



QI Macros



For All Versions of Excel 2000-2013

Table of Contents

Installing the QI Macros	1
QI Macros Overview	3
QI Macros Wizards:	
Chart, Control Chart, Statistical, PivotTable	4
Run a Macros Using the Menus	9
Data Format and Selection Tips	10

 Charts:	12
Pareto Chart	12
Scatter Chart.....	13
Box & Whisker	14
Multi Vari Chart	14
Histogram.....	15

Control Charts	17
 c, np, p, u Charts	17
X and R Charts.....	18
Control Chart Stability Rules	20
QI Macros Chart Menu	21

 Control Chart Dashboards.....	23
Templates for Lean Six Sigma	25
 Control Chart Templates	26
Fishbone (Ishikawa) Diagrams	27
Value Stream Map, GageR&R and DOE.....	28

Statistical Tools	31
Data Mining Tools	32

Installation Trouble Shooting	33
Free Webinars and Training Resources	35

Installing the QI Macros

From Download:

- Save the QIMacros230.zip file on your PC or Mac
- Close Excel
- Extract files from the zip folder
- Run the Installation Wizard

PC: Open the QI Macros PC Folder and double click on QIMacrosSetup.exe to run the wizard.

MAC: Open the QI Macros MAC Folder and double click on QIMacros.dmg to run the wizard.

From CD:

- Close Excel.
- Insert CD and open to view contents.
- PC - Double click on QIMacrosSetup.exe to run the installation wizard.
- MAC - Open the QI Macros MAC Folder and double click on QIMacros.dmg to run the installation wizard.

Installation Troubleshooting

If the installation wizard ran, but the QI Macros menu does not appear on your Excel toolbar, the QI Macros file has most likely been disabled by Excel. See easy fix to enable the file on page 33 or see:

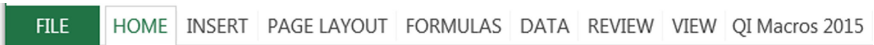
qimacros.com/support/qi-macros-tech-support/#NoMenu

Tech Support:

- **qimacros.com/support/qi-macros-tech-support**
- Email: support@qimacros.com
(Attach a copy of your data in Excel, if applicable)
- Call: 888.468.1537 or 303.756.9144

Excel 2007, 2010 & 2013 Ribbon Menu

Excel 2007, 2010 & 2013 have a different user interface from previous versions of Excel called "the ribbon." When properly installed, the QI Macros will appear in the far right of the ribbon.



Click on QI Macros to reveal the QI Macros functions. Any menu with an arrow to the right has a menu of further options.



Excel for Mac and Excel 2000-03 Menu

When properly installed on a Mac or older version of Excel, the QI Macros will appear in the far right part of the menu. Click on QI Macros to access all of its features.



Licensing:

The QI Macros software is a Single User License. You need to buy one license for each user or computer.

Home/Office Edition: For one user with two computers (desktop/laptop, home/office, PC/Mac). Add a 2nd computer for a single user: qimacros.com/store/add-w244/

About this User Guide

This booklet covers use of the QI Macros. It will *not* cover Excel, SPC, or Lean Six Sigma. See www.qimacros.com for other resources addressing these topics.



QI Macros Overview

The QI Macros Consists of Four Parts:

1. Macros	Control Charts, Histograms, Line, Run, Scatter, Pareto, Bar, Pie, Box and Whisker, Multi Vari
2. Templates	SPC Charts, Dashboards, Flowcharts, Fishbones, DOE, Gage R&R, QFD, FMEA, PPAP, Value Stream Maps
3. Statistics	ANOVA, F-Test, t-Test, Chi-Squared, Correlation, Regression, Sample Size Calculator
4. Data	PivotTable Wizard, Count Words, Stack/Restack Tables, Paste/Link Transpose

Works Right in Microsoft Excel

Other software packages make you transfer your Excel data into special tables within their application, but not the QI Macros.

Just click and drag over the data in your Excel spreadsheet and click on the chart or analysis you want to run from the QI Macros menu.

Sample Data

The QI Macros installation loads sample data for each chart and statistical tool on your computer here:

Documents\QIMacros Test Data

Use this data for examples of how to set up your data and to practice running charts.

Video Tutorials

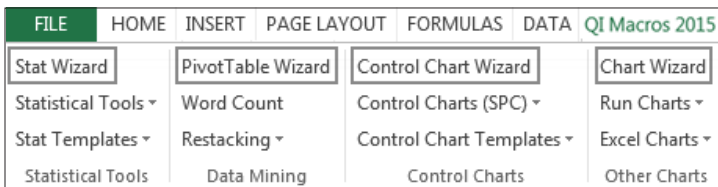
Watch "how-to" videos for many QI Macros tools:

qimacros.com/qi-macros/video-tour

QI Macros Wizards

The QI Macros is the only Six Sigma SPC software that provides Wizards to automatically choose charts based on your data.

We have found that beginning and even experienced Six Sigma users aren't always sure what chart or tool to use. Because users select their data before they draw a chart or run a statistic, the QI Macros can easily determine the best charts, statistics or organization for the data.



The QI Macros has several wizards to assist in choosing the right chart or statistic:

- **Chart Wizard** - Chooses the right charts for your data: descriptive statistics, pareto charts, control charts, histograms, box and whisker charts, scatter charts, etc.
- **Control Chart Wizard** - Chooses the right control chart for your data from: c, np, p, u, XmR, XbarR, or XbarS.
- **Statistics Wizard** - Analyzes your data and chooses the right hypothesis tests for you. Hypothesis testing determines if the means and variances of two or more samples are the same or different. The Stat Wizard will figure it out and tell you in no uncertain terms. No more p values to evaluate.
- **PivotTable Wizard** - creates a PivotTable when you select up to four columns of data.

For more information see: qimacros.com/qi-macros/wizards/

QI Macros Chart Wizard

You've Collected Your Data - Now What?

If you are like many of our users, you are confused about which chart to use to analyze your data. Rather than having to find your way through a forest of decision trees, wouldn't it be great if the decision tree was already coded into the software?

In the QI Macros, it is!

Just select your data, click on the QI Macros menu and then Chart Wizard. The QI Macros will analyze your data, run descriptive statistics and create the most probable charts.

Chart Wizard Results include:

- Descriptive Statistics - with a Histogram, Box Plot, Confidence Intervals, Normal Probability Plot
- One of several Control Charts
- Pareto, Scatter, or Box and Whisker Plot

Chart Wizard Selection Highlights

Columns	1	2	3-9	10+
Integers or Decimals	Pareto Chart if headings not dates	Scatter Plot		
Integers	c chart	p, u, np chart		
Decimals Normal	XmR	XbarR Box Whisker	XbarR Box Whisker	XbarS Box Whisker
Decimals Non-Normal	XmR Median	XmedianR Box Whisker	XmedianR Box Whisker	XbarS Box Whisker

For more info, see qimacros.com/quality-tools/chart-wizard/

Control Chart Wizard

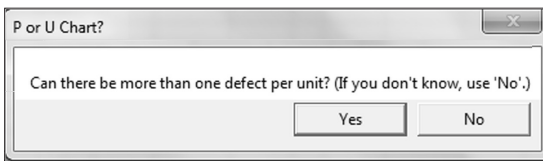
Choosing the right control chart depends on your data—attribute (counted) or variable (measured)—and the sample size.

Type of data	Number in Sample		
	1	2-or-more	Varies
Fraction Defective		np	p
Number of defects		c	u
Time, length, weight, \$ (Measured)	XmR	XbarR XbarS	XbarR XbarS

You can select the control chart yourself or let the QI Macros Control Chart Wizard analyze your data and select one for you.

