

QIMacros



How To Guide

Quick Tips for Our Most Popular Tools





Installation

If you're reading this guide, that means you've already taken the first important step toward simplifying Lean Six Sigma tools like control charts and statistics. QI Macros is easy to use and provides a wealth of tools to help improve your processes.

If you haven't already completed your QI Macros installation, let's get started:

Installation Instructions:

<https://www.qimacros.com/support/qi-macros-tech-support/#install>

Installed by IT?

IT, log in as the end-user prior to installation, right-click the setup file and select "Run as Administrator."

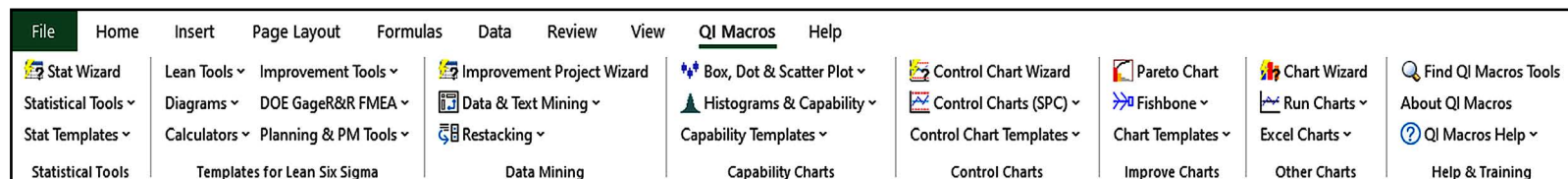
Need Installation Assistance?

Person-to-person support is available Monday through Friday, 8 a.m. to 5 p.m. Mountain Time.

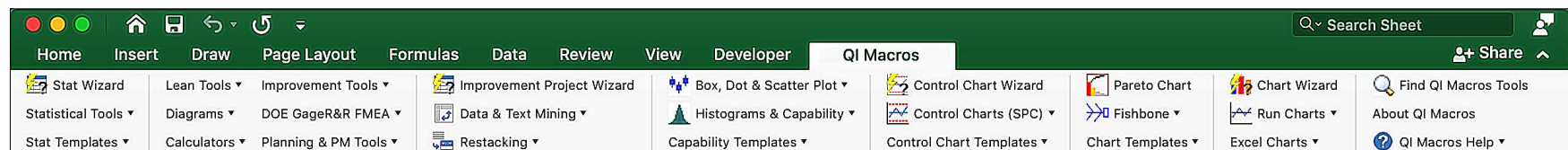
Email: support@qimacros.com

Phone: 303-756-9144 or 888-468-1537

PC



MAC





QI Macros Wizards

If you are confused about which chart or statistics to use, or you are not sure how to organize or summarize your data, QI Macros wizards can help! QI Macros is the only Six Sigma software with built-in wizards to automatically choose charts and analysis based on your data.

Chart Wizard:

Creates all probable charts for your data (Pareto charts, control charts, histograms, etc.) and runs descriptive statistics.



Control Chart Wizard:

Analyzes your data and creates the right control chart for you (c, np, p, u, XmR, XbarR, or XbarS.)



Control Chart Template Wizard:

Analyzes your data, selects the right control chart template, and inputs your data for you.



Improvement Project Wizard:

Analyzes your data, creates a pivot table, and generates an XmR chart, defect Paretos, and a fishbone diagram – the basic charts needed for any improvement project.



Stat Wizard:

Will analyze your data and choose the right hypothesis tests for you. The Stat Wizard will tell you if the means and variances of two or more samples are the same or different – no more p values to evaluate.

t-Test	α	0.05
	Batch 1	Batch 2
Mean	92.255	92.733
Variance	5.688	8.901
t Stat	-0.302	
P(T<=t) one-tail	0.386	

**Cannot Reject Null Hypothesis:
p > 0.05 (Means are the same)**



Most Popular Tools

QI Macros for Excel has more than 40 charts, 30 statistical tools and 140 Lean Six Sigma templates you can use to reduce costs and boost profits. This guide shows you how to use our most popular tools.

