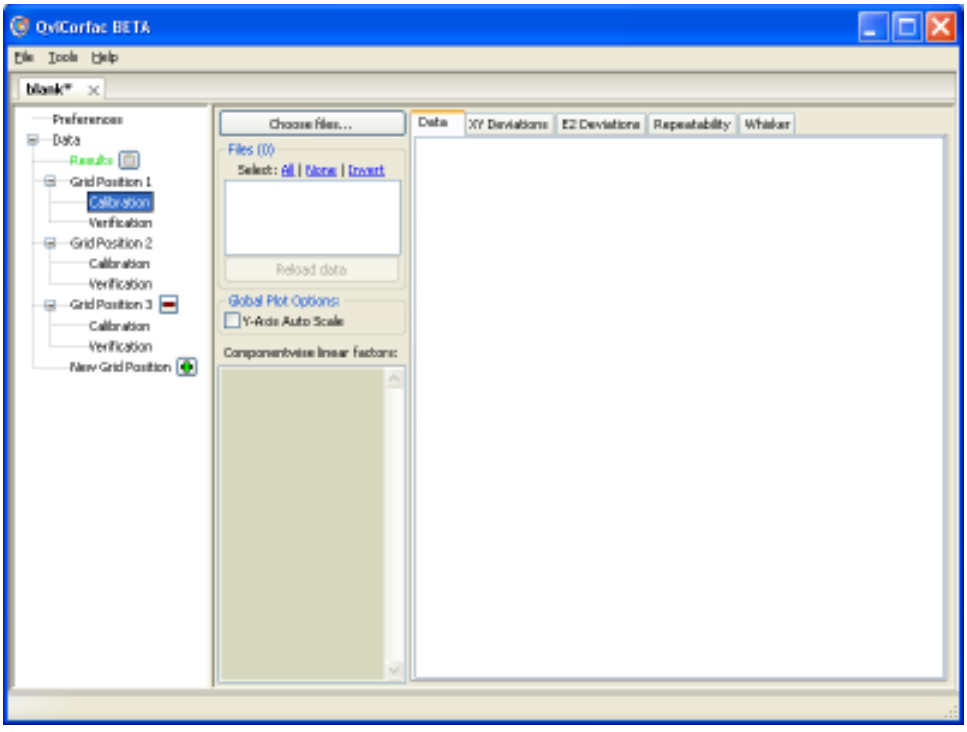
Your Preferences screen should now look like this:



6. Click the “Load Parameters from Host PC” button at the bottom of the screen and click “Yes” to the caution message that will appear. This will load the machine-specific parameters from the machine into the application session.

7. Click the “Certification” tab. Click the “Browse” button and browse to your grid certification file. Click Open.

8. Click the “Data” item in the tree. Select the “Raw NL” measure style.
9. You will measure three grid positions on this machine. The calibration session needs to reflect this. In the tree, click the green “plus” button twice to add two grid positions. Select the first grid position’s “Calibration” item. Your screen should now look like this:

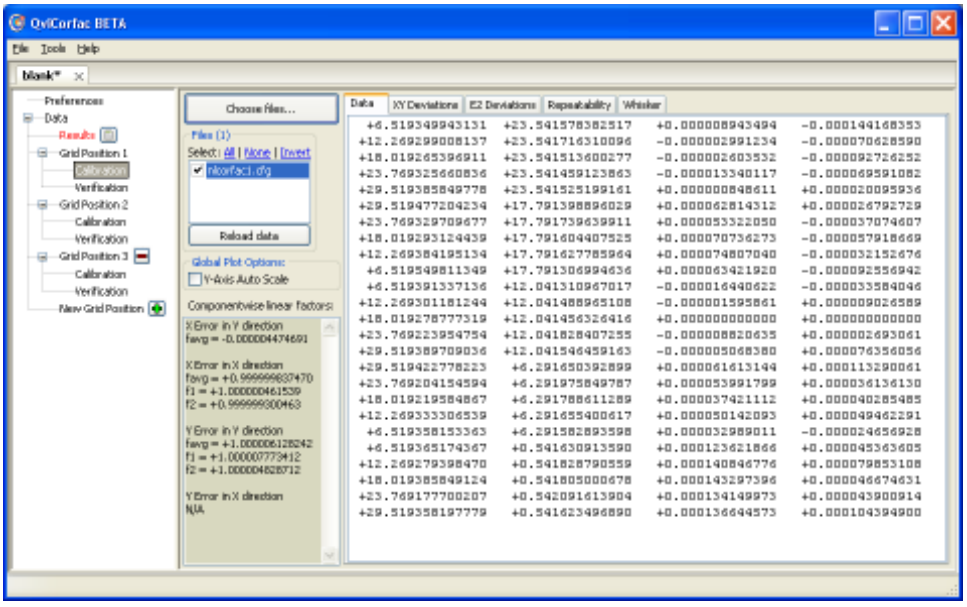


You are now ready to input your calibration data from the three positions.

