19. Manual Dimensions

19.1 Introduction

Besides the CMM (machine) dimensions and the calculated dimensions discussed in the previous section, you can add what are known as Manual Dimensions. They are called manual dimensions because you must enter these values manually. Most times these values are collected using a hand-held gage and you want them stored with your CMM data to complete the part. Manual Dimensions are useful for adding features that are not available from a CMM and are measured using another such as a hardness value, a chemical reading, or color value, etc.

QC-CALC can also include dimensions that are calculated as described in the Calculated Dimensions section on page 96. This means QC-CALC has a total of 3 different measurement types plotted in Real-Time.

- Machine Dimension   Received from your CMM part program
- Calculated Dimension   Extra dimension calculated by QC-CALC
- **Manual Dimension**   Extra dimension typed by you

This unique capability means you can add separate features to your existing QC-CALC file that cannot be measured on your CMM.

There are actually a couple of ways to add manual dimensions while you are inspecting your parts. These are listed below in order or recommended use. The most recommended is first.

- **QC-Gage via MultiSource –** This is the best way to enter manual measurements because it allows you the most flexibility when it comes to validation of the measurements taken. It also allows for a level of automation since QC-Gage can collect data from small measurement devices and specialized machines (such as hardness, roundness, surface finish gages, etc) via RS-232, TCP/IP, and file based outputs. As of QC-CALC 3.3, there is a new feature called MultiSource which allows your QCC files to literally have multiple sources. For instance, a QCC file with 10 dimensions could have 3 coming from a CMM, 5 coming from a video measurement system and the last 2 coming from QC-Gage (via manually entered values or a wireless micrometer). For more information on this, please consult Prolink for a demo.

- **Manual Input Screen –** This screen is great for entering trace fields (factors) for your parts when your inspection equipment does not have the ability to provide them. For instance, your inspection equipment can output the measurements directly into QC-CALC, but does not have the ability to allow your inspectors to enter the lot number, fixture, machine or other traceability info. It is also good for quickly entering manual dimensions when you don't want to use QC-Gage. It also allows you to validate manual dimensions as a percentage to help prevent mistyped values, combine trace fields and manual dimensions into the same screen, choose values from a list for better consistency, and it can be launched at regular measurement intervals (such as every 5 parts).

- **Manual Dimension Values Screen –** This screen is the original way of entering manual data and is the simplest of the manual data entry options. It simply gives you a column of cells for each manual dimension. You can then type the values directly into the cells. There is no validation

on the data and the values are plotted immediately upon pressing the Enter key on your keyboard.

In this section, the first of the manual options will not be discussed since it involves QC-Gage as an outside product.

Whether you decide to use the Manual Input screen or the Manual Dimension Values screen, the first thing you need to do is modify the database and create the dimensions that will be manually entered and ready them for the data to come. The next three sections cover this task and are followed by the two options so you can make an accurate choice based on your needs.

19.2 Adding the Extra Features

When we discussed adding an extra dimension in the Calculated Dimensions section on page 96, we added 1 Manual dimension and did not discuss anything further about it. Briefly, to add a Manual dimension, select **File** – **Modify Database Structure** and then select the **Database Settings** tab. Change the **Manual** Dimensions 1 to add one new dimension to the database. Again, review the Calculated section for more details.
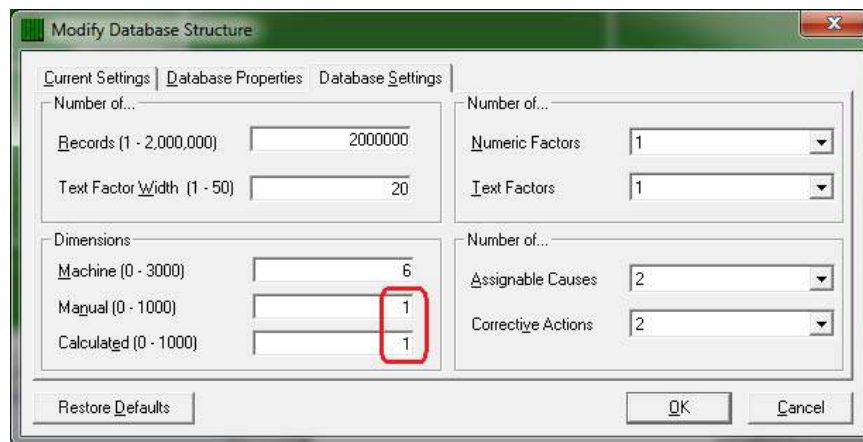

