QI Macros

For All Versions of Excel 2000-2011

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To Install the QI Macros:

PC Installation Instructions:

From Download:

- Save the QIMacros230.zip file on your PC
- Extract files from the zip folder
- Double click on QI Macros2012Setup.exe to run the installation wizard.

From CD:

- Insert CD and an installation page should automatically open with a link to install in the top right corner.
- Click on this link to run the install wizard.
- If the install page does not open, right click on the CD drive and select open.
- Double click on QIMacros230.zip to run the installation wizard.

Mac Installation Instructions:

From Download:

- Click on the macintosh.zip file to download
- View your downloads and click on the QIMacros.mpkg file to run the installation wizard.

From CD:

- Insert CD into your Mac and double click on the QIMacros.mpkg file to run the installation wizard.

QI Macros purchased before November 2011:

- Copy the contents of the Excel Folder to Microsoft Office (2001-11):Office:Startup:Excel.

Troubleshooting:

- If the QI Macros menu does not appear on your Excel menu, see install help at qimacros.com/techsupport.html#install
- For other problems with your CD or download, email: support@qimacros.com.

The QI Macros is a Single User License.
You need to buy one license per computer.

Excel 2007-10 Ribbon Menu:

Excel 2007-10 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 part of the ribbon.

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

Classic Menu Option for Excel 2007-2010

For users who prefer the Excel 2003 style menu, see instructions to change from the ribbon menu to a "classic Excel 2003 menu" at qimacros.com/XL2007-switch-menus.html.

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.

Help, Technical Support & Other Resources

Technical support - qimacros.com/techsupport.html
FREE Training Resources: You can access videos, pre-recorded webinars, how to articles and a series of overview lessons at qimacros.com/free-qimacros-training.html

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.

Tools in the QI Macros

Introduction

The QI Macros SPC Software for Excel consists of five parts.

1. Macros	Control Charts, Histograms, Line, Run, Scatter, Pareto, Bar, Pie, BoxWhisker, Multivari
2. Templates	SPC Charts, Flowcharts, Fishbones, Gage R&R, DOE & QFD, FMEA & PPAP, Value Stream Map
3. Statistics	ANOVA, F test, t test, Chi Squared, Correlation, Regression, Sample Size
4. Data	PivotTable Wizard, Count Words, Stack/Restack Tables, Get Sample from Table, Paste/Link Transpose
5. Wizards	Chart, Control Chart, PivotTable and Statistics

90% of common problems can be diagnosed with control charts, pareto charts, and Ishikawa diagrams. The QI Macros can be used to create all of these charts, graphs, forms and tools.

Excel Workbooks—Entering your data.

Other software packages make you transfer your Excel data into special tables, but not the QI Macros. Just put your data in a standard Excel worksheet. The simplest format for your data is usually one column of labels, and one or more columns of data.

	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

Sample Data: The QI Macros loads sample data on your computer at c:\qimacros\testdata. There is sample data for each chart. Use this data for examples of how to set up your data and to practice running charts.

Watch "how to videos" for many QI Macros tools at www.qimacros.com/qimacros-video-tour.htm

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

Tips: Only select one column and row of labels. Each chart requires a certain number 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		Multivari
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 pull-down 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. Don't forget to save your workbook.

Data Format & Selection Tips

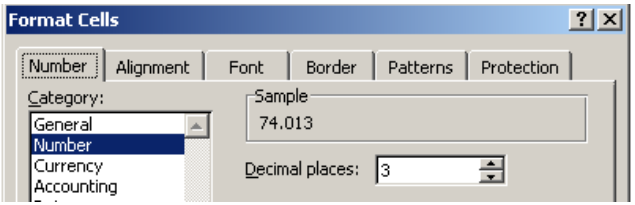
1. **To highlight cells from different columns** (as shown)**.** Click on the top left cell and drag the mouse down to include the cells in the first row or column. Then, hold down the Control Key, while clicking and highlighting the additional rows or columns.

	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
10					
11		Jan	Feb	Mar	Apr
12	Plant 1	15	23	56	33
13	Plant 2	77	56	33	33
14	Plant 3	44	33	55	22

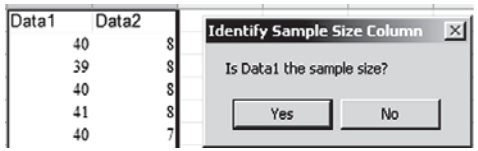
3. **Numeric data and decimal precision:** Excel formats most numbers as "General" not "Number". <u>If you do not specify the format for your data, Excel will choose one for you.</u> To get the desired precision, select your data, choose Format-Cells-Number and specify the number of decimals:



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.

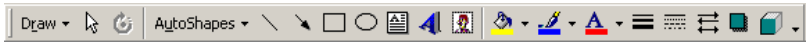
The u chart assumes that your defects column is to the left of your sample size column. If the columns are reversed (larger #s on the left), the macros will ask you if the left column is the sample size.



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 Excels drawing toolbar to add text boxes, arrows or other symbols to your chart. To view the drawing toolbar, select View/Toolbars/Drawing. The drawing toolbar usually appears on the bottom of the worksheet.



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

For Other Chart Options - Click on the Chart pull down menu.

See www.qimacros.com/free-excel-tips/format-charts.html for further information on how to format your charts.

Data Transformation Tools

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

Pivot Table Wizard
The QI Macros PivotTable Wizard makes it easier to run Pivot tables. Just select up to 4 columns of data and select the wizard.

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.

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. Just select your data, then click on stack restack and answer the prompt about how many new columns you desire.