Inputs

1. In each grid position's "Calibration" item click the "Choose files…" button and browse to the respective calibration file. For example, for grid position 1, select the nlcorfac1.cfg file:

Your calibration screen will now look similar to this one:



2. Repeat the same procedure for the "Calibration" item in grid positions 2 and 3. You are now ready to calculate the results.

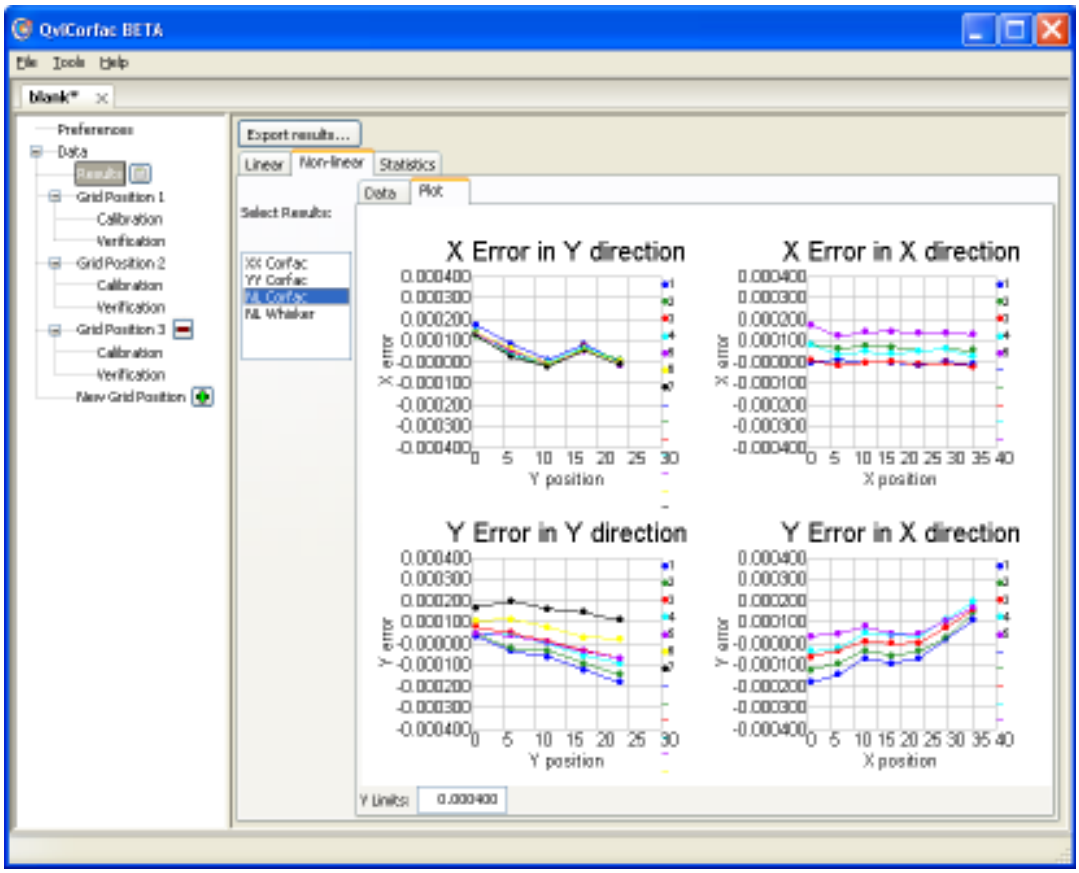
Results

1. Click the Calculator icon next to the "Results" item in the tree. If you did everything correctly up to this point, you will get a confirmation message:

If something is wrong in the preferences, you will get an error message informing you to take corrective action. The most common blunders are:

