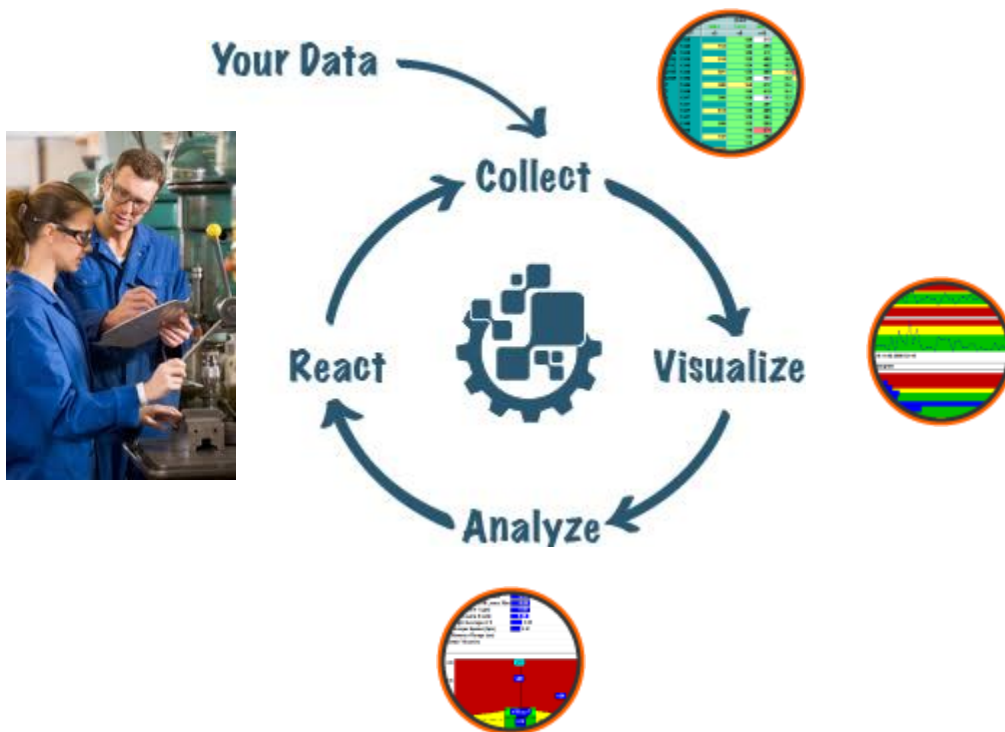


# Need a little help getting started with Quality Window 5





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## Introduction

This document is intended to provide an overview of how to get started with the Quality Window 5 (QW5) product. It outlines how QW5 can be applied by providing examples of typical applications where QW5 can and is being used.

The flow of this document is designed to lead the reader through an overview of what a QW 5 application is and then the steps to follow in designing, developing and deploying QW 5 applications.

To get you going quickly with QW 5, I would suggest viewing some of the video presentations we have in our Video Tutorials section of the website. <http://busitech.com/help-and-support/eschool/>

Please start with this presentation to assist you in better understanding what QW 5 is and how you can use it. <http://assets.busitech.com/videos/introduction-to-qw5/introduction-to-qw5.html>

**Note:** A very important step in successfully developing and deploying QW 5, is the location and organization of the QW applications files. Typically, an area on a shared fileserver would be defined with a name like QW Application Files and then subdirectories defined to organize the files in logical groups like Production Line or Products. This is a very important step and is mentioned in the Deployment phase of implementing QW 5 but should be understood and followed from the beginning of the process.

## What is a QW 5 Application?

A QW 5 Application is a specific use of QW 5 to achieve an objective. Objectives like conducting a Process Audits or to track Downtime. More specifically, you would create a QW 5 Application that would collect and monitor the process settings on Line 15 while making Product X size 3. The QW 5 application would contain all of the settings, variables, specifications and targets to accomplish this specific task. You can create additional applications almost identical to this one but for different products, sizes and production lines.

Once you decide on the type of application you would like to create with QW5, then it is just a matter of assembling the information and getting to it. The QW5 product is designed to help you build these applications quickly and change them just as quickly...the rapid change capability of QW5 is a key feature of the product and is why QW5 applications are typically supported at the department level by key individuals or champions – Quality Lab or Production lines, for example.

So let's get started and here is an outline of the key items:

- Application possibilities
- Planning a QW 5 Application
- Building a QW 5 Application

## Application possibilities – two main types of Applications

1. A monitoring application – regular timed interval for sampling data – minimize variation and run to target – Uses Specification, Control and Target Limits as well as Control rules (Alarms)
  - Process settings
  - Quality variables
  - Product variables
  - Raw material verification
  - Fill weights
  - Equipment validation
2. An event application – capture details of events - find and fix causes of failures
  - Downtime
  - Quality Defects
  - Loss/waste
  - Customer complaints

While there may be two main types of applications (Interval and Event), there are many options for collecting the data.

1. Manual data entry - record data using the keyboard on a Workstation
2. Manual but supplemented – add devices like weigh scales to capture data at its source
3. You have data in another format and want to view it in a Quality Window – got data and want to see it
  - Excel data organized in rows and columns – QWXltoQW utility
  - Data is in an SQL data base and you want to view it – QWSQLWizard utility
4. I want to capture and view data from Automation Systems – automating data collection
  - Data in PLC based automation and control system - QWDataHub – bridge to automation data
  - I want to capture it on a scheduled or Event basis - QWScheduler Utility

If you don't see what you are looking for, send us an e-mail...we are pretty creative and enjoy a challenge!

## Building a QW 5 Application

We will use a Process Monitoring example in the discussion of building an application. The key steps are:

- **Design it** – plan out your application
- **Develop it** – Use QWAdmin to create and change QW 5 Applications
- **Deploy it** – put the infrastructure in place and roll it out

### Design it!

This type of application is designed to keep you on a fixed path – minimize variation and run to optimum target. You want to make a product the same every time so a customer or downstream process, sees or detects little or no variation in the product or service provided.

To accomplish this, you need to employ tools such as limits –Specs and targets, Rules and, as usual, timing is everything.

Planning the application is important as it will help organize your thoughts and provide structure to what you are trying to accomplish. Putting a little planning effort in first will help you avoid re-work in the future - typically you would be part way through the development and realize you forgot something important and have to start over.

Here are a few guidelines to help you in your planning:

#### What is the purpose of the Application?

- Verify process settings on start up
- Ensure product requirements are met

Both of these statements tell you a lot on how to proceed.

#### How will you group the variables you collect?

- By Line
- By Customer
- By product
- By size
- By colour

Now you are getting the picture...how you answer these questions can dramatically affect what you end up with. For instance, if you build applications by product, do you include sizes in one application or separate sizes into different applications?

Remember, each of the groupings above probably results in a difference in the targets and specifications to be applied. This is a clear indicator for grouping of parameters you are monitoring into individual applications.

## What variables are you going to collect?

This is a very important decision. What do you have to keep an eye on to avoid issues like defects, waste or downtime events. I can tell you with great confidence, you will not think of them all and as you learn from your process, you will update this list.