Paste Link/ Paste Link Transpose
Excel lets you paste link and paste transpose but it doesn't let you do both at the same time. Use these functions to link your data to a QI Macros Fill-in-the-Blanks Template. Update your data sheet and the template and chart are automatically updated. Use these function to build dashboards.

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.

See qimacros.com/free-excel-tips/data-transformation.html for further information on these tools.

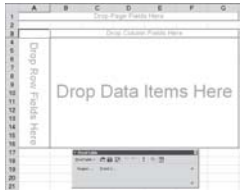
Summarize Your Data

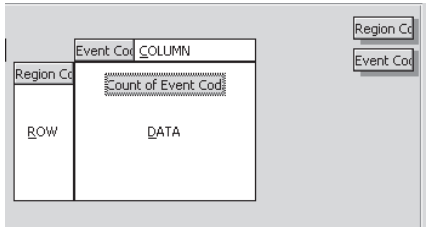
The QI Macros PivotTable Wizard or Excel's PivotTable tool will help you summarize your data just about any way you want.

1. **To use the PivotTable Wizard, click on up to four column headings. Otherwise, select the labels and data to be summarized**, in this case, event codes by region. Many processes and gages produce one code or measurement each time an event happens. These often need to be summarized to simplify your analysis.

	A	B
1	Region Code	Event Code
2	002	100
3	001	94
4	001	4
5	001	122

2. **From Excel's menu, choose: Data-Pivot Table.** Follow the PivotTable Wizard until you get a screen like one of these:





3. **Click and drag the data labels** into the appropriate area of the PivotTable to get the summarization you want:

	A	B	C	D	E	F	G	H	I	J	K	L
1	Count of Event Code	Event										
2	Region Code	1	2	3	4	5	6	8	9	10	11	1
3	001	4	376	51	157	34	240	43	87	255	2	1
4	002	1		93	86	17	12	7	9	17	9	
5	003	1	2			2		23				
6	004	2	4	1	1	16		2			3	
7	019	1			2	4			1			
8	020			5		7		1	29	11		
9	029	1				14	13		5			
10	035		9	33	2	24	63	38	116	5	7	1
11	038		2	3		4	1	57	2	1	3	
12	053	1	77	69	20	81	194	49	236	146	7	3
13	Grand Total	11	470	255	268	203	523	220	485	435	31	6

4. **To change how the data is summarized,** use the PivotTable Wizard or double click on the top left-hand cell. For online tutorials, Google "Excel PivotTable".

5. **Select labels and data tp draw charts** using your data.

QI Macros Wizards

The QI Macros is the only Six Sigma SPC software that 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 have 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.
- **PivotTable Wizard** - creates a Pivot Table when you select up to four columns of data.
- **Statistics Wizard** - to automate hypothesis testing: normality, F test, t test, ANOVA, etc.

1. Highlight the labels and data to be graphed, then click on the QI Macros menu and then select the appropriate wizard.

2. The QI Macros Wizards will automatically draw all of the graphs or statistics required. The PivotTable will summarize the data based on the number of columns selected.

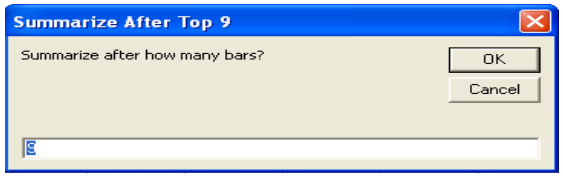
Create Pareto Charts:

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

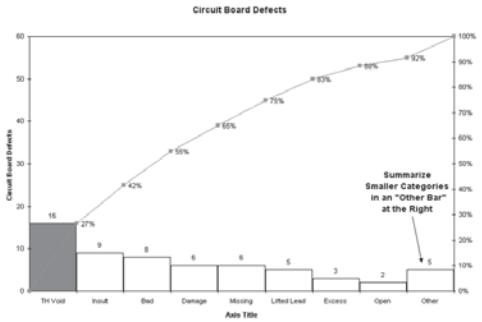
Pareto charts are a combination line chart and bar graph. They help narrow your focus to simplify problem solving.

	A	B	C	D
1		Med Errors Baseline	Med Errors 6 months	Med Errors 18 months
2	Drug not available	3	5	4
3	Extra Dose	1	3	2
4	Omission	0	2	0
5	Unauthoried 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 Macro Menu bar 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 add data, consider using the Pareto template instead of the macro. Watch video of a pareto chart being created at qimacros.com/qiwizard/pareto-chart-video.html

Create a Scatter Chart:

1. **Highlight the labels and data to be graphed**.

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

Scatter charts require two columns of data.

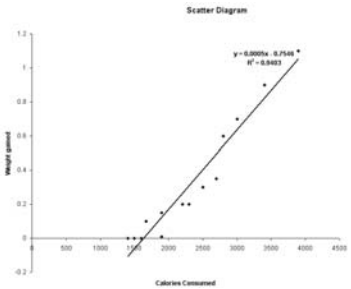
If R^2 >.8, most statistics books imply there is a strong correlation.

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 Macro Menu bar 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.