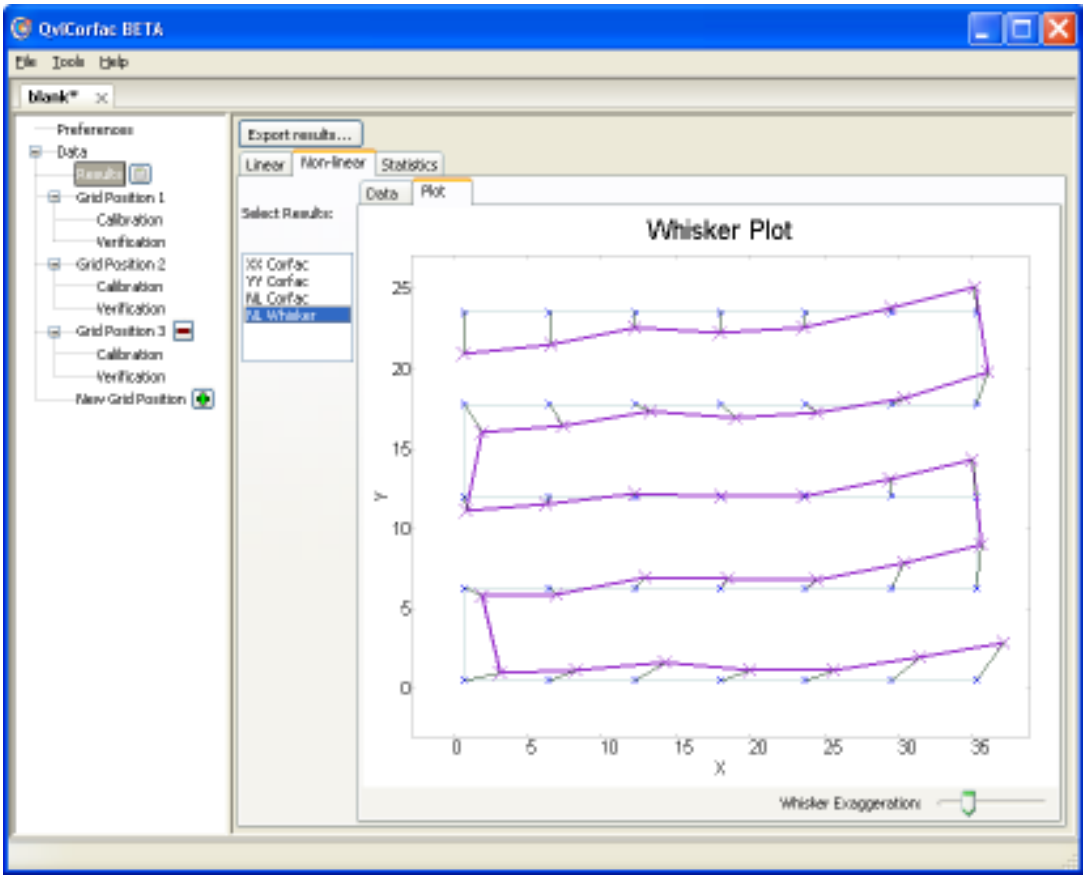
- The number of calibration positions specified in the Preferences does not match the number of input grid positions in the tree. To correct this, either change the number of calibration positions in the General preferences tab, or add/remove grid positions in the tree to match.
- The grid certification is not defined. To correct this, go to the Certification tab in Preferences and browse to the grid file.

2. Click the “Results” item in the tree. In the window to the right, you can view all the linear, nonlinear results, as well as the fit statistics. The NL Corfac plots in the Nonlinear Plot tab should be of particular interest to the calibrator, as these plots display the quantitative measure of the machine’s mechanical state.



Please note that these plots display the UNCORRECTED errors of the machine, hence this is the raw mechanical condition of the XY stage.

The qualitative view of this same data is available in the "NL Whisker" plot. This is simply a visual tool that displays the deviations as exaggerated vectors, adjustable by the "Whisker Exaggeration" slider:



NOTE: You have not yet actually calibrated the machine! These results only exist in the application's session at the moment. Please save your session now by going to the File -> Save menu. We suggest that you use the machine's serial number in the name of the calibration file.

The calibration file is portable. You can archive it for future reference, email it, etc. The supporting input files do not need to be sent along with it because they are embedded in the saved file.

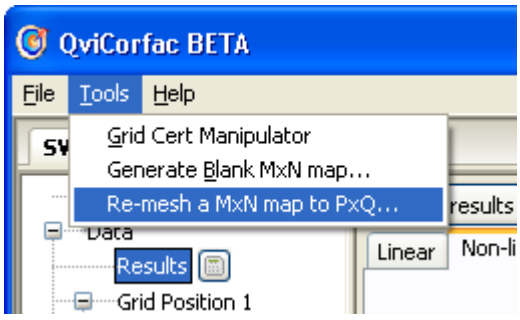
See the next section on how to actually calibrate the machine using the calibration results.