19.3 View the Extra Dimension

The Real-Time Plots screen now shows the two extra plots we added. Note the data line is flat since we had collected 11 parts before adding these extra two dimensions. QC-CALC back fills the new dimensions with nominal values.
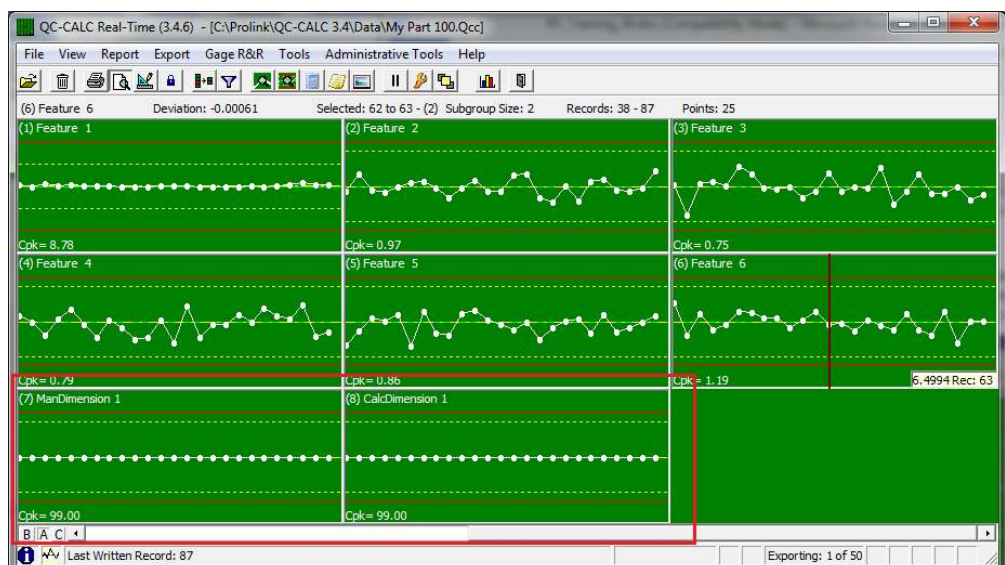
19.4 Scale the Plot

Right click on the Manual dimension and select **Plot Properties**. Assuming this new dimension has a nominal of 0.5000 and the upper and lower tolerance to be +/- 0.01 we entered these values into the Point Property screen. The control limits were entered at 80% of the upper and lower specification limit or 0.508 and 0.492. The plot is red because all values are set to zero and must be updated. Press the F7 key to stop editing the **Plot Properties** and your plot is now ready.
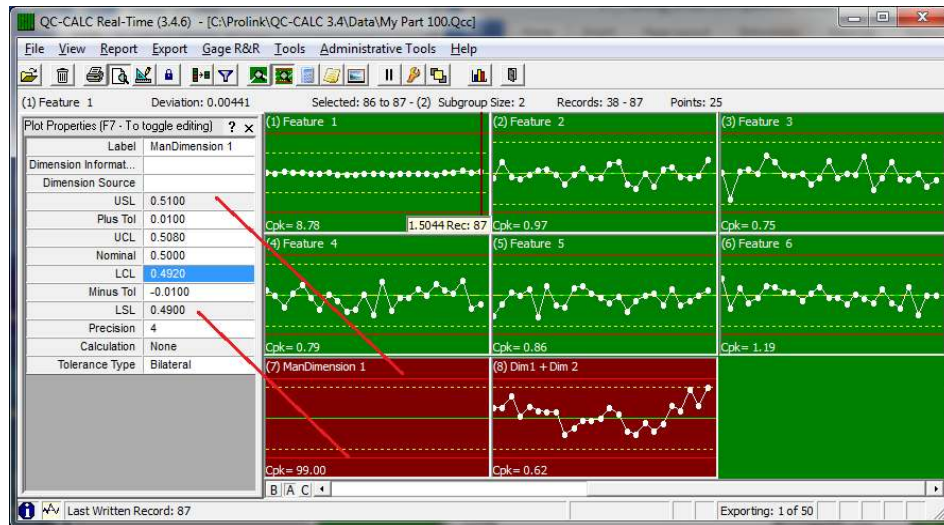