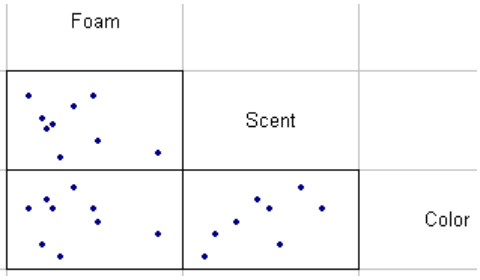
Watch video at qimacros.com/qiwizard/scatter-plot-video.html



Create a 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



Create a Box &Whisker:

1. **Highlight the labels and data to be graphed.**

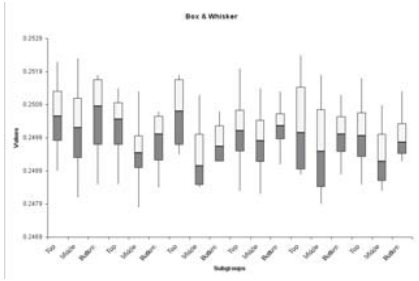
	Cavity 1	Cavity 2	Cavity 3	Cavity 4
Top	0.2522	0.2501	0.2510	0.2489
Middle	0.2523	0.2497	0.2507	0.2481
Bottom	0.2518	0.2501	0.2516	0.2485
Top	0.2514	0.2501	0.2508	0.2485
Middle	0.2513	0.2494	0.2495	0.2478
Bottom	0.2505	0.2495	0.2507	0.2484
Top	0.2518	0.2498	0.2516	0.2494
Middle	0.2512	0.2484	0.2496	0.2485
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	0.2487	0.2497	0.2483
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.

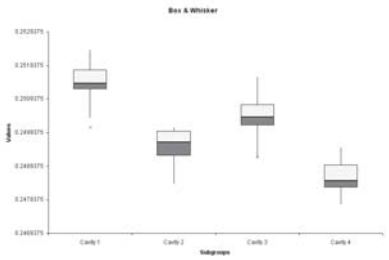
This chart requires 2 or more columns of data.

2. **From the QI Macro Menu bar select Box and Whisker.** The Box and Whisker macro will ask whether your data is grouped in rows or columns. The data above has 18 rows and 4 columns.

Graph if select by Rows



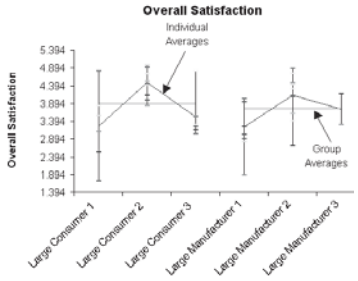
Graph if select by columns



Create a Multivari Chart:

The Multivari Chart summarizes data based on labels (A:C) and plots the averages and data points:

	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



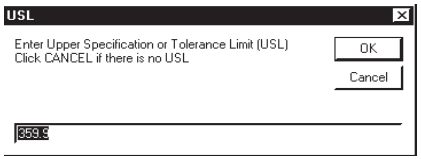
Create a Histogram:

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.

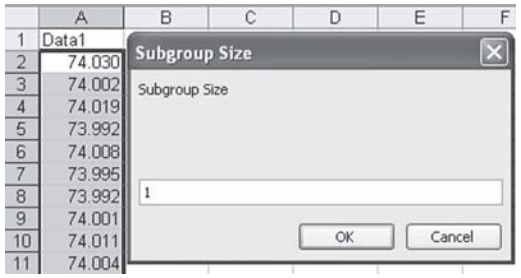
2. **Highlight the labels and data to be graphed** (a minimum of 20 data points is recommended)**.** Click on the top data cell and drag the mouse down to include just the data cells. **Tip:** Do NOT sort your data before running a histogram.

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

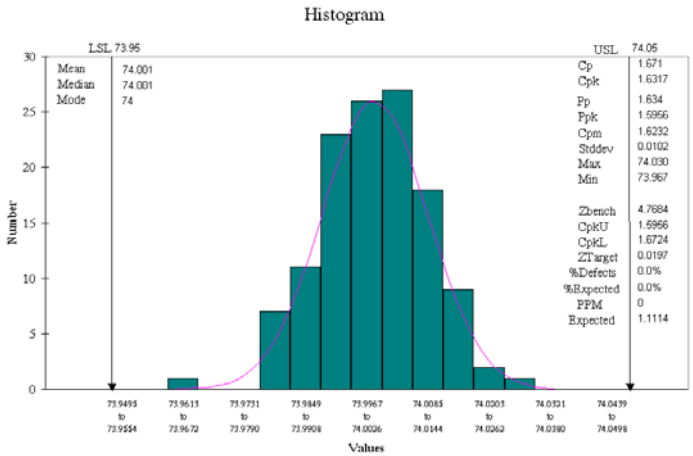
3. **From the QI Macro Menu bar, select either the histogram or frequency histogram.** You will be prompted for upper and lower spec limits and the approximate # of bars to display. Click OK to use the defaults or enter your own. For one-sided or unilateral histograms, click Cancel if there is no USL or LSL.



4. **Single Column of Data?** If you select a single column of data, the histogram will prompt for subgroup size (default=1, but some gauges produce five samples per subgroup).



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 Histdata sheet and change the upper and/or lower 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 showing how to create a histogram at qimacros.com/qiwizard/histogram-video.html.

Control Chart Wizard:

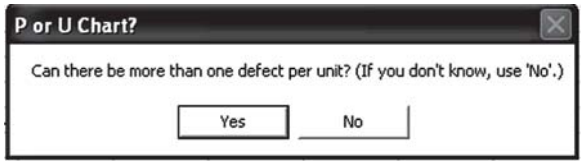
Choosing the right chart depends on your data–attribute (counted) or variable (measured)–and the sample size.

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

You can select the chart yourself or let the Control Chart Wizard analyze your data and select it for you.