Calibrating the Machine

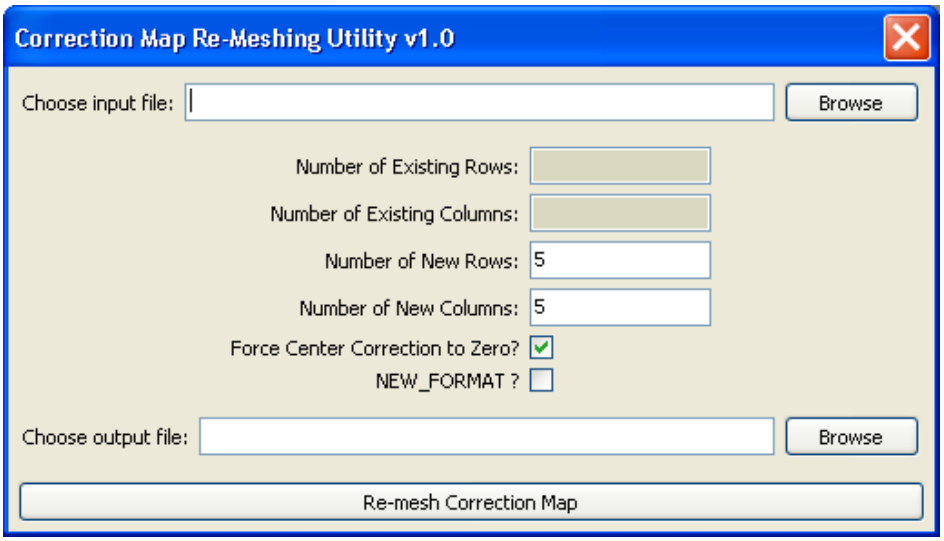
You will need to export your calibration results before you can transfer the calibration to the machine's metrology software. It is good practice to create a separate directory for these files, and call it "results" for reference. Do this now before performing the export.

To export the results:

1. Click the "Results" item of the tree.
2. Click the "Export results…" button in the window to the right.
3. Select the directory where you want to export the data files and click OK.
4. The following files will be created in the specified directory, in alphabetical order:
   - COMPOSITE_NLCORFAC.CFG
   - FitStatistics.txt
   - LinearResults.txt
   - XXCORFAC.CFG
   - YYCORFAC.CFG
5. The "COMPOSITE_NLCORFAC.CFG" file is the file relevant to the calibration at hand. Please note that while this file is in the typical NLCORFAC format, it does not contain the typical 25 lines that you see in the everyday NLCORFAC files. On a Flash 900 using a 24"x24" grid, this file will contain 35 lines because the 36"x24" machine stage in conjunction with three measurements using the grid will produce 7 rows and 5 columns in the composite correction file. Although MM3D supports such a format at this time, you will not be able to easily verify the calibration in the usual way. Furthermore, the Measure-X software does not support this format.
6. In short, this means that the composite correction file needs to be post-processed so that its 5x7 mesh is reduced to 5 rows by 5 columns. The QviCorfac application has this utility built in. In the Tools menu, select "Re-mesh a MxN map to PxQ…":



You will be presented with the following dialog window:



Leave all the settings at default as shown. To specify the input file, browse to the "COMPOSITE_NLCORFAC.CFG" file in the results directory. To specify the output file, browse to the results directory and type in a unique name, such as "REDUCED_NLCORFAC.CFG". After specifying both the input and the output file, click the button "Re-mesh Correction Map" at the bottom of the dialog window. If you did everything correctly, you will get a confirmation message. If you get an error, make sure that you have specified an existing input file, and a unique output file.

7. At this point, you can open the output file in Notepad and verify that it contains 25 lines. You can now copy this file to the Config directory.
8. Delete the existing NLCORFAC.CFG file in the Config directory. Rename the file you just copied to NLCORFAC.CFG.
9. To activate the new calibration, load NLCORFAC.CFG in MM3D using the F8 procedure. If you are using Measure-X, shutdown the software and start it with the "-restore" command-line option. This will load the new file into the DSP.

Verifying the Calibration

1. Verify the calibration as usual. Place the grid in the center, left, and right positions and use System -> Calibrate -> Nonlinear XY… -> Verify. Perform the verification three times in each position to determine repeatability.