The simplest items are always the mission critical ones that affect product performance, customer satisfaction. If your customer specifies it in their requirements you should be checking it and the items that may affect or influence those items. If you need it for a Certificate of Analysis, you need to be checking it. All regulatory requirements should be checked as well.

## What order do you put the variables in an Application?

There are a number of options on the order of the variables in a QW 5 Application.

- If you are converting to QW 5 from a paper logsheet, use the order of the variables from the existing document. This has the advantage of being more familiar to the people using the application. Remember to eliminate variables no longer used from the old sheet.
- Order the items in the same sequence they will be collected during the walk around.
- Place the most critical variables first in the collection process to highlight these issues quickly.
- Views in QW 5 can also be used to revise the order of the variables for the analysis of the data.

## Where are you going to get the limits for each variable?

Note: Limits are Specification, Control Warning and Target values

These limits can come from customer requirements, product specification, and regulatory requirements but you do need to get them from somewhere.

A quick overview on the different limits available for a numeric or calculated variable in a QW 5 Application:

- Specification Limits, both upper and lower – data will appear in white – think white hot!
  - Typically, these are your reject limits, if a result is outside of these it's a serious problem
  - These could be based on customer, performance or regulatory requirements
- Control Limits, both upper and lower – data will appear in red – think trouble brewing!
  - These limits are usually based on the capability or performance of a variable
    - For this variable for this product on this line, it should stay within these limits
  - Setting good realistic control limits are important to avoid hitting the Specification limits. Control limits are your early warning of problems allowing for you to look into an issue before it results in a reject or shut down .
- Warning Limits, both upper and lower – data will appear in yellow – a variable is wandering away from target.

	LIMITS
MAX	9999
USL	C 1132.5
UCL	C 1074.4
UWL	F 910.0
TGT	F 900.0
LWL	F 890.0
LCL	C 725.6
LSL	C 667.5
MIN	0





Using the Summary screen in conjunction with the Rules and Limits supports the methodology “if it is not broke don’t fix it!” So when the data is entered, only problems that should be reacted to will be displayed.

## How often should these variables be checked

This is another decision that can affect how QW Applications are organized. If all variables have the same sampling frequency, example 1 hour, then it makes sense to place them all in one QW 5 application. QW 5 does allow variables with varying sample rates to be in one application. (see <http://www.busitech.com/Using-the-Sampling-Plan-feature-in-QW-5/>)

This makes sense when there may only be a few of them that are different and you still want them included for analysis purposes. But when there is a large number of these, it may make sense to separate them into individual QW Applications like an hourly audit and a once a shift audit.

Sampling frequency is important and getting it right can make all the difference. If you don’t sample often enough you could be making rejects. Sample too often and you are wasting valuable resources.

Effects on sampling:

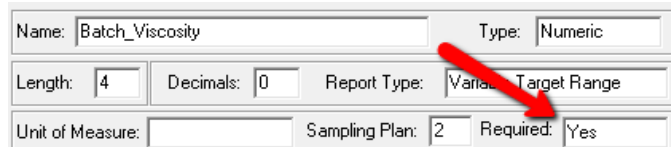
- Regulatory requirements
- Variation in a process/product
- Product/Customer requirements
- Raw materials – lot changes

Having data is the best measure of your process and reviewing it will go a long way to helping you establish the correct sampling plan for your Applications.

## Are any Variables required entries?

The data you collect may have items that are “Mission Critical” to the product or process you are tracking. In this case you may wish to set those variables to “Required” during the definition process. This will ensure that the user cannot exit the Add screen process without recording a value for variables designated as “Required”

Ideally this feature would be used for Customer requirements, quality checks or product performance measurements.



Name: Batch_Viscosity	Type: Numeric	
Length: 4	Decimals: 0	Report Type: Variable Target Range
Unit of Measure:	Sampling Plan: 2	Required: Yes

## Can calculated variables add value to your application?

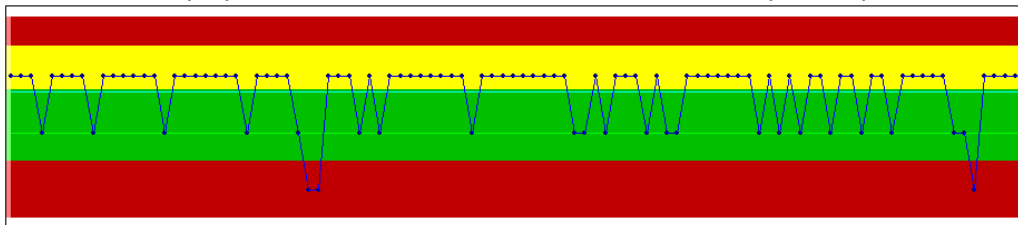
Think of a calculated variable in a QW 5 application as “free” data because you get the results without any effort. A calculated variable can be used to produce averages or ranges of other data that has been entered like Fill Weights. @AVG[V9..V12]

This one will calculate what the current shift is based on the current time.

@CASE[@HOUR[V2]+(@MINUTE[V2]/60),7.50,15.49,10,15.50,23.49,20,23.50,24.00,30,00.00,7.49,30]

You can also use them to produce summary statistics like the % of variables entered that meet Specification Limits for individual records entered. @COMPLYSL%[V7..V11,V13..V21,V25]

The other advantage to calculated variables is that you can apply limits to them like a numeric variable and display results in colour and chart the data for a very visual presentation.



## Can default values improve the data capture process?

To assist the people collecting data you may want to consider offering default values – especially for reoccurring data like Shift, Team or Product. For instance if you are performing hourly checks and the values for some variables repeats from the last entry you can provide a default value of the last value entered.

Input File:	sample QW Applications\TEAM.IO
Output File:	sample QW Applications\TEAM.IO
Help File:	

This is done through the use of the Input/Output field definitions available for each variable in a QW 5 application.

The Add screen will

display the value from a file that is defined as an Input file for the variable. The Output file will have the value from the Add screen written to it when the data is saved. Using the same file name for both the Input and Output file enables the default value feature. Here is a link for more information on this feature.

Variable	Value
1 Date YYYY-MM-DD	2012-04-02
2 Time HH:MM:SS	15:45:59
3 Team	10-A Team
6 Product Description	20-Chocolate Mint
9 Downtime Type	30-Reporting
12 Downtime Cause	
13 Minutes Down	

<http://www.busitech.com/Using-Input-and-Output-Files/>

The following item also describes another form of default values.

## Can interfaces to other systems or devices be used?

The collection of data can be a time consuming process. Interfaces can help to decrease the time to collect the data as well as improve accuracy. In QW 5, there are a variety of interface opportunities to assist in the data collection process.

- Measuring devices like weight scales. These RS232 devices can be integrated into the Add data process and greatly decrease the time to do product checks and Fill Weight applications
- Individual data values for variables can be acquired from Automation Systems (Programmable Logic Controllers PLC's) through the use of IO Servers and a connection to those systems. These would be values like pressures, temperatures and speeds that are monitored by the Automation

System. Defining an Input file for a variable with the DDE or OPC address in the PLC can obtain that data when the Add key is pressed in a QW 5 application.