To use the Control Chart Wizard:

1. Highlight **the labels and data to be graphed**.
2. From the QI Macros Menu, **select Control Chart Wizard**.
3. The wizard will analyze your data and select the correct chart for you. If it needs to determine between two possible charts, you may be prompted for a question like:



Resources for selecting your own chart include:

- The SPC Quick Reference Card at:
qimacros.com/pdf/spc-free-training.pdf
- Free article at:
qimacros.com/free-excel-tips/choosing-control-charts

QI Macros Statistics Wizard

The Statistics Wizard will analyze your data and choose the right hypothesis tests for you.

Hypothesis testing can seem complex and challenging, but it basically wants to know if the means and variances of two or more samples are the same or different. The Stat Wizard will tell you in no uncertain terms. No more p values to evaluate.

1. To use the Stat Wizard organize your data into columns. See sample data sets at: **Documents\QIMacrosTestData\anova**
2. Select your data then choose Stat Wizard from the QI Macros toolbar. The wizard will determine the number of columns of data and whether the data is decimals or integers. Based on that information, it will run the following statistics:

1 Column	Descriptive Statistics 1 Sample t Test for Means
2 Columns	f Test for Variances t Test for Means Chi-Square Table for independence (if data is integers) Fisher's test for 2X2 tables, Regression
3+ Columns	ANOVA for Means Levene's Test for Variances Chi-Square Table for independence (if data is integers)

The QI Macros results will answer these questions for you:

- Is your data normal?
- Reject or Accept the Null Hypothesis?
- Are the Means or Variances the same or different?

Learn more:

qimacros.com/hypothesis-testing/statistics-wizard-excel

qimacros.com/hypothesis-testing/hypothesis-testing-excel

QI Macros PivotTable Wizard

If you are like many Excel users, you struggle with creating PivotTables in Excel. However, PivotTables are a valuable tool that every quality improvement professional should learn to use.

The QI Macros makes creating PivotTables easy. Here is how:

1. Make sure each column in your data sheet has a heading and that there are no blank rows or columns separating the data you want in the PivotTable.
2. In the data sheet, hold the Ctrl key to select up to four column headings for the data you want included in the PivotTable.

1	Region	POST DATE	ENT	ADM DATE	DIS DATE	FC	IN1	PT	DENIED CHARGES
2	North	6/27/03	Hosp1	2/13/03	1/1/00	X	AEH	O	543.07
3	South	12/24/02	Hosp2	7/13/02	1/1/00	X	BCP	E	215.4
4	South	2/25/03	Hosp2	12/6/02	1/1/00	X	CGH	O	157.92
5	South	5/23/03	Hosp3	10/20/02	1/1/00	X	MAH	O	90.73
6	North	7/15/03	Hosp1	5/7/03	1/1/00	X	HEH	O	4103.78

3. From the QI Macros menu, choose PivotTable Wizard.
4. The wizard will determine the best way to organize your data into a PivotTable and create one for you.

	A	B	C	D	E	F	G	H	I
1	Region	(All)							
3	Sum of DENIED CHARGES	ENT							
4	ADM DATE	Hosp1	Hosp2	Hosp3	Hosp4	Hosp5	Hosp6	Hosp7	Grand Total
5		3/28/00		387.48					387.48
6		4/25/00		379.62					379.62
7		3/13/01		6908.98					6908.98
8		7/24/01	311.16						311.16
47		2/13/03	543.07						543.07
48		4/15/03						215	215
49		5/7/03	4103.78						4103.78
50		6/2/03			12				12
51		8/8/03					482		482
52	Grand Total	18492.75	32955.38	23447.35	4387.83	5416.62	5007	215	89921.93

4. Hold the Ctrl key to select labels and data in PivotTable to draw charts using the QI Macros.

Run a Macro Using the Menus

- 1. Input your Data into an Excel Worksheet:** The simplest format for your data is usually one column and one row of labels, and one or more columns of data (e.g., samples).

Date/Labels
↓

	A	B	C	D	E	F
1	Sample Number	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
2	S1	74.030	74.002	74.019	73.992	74.008
3	S2	73.995	73.992	74.001	74.011	74.004
4	S3	73.988	74.024	74.021	74.005	74.002
5	S4	74.002	73.996	73.993	74.015	74.009
6	S5	73.992	74.007	74.015	73.989	74.014

← Defects/Samples

Tip: Only select one column and row of labels. Each chart requires a certain # of columns of data to run properly:

Required number of columns of data:			
1	1 or more	2	2 or more
Pareto	XmR	Scatter	Box & Whisker
Pie, Run	Histogram		Multi Vari
c, np, XmR	Freq Hist		
Levey Jennings	EWMA	u Chart	XbarR
Moving Avg	Cusum	p Chart	XbarS
Dot Plot	XmedianR	Hotelling	Matrix Plot

- 2. Select Your Data:** Use your mouse to click-and-drag to select the data you want to graph. (Hint: don't select the whole column or row, just the cells you want to graph.)
- 3. Select Your Chart:** Click on the QI Macros menu and select the Chart Wizard or the chart you want to run.
- 4. Answer the Prompts:** Most charts will prompt you for titles and other information to complete the chart.
- 5. Review and Save Your Workbook:** When the macro is done you will have a workbook with 3 sheets: your data, the chart and an intermediate spreadsheet where you can view the calculations. Remember to save your workbook.

Data Format & Selection Tips

1. To highlight cells from different columns (as shown):

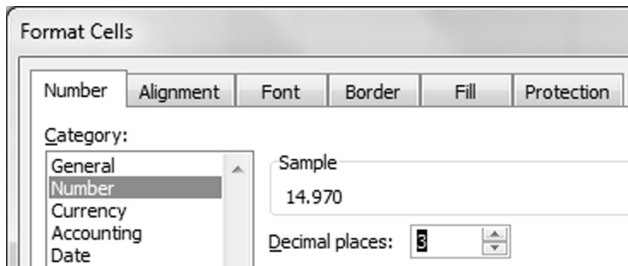
Click on the top left cell and drag the mouse down to include the cells in the first row or column. Then, hold down the Control (Ctrl) Key, while clicking and highlighting the additional rows or columns.

	A	B	C	D
1		Plant 1	Plant 2	Plant 3
2	Jan	15	77	44
3	Feb	23	56	33
4	Mar	56	33	55
5	Apr	33	33	22
6	May	77	23	66
7	Jun	33	15	11
8	Jul	14	14	77

2. You may also use data in horizontal rows: Click on the top left cell and drag the mouse down and right to include the cells in the horizontal rows.

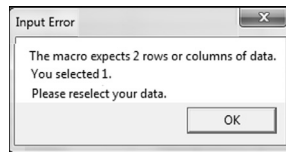
	A	B	C	D	E	F	G	H
1		Jan	Feb	Mar	Apr	May	Jun	Jul
2	Plant 1	15	23	56	33	77	33	14
3	Plant 2	77	56	33	33	23	15	14
4	Plant 3	44	33	55	22	66	11	77

3. Numeric data and decimal precision: Excel formats most numbers as "General", not "Number." If you do not specify the format for your data, Excel will choose one for you. To get the desired precision, select your data, choose Format-Cells-Number and specify the number of decimals:

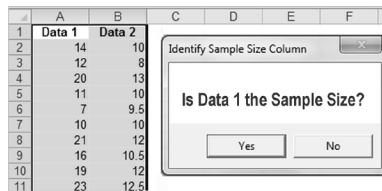


Common Error Messages

Many charts require more than one column of data. If you only select one column of data and then select one of these charts, you will receive the following error message:



The u chart assumes that your defects column is to the left of your sample size column. If the columns are reversed (larger #s on the left), the macros will ask you if the left column is the sample size.



Formatting Excel Charts

Once you create a chart, you can use any of Excel's menus and commands to enhance or format your chart. Just select the item to format and then right click to view the options available.