To use the Control Chart Wizard:

1. Highlight **the labels and data to be graphed.** From the QI Macro Menu bar, **select Control Chart Wizard.**
2. The wizard will analyze your data and select the correct chart for you. If it needs to determine between a p and a u chart it will prompt you to answer the following question:



If you answer No, it will run a p chart. If you answer Yes, it will run a u chart.

Resources for selecting your own chart include:

- The SPC Quick Reference Card at qimacros.com/sustainaid.pdf
- Free article at qimacros.com/free-excel-tips/choosing-control-charts.html
- The 1 hour SPC Simplified Training Video at qimacros.com/spc-simplified-training-video.html

Create a c, np, p or u Chart:

Attribute 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

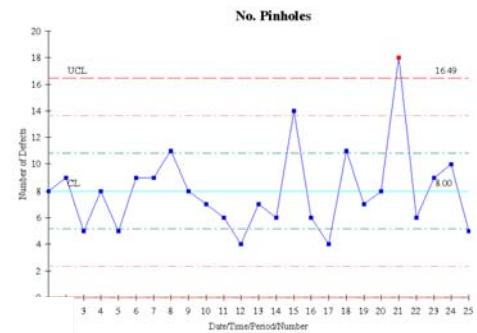
A	B	C
Sample Number	Nonconforming Units	Sample Size
S1	12	100
S2	8	80
S3	6	80
S4	9	100
S5	13	110
S6	12	110
S7	11	100
S8	16	100
S9	10	90

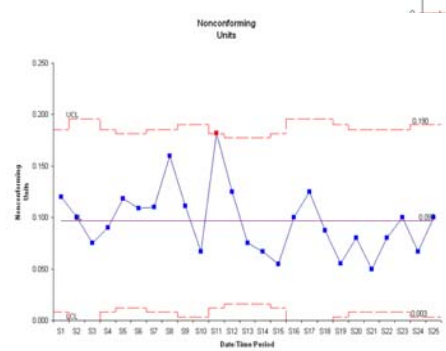
u charts

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-charts/show-hide-sigma-lines.html
qimacros.com/control-charts/p-and-u-chart-formats.html

Create X and R Charts:

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

1. **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

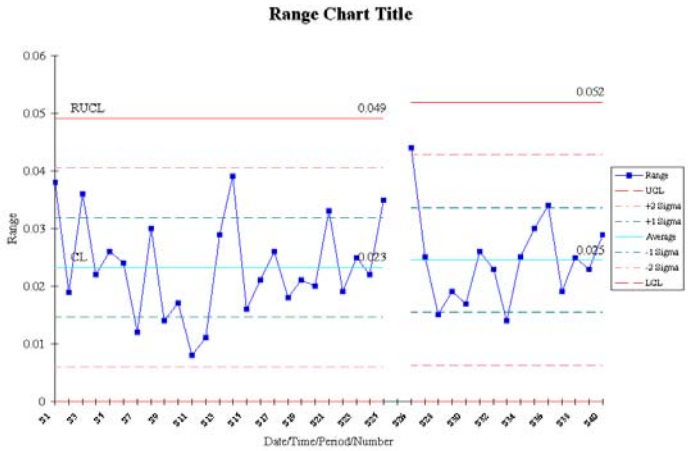
	A	B
1	Batch Number	Viscosity
2	B1	33.75
3	B2	33.05
4	B3	34.00
5	B4	33.81
6	B5	33.46

XbarR and XbarS

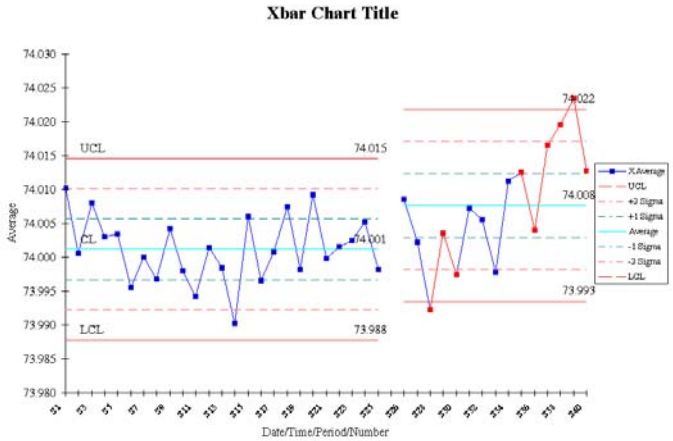
	A	B	C	D	E	F
1	Sample Number	Obs 1	Obs 2	Obs 3	Obs 4	Obs 5
2	S1	74.030	74.002	74.019	73.992	74.008
3	S2	73.995	73.992	74.001	74.011	74.004
4	S3	73.988	74.024	74.021	74.005	74.002
5	S4	74.002	73.996	73.993	74.015	74.009
6	S5	73.992	74.007	74.015	73.989	74.014

2. **From the QI Macro Menu bar, 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.

3. **The macro will first draw the Range Chart.** If the R chart looks unstable, then the process is unstable.



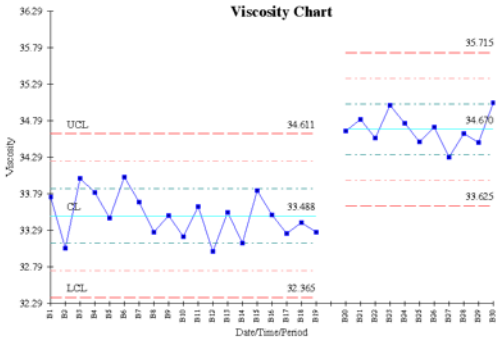
4. **Next, the macro will draw the X chart.** If the Range Chart looks stable and the X chart is stable, then the process is stable.