- QW 5 supports VB Scripting modules that can be developed (by you or us) to link to existing data sources like an SQL database to obtain data via the Add Screen processing interface and provide it as a default value when the Add screen is presented.

## Are there any security or regulatory requirements for capturing and editing of data?

QW 5 has security options that can be enabled to assist in the restricting of access to some functions for example:

- anybody can add data but only certain individuals can edit or delete the data
- <http://www.busitech.com/Security-in-Quality-Window/>
- Traceability of the data for meeting requirements like FDA 21 CFR part 11 though the use of transaction logging for every add, edit or delete of data in an application.
- <http://www.busitech.com/meeting-the-21-cfr-part-11-requirements-with-quality-window-5/>

## Will a Help System improve the application? – YES!

Consider this - It is 3am in the morning and a critical variable has gone outside specification limits. What do you want the operator to do? Phone you or follow a documented Current Best Approach (CBA) for investigating and solving the problem? I know which one I would want the operator to choose!

For each variable defined in a QW 5 application, you can define a file to point to that contains the CBA for that variable. So from the Summary Screen, which displayed the Rule violations, the operator can select User Help and the best approach for overcoming the issue is displayed for them. The key points are for providing this help are:

- It is available when it is needed at the click of a mouse – no need to search for it
- It can provide a structured method to resolve the problem. Everybody using the same playbook – that's team work!

You can define these Help files in any format (Word, Excel, PDF, Website or a Video) and QW 5 will present the data using the default Windows viewer for this file. This is the last step in creating a QW 5 application but it is important to consider it in the planning cycle.

## Develop It – Building the Application

After reviewing these items and considering the points presented, it is time to start building your application. The QWAdmin tool is what you will use to create and change your QW 5 Application. I mention change because that is what you will do most with your QW 5 Application, and the QWAdmin tool is designed to give you a “rapid change” capability to do that.

### QWAdmin - Let's get started!

There are four tabs to select from when changing a QW 5 Application under the QWAdmin – Application selection:

- **Application Settings** – define General setting for an application
- **Variable View** – Add, change and order the variables in a QW 5 Application
- **Grid View** – make limited changes to a QW 5 Application on a grid format
- **Script** – Define Application specific VB Script routines

**Variable View** – adding, editing and arranging Variables

A QW 5 Application can have the following field types:

- **T** – Text – used for non numeric uses like a comment field
- **N** – Numeric – a measurement field that will want to assign limits to and chart the data
- **C** – Calculated – a value that is determined by a formula – average of three variables
- **P** – Popup – a selection table of values to pick from – Shift, Team or Product
- **L** – Lookup a calculated test field associated with a P-Popup file
- **A** – Average – like a calculator window input 5 values and it returns the average
- **R** – Range – works with the A-average field to provide the range of the values entered

**Note:** the A-average and R-range variables are special use variables where retaining the original data is not required. It is recommended that you use the C-calculated variables for generating average and range values.

**Suggestion:** Draw out your application on paper. List all the variables down a page like this:

Date  
Time  
Shift  
Team  
Team\_Leader  
Line\_Speed\_(fpm)  
Run\_Number  
Bottle\_Weight\_1 (oz)  
Bottle\_Weight\_2 (oz)  
Bottle\_Weight\_3 (oz)  
Average\_Bottle\_Weight (oz)  
...  
Comments

Don't worry about forgetting anything as you can always insert them later.

**Note:** When I define a variable name, I like to capitalize the first letter of each word and also include the unit of measure as the last item. This makes the names easy to read and having the unit of measure.

**Note:** Did you notice the underscore character ( `_` ) between the names of the variables above? This is a method of telling QW 5 to split the name of the variable on multiple lines on the Log Sheet screen. This can make columns much narrower like the example on the right.

Conveyor Speed (fpm)	Conveyor Speed (fpm) <sub>1</sub>
140.0	140.0
v7	v8
148	
159	

## Variables Types and definitions

Next, think of the type of data you want to collect in each field. We will explore the different field types and their options in this overview.

**Date and Time Fields:** these two are by default the first two fields in a QW 5 application and are defined as T-text type variables. You do not need to make any changes to these fields. If you wish, you can change the name of the variables to say Production Date and Production Time to add clarity to the information captured

## T-Text – example Comments variable:

This is the simplest variable definition in a QW5 application, but a very useful field for collecting important data. It is typically text type data that you do not want to chart so it shows up always in black on the screen. You would use this type of field for things like Comments that provide a way of entering information that is relevant to current operating conditions, or actions taken as a result of an issue.

Suggested setting for a Text Variable:

- **Variable Name:** Comments – don't forget to use the underscore character between words if needed
- **Variable Type:** T-Text
- **Length:** 40 – your choice you can set it to 100 or more if there is a need for allowing for verbose comments
- **Convert to capital letters:** Recommend you do not check if this is a comment field, no one likes to see all capital letter in a message. If this is a field like Team where it can be A,B,C or D then I would check this option. This will take a lower case "a" and convert it to a capital "A" making selecting data later easier.
- **Unit of measure** – leave blank
- **Sampling Plan:** Unless you require a comment each time, not recommended, set to zero (0) meaning optional
- **Required:** If you want this field to be entered every time set to Y, typically No. Set to Protected if the value is collected externally and you don't want to allow changes.
- **Input and Output files:** Typically not required for Comments. (see Line Speed (Input/Output Files) for more information on this option.

- **Category/ Xref:** Blank (see Line Speed (Category/Xref) for more information on this option.)
- **Help File:** Leave Blank – no need for help on this variable.

## N-Numeric - Line Speed Field

Line Speed is a variable that you would want to monitor as it can greatly affect a process. It will be a numeric value and you will want to apply limits to it.

First decision is to determine the size of the field you want. To do this you must know:

- The highest and lowest possible value?
  - In this case 600 feet per minute and 0 is the lowest
- Are there any decimal positions and how many?
  - There will be no decimal positions but if there were, you need to know this in considering field size. If there were 2 decimal places like 546.45 the field length would be 6:
    - 3 for the integer
    - 1 for the decimal point
    - 2 for the decimal positions
    - Total of 6
- Can the value be a negative value? (- 546.45)
  - If it could be, then you would add 1 to the field length making it 7.

**Report Type:** affects the way that some statistics are calculated for this variable to make them more accurate for a given situation.

- Variable – Normal calculation – **default setting**
- Variable Target Range – used to define a variable that the target value is a range rather than a specific number.
  - used to modify the way Target Z is calculated
  - Used with the Warning Limits if they are Fixed
    - If the average is between the warning limits Target Z =0
    - If the average is above the warning limits Target Z=+1
    - If the average is below the warning limits Target Z=-1
    - Calculated or Blank warning limits - Target z set to n/a
- Attribute Measureable – used for variable that has a grading scale like opacity
  - Disables calculation of Cr, Tz, Cpk and Cool
- Attribute Count 1-50 – inspection group size
  - Modifies the calculation of the %OOL
    - Average/Sub-group size \* 100
  - Disables calculation of Cr, Tz, Cpk and Cool

**Unit of Measure:** Pick from a list of available Units of Measure that matches the variable you are creating. The Unit of Measure is for documentation and reference purposes only. It is only displayed in the Variable Information Screen. The Unit of Measure pick from list can be changed in the QWAdmin – Unit of Measure option.