Add text boxes, arrows or other: Use Excel's drawing tools to add text boxes, arrows or other symbols to your chart. Drawing tools are under the Insert tab in Excel 2007-2013, or on the drawing toolbar in older versions of Excel.



Put two charts on the same worksheet: Click on your chart and select Edit-Copy. Next, click in the destination worksheet and select Edit-Paste.

For Other Chart Options: Right click on the item you want to change or click on the Chart Tools menu. For further information see: qimacros.com/free-excel-tips/format-charts



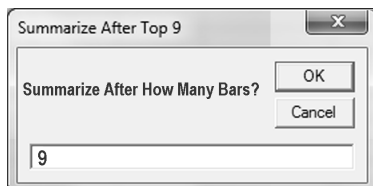
Pareto Chart

1. **Highlight the labels and one column (or more) of data (you will get a separate pareto for each data column):** labels in the left-hand column, data in the right-hand column.

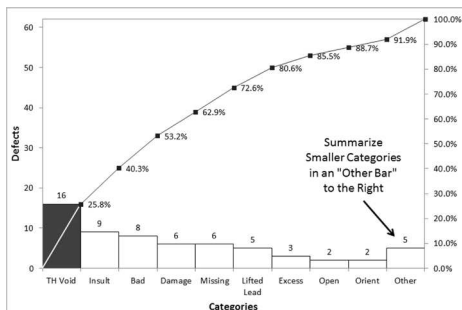
Pareto charts are a combination line chart and bar graph. They help narrow your focus to simplify problem solving.

	A	B	C	D
		Med Errors Baseline	Med Errors 6 months	Med Errors 18 months
1				
2	Drug not available	3	5	4
3	Extra Dose	1	3	2
4	Omission	0	2	0
5	Unauthorized Drug	0	2	1
6	Wrong Dose	5	1	2
7	Wrong Form	3	0	0
8	Wrong Route	5	1	0
9	Wrong Technique	41	25	5
10	Wrong Time	33	13	16

2. **From the QI Macros Menu, select Pareto Chart.** If you have more than 9 data points, the macros will ask you how many bars you want before you summarize the miscellaneous ones into an "Other" bar. Input the number of bars and then click "OK".



Sample Pareto chart with an "Other" Bar.



If you want to continually add data, consider using the Pareto Chart template. Watch a video of a pareto chart being created at: qimacros.com/pareto-chart-excel/pareto-chart-video

Scatter Chart



1. Highlight the labels and data to be graphed.

Scatter charts can help confirm your suspicions about cause and effect.

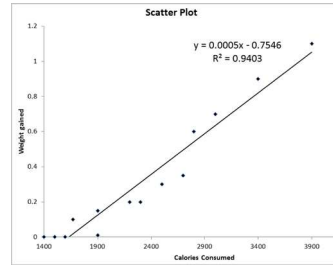
Scatter charts require two columns of data.

If $R^2 > .8$, most statistics books imply there is a strong correlation.

A	B
Cases (x)	Time (y)
7	16.68
3	11.50
3	12.03
4	14.88
6	13.75
7	18.11
2	8.00
7	17.83
5	21.50
10	21.00

2. From the QI Macros Menu, select "Scatter Diagram."

3. The macro will create a scatter diagram with y and R^2 metrics. Other metrics can be found on the scatter data worksheet.



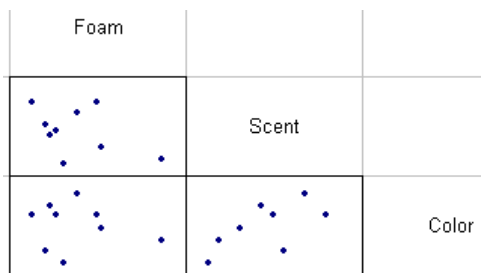
Watch a video of a scatter plot being created at:

qimacros.com/training/videos/scatter-plot

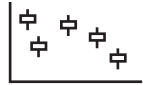
Matrix Plot

You can also use a Matrix Plot to evaluate the correlation and cause effect between two or more variables.

Foam	Scent	Color
6.3	5.3	4.8
4.4	4.9	3.5
3.9	5.3	4.8
5.1	4.2	3.1
5.6	5.1	5.5
4.6	4.7	5.1
4.8	4.8	4.8
6.5	4.5	4.3
8.7	4.3	3.9



Box & Whisker



1. Highlight the labels and data to be graphed.

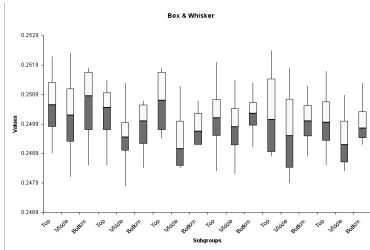
	Cavity 1	Cavity 2	Cavity 3	Cavity 4
Top	0.2522	0.2501	0.2510	0.2489
Middle	0.2523	0.2497	0.2507	0.2481
Bottom	0.2518	0.2501	0.2516	0.2485
Top	0.2514	0.2501	0.2508	0.2485
Middle	0.2513	0.2484	0.2495	0.2478
Bottom	0.2505	0.2495	0.2507	0.2484
Top	0.2518	0.2498	0.2516	0.2494
Middle	0.2512	0.2484	0.2496	0.2485
Bottom	0.2501	0.2492	0.2507	0.2492
Top	0.2520	0.2499	0.2503	0.2483
Middle	0.2514	0.2495	0.2501	0.2482
Bottom	0.2513	0.2501	0.2504	0.2491
Top	0.2524	0.2488	0.2511	0.249
Middle	0.2518	0.2486	0.2504	0.2479
Bottom	0.2512	0.2497	0.2503	0.2488
Top	0.2517	0.2496	0.2503	0.2485
Middle	0.2509	0.2467	0.2497	0.2493
Bottom	0.2513	0.2500	0.2492	0.2495

Box and Whisker plots help show the dispersion of data over time. Each bar is like a histogram turned on its side.

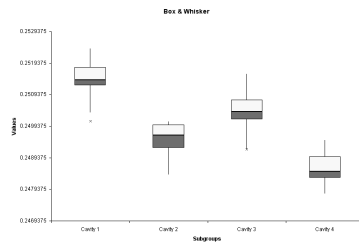
This chart requires 2 or more columns of data.

- From the QI Macros Menu, select **Box & Whisker**. The macro will ask if your data is grouped in rows or columns. The data above has 18 rows and 4 columns. Watch the video at: qimacros.com/training/videos/box-whisker-plot/

Graph if selected by rows



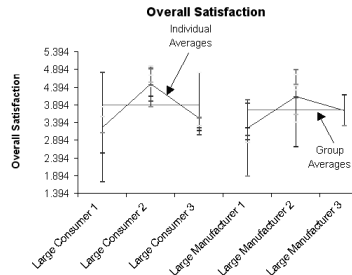
Graph if selected by columns

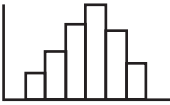


Multi Vari Chart

The Multi Vari Chart summarizes data based on labels (A:C) and plots the averages and data points. Watch the video at: qimacros.com/training/videos/multi-vari-chart/

	A	B	C	D
1	Size of Customer	Product Type	Customer Type	Overall Satisfaction
2	Small	Consumer	2	3.54
3	Large	Consumer	3	3.16
4	Small	Manufacturer	2	2.42
5	Large	Manufacturer	2	2.7
6	Small	Consumer	3	3.31
7	Large	Consumer	2	4.12





Histogram

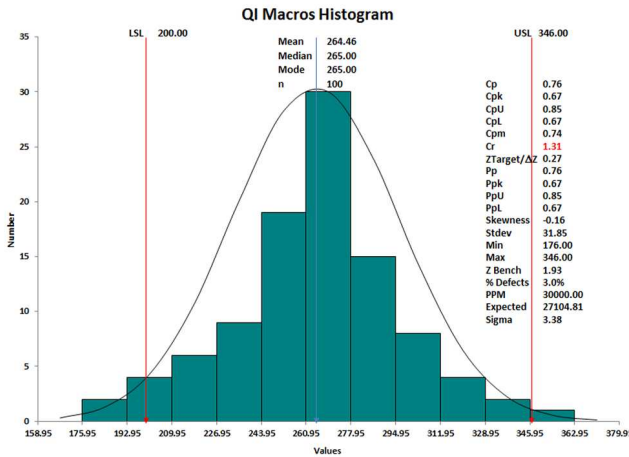
- 1. Make sure the cells are formatted to the correct decimal precision.** Right click on cells and select Format-Cells, select Number and specify the number of decimal places you want.
- 2. Highlight the labels and data to be graphed** (a minimum of 20 data points is recommended). Click on the top data cell and drag the mouse down to include just the data cells.
Tip: Do NOT sort your data before running a histogram.