19.5 Entering Data via Manual Input Screen

The Manual Input screen (MIS) gives you an interface to enter extra data into a file that already contains the data from the CMM machine. Normally a CMM machine automatically measures a part and sends the data over to QC-Calc to be analyzed and displayed. For this process everything is done automatically. Now, what if, in addition to automatic part checks, you have to check parts with a different machine or by hand (Ex. microscope) where no automatic output feature exits? The Manual Input screen gives you the ability to enter these values into the same file as the CMM data. This needs to be set up so it launches at the right time and for the right number of parts.
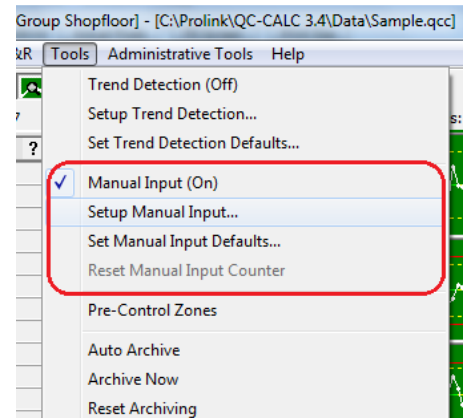
19.5.1 Setup Manual Input

To set up the Manual Input screen, choose **Tools** – **Set up Manual Input** and the setup screen will launch. There are two sections to this screen; **Settings** and **Input Values**.

At the top of the screen, a checkbox labeled **Use default Manual Input settings** allows you to either use the defaults set in the **Tools – Options** area or override the settings for this specific QCC file.
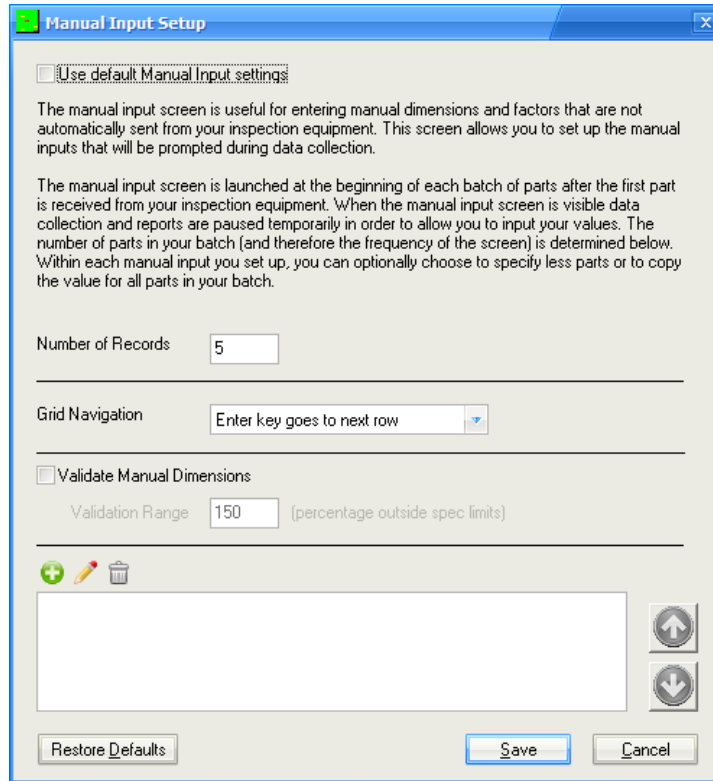

First, set the **Number of Records** option to tell QC-CALC how often to launch this screen. In the picture above, this has been set to 5. This means the screen will launch every 5 parts to ask for manual values to be entered. It is important to understand that it will launch at the beginning of each group of 5 parts. When the data is entered, the values will then be applied to the next 5 parts as they arrive. **If you shut down QC-CALC or change QCC files by inspecting different parts, it will not remember the manual values entered so it is important to enter the data and measure the parts together before switching parts.**

The **Grid Navigation** choice controls how the screen behaves when asking for values.