**Sampling Plan:** Used to indicate on the Add screen, when a variable is to be entered. It can be used with the Required – Yes option to force entry of value on the Add Screen. Sampling plan is a numeric

# Need a little help getting started with Quality Window 5



entry that sets the Variable Reference Number (numbers to the left of the variable name) on the Add screen to difference colours to help indicate when data show be entered.

Set to zero - displayed in blue means the entry for this variable is **optional**

Set to 1 - displayed in **white** means please enter a value for this variable each time a record is added but not required

Set to 2-99 displayed in **white** means please enter a value for this variable every second time (in the case of a 2) a record is added to this application.

A Variable Reference Number displayed in Red indicates a **Required** entry field.

Variable
1 Date YYYY-MM-
2 Time HH:MM:SS
5 Team
7 Batch Number
8 Batch Viscosity
9 Conveyor Speed
10 Oven Temp. (F)

Please refer to this Self Help entry for more information on Sampling Plan

<http://www.busitech.com/Using-the-Sampling-Plan-feature-in-QW-5/>

**Required:** Options are:

- Yes – value must be entered before saving data on the Add screen
- No – not required
- Protected – value cannot be changed on the Add or Edit screens. Used where the value is provided from an external source like a Weight Scale or a PLC.

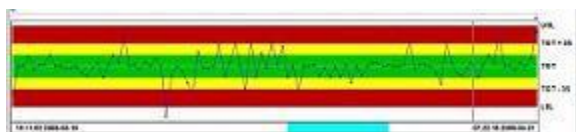
**Calc. Limits Based on** gives you the additional capability to calculate limits that are set to C-calculated more accurately. The options here are:

- Population
- MR Estimate
- Low Variation
- High Variation
- Low Average
- High Average

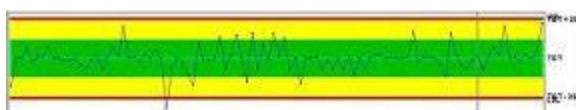
I would suggest selecting Low Variation. What this will do is scan the data for the variable and select 20 consecutive points that have the lowest Standard Deviation and then use that value to calculate the control limits. (+- 3 times Lowest SD)

This means your control limits always reflect the best recent performance you were able to achieve which in turn means that you don't have to keep manually adjusting your Control Limits every month or so.

The following charts demonstrate Control Limits set with Low Variation and the second with using the Standard Deviation of the Population.



Low Variation



SD of Population

The Low Variation option provides you with Control limits away from the Specification limits thus giving you ample warning of process upsets as an Out of Control situation rather than Out of Specification or reject level.

**Center on:** This is used to determine if Calculated limits should be centered around a fixed target value of the calculated average for the data. If your average is positioned away from a fixed target then by setting this value to Calculated will mean you do not have symmetrical limits around the target value. In some cases the target value could appear in a red zone. It is recommended you set this to Fixed Target if you are using calculated limits.

**Setting Limits:** Refer to Item 5 on page two for an overview on setting limits

**Control Rules:** Refer to **Using Control Rules – Alarms to help monitor the data** on page 3.

**Input/Output files:** These two fields work together to provide a number of features for improving an application. Typically, we recommend that you use the name of the variable and an (.IO) extension for these files so that when you review the files in a directory they are easy to identify.

The Input file is used to provide a default value for a variable when the Add screen is presented. It can be from a previous entry of other sources like Scales or PLC's. The Output file can be used to store the current value of a variable from the Add screen – in the case of a default value or to share the value with a different QW Application.

Refer to the following Self Help entries for more details on these files.

<http://www.busitech.com/Using-Input-and-Output-Files/>

<http://www.busitech.com/How-do-I-create-a-default-value-in-Quality-Window/>

**Category/X-Ref:** These two are not used within QW 5. They are provided so that it can be used to assist application developers as required. For instance, it can be used to identify the cross reference name for this variable to another database. They can be used to group variables in a QW application for external reporting needs. You may not have a need now for them but they are available if needed in the future.

**Help File:** By placing the filename and extension of a file in this field, it will tell QW 5 to display the contents of that file using the Windows Default viewer for that file type. If you use a .DOC, Windows will use Word to display the document. For .XLS, it will use Excel.

This option gives you the ability to provide Variable specific help for a user when they require it, at the click of the Variable Help key in a QW 5 application. It is a very powerful tool for solving problems quickly and in a consistent lanner.

## N-Numeric (no Limits or Rules) - Run Number Field

This type of variable is used to provide reference information for the data being captured. If there were text or special characters to be included in this field, then a Text type variable would be used – example (123-34AB7). In our application the Run Number will have a numeric value entered like (223543).



**Note:** A variable set to numeric will have leading zeros suppressed. So if this variable is to be a tracking number like a Run Number and it can have leading zeros, make the field T-Text

Here is how to proceed:

- Set the field length to meet your expected data
- Decimals = 0
- Report type = Variable
- Unit of Measure – ignore
- Sampling Plan – 1 if you expect it every time
- Calc. Limits based on – ignore
- Centered on Target – ignore
- Max Value – set it based on your highest possible value. Good error check
- All Limits set to Blank
- Min value – set to lowest possible value or zero. Good error check
- Set all rules to off – clear check marks
- Input/Output Files – set to RunNumber.io if you want a default value. Useful if the same run number is used for multiple entries, otherwise leave blank.
- Category/X-Ref – leave blank
- Help file – if you have a help file enter filename here.

Using these settings will result in the data for Run Number being displayed in black and data cannot be charted and the variable will not appear on the Summary – Alarm screen.

## C-Calculated – Average Bottle Weight

Calculated variables in QW 5 are like free data. There is no cost in terms of time or effort to get results but they add tremendous value and insight to a QW 5 application.

A calculated variable is defined almost the same as a numeric variable (see Numeric Variable for details) with the exception that the value of calculated variable is not entered but is derived from a formula.

A formula can be very simple or quite complex and can be comprised of:

- use other Variables using their V-reference number – Example V17 to represent Product Weight
- numerical operators like +-\* /
- parentheses () to control the order of events
- pre-programmed functions identified by the use of an @ and square brackets []

Simple Calculated variable:

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- A value of 15. Using this type of calculated variable would result in a constant value of 15 for the variable. This can be handy if you want to have the number identified in the data so when you bring data together from two production lines, you can see the source of the data.