A	B	C	D	E	F
Sample Number	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
S1	74.030	74.002	74.019	73.992	74.008
S2	73.995	73.992	74.001	74.011	74.004
S3	73.988	74.024	74.021	74.005	74.002

- 3. From the QI Macros Menu, select Histograms and Capability, then the Histogram you want.** You will be prompted for upper and lower spec limits and the approximate # of bars. Click "OK" to use the defaults or enter your own. For one-sided or unilateral histograms, click Cancel if there is no USL or LSL.

- 4. Single Column of Data?** If you select a single column of data, the histogram will prompt for subgroup size. Input subgroup size or use the default of 1 if there are none.

5. Then, the macro will draw the graph for you.



6. To move the USL or LSL arrows or text boxes:

Arrows: Click on each arrow and drag it to the appropriate position. To extend an arrow, click on it, then click on the handle at either end and extend the arrow.

Text: Click on each text box and drag it to sit on top or beside its corresponding arrow.

7. To revise the process capability analysis, switch to the Hist-data sheet and change the upper and/or lower or specification limits. Excel will recalculate **Cp** ,**Cpk** and other metrics and update the contents of the text boxes on the chart. You can also change the **# of bars**, **class width** and **beginning point**.

LSL	73.970
USL	74.030
Number of Bars	11.000
Number of Classes	6.000
Class Width	0.010
Beginning Point	73.960

For information about histogram calculations in the QI Macros, see: qimacros.com/pdf/histogram-manual-calcs.pdf

Watch a video of a histogram being created using the QI Macros at: qimacros.com/training/videos/histograms

c, np, p, and u Control Charts

Attribute control charts track the number of defects in a sample.

1. Highlight the labels and data to be graphed (as shown).

c or np charts

	E
1	No. Pinholes
2	8
3	9
4	5
5	8
6	5
7	9
8	9
9	11
10	8

p charts

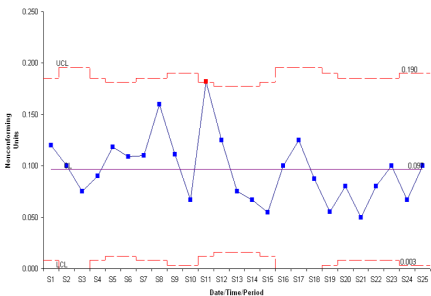
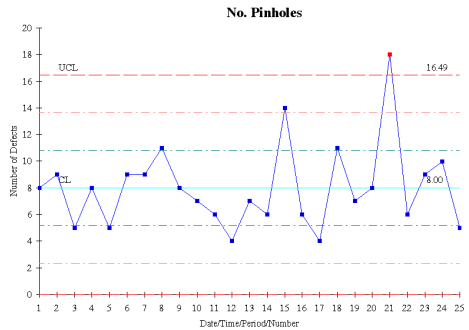
A	B	C
Sample Number	Nonconforming Units	Sample Size
S1	12	100
S2	8	80
S3	6	80
S4	9	100
S5	13	110
S6	12	110
S7	11	100
S8	16	100
S9	10	90

u charts

A	B	C
Sample Number	Nonconforming Units	Sample Size
S1	12	100
S2	8	80
S3	6	80
S4	9	100
S5	13	110
S6	12	110
S7	11	100
S8	16	100
S9	10	90

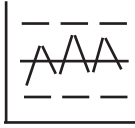
2. From the Control Charts Menu, select **c, np, p** or **u chart**. The np chart will prompt for a sample size if you did not include it in your selection.

c or np charts have straight UCL and LCL.



p and u charts can have UCL and LCL lines that vary with the sample size.

See also: qimacros.com/control-chart/show-hide-sigma-lines and qimacros.com/control-chart/p-and-u-chart-formats



X and R Control Charts

An X chart shows process performance using continuous data (i.e., time, length, weight, money, etc.)

- Highlight the labels and data to be graphed.** You will need 20 or more data points to get a good graph. Your data should look like this:

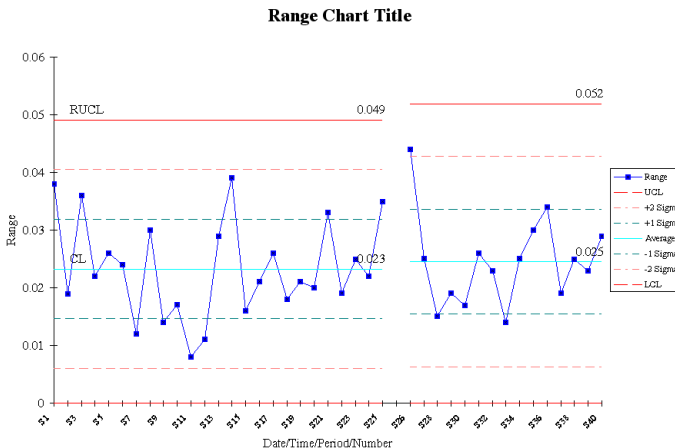
XmR

	A	B
1	Batch Number	Viscosity
2	B1	33.75
3	B2	33.05
4	B3	34.00
5	B4	33.81
6	B5	33.46

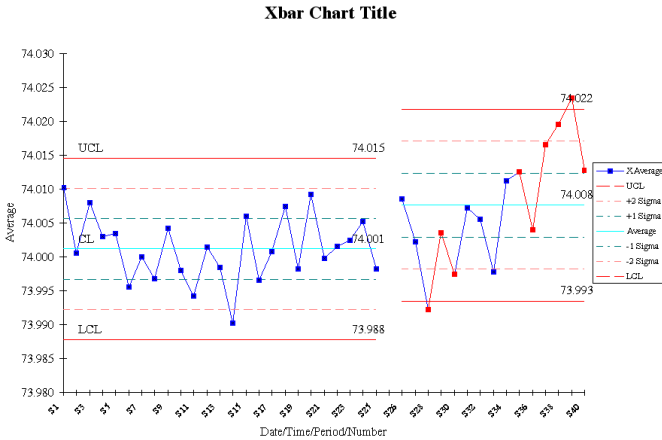
XbarR and XbarS

	A	B	C	D	E	F
1	Sample Number	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
2	S1	74.030	74.002	74.019	73.992	74.008
3	S2	73.995	73.992	74.001	74.011	74.004
4	S3	73.988	74.024	74.021	74.005	74.002
5	S4	74.002	73.996	73.993	74.015	74.009
6	S5	73.992	74.007	74.015	73.989	74.014

- From the QI Macros Menu, select "XmR, XmR Median R, XmR Trend, XbarR, XbarS, or Xmedian Chart."** The macro will create a new worksheet and begin calculating the X and R values, control limits, and averages.
- The macro will first draw the Range Chart.** If the R chart looks unstable, then the process is unstable.