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, the 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/qimacros-excel-tips.html#menu

Control Chart Stability Rules

When you run a control chart, the QI Macros will show unstable points as diamonds and conditions in red. They will also show 1 and 2 sigma lines for evaluating stability. The QI Macros use stability rules defined in Montgomery's Introduction to Statistical Quality Control 4th edition.

You can change the sigma lines, 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	
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
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 1sigma; 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 and 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.html.

Chart Tools Menu

After you run a chart, the QI Macros give you additional tools to help update and analyze your data using the Chart Tools menu. To access this menu, click on a chart and then click on the QI Macros Chart menu.

Chart Menu in Excel 2007 - 2010

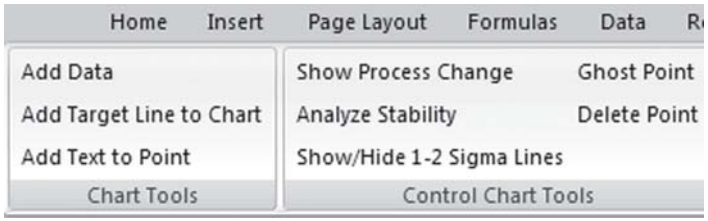
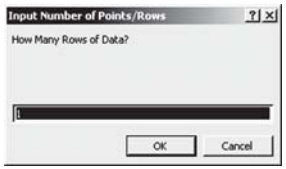


Chart Menu in Excel 2000 - 2003 and Mac versions of Excel

Add Data toCharts: Click on the chart datasheet (i.e. cdata) and input new data points. Then click on the chart. Next click on the chart tools menu and Add Data. Enter the number of rows to add and then click OK.



Add Target Line to Chart: Click on the 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 where you want the line drawn.

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

Control Chart Tools Menu

Delete Point: Deletes a point from a control 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 Tools 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.

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 and 2 sigma lines from your chart.

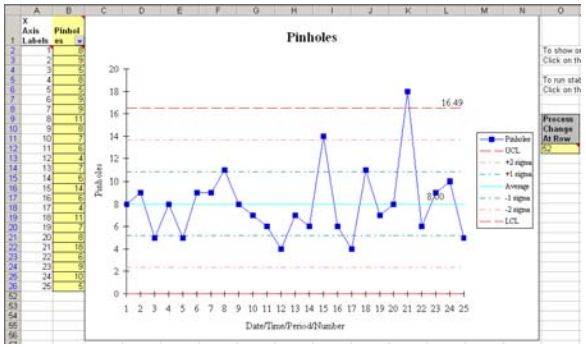
Recalculate Control Limits After you Add New Data (optional): Control limits are calculated with the data you selected when running the macro. If you want to recalculate control limits after you add new data: Add new data tothe chart. Next, click on the first data point on the chart and select Show Process change on the menu.

Since this function recalculates control limits using the point selected and every point to the right, it will recalculate your control limits using all of your data including the new points. For more info about all of these features see qimacros.com/qimacros-excel-tips.html

Control Chart Templates

You can also use Fill-in-the-Blanks templates to create control charts.

1. Click on the QI Macros Menu, Fill-In-The-Blanks Templates and then SPC Charts. Then select the desired template.



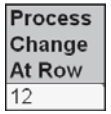
2. Each template is made up of several worksheets (average, median, rolling, fixed, short run etc.) See further info and descriptions at qimacros.com/qiwizard/control-chart-template.html

3. Just 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: Templates default to 50 data points. To add more points, copy down the formulas (they are hidden behind the charts), then click on the chart and select Add Data to Control Charts on the Chart Tools menu. Input the number of points you want to add.

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 box to the right of the chart.

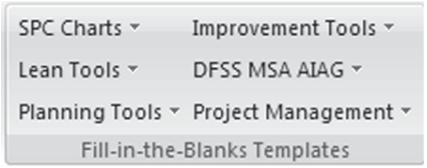


Analyze Stability: click on the chart and then select Analyze Stability on the Chart Tools menu.

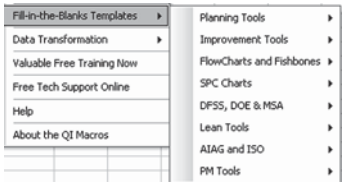
Fill-in-the-Blank Templates:

The QI Macros contain 90 + templates including a balanced scorecard, flowcharts, fishbones, 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 whisker and pareto charts.

Fill-In-the-Blanks Templates in Excel 2007-2010: Click on QI Macros, then look for Fill-in-the-Blanks Templates. Click on each sub menu to get a list of templates in that category.



Fill-In-the-Blanks Templates in other versions of Excel: From the QI Macro Menu bar, choose Fill-In-The-Blank-Templates. Then choose a sub menu to get a list of templates in that category.

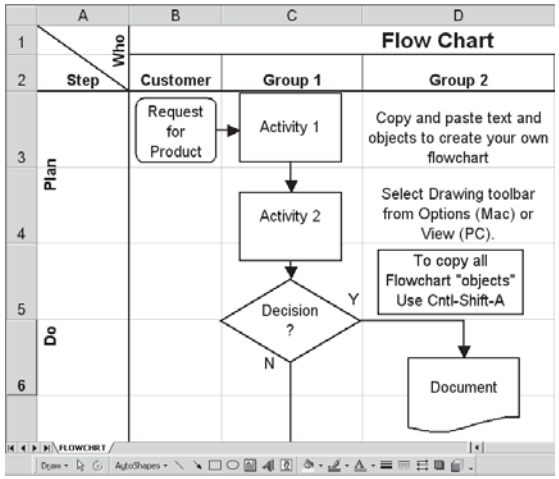


Many templates including the Balanced Scorecard, FMEA, Gage R&R, DOE and PPAP Forms are really several different templates (worksheets) in one workbook. To access each worksheet just click on the worksheet tab.