Using Variable reference numbers

- V16+V17

Using parentheses ( )

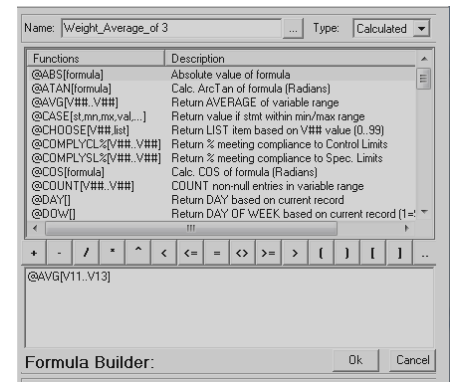
- (V16+V17)/V23

@ Functions

- @AVG[V16..V23,V26]
- Calculates an average value of the variables V16 through V23, including V26

Complex calculations: up to 270 characters in length

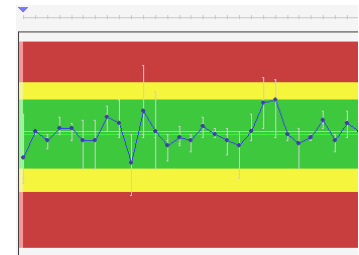
- @CASE[@HOUR[V2]+(@MINUTE[V2]/60),7.50,15.49,10,15.50,23.49,20,23.50,24.00,30,00.00,7.49,30]
- Determines the value of a Shift code based on the current time.



There are a number of @Functions available to you when you define a calculated variable in QW5. You can explore the list of available @Functions in the Formula builder Window when you click on the Formula tab in the definition screen for a Calculated Variable.

A couple of special @Functions are:

- @POP[V15..V17] – produces a custom chart view of the Average value for all data contained in these three variables as well as a range line in the Control chart indicating the highest and lowest value of the variables selected. The histogram and the Statistics will be for the combined data of the three variables selected.
- @XBar[V11..V13] – produces a true XBarR chart for the variables selected including a Range chart



## P-Popup - Shift Field

In the shift field we are expecting data like Days or Nights for 12 hour shifts or 1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> if it were 8 hour shifts. So you could create this as a T-text field and give it a field length of 6 (“nights” is the longest value). This would mean people would type these values in for each record entered.

That would work but some people may type “days” all lowercase or “DAYS” all upper case or just enter D or N. A better field type for this type of variable would be P-popup.

A P-Popup field lets you ask a question and then provide a list of possible answers. This makes the capturing of data fast, accurate and consistent. There are three types of Popups you can use in a QW 5 application:

- A single level - one question one answer
  - What shift is it? Days or Nights
- A single level - one question but with associated data
  - What Product are you making? Deluxe 32oz
  - Associated with the Deluxe 32oz selection are additional pieces of data like:

- Plastic bottle
- Model 332 Screw cap
- SKU 12345
- Green Label
- Once the selection of product is made – Deluxe 32oz, then all of the associated data can be included in a QW 5 application through the use of L-Lookup type variables
- A multi-level Popup – multiple related questions to drill down to the right answer
  - What Area of the Line caused the Stoppage?
    - Mixer
    - Conveyor
    - Filler
    - Packager
  - If Mixer is selected then the questions would be Reasons for Stoppage?
    - Electrical
    - Mechanical
    - Operational
  - If Electrical is selected then only the Causes for Electrical failures for the Mixer are displayed
    - Power Outage – Source
    - E-Switch hit – operator stop
    - Motor failure
  - You are lead to the best answer based on the number of questions you ask.
    - Mixer
      - Electrical
        - Power Outage – Source
        - E-Switch hit – operator stop
        - Motor failure

This in turn allows you to analyze your failures based on the questions to ask when it happens:

What area of the Machine had the most failures?

What Reason (discipline) had the most minutes down?

What's the biggest Cause of failure in terms of Events, Minutes or Cost?

All in all, Popups and their associated data can add tremendous value to a QW 5 application while greatly decreasing the time it takes to collect the data.

Here is some information on creating Popups.

<http://www.busitech.com/Lets-Talk-Popups/>

Note: Popups must be created using QWAdmin – Popups, before they can be included in a QW 5 Application. So once you decide to use a Popup, you must create it first.

Refer to the Quality Window 5 Sample Applications for examples of how Popups are used. Typically, they are installed in the Busitech/QW50/Sample QW Applications directory.

## L- Lookup– calculated text fields

A L-lookup type variable is a calculated text field. It uses a value from another variable as a key to a Popup Selection file to obtain Popup Fields information.

A L-lookup variable does not appear on the Add, Edit, Insert, Copy screens. Its value is only determined when the Save button is clicked on the Add, Edit, Insert, Copy screens.

Good examples of using Popup and Lookup variables are in the example applications included with QW 5.

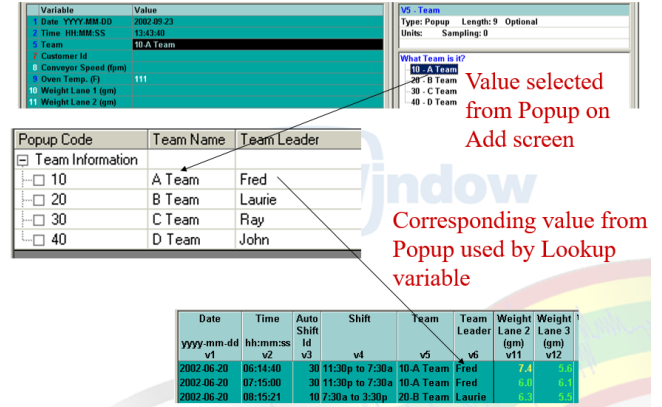
In the Process Monitoring Example:

- Shift Id and Shift Description are good examples of a Calculated Shift Id used in a Lookup field to a Popup to get a description
- Team and Team Leader – example of a single level popup with associated data.

In the Downtime/Production Tracking Example:

- Downtime Type – example of a single level popup
- Downtime Area, Reason and Cause – 3 level popup
  - Where the Cause is the Popup field – P type field is always on the lowest level
  - Area and Reason fields are Lookup type variables using the code captured in the Cause field.

### Lookup Variable



The screenshot illustrates the configuration and use of a Lookup Variable. It shows a variable definition for 'V5 - Team' with a popup type and a 'What Team is it?' field. Below this is a table for the popup:

Popup Code	Team Name	Team Leader
10	A Team	Fred
20	B Team	Laurie
30	C Team	Ray
40	D Team	John

Annotations indicate that the value '10' is selected from the popup, and the corresponding value 'A Team' is used by the lookup variable. A data table below shows the resulting values in a log sheet:

Date	Time	Auto Shift Id	Shift	Team	Team Leader	Weight Lane 2 (gm)	Weight Lane 3 (gm)
yyyy-mm-dd v1	hh:mm:ss v2	v3	v4	v5	v6	v11	v12
2002-06-20	06:14:40	30	11:30p to 7:30a	10-A Team	Fred	7.4	5.8
2002-06-20	07:15:00	30	11:30p to 7:30a	10-A Team	Fred	6.5	6.3
2002-06-20	08:15:21	10	7:30a to 3:30p	20-B Team	Laurie	6.5	5.5

## QWAdmin – Applications Settings

Once you have created all your variables for your QW5 Application, it is then time to enter the QWAdmin Applications Settings screen and complete the process.

### General Information about your application:

The settings in this section offer a number of customizing features for adapting your application to better meet the use of the application.