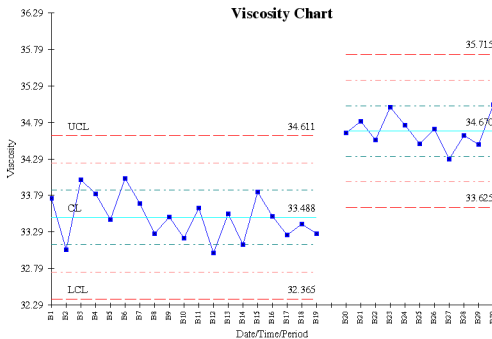
4. Next, the macro will draw the X chart. If the Range Chart looks stable and the X chart is stable, then the process is stable.



5. From the File Menu, select Save to save the graph with your workbook.

Create Stair Step Limits

Before you run any control chart you can **insert a blank row** in your data where you know a process change occurred; QI Macros will calculate separate UCLs and LCLs for each group of data giving you "stair-step" control limits.



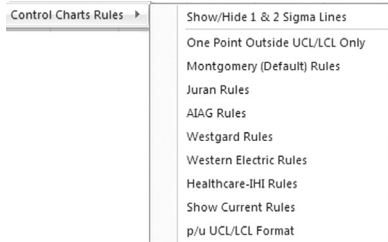
For more information about control chart menu features see:
qimacros.com/control-chart/update-control-chart/

Control Chart Stability Rules

When you run a control chart, the QI Macros will show unstable points as diamonds and unstable trends in red. They will also show the Center Line, UCL and LCL for evaluating stability. QI Macros uses stability rules defined in Montgomery's Introduction to Statistical Quality Control 4th edition.

You can Show/Hide 1-2 sigma lines, change stability rules, or p/u chart limit formats (flat vs. wavy) as follows:

1. Click on the QI Macros Menu, then Control Charts then Control Chart Rules.



2. Click on the stability rules you want to use. The stability rules for each selection are:

Control Chart Rules	Westgard	Nelson-Juran	AIAG	Montgomery	Western Electric	Healthcare
Points above UCL or Below LCL	1	1	1	1	1	1
Zone A n of $n + 1$ points above/below 2 sigma	2	2	2	2	2	2
Zone B n of $n + 1$ points above/below 1 sigma	4	4	4	4	4	4
n points in a row above or below center line	8	9	7	8	8	8
Trends of n points in a row increasing or decreasing	7	6	6	6	6	6
Zone C - n points in a row inside Zone C (hugging)		15	15	15		15
n points in a row alternating up and down		14	14	14		
Zone C - n points in a row outside Zone C		8	8	8		
Zone B n points above/below 1 sigma; 2 points one above, one below 2sigma	4					

3. To hide sigma lines or change p/u chart formats, click on the appropriate selection.
4. Any changes you make will be saved to the QI Macros and will be applied to all of the charts you run. To change the rules back, simply click on Control Chart Rules and select Default rules or Show/Hide 1-2 sigma lines or p/u chart format. If you want to customize the stability and chart format rules even further, see: qimacros.com/free-excel-tips/control-chart-rules

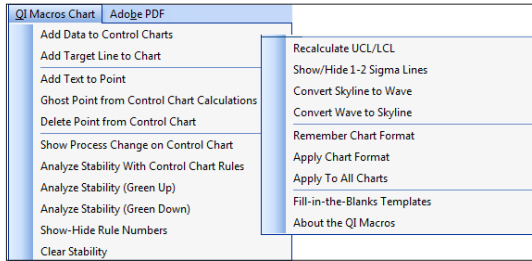
QI Macros Chart Menu

After you run a chart, the QI Macros will give you additional tools to update and analyze your chart. To access these tools, click on a chart and then click on the QI Macros Chart menu.

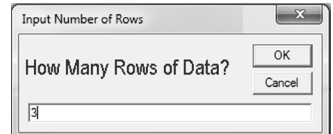
Chart Menu in Excel 2007 - 2013

FILE	HOM	INSER	PAGE	FORM	DATA	REVIE	VIEW	DEVEL	ADD-I	QI Ma	DESIGN	FORMAT	QIMacros Chart
Add Data			Show Process Analyze Stability			Clear Stability Analysis			Recalculate UCL/LCL			Remember Format	
Add Target Line to Chart			Ghost Point Analyze Stability Green Up			Show/Hide Rule Numbers			Convert Skyline to Wave			Apply Format	
Add Text to Point			Delete Point Analyze Stability Green Down			Show/Hide 1-2 Sigma Lines			Convert Wave to Skyline			Apply To All	
Chart Tools				Control Chart Tools						Chart Format Tools			

Chart Menu in Mac versions of Excel



Add Data to Charts: Click on the chart datasheet (i.e., cdata) and input new data points. Then click on the chart. Next click on the QI Macros Chart menu and Add Data. Enter the number of rows to add and then click "OK".



Add Target Line to Chart: Click on the QI Macros Chart menu and then Add Target Line. You will be prompted for the series label (e.g., Target, Spec Limit, Goal, etc) and the value.

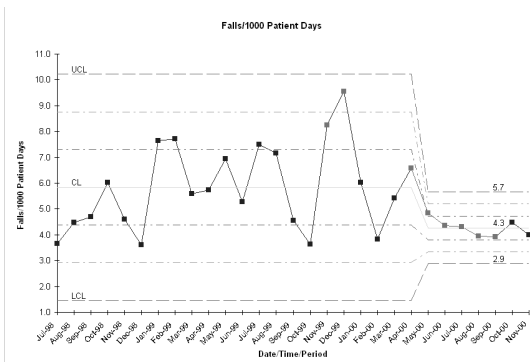
Analyze Stability: Always re-run stability analysis after you add new data, delete a point or show a process change on a control chart. To do so, simply click on Analyze Stability from the QI Macros Chart menu.

For more information on our new Control Chart Menu, visit: www.qimacros.com/control-chart/update-control-chart/

Delete Point: Deletes a point from a chart and the calculations.

Ghost Point: Deletes a point from the calculations, but leaves it on the chart.

Show Process Change: On the chart, click on the point where the process change occurred. Now click on the QI Macros Chart menu and select Show Process Change. The macros will calculate a new set of control limits, starting at the point you selected. The UCL, CL and LCL values will be updated to show the new limits. You can use this feature multiple times on the same chart.



Stability Analysis: Make sure you re-run stability analysis after you do any of these functions.

Show/Hide 1-2 Sigma Lines: Just click on this selection to add or delete 1-2 sigma lines from your chart.

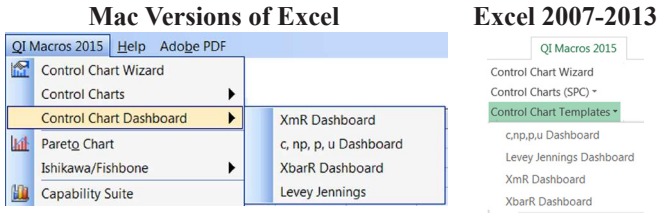
Recalculate Control Limits After you Add New Data (optional): Control limits are calculated with the data you initially selected when first running the chart macro. If you want to recalculate control limits after adding data to your chart, click on the first data point on the chart and select Show Process change from the menu. This will recalculate your control limits using all of your data, including the new points. Remember to re-run stability analysis after you recalculate the control limits.

For more information about all of these features, visit:
qimacros.com/free-resources/excel-tips/#menu

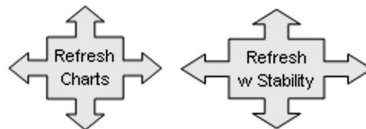
Control Chart Dashboards

These templates will automatically create Control Chart Dashboards for you.

1. Click on the QI Macros menu (see below examples) and select Control Chart dashboards. Then select the XmR, XbarR, c, np, p, u , or Levey Jennings Dashboard.