The **Validate Manual Dimensions** option instructs QC-CALC to validate the dimensions being entered. This is set as a percent of tolerance. Therefore, if you set it at 150%, then it will warn you if a number that is typed is outside 150% on either side of tolerance. This is meant to prevent wildly out of tolerance values such as a misplaced decimal point (typing 11 instead of 1.1).

The bottom section of the screen is where you set up the actual data points (dimensions and factors) that will be manually entered. To add entries, click the green plus icon and the **Manual Input Editor** screen will be displayed.
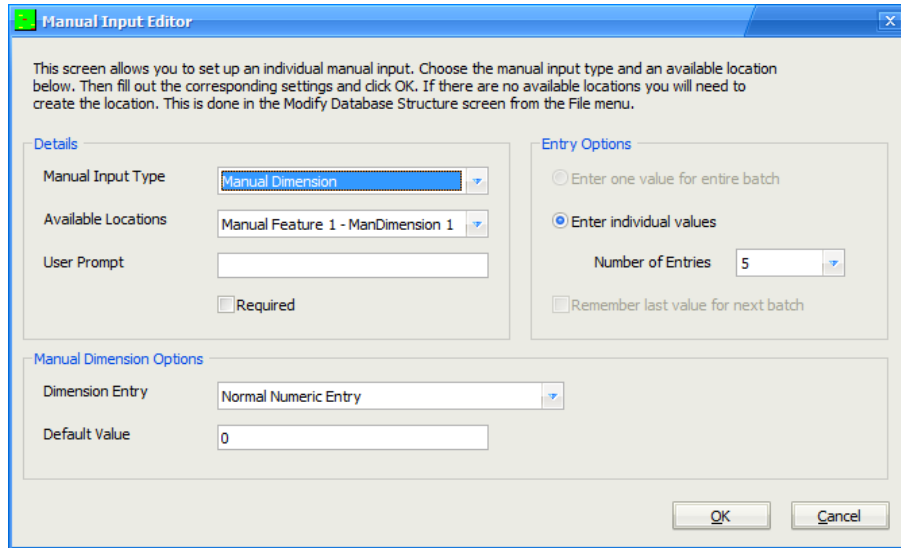
Details

Manual Input Type

This screen allows you to enter either Manual Dimensions or Factors (Numeric or Text). Some of the remaining settings on this screen will change depending on the choice made here.

Available Locations

This is the location where the entered data will be placed. It can either be a Factor or a Manual Dimension.

User Prompt

This is the message the user will see. Enter something friendly like "Please type the serial number of the part" or "Please bar code scan your badge" to lead the operator through the process.

Required

With this option checked the operator will not be able to close the Manual Input Screen unless this value has been entered.

Entry Options

Enter one value for entire batch

This choice is only available for Factors. With this option chosen the value entered into the Manual Input Screen will be used for all records in the session. This is useful for things like "Operator Name" and "Lot Number" where the same value applies to everything in this session.

Enter individual values

This is available for both Factors and Manual Dimensions. When this option is chosen you will need to enter the **Number of Entries** (records) that will be required on the Manual Input Screen. This number may be less than the total Number of Records entered into the **Manual Input Setup** screen.

For instance, you may want to launch the screen every 5 parts, but only want to manually measure the first 3 of those parts for a particular Manual Dimension. In this case, the **Number of Records** on the main **Manual Input Setup** screen would be 5 and the **Number of Entries** for this Manual Dimension would be 3. If you want to have the operator fill in data for all parts

in the session, make sure the **Number of Entries** number matches the **Number of Records**.