**Application Template Name:** This is the name that the end user will be selecting, from the list of applications on the Begin screen. Make it meaningful, easy to understand and consistent.

Example:

- Downtime Line 6
- Line 6 - Product X Size 4 Quality
- Line 6 Process checks

**Number of variables to lock:** (Default 2) This will set the number of variables from the left to keep locked (frozen) in place when scrolling to the right on the Log Sheet screen. It is a good idea to organize the order of the variables in the application to insure variables like Team, Shift and/or Product stay locked in place for easy reference on the logsheet.

**Number of Historical Data Points:** (Default 100) When a QW 5 Application is selected from the Begin screen, QW 5 looks to this field to determine the number of records that should be loaded into memory starting from the most recent, backwards this number of data points. The number of records loaded is also the basis for calculating statistics that appear in the statistics box on the Chart type screens as well

as the data used to calculate any limits that are set to Calculated for any of the variables in the application.

**Note:** Setting this value to ALL will load all records in a QW 5 Application file. It is not recommended to have this value set to ALL for regular use as it may cause slow performance on loading. At any point in the QW5 program, you can access the Filter screen and load additional records if required.

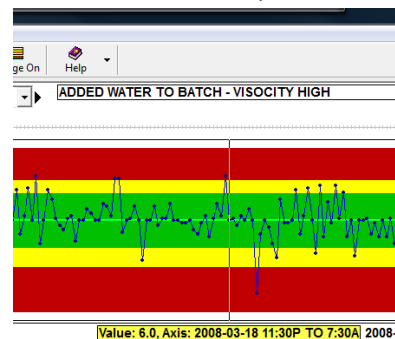
**Chart Screen Options:** These are options that allow you to customize the Control Chart in QW 5 add value to the data displayed. It is recommended you set these options

**X-Axis Variable 1 Included in the positional Cursor Information Box:**

- Located on to the right of the Value displayed inside of the yellow information window under the Control chart. This information window appears when the left mouse button is pressed while pointing at a value on the control chart.

**X-Axis Variable 2 Included in the positional Cursor Information Box:**

- Located on to the left end of the yellow information window under the Control chart. This information window appears when the left mouse button is pressed while pointing at a value on the control chart.



**Annotated field: Above top right corner of the control chart:**

- Select a variable from the application that you wish to display the value for as you move the Positional Cursor on the Control Chart.
- A good use of this option is a variable like a Comment variable that will display the comment entered for a record in the QW Application. This makes this field a great problem solving tool when investigating issues.

**Add Screen options: (Optional)** This option tells QW 5 to perform a task when the A-Add screen is pressed. It is an opportunity to interface with devices like digital scales to collect data via an RS 232 interface.

**Batch filename to Execute:** This is the name of a command type file that will perform the task requested. You can navigate to the location on your computer where this command type file is located.

**Transaction Audit Trail:** This group of options is performed when the Save key is pressed in QW 5. It provides the ability to create a transaction log file containing every Add, Edit, Copy, Insert or Delete of data in a QW 5 application. This is great options for meeting the traceability requirements of your data, especially for regulated products like pharmaceuticals.

**Log filename to update:** Enter a valid filename you wish to record the logging transactions in. Typically this would be the same name of the QW 5 Application with an extension of .LOG.

**Note:** There is a Transaction Log file Viewer in QW 5 under the Macros label at the top of the QW 5 program screen. Click on Macros and DisplayAuditTrail option to view the contents of the transaction log.

**Batch filename to Execute:** This is the name of a command type file that will perform the task requested. You can navigate to the location on your computer where this command type file is located. An example of how you might use this option may be to update data in another database based on the data entered in the current QW 5 Application.

*Variable Used to store AutoNumber:* **(Optional)** QW 5 can create a unique number or id for each record of data collected. This number is very useful in the tracking of data as well as providing a Key like value to be used to synchronize data between two data bases.

To make use of this feature, select a variable from the application to store this AutoNumber in. It should be a numeric value and then set to Protected so the value cannot be edited.

*Security Options:* These options are used to identify what functions (Add, Edit, Insert, Copy and Delete) should be restricted and would require the entry of a valid security Id and password. A detailed overview for setting these options can be found in our Selfhelp blog at this link:

<http://www.busitech.com/Security-in-Quality-Window/>

*Limit Method Criteria:* In the calculation of limits in QW 5 (Specification, Control and Warning) there is a setting called Low and High Variation. If one of these methods are selected, QW 5 will use the criteria set here to scan the data for the requested state of Standard Deviation (high or Low). It is recommended that you use the default settings for these fields (20, 20, 100).

Here is an overview of the calculation of limits in a QW 5 application:

<http://www.busitech.com/Getting-the-most-out-of-your-Control-Limits/>

*Event Application Information:* There are two primary types of applications that QW 5 can be applied to. They are:

- Regular Timed Interval for Sampling – it uses Specification, Control and Target limits along with Control rules to monitor a product or process – this document covers this type of application.
- Event based – record data when something happens - downtime, defects, scrap. These types of applications typically record data like:
  - Measures of severity – Minutes down, costs or products rejected
  - Descriptive data like root cause, shift, product and customer to permit the ranking and filter of data for analysis.

For the type of application we have created in this document, the Event Information options would not be used. See Creating an Event Analysis Applications for details on these options.

*SQL Interface Information:* These options are typically not used for regular QW 5 applications. They are used when a QW 5 Application obtains data directly from an external database through the use of a Connection String and a SQL Statement. We called these types of Applications “On the Fly” applications as they are created at the time the query is made and the elements in the SQL Statement become the variables in the QW 5 application. The QWSQLWizard utility, found in the QW 5 program directory, would be used to create the initial Connection string and SQL statement.

## Develop it – Last step: Test and Show the application you created

As you try your application, you will probably find small issues that you will wish to change. Things like moving variables around or adding and even deleting variables. The QWAdmin tool provides you with a rapid change capability that allows you to easily make these changes.

It is important to try out the application and share it with others to make sure it meets all the objectives it was intended for. Don't be afraid to show it off and expect comments. The rapid change capability

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means you adjust the application quickly, but it also helps to get “buy in” from the people who will use it when you make changes based on their comments.



## Deploy it!

So, you have Designed, Developed and Tested your QW 5 Application...now what do you do?