2. A template will open. Each template has an instructions sheet, a data input sheet, and a sheet for each available chart.
3. Input or cut and paste your data into the columns in the Data Sheet. Each column or set of columns creates a different chart. The XmR and XbarR dashboards have cells for USL/LSL, as well.
4. Now click on the sheet for the desired chart. You will see a chart created from the first data set. Click on the previous and next arrows to view charts for each data set.
5. If you want to create a dashboard with charts for all data sets, simply click on the Create Dashboards icon.
6. To add new data to the templates or the dashboard charts, just add data to the Data Sheet and click on the Refresh Charts or Refresh with Stability icon.



See also:

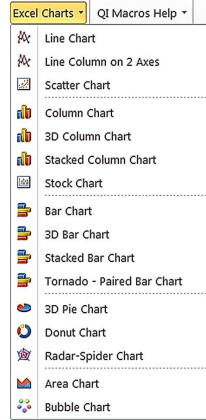
qimacros.com/control-chart/control-chart-dashboard



Excel Charts

Excel's chart wizard enables you to run various charts. We have taken the most popular of these and made them easier to use. To run these charts using the QI Macros:

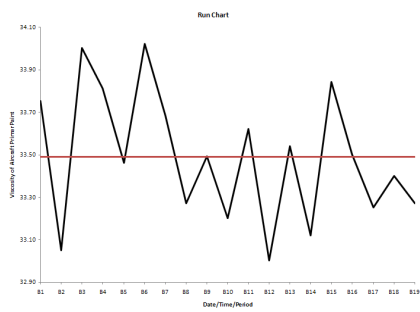
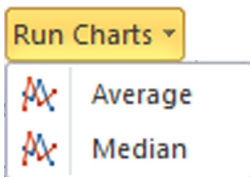
1. Highlight the labels and data to be graphed.
2. Click on the QI Macros menu, Excel Charts, then the chart you want to run.



Run Charts

A run chart is a line graph of your data plus a center line representing the average or median of your data. To create a Run Chart using the QI Macros:

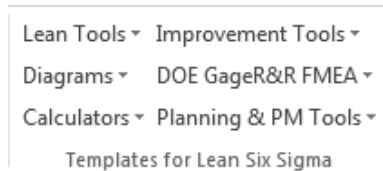
1. Highlight the labels and data to be graphed.
2. Click on the QI Macros menu, then Run Charts.
3. Next, choose between Average or Median.



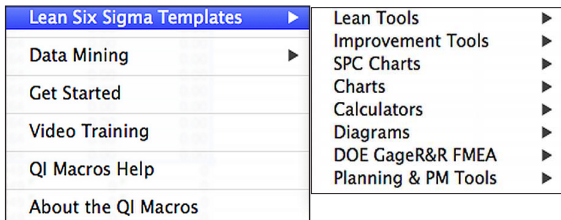
Templates for Lean Six Sigma

The QI Macros contains 100 + templates including flowcharts, fishbones, balanced scorecard, FMEA, QFD, DOE, GageR&R, PPAP, Value Stream Mapping, Time Tracking, and more. There are also templates for most charts including control charts, histograms, scatter, box and whisker plots, and pareto charts.

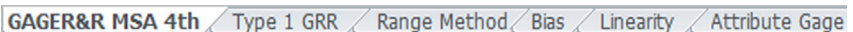
Lean Six Sigma Templates in Excel 2007-2013: Click on QI Macros, then look for Templates for Lean Six Sigma. Click on each sub menu to get a list of templates in that category.



Templates in Mac menu: From the QI Macros Menu, click Lean Six Sigma Templates. Click on each sub menu to get a list of templates in that category.

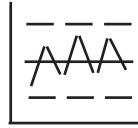


Many templates including the Balanced Scorecard, FMEA, Gage R&R, DOE, and PPAP Forms are really several different templates (worksheets) in one workbook. To access each worksheet, just click on the worksheet tab.



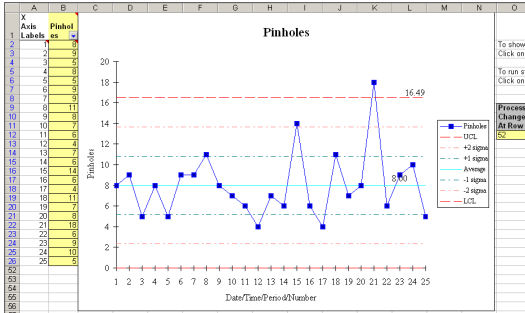
Our E-zine archives contain articles about many of these tools:
qimacros.com/free-resources/six-sigma-articles

Control Chart Templates



Use the Control Chart Templates to create various control charts.

1. Click on the QI Macros Menu, find "Control Chart Templates," and select the desired template.



2. Each template is made up of several worksheets (average, median, rolling, fixed, short run, etc.) See further info and descriptions: qimacros.com/control-chart/control-chart-template

\XmR Individuals Chart / XmR Rolling / XmR MedianR / XmR Short Run / XmR Horizontal / XmR Fixed /

3. Input your data in the yellow area and the points will be plotted on the chart as you enter them. You can also cut and paste into the yellow area or link the cells to another spreadsheet.

Add New Data: The QI Macros will automatically update to the additional number of rows.

Delete a Point: Simply delete the point from the input area.

Show Process Change: Enter the Excel row number corresponding to the data point where the process change occurred in the Process Change at Row box to the right of the chart.

Process Change At Row
12

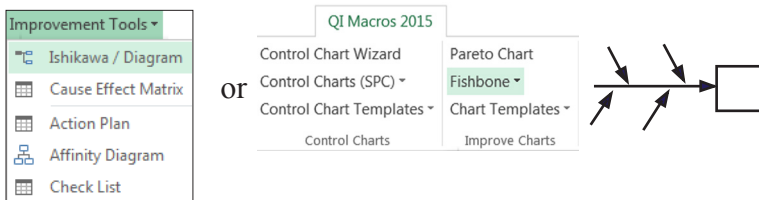
Analyze Stability: Click on the chart and then select Analyze Stability on the QI Macros Chart menu.

For more information on our new Control Chart Menu, visit: www.qimacros.com/control-chart/update-control-chart

Ishikawa Fishbone Diagram

Use our Ishikawa or Fishbone Diagram (a.k.a. cause and effect diagram) to identify the special root causes of delay, waste, rework or cost.

1. Access the fishbone Diagram under Improvement Tools in the Templates for Lean Six Sigma section of the QI Macros menu, or from the Improve Charts Section:



2. Fill in the Blanks - Select the fishbone style (Cell F10) you want and then input your text in the yellow shaded cells. When you are done, click "Create Fishbone":

Fishbone Style => **Healthcare**

	A	B	C
1	Process	Step 1 - Why?	Why?
2			Why?
3			Why?
5		Step 2 - Why?	Why?
6			Why?
7			Why?
9	People	Category 1 - Why?	Why?
10			Why?
11			Why?