Control Charts to Analyze Stability:

Control charts are great tools for tracking processes over time. They can tell you if your process is consistent and predictable or has unstable conditions that need to be investigated.

Histograms with Cp and Cpk Capability Metrics:

Use these tools to determine if your process meets your customer's requirements as defined by upper and lower specification limits.

Pareto Charts and Fishbone (Ishikawa) Diagrams:

Pareto charts help narrow your focus to the "vital few" defects, mistakes and errors. Fishbone diagrams capture the root causes.

Statistical Tools for Testing Hypotheses:

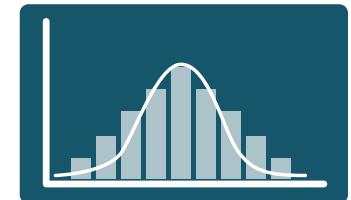
Do two or more data sets have the same or different means and variances? Or is there a relationship between them? Statistical tools can answer these questions.

Gage R&R/MSA:

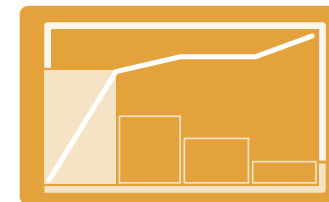
A common cause of variability in manufacturing is measurement error. Gage R&R Studies help determine if measurement processes are a root cause of variation and if the variation is caused by appraisers or equipment.



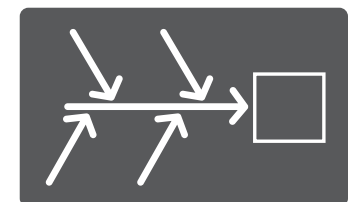
Control Chart



Histogram Chart



Pareto Chart



Fishbone (Ishikawa)

t-Test	α	0.05
	Batch 1	Batch 2
Mean	92.255	92.733
Variance	5.688	8.901
t Stat	-0.302	
P(T<=t) one-tail	0.386	

**Cannot Reject Null Hypothesis:
p > 0.05 (Means are the same)**

Statistical Tools

%EV	17.6%
%AV	20.0%
%R&R	26.7%
%PV	96.4%

Gage R&R/MSA



Control Charts Overview

Control charts are a great tool for analyzing and monitoring process stability and performance. There are different types of control charts depending on your data; they fall into two categories: attribute and variable.

Attribute Charts for Counted Data

- c Chart
- np Chart
- p Chart
- u Chart

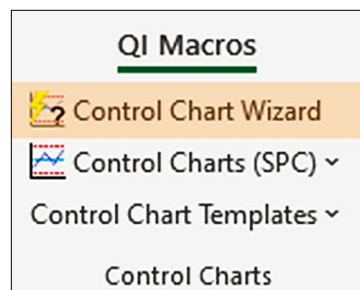
Variable Charts for Measured Data

- XmR – Individual Moving Range Chart
- XbarR Chart
- XbarS Chart

The most commonly used control charts are:

Services (e.g., healthcare): XmR, p and u charts.

Manufacturing: XbarR, p and u charts.



Not sure which control chart to use?
The QI Macros Control Chart Wizard will analyze your data and select the right control chart for you.



Creating a Control Chart

Creating control charts for analyzing the stability of a process couldn't be easier. Just follow these steps and you'll have the charts you need to determine if your process is consistent and predictable.

Step 1: Highlight Your Data

Highlight your Excel control chart data. If you need help setting up your Excel data, access sample data sets from your QI Macros help menu.

Step 2: Select a Control Chart

Select a control chart from the QI Macros menu or select the Control Chart Wizard to let QI Macros select the right control chart for you.