Our Six Sigma Ezine archives contain articles about many of these tools at qimacros.com/six-sigma-articles.html.

Create a Flow Chart:

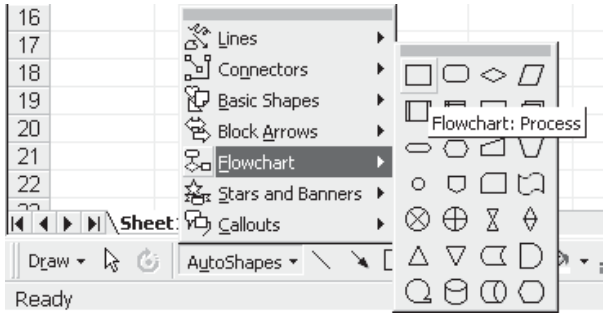
1. **The first step of managing any process is to define its flow.** Select Fill-in-the-Blanks Templates, Flowcharts and Fishbones, then **choose the Flow Chart template.**



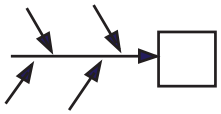
2. From the File Menu, **select Save As to store the template under a new name.**

3. **Copy and paste** the existing text, boxes, diamonds and arrows to create your flow chart. Change the text.

4. **Excel 2000-2003**: Select VIEW-TOOLBARS- DRAWING. **In Excel 2007-2010**, select Insert, Shapes. Use Autoshapes to find more drawing shapes and to connect the boxes and diamonds as you would with any flowcharting tool.

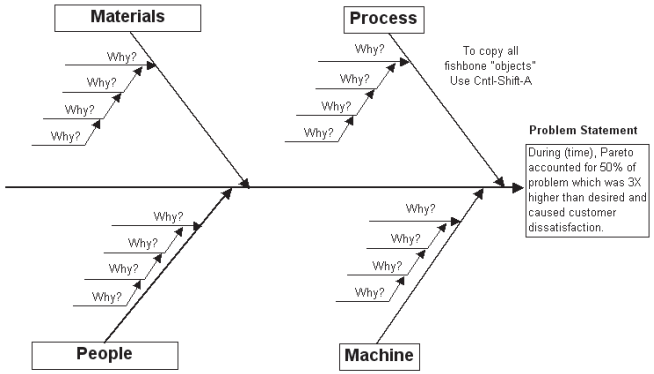


Create an Ishikawa:



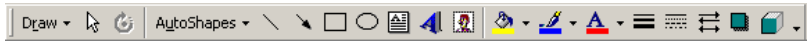
Excel may not be the best tool to do this with, but you can easily draw Ishikawa diagrams with the drawing tools.

1. **Select Fill-in-the-Blanks Templates,** Flowcharts and Fishbones, then choose the Ishikawa, or fishbone diagram.

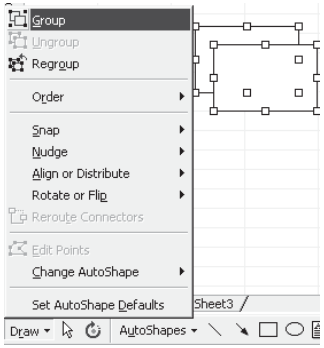


2. From the File Menu, **select Save As to store the template under a new name.**

3. Use the text and arrow tools from the Drawing Tool Bar to add arrows and causes. (To see the tool bar, select**: View/Options-Toolbars-Drawing.**) In Excel 2007-2010, select Insert-Shapes.



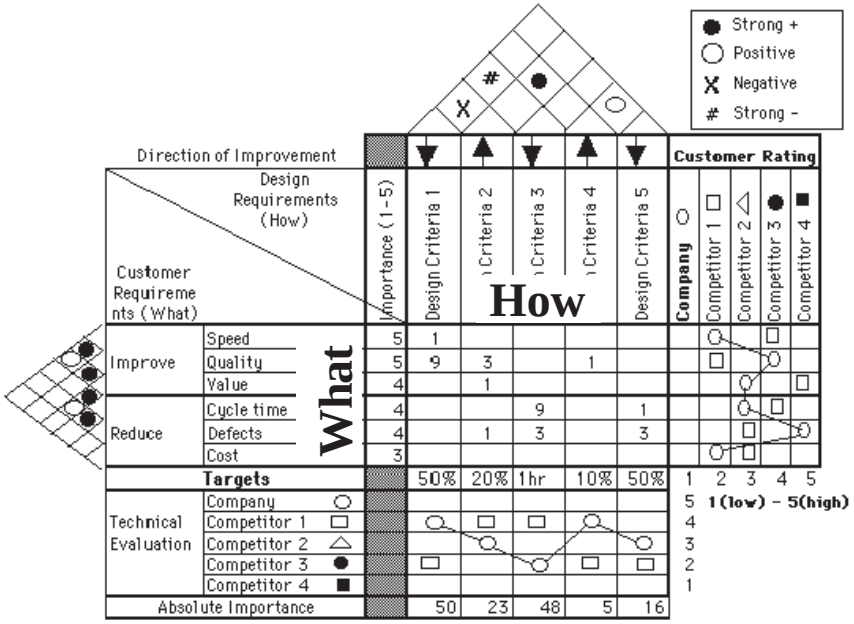
Use the Ellipse tool to circle root causes.