Clear

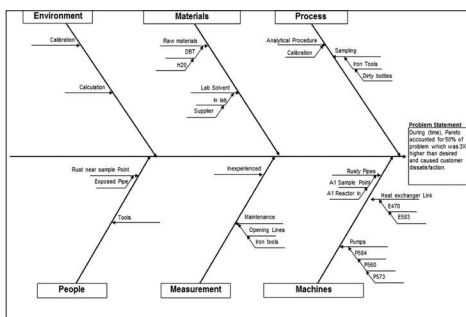
Create Fishbone

Sample

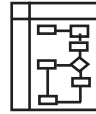
Copy

Reset

3. Analyze and Improve - QI Macros will automatically create a fishbone diagram for you.

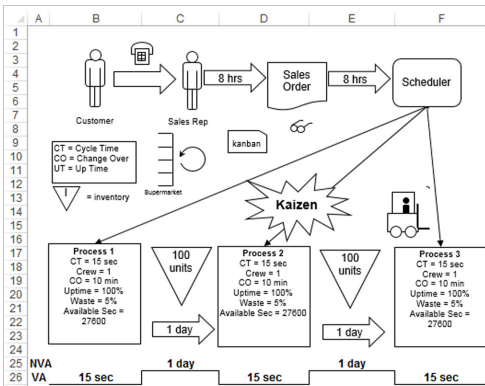
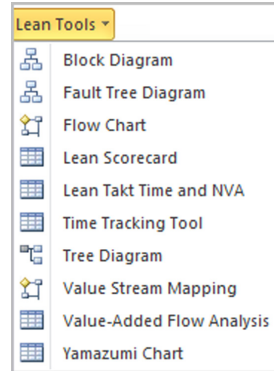


Value Stream Mapping



The QI Macros includes several Lean Tools, including Flowcharts and Value Stream Maps.

1. To create a Value Stream Map, select Templates for Lean Six Sigma, Lean Tools, then Value Stream Mapping.
2. The Value Stream Mapping template has several different tabs including a resource tab with Symbols, three different Value Stream Maps to help you get started and a Spaghetti Diagram.
3. Once you open a template, use the Symbols tab, Excel's cut and paste functions and Excel's drawing toolbar to create your Value Stream Map.



Value Stream Mapping Template

Symbols Template

	A	B	C	D	E	F
	Symbols	Description	Symbols	Description	Symbols	Description
1		Customer/Supplier		Kaizen Blitz		External Shipment
2		Process		Supermarket		FIFO
3		Machine, operation or department through which material flows		Small inventory for immediate production		First in, First out lane
4		Data Box		Buffer		In Box
				Safety Stock		Information Queues

Gage R&R

- From the QI Macros, select Templates for Lean Six Sigma, then DOE, GageR&R, FMEA. Then choose the **Gage R&R template**.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O		
1	Gage R&R						Part Number										
2	Average & Range Method	1	2	3	4	5	6	7	8	9	10	Sum					
3	Appraiser 1	Trial 1	0.29	-0.56	1.34	0.47	-0.8	0.02	0.59	-0.31	2.26	-1.36	5.710				
4	Enter your data here→	Trial 2	0.41	-0.68	1.17	0.5	-0.32	-0.11	0.75	-0.2	1.99	-1.25					
5		Trial 3	0.64	-0.58	1.27	0.64	-0.84	-0.21	0.66	-0.17	2.01	-1.31	2.110				
6		Trial 4												Xbar1	Reference		
7		Trial 5												0.190333	0.001		
8		Total	1.34	-1.82	3.78	1.61	-2.56	-0.3	2	-0.68	6.26	-3.92			Bias		
9		Average	0.44667	-0.607	1.26	0.5367	-0.853	-0.1	0.6667	-0.227	2.0867	-1.307		Rbar1	0.189		
10		Range1	0.35	0.12	0.17	0.17	0.12	0.23	0.16	0.14	0.27	0.11		0.184			
11	Appraiser 2	Trial 1	0.08	-0.47	1.19	0.01	-0.56	-0.2	0.47	-0.63	1.8	-1.68	2.050				
12	Enter your data here→	Trial 2	0.25	-1.22	0.94	1.03	-1.2	0.22	0.55	0.08	2.12	-1.62					
13		Trial 3	0.07	-0.68	1.34	0.2	-1.28	0.06	0.83	-0.34	2.19	-1.5	0.890				
14		Trial 4												Xbar2	Reference		
15		Trial 5												0.068333	0.001		
16		Total	0.4	-2.37	3.47	1.24	-3.04	0.08	1.85	-0.89	6.11	-4.8			Bias		
17		Average	0.13333	-0.79	1.1567	0.4133	-1.013	0.0267	0.6167	-0.297	2.0367	-1.6		Rbar2	0.067		
18		Range2	0.18	0.75	0.4	1.02	0.72	0.42	0.36	0.71	0.39	0.18		0.513			
19	Appraiser	Trial 1	0.04	-1.38	0.88	0.14	-1.46	-0.29	0.02	-0.46	1.77	-1.49	-7.630				
20	Enter your data here→	Trial 2	-0.11	-1.13	1.09	0.2	-1.07	-0.67	0.01	-0.56	1.45	-1.77					
21		Trial 3	-0.15	-0.96	0.87	0.11	-1.45	-0.49	0.21	-0.49	1.87	-2.16	-2.840				
22		Trial 4												Xbar3	Reference		
23		Trial 5												-0.254333	0.001		
24		Total	-0.22	-3.47	2.64	0.45	-3.98	-1.45	0.24	-1.51	5.09	-5.42			Bias		
25		Average	-0.0733	-1.157	0.88	0.15	-1.327	-0.483	0.08	-0.503	1.6967	-1.807		Rbar3	-0.256		
26		Range3	0.19	0.42	0.42	0.09	0.39	0.38	0.2	0.1	0.42	0.67		0.328			

- From the File Menu, select **Save As to store the template**.
- To conduct a study:** You'll need five to ten of the same part from one batch or lot (these must span the range or tolerance you are trying to measure), at least two appraisers and a minimum of two measurement trials, on each part, by each appraiser. If you have references or specification tolerances, enter them.
- Evaluate Gage R&R, graphs, and data** to identify where to improve your measurement system.

Gage R&R System Acceptability:

- % R&R < 10% - Gage System is Okay (Most variation caused by parts, not people or equipment)
- % R&R < 30% - May be acceptable based on importance of application and cost of gage or repair
- % R&R > 30% - Gage system needs improvement (People and equipment cause over 1/3 of variation)

See: qimacros.com/gage-r-and-r-study/aiag-msa-gage-r-and-r

Design of Experiments (DOE)

DOE can help you shorten the time and effort required to discover the optimal conditions to produce Six Sigma quality in your product or service.

1. On the Templates for Lean Six Sigma menu select DOE, Gage R&R, FMEA, then Design of Experiments. Next, select the type of DOE template you want to use.
2. Input your factors and the low-high settings for each factor. In a two factor test it might be, Time: 30 minutes & 45 minutes, and Temperature: 325 degrees and 375 degrees.

Design of Experiments		Level 1 Low()	Level 2 High()		
Factor	Factor Name				
2 ²	A	Time	30	45	Two Factor Experiment
	B	Tempera Factors	325	375	
	AB	Time X Temperature			
2 ³	C	Here			Three Factor Experiment
	AC	Time X c			
	BC	Temperature X c			
	ABC	Time X Temperature X c			
2 ⁴	D	d			Four Factor Experiment
	AD	Time X d			
	BD	Temperature X d			
	CD	c X d			
	ABD	Time X Temperature X d			
	ACD	Time X c X d			
	BCD	Temperature X c X d			
ABCD	Time X Temperature X c X d				

3. Use the +/- values in the orthogonal array to guide your test of every combination. In a two factor test it would be: High ++ (45 min & 375 degrees), Low -- (30 min & 325 degrees), In between + - (45 min & 325 degrees) and - + (30 min & 375 degrees).