Step 3: Analyze and Improve

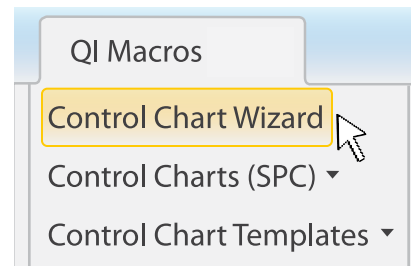
QI Macros will draw the control chart and analyze stability for you. Red points represent unstable conditions that should be investigated.



1. Point

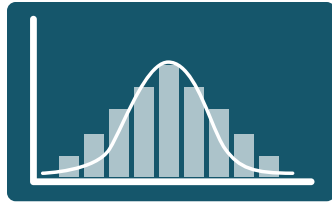
	A	B	C
1		Obs 1	Obs 2
2	Jan	1.32	1.41
3	Feb	1.43	1.36
4	Mar	1.43	1.49
5	Apr	1.50	1.64
6	May	1.56	1.27
7			

2. Click



3. Analyze & Improve





Capability Analysis Overview

Histograms are a great tool for evaluating process capability. Several different types of histograms are available:

- **Frequency Histogram:** For consistent measurements (e.g., 0.05, 0.10, etc.)
- **Histogram or Capability Suite:** For variable measurements
- **Weibull Histogram:** For evaluating failure times of products or equipment

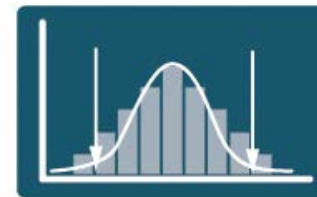
Process Capability Metrics

Cp – Capability Index

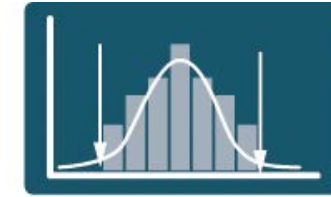
- Measures how well the data fits between the USL and LSL.
- $Cp \geq 1.33$ is desirable

Cpk – Centering Index

- Measures how well the data is centered between the USL and LSL.
- $Cpk \geq 1.33$ is desirable

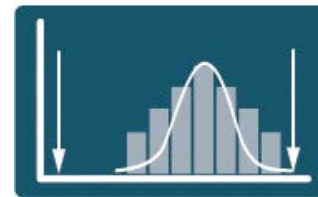


Does not fit



Fits between LSL and USL

Cp



Not Centered



Centered

Cpk



Creating a Histogram with Cp & Cpk

Creating histograms for capability analysis couldn't be easier. Just follow these steps and you'll have the charts you need to evaluate if your process is meeting your customer requirements.

Step 1: Highlight Your Data

Highlight your histogram Excel data (Access sample histogram data sets from the QI Macros help menu.)

Step 2: Select a Histogram

Select a histogram from the QI Macros menu and enter the Upper Specification Limit (USL) and Lower Specification Limit (LSL) at the prompts.

Step 3: Analyze and Improve

Cp>1: Process is capable

Cpk>1 Process is capable and centered between the LSL and USL

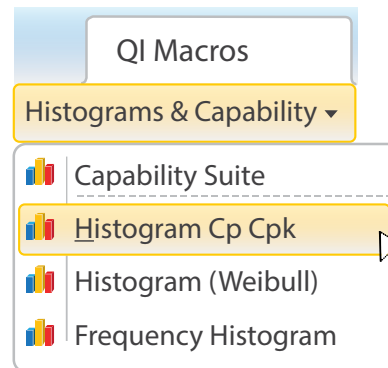


1. Point

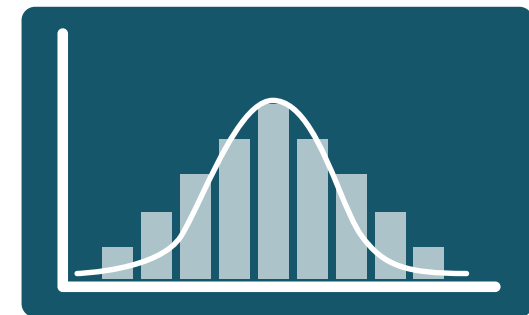
	A	B	C
1		Obs 1	Obs 2
2	Jan	1.32	1.41
3	Feb	1.43	1.36
4	Mar	1.43	1.49
5	Apr	1.50	1.64
6	May	1.56	1.27
7			