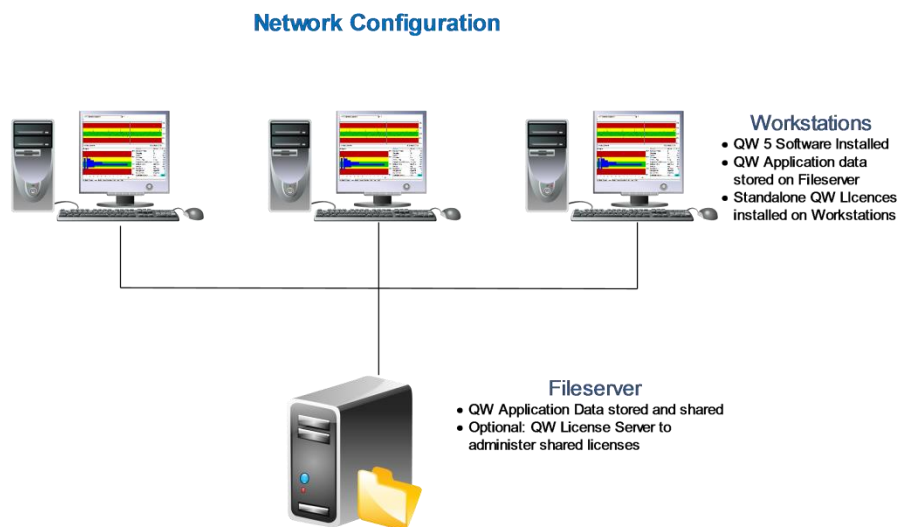
You now need to deploy your application to the workstations that will use the application. This means you need to install the Quality Window 5 product on that workstation that will need it. You may need assistance from your IT resources at this point. Here is an outline on how to proceed.

### Choose your configuration.

There are a variety of ways that QW 5 and its applications can be deployed from Single standalone workstations to multi workstations on a network or a terminal server environment. Refer to this document on Self Help blog to review and understand the best option to meet your requirements.

<http://assets.busitech.com/documents/TheBigPicture-QW5InstallationOverview.pdf>

For this discussion, we will use the QW 5 on a Network – data sharing with multiple workstations configuration, as this is the typical configuration used for deploying QW5 and its associated applications.



In this configuration, all data should be stored on central fileserver on your network. This is important to allow the data to be shared, provide a level of security and allow backups to be performed on the QW 5 applications.

Typically, the location of the QW 5 Applications will be a Mapped Drive identifier for ease of access and the setting up of users for the applications. We will call it Q:\QW5 Applications Data\ for this discussion.

### Storage Requirements:

The storage requirement for the QW 5 Applications should be determined to allow for proper allocation of disk space, as well as for backup requirements. Here are some of the factors that determine the space requirements for QW 5 Applications:

- Number of variables in an application
- Field length of those variables
- Number of records added based on how often data is recorded

- Once an hour, shift or day
- Number of QW 5 applications you will have

Refer to this link in the Self Help Blog for a guide for determining QW 5 Applications space requirements.  
<http://www.busitech.com/Determining-Storage-Requirements-for-QW-Applications/>

## Licensing considerations:

There are two main types of licensing for the QW 5 Product.

The first is Standalone Workstation licenses. These are licenses that are allocated to individual workstations. This type of license is best suited for workstations used by what we call primary users. These are users that must have QW 5 available to them at all times to record and review data. These users would typically be production floor users that are recording process and product audit, as well as downtime type applications. Quality or Lab users would also be considered primary users and have QW 5 available when they require it.

A secondary user could be offline personnel, managers and process engineers who require access but not necessarily immediately. Their needs may best be met using the second type of licensing; a server based concurrent or shared licensing service.

In this case, the QWLicense Server application would run on a Server (could be the same server used to store QW 5 Application data) and as a QW 5 user opens the QW5 Program on their workstation, a license would be requested from the pool of available licenses. If there is a license available, that license will be allocated to the user requesting a licence. A QWLicense Server installation will have a minimum of 10 licenses but the number of licenses or seats can be increased to meet demand requirements. If all the licenses in a license pool are allocated, then the requesting user will receive a message indicating there are no licenses available at that time. If this message appears regularly, then increasing the number of seats should be considered.

### Licensing Strategies – Pros and Cons

The easiest to manage license strategy would be using the QWLicense Server concurrent license method. It ensures that all licenses purchased are available. Make sure that the size of the license pool is sufficient to meet peak demand.

The Dedicated workstation license ensures licenses are available when needed, but can result in underutilized licenses because they are dedicated to a workstation.

A combination of both licensing types may be the best way of meeting the needs of the organization while helping to minimize costs with the shared concurrent license approach.

## Installing Quality Window 5 – what do you need?

The Quality Window 5 product must be installed on each workstation that will make use of the product. If you are using a Terminal Server environment, it is installed on the server instead of each workstation, but this would be configured by your IT support people.

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The software can be downloaded directly from the Busitech Website and if you are doing multiple installs you should first save the installation package to a local server or workstation and install from that location.

The typical installation structure will be that the programs are installed in a directory called Busitech\QW50 under the Programs files directory. The QW 5 Sample Applications will be installed under Program Data\Busitech\QW50\Sample QW Applications directory.

The installation of QW 5 can also be configured as a command line process for unattended install. Refer to this Self Help entry for details on this option:

<http://www.busitech.com/Commandline-Installations/>

The Quality Window 5 Product comes with several modules that allow you to maximize the use of QW 5 in a variety of environments. The two main modules are:



Quality Window

QW5 – Typically for the people like process operators and Quality personnel that will be recording, reviewing and reacting to data.



QWAdmin

QWAdmin – used to create and change QW 5 applications as well as associated files like Popups. This module should not be available to the general user, as it is a very powerful tool but dangerous in the wrong hands.

So, for the people that record, review and react to data, they might only require the Quality Window icon on their desktops.

Access to the QWAdmin program should be restricted to only those people that build and maintain QW5 Applications. This can be as simple as to not put the QWAdmin Icon on the desktop or using the QWSecurity settings, you can put a password on access to the QWAdmin program.

See details for setting up Security in QW 5 at:

<http://www.busitech.com/Security-in-Quality-Window/>

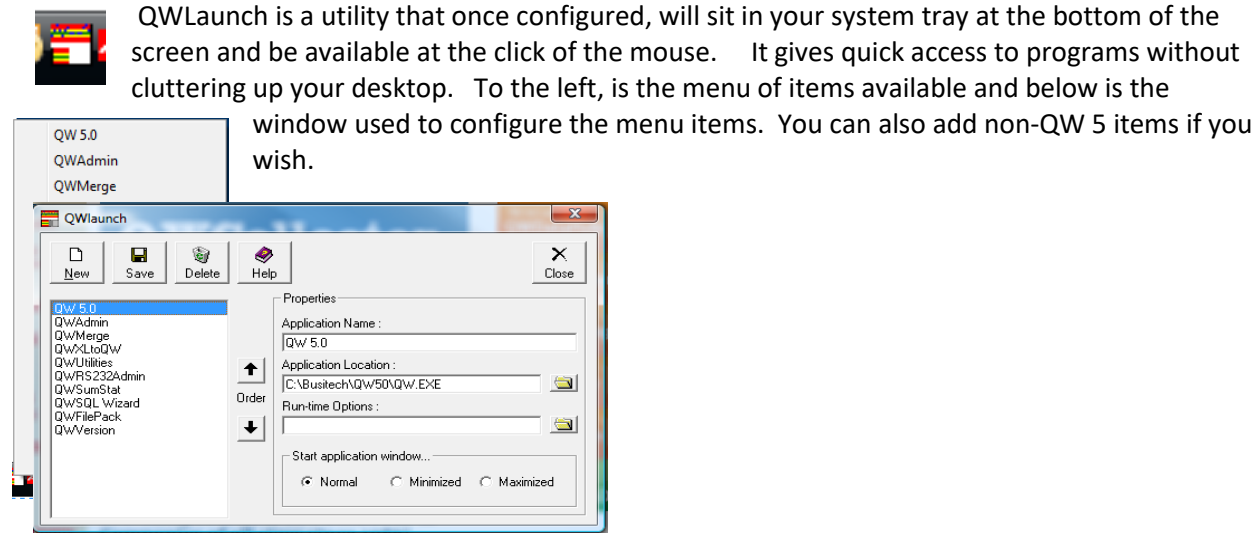
## Sharing Resource files with all workstations

There are several resource files that can be shared with all workstations making it easier to maintain these files. Here is a list of these files:

- ☑ Rules definition file
- ☑ Statistics definition file
- ☑ Units of Measure definition file
- ☑ Global Script file
- ☑ Security Script file
- ☑ Security database

To share access to these files on a Server please review the documentation for the Shared Configuration Manager at this link: <http://busitech.com/managing-resource-files-qw-5/>

There are several additional tools that come with QW 5 and you can selectively make these programs easily available using one of these tools.