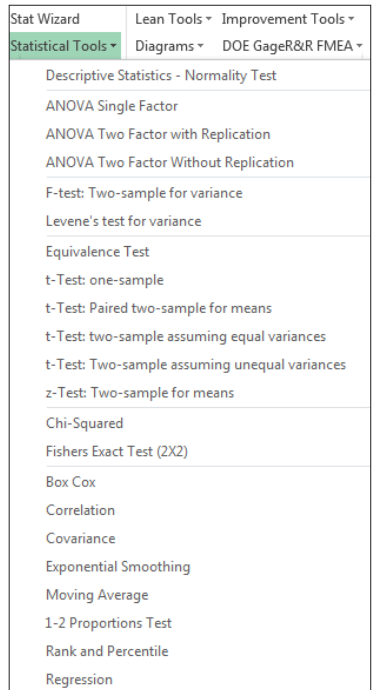
Design Factors								
	Trial	A	B	AB	C	AC	BC	ABC
2 ²	1	-	-	+	-	+	+	-
	2	+	-	-	-	-	+	+
	3	-	+	-	-	+	-	+
	4	+	+	+	-	-	-	-
2 ³	5	-	-	+	+	-	-	+
	6	+	-	-	+	+	-	-
	7	-	+	-	+	-	+	-
	8	+	+	+	+	+	+	+

4. Input your results into the yellow input area and observe the interactions. See the DOE article at: qimacros.com/lean-six-sigma-articles/design-of-experiments

Statistical Tools

Six Sigma utilizes analysis tools like ANOVA, regression, f test, t tests, etc. The QI Macros Statistical tools are much easier to use than Excel's Data Analysis Toolpak. The QI Macros also mistake-proofs data entry and interprets the results of many statistical tests for you (i.e. data is normal, accept or reject null hypothesis).

- 1. Select data for analysis.** Some tools, like Anova, can take many columns. Others, like Regression, use two columns. A few use only one column. Data must be in columns for these tools to work. See: [documents/qimacros/testdata/anova](#) for examples of how your data should be organized.
- 2. From the QI Macros Menu, choose Statistical Tools.** A number of different statistical tools will be displayed.
- 3. Select the appropriate statistical analysis, and click "OK". If you aren't sure, choose the Stat Wizard.** Answer any of the prompts (defaults are provided) and the QI Macros will perform the analysis you've requested.
- 4. The QI Macros output will also interpret the results for you.** It will tell you to Reject or Accept the Null Hypothesis and whether the Means or Variances are the same or different.



Learn More:

qimacros.com/hypothesis-testing/statistics-wizard-excel

qimacros.com/hypothesis-testing/hypothesis-testing-excel

Data Mining Tools

The QI Macros Data Mining Tools help you analyze your data and reorganize it to run a chart.

PivotTable Wizard

The QI Macros PivotTable Wizard makes it easier to run PivotTables. Just select up to 4 column headings and select the wizard. qimacros.com/quality-tools/pivot-table-cross-tab/

Count Words in a Table

Just select your data and the Word Count function will count the number of times a word or two word phrase appears in your data. qimacros.com/quality-tools/word-count/

Stack/Restack/Restacking

This function increases or decreases the number of columns your data is organized into. It can take one column of data and "stack" it into multiple columns or it can take multiple columns of data and restack it into one column. It can also convert 2 columns to 3, or 4 columns to 2, etc.

qimacros.com/quality-tools/restack/

Paste Link/Paste Link Transpose

Excel will paste-link and paste-transpose but it doesn't do both at the same time. Use these functions to create dashboards by linking your data to a chart template. Update your data sheet and the template and chart are automatically updated.

qimacros.com/quality-tools/pastelink/

Box Cox Transformation

Box Cox Transformation multiplies the selected data by a transformation factor. The purpose is to transform non-normal data into data that is closer to normal.

qimacros.com/quality-tools/boxcox/

Installation Trouble Shooting

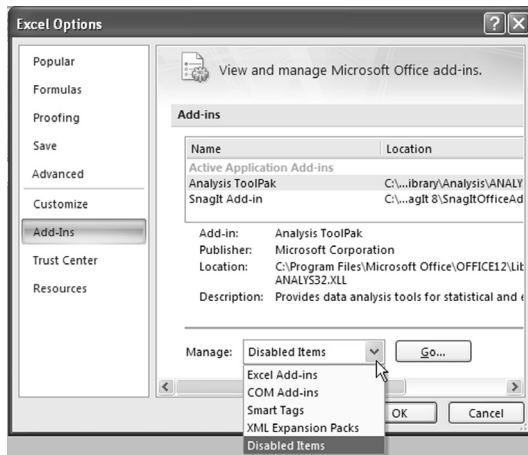
QI Macros Menu is not visible in Excel or qimacros.xla could not be found message. Excel has disabled the QI Macros files. To fix the issue, simply re-enable the file per these instructions:

Excel 2000 - 2003: In Excel, click on Help/About Microsoft Excel then click on Disabled items in the lower right corner. Enable any disabled QI Macros files.



Excel 2007: Click on the office icon in the upper left corner.
Excel 2010 and 2013: Click on File.

Next select Excel Options, then Add-ins on the left. Click on the arrow next to Manage, and select Disabled Items. Click Go to see the disabled items. If the QI Macros is disabled, enable them. Now close and re-open Excel.



Other Common Questions

- **How do I set up my data?** See test data files loaded on you computer: **c:\Documents\QIMacros\testdata**
- **Run Time Error...** These messages usually mean there is a problem with your data. Either your header looks like data, your data looks like text or you have selected blank cells.
- **To Uninstall the QI Macros:** Delete the qimacros.xla file and the QIMacros2010menu.xlam file (Excel 2007-2013 only) in Excel's startup folder:

C:\Program Files\Microsoft Office\Office(10,11,12,14)\XLStart
Windows 7 PCs may use Program Files (x86).

Windows 8 and Excel 2013 is located at:

C:\Program Files\Microsoft Office15\Root\Office15\XLStart

Technical Support

Most tech support questions are answered at:

qimacros.com/support/qi-macros-tech-support

If you're still having problems e-mail your Excel file and problem to: support@qimacros.com. Include the version number and service pack of Excel, and QI Macros version.

You can also call our tech support line at: (888) 468-1537 on Monday through Friday, from 8:00 am to 5:00 pm mountain time.

QI Macros questions are free; however, there is an additional fee for SPC and Excel coaching and help.

If you get Windows or Excel errors, check the Microsoft knowledge base at support.microsoft.com

Other Resources

Free Training at: qimacros.com/free-resources/qimacros-training

Sign up for a FREE supplemental course on the QI Macros at:

qimacros.com/newsletter

Free Webinars and Training

Free 1 Hour Webinars: Great overview of the key functions in the QI Macros: qimacros.com/training/qi-macros-webinar/

Lean Six Sigma "Yellow Belt" Training: lssyb.com

Free email lesson series and monthly tips and tricks newsletter. Sign up at: qimacros.com/newsletter

Free how-to articles and Excel tips at:

qimacros.com/free-resources/excel-tips/

Free QI Macros Video Tour at:

qimacros.com/qi-macros/video-tour/

Other Products and Services

We offer books, training videos and on-site training on:

Lean

Six Sigma

SPC

Download a product brochure at: qimacros.com/pdf/qiflyer.pdf

See on-site training options at: qimacros.com/training/lean-six-sigma-training

Order Options:

Online: qimacros.com/store

FAX: POs to (888) 468-1536 or (303) 756-3107

Call: (888) 468-1537 or (303) 756-9144

Email: orders@qimacros.com

Tech Support: (888) 468-1537 or (303) 756-9144 or support@qimacros.com

KnowWare International, Inc.
2696 S. Colorado Blvd., Suite 555
Denver, CO 80222

QI Macros License Agreement

This perpetual license agreement is a legal agreement between you and KnowWare International Inc. It permits you to use one copy of QI Macros on a single computer. By opening and using the QI Macros software you are agreeing to be bound by the terms of this agreement. The QI Macros is owned by KnowWare International Inc. and protected by U.S. Copyright laws. You may transfer one copy to a hard disk. Any enhancements added to the existing macros are considered the property of KnowWare International, Inc. You may not copy, rent, or lease the QI Macros, or the documentation accompanying it.

Refer to qimacros.com/support/qi-macros-faqs for more information.