The entries are always at the beginning of the sample set. Therefore, if the frequency is 5 and a dimension has the Entries set as 3, it is always the first three parts that will have a value for the dimension and the remaining 2 will not be used (a Null value for Text Factors, 0 for Numeric Factors, or set to Nominal and Marked as Deleted for Manual Dimensions).

> **Note:** Each different type of data entry point can have its own value for Entries. This allows you to set up some of your factors for all parts, but other dimensions for only some of your parts.

Remember last value for next batch

This choice is only available for Factors. With this option chosen the value entered into the Manual Input Screen during the last session will automatically populate the Manual Input Screen during the next session. This value can be changed if necessary, but it many cases it is a good starting point.

Manual Dimension Options

Dimension Entry

There are 3 choices for this option:

- **Normal Numeric Entry** – With this option the operator would just type in the number for this dimension.
- **Enter as Pass or Fail** – With this option the operator would be given a choice of "Pass" or "Fail" only.
- **Enter as Pass or Fail with N/A option** – With this option the operator would be given a choice of "Pass" or "Fail" or "N/A".

Default Value

This is simply the default value of the dimension. When the screen launches, cells with default values are pre-populated allowing the operator to enter the data only if it changes.

Factor Options

Choose from list

This option allows you to force the operator to choose the value from a list. This is useful for repeating values such as operator names or machine numbers where there is a finite list of items from which to choose. It helps to provide consistency in your data making filtering easier later.

> **Note:** It is always recommended that you use lists when possible, especially for typed values such as names. Often operators will spell their names differently depending on mood or time of day (initials, first name, etc). By forcing a list, it ensures the data will be entered the same every time.

Default Value

This is simply the default value of the factor. When the screen launches, cells with default values are pre-populated allowing the operator to enter the data only if it changes.

19.5.2 Turning Manual Input On/Off

The Manual Input functionality is turned on and off via the **Tools – Manual Input** menu. Simply click it in the **Tools** menu to activate or deactivate the MIS.

19.6 Entering Data via Manual Dimension Values Screen

To add data into this Manual dimension, select **Manual Dimension Values** from the **View** menu and a spreadsheet "like" grid is displayed. The grid contains the same number of values as displayed points. As you type the number into the grid, you will see the plot updating. Should you make a mistake, move up in the grid and change your entry.
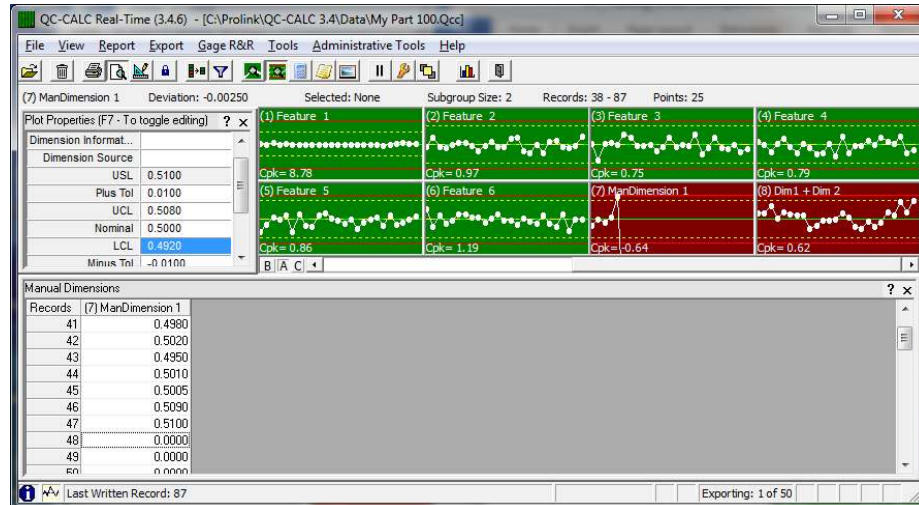
Remember, QC-CALC stores the manually entered results in the database so you can treat the manual dimension the same as any other dimension.