Each line, box, text or circle is called an "object." Objects can be grouped together to form a single object or moved in front or behind each other using the Drawing Tool. To copy the fishbone and place it in another document, use Cntr+Shift + A to select all objects, then Edit-Copy.

Create a QFD Template:

1. **From the QI Macros, select Fill-in-the-Blanks Templates, then DFSS.** Choose the QFD House of Quality.



2. From the File Menu, **select Save As to store the template under a new name.**

3. **Enter the "whats" and "hows" for the diagram.** Insert columns and rows as required to expand the matrix. Then enter importance and interactions.

4. **Excel 2000-2003**: Select VIEW-TOOLBARS- DRAWING. **In Excel 2007-2010:** Select Insert-Shapes. Use Autoshapes to draw all competitor scores.

For articles about QFD, see qimacros.com/six-sigma-articles.html

To sign up for our Six Sigma ezine, send an email to: six-sigma-ezine@aweber.com, Subject = "sign up"

Create a GageR&R:

1. **From the QI Macros, select Fill-in-the-Blanks Templates, then DFSS, DOE, MSA.** Choose the GageR&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->	Trial2	0.41	-0.68	1.17	0.5	-0.92	-0.11	0.75	-0.2	1.99	-1.25			
5		Trial3	0.64	-0.58	1.27	0.64	-0.84	-0.21	0.66	-0.17	2.01	-1.31	2.110		
6		Trial4												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->	Trial2	0.25	-1.22	0.94	1.03	-1.2	0.22	0.55	0.08	2.12	-1.62			
13		Trial3	0.07	-0.68	1.34	0.2	-1.28	0.06	0.83	-0.34	2.19	-1.5	0.890		
14		Trial4												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->	Trial2	-0.11	-1.13	1.09	0.2	-1.07	-0.67	0.01	-0.56	1.45	-1.77			
21		Trial3	-0.15	-0.96	0.67	0.11	-1.45	-0.49	0.21	-0.49	1.87	-2.16	-2.840		
22		Trial4												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	

2. From the File Menu, **select Save As to store the template.**

3. **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.

4. **Evaluate GageR&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 free articles at qimacros.com/qimacros-excel-tips.html#msa or consider our Gage R&R whitepaper at qimacros.com/products.php

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 Fill-In-The-Blank Templates menu select DFSS, then DOE**. Next select the Taguchi or Plackett Burman 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				
	Factor	Factor Name	Level 1 Low(-)	Level 2 High(+)	
2^2	A	Time Enter	30	45	Two Factor Experiment
	B	Tempera Factors	325	375	
	AB	Time X Temperature			
2^3	C	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/free-lean-six-sigma-tips/design-of-experiments.html

Statistical Analysis

Six Sigma utilizes analysis tools like ANOVA, regression, and other tests. You can now access these tools through the QI Macros.

1. **Select data for analysis**. Some tools, like Anova can take many columns. Others, like Regression use two columns. A few only use one column. Data must be in columns for these tools to work. See c:qimacros/testdata/anova for examples.
2. **From the QI Macros, choose** Stat Wizard to automatically analyze normality, variation and means. The Wizard will base it's analysis on the data selected.
3. **Or from the QI Macros, choose** ANOVA and Analysis Tools**.** A number of different statistical tools will be displayed.
4. **Select the appropriate statistical analysis, and click OK.** Answer any of the prompts (defaults are provided) and the QI Macros will perform the analysis you've requested.

5. **The QI Macros will also interpret the results for you.** For example, they will tell you to Reject or Accept the Null Hypothesis and whether the Means or Variances are the same or different.

For more help go to:

qimacros.com/qiwizard/statistics-wizard-excel.html

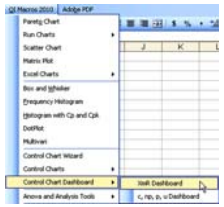
qimacros.com/qiwizard/hypothesis-testing-excel.html

Control Chart Dashboards

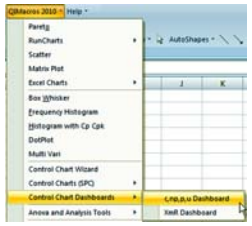
These new templates will automatically create Control Chart Dashboards for you.

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

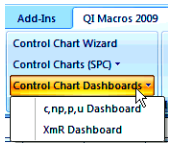
Excel 2000 to 2003



Excel 2007 Classic



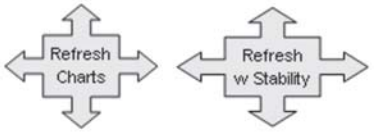
Excel 2007-2010



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 dashboard has 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 Data or Refresh Data with Stability Analysis icon.

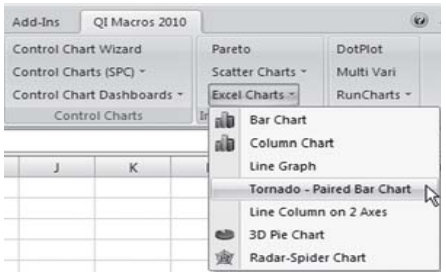


See also qimacros.com/qiwizard/control-chart-dashboard.html

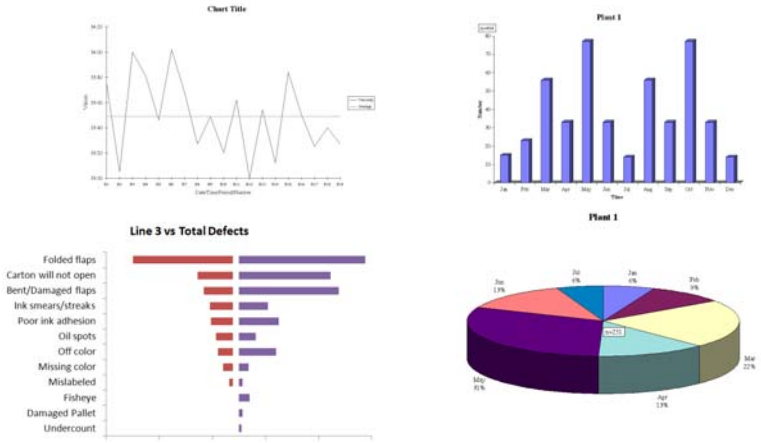
Create Excel Charts:

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 a **line, bar, pie, spider (radar) or line column chart**:

1. Highlight the labels and data to be graphed, then click on the QI Macros pull down menu, Excel Charts and then select the chart you want to run.



2. The QI Macros will prompt you for the graph title, and the X and Y Axis titles as appropriate.



Create Run Charts

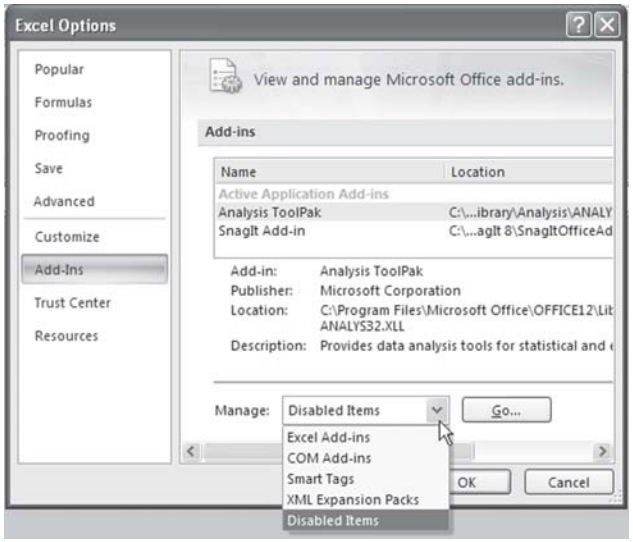
A run chart is a line graph of your data and an additional line representing the average or median of your data. **Create a run chart by selecting your data and selecting run chart from the QI Macros pull down menu, then select Average or Median.**

Installation Trouble Shooting

QI Macros Menu is not visible in Excel OR qimacro.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 2007-10: In Excel click on the office icon in the upper left corner, then Excel Options then Add ins on the left. Click on the arrow next to Manage and select Disabled Items. Click Go to see disabled items. If th QI Macros are disabled, enable them.



Other Common Questions

- **How do I set up my data?** See test data files loaded on your computer at c:\qimacros\testdata.
- **Run Time Error...** These messages 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 Macros:** Delete the qimacros.xla file and the QIMacros2010menu.xlam file (Excel 2007-2010 only) in Excel's startup folder at

c:Programfiles/Microsoft Office/Office(10, 11, 12,14)/XLStart:

Technical Support

Most tech support questions are answered at:
qimacros.com/techsupport.html

If you're still having problems email 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 to 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-qimacros-training.html.

Email qimacros@aweber.com for a FREE supplemental course on the QI Macros.

Disclaimer: These macros are not infallible. Given bad data, they will halt. Simply press **Halt** or **Continue**.

Customizing & Enhancements

The QI Macros are written in VBA. We can create custom Excel applications for you. Just let us know what you need and we will send you a free quote.

Simple Turnkey Systems in Excel

Is there something you want to do in Excel, but you just don't have time to figure it out? Is there something the macros could do to help you make analysis more easy?

Here are just a few of the applications we've developed for other clients in Microsoft Excel:

- Healthcare Dashboards and Scorecards
- Do-it-yourself Dashboards and Scorecards
- Customer Wait Time Tracking
- Measurement Dashboards
- Automated roll-up of various data and charts

For a free quote, send your Excel data and charts to info@qimacros.com. Describe what you want to accomplish and we will send you a free estimate.

Fill in the Blanks Dashboards Systems. These systems contain a place to define your measures and color coding criteria, a data entry sheet, a color coded scorecard and a dashboard with control charts. See our 10, 20 and 30 Measure Dashboard Systems at

qimacros.com/dashboard-scorecard-for-excel.html.

Lean Six Sigma or QI Macros On-site Workshops Consider bringing Jay on-site to train your employees. Call (888) 468-1537 to schedule a class or view these pages for further information:

QI Macros One Day Workshop - qimacros.com/qimacros-training.html

Lean Six Sigma One Day Workshop - qimacros.com/lean-six-sigma-workshop.html

Free Webinars and Training

Free Monthly One Hour Webinars: Great overview of the key functions in the QI Macros. Check dates and register at: qimacros.com/webinars/webinar-dates.html

Free Lean Six Sigma "Money Belt" Training: www.lssmb.com

Free email lesson series and monthly tips and tricks newletter. Sign up by sending an email to qimacros@aweber.com

Free articles and tips and tricks archive at qimacros.com/qimacros-excel-tips.html

Free QI Macros Video Tour at qimacros.com/qimacros-video-tour.htm

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

Lean **Six Sigma** **SPC**

Check out our products page at qimacros.com/products.php

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

Order Options:

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FAX: POs to (888) 468-1536 or (303) 756-3107
Call: (888) 468-1535 or (303) 757-2039
Email: orders @qimacros.com

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

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