## Special considerations when Installing QW 5

The QW 5 product has a feature in it that will save items like:

- Home Directory
- Install Directory
- License Information
- Recent applications accessed
- Additional configuration and option settings

To allow the saving of these settings by general users, write access to the registry must be granted. We recommend this be granted at the HKEY\_LOCAL\_MACHINE/SOFTWARE/BUSITECH level of the registry and below. **[This is no longer a requirement in build 801+]**

Write access to the Busitech/QW50 folder should be allowed for the saving of configuration files used for some of the modules.

## Organizing your QW 5 Applications:

This is an important consideration. Your goal here is to help users select the right application to use each time.

The Begin screen in QW 5 is the first screen a user sees when they start up QW 5. It is important that the way you name your applications be consistent and clearly describe the application use. Make sure the names of your applications reflect the names operators will recognize them by. These would be the same names as on the Product labels or production schedule.

Example:

Line 6 Product A Size B Process Settings

- Product A would be the name of the product

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- Size B is the further qualification of the product hat has a difference in specs and targets
- Process Settings helps people to understand the use of the application the word Settings is extra and could be eliminated

Line 6 Product A Size B Quality variables

- Quality Variables implies variables important to the customer that must be met.

Line 6 Downtime

Line 6 Quality Defects

If you group your applications by Line, then you may not need it in the name of the application, but you should have a variable in the application called Line with a constant value of "6" in this example. Doing this will allow you to combine application data later but still identify the Line it came from.

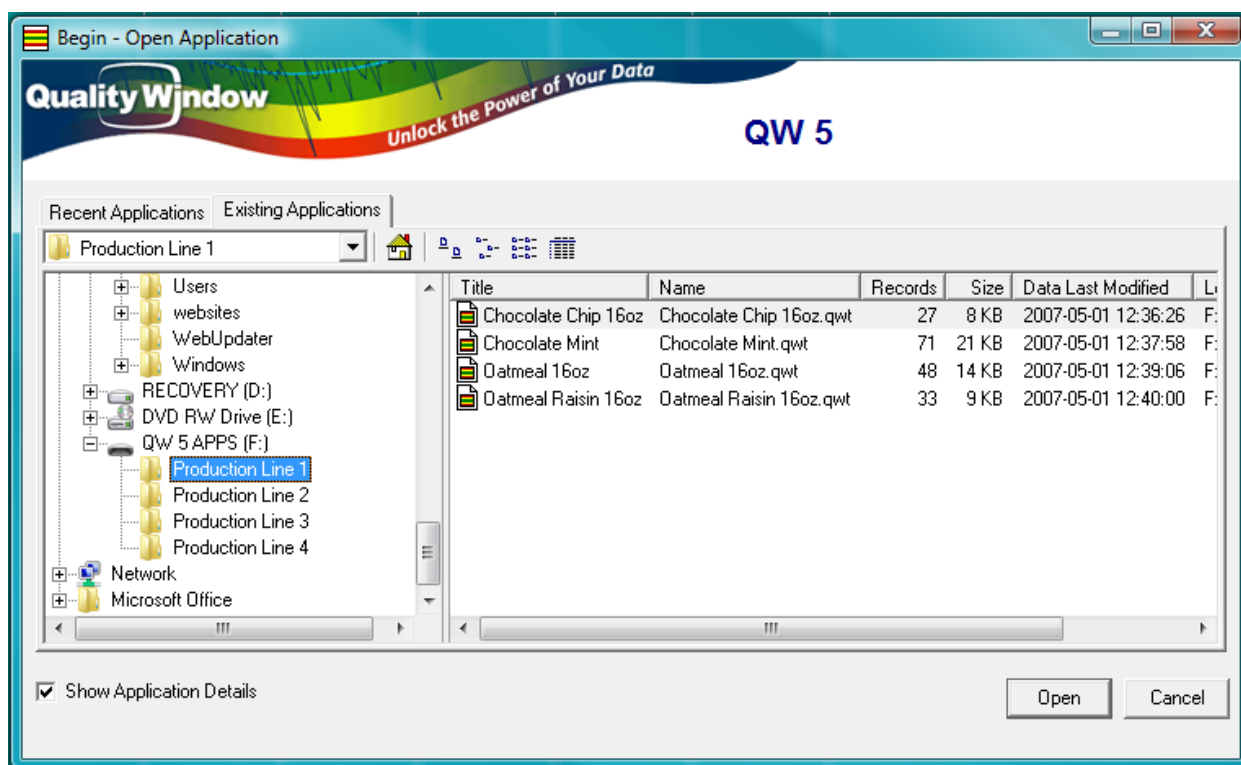
## Structure of the Applications:

If you have 10-15 applications, then naming them consistently is important and having them appear on one Begin Screen would work for you.

If you have multiple production lines, multiple products and multiple sizes or customer specifications per product, then you need a good structure that will allow a user to easily navigate the applications in order to select the correct application to record and review data with.

Here are few ideas to consider that will help users pick the right applications.

You can organize your QW 5 applications into separate directories by Production line. So you would have the Icon for QW 5 on the desktop of the Line workstation and the Home or default directory for that Icon would be the directory containing the applications for that specific line.



Within that directory, you can list all the products and sub categories like size or unique customer. If the list of applications within one directory is too large, making selection of the correct application difficult, you can continue to create directories under the Production Line 1 to further breakdown the list.

An alternative to using the file system directories method is to employ a QW 5 feature called Directories. Using this feature, you can place all your applications anywhere you like, and then use a QW 5 Directory window to display the applications available to a user.

## Deploy it – the final statement!

The final comment is one of the most important after you have Designed and Built your applications. What is the backup strategy you need to put in place and ensure the valuable data you are collecting is protected? This backup strategy should include when backups are done and verifying all the necessary files are backed up.

The answer to when (once a shift, once a day, once a week) is up to you. Answer this question – how much will it hurt if you lost a shift/day/week of data? Once you answer this you will know how often you should be doing a backup of the data. Remember, there may also be regulatory requirements for maintaining your data that need to be considered as well.