2. Click



3. Analyze & Improve





Lean Six Sigma Tools Overview

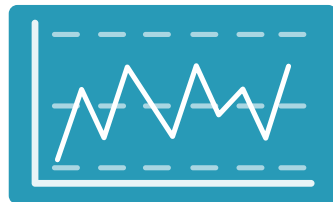
More than 40 charts and 140 Lean Six Sigma templates exist in QI Macros. Improvement projects fall into two main categories: reducing defects or reducing deviation (i.e., variation):

Reducing Defects

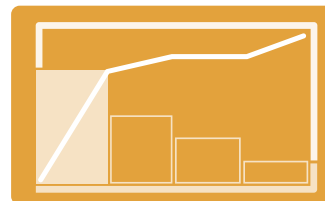
- XmR, p or u Control Charts
- Pareto Chart
- Fishbone (Ishikawa) Diagram

Reducing Deviation

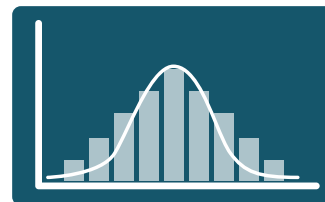
- Capability Suite
- XbarR Control Charts
- Histograms
- Fishbone (Ishikawa) Diagram



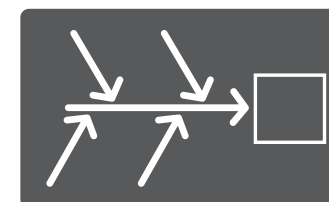
Control Chart



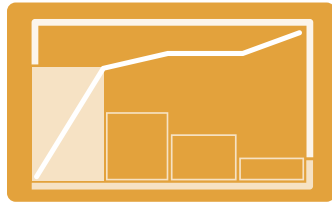
Pareto Chart



Histogram Chart



Fishbone (Ishikawa)



Creating a Pareto Chart

Creating Pareto charts to identify the biggest causes of defects, mistakes and errors is simple. Follow the steps below and you'll have the chart you need to create powerful improvement projects.

Step 1: Highlight Your Data

Highlight your Pareto Excel data or access sample Pareto data sets from the QI Macros help menu.

Step 2: Select Pareto Chart

Select Pareto Chart from the QI Macros menu.

Step 3: Analyze and Improve

Each colored bar on the left side of the Pareto chart could be used as the problem statement in the head of the Fishbone (Ishikawa) diagram.

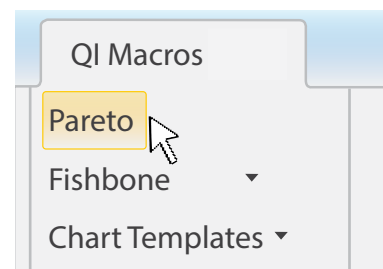


1. Point

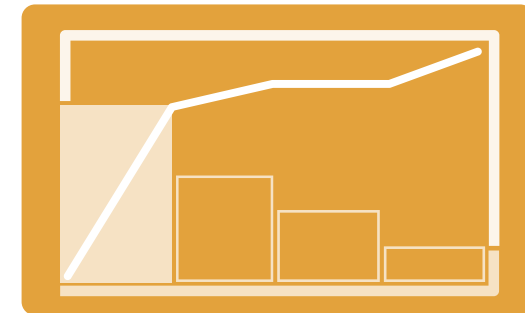
	A	B
1	Category	Count
2	Conveyor Failure	71
3	Flooding	20
4	Generator Failure	346
5	Safety	26
6	Training	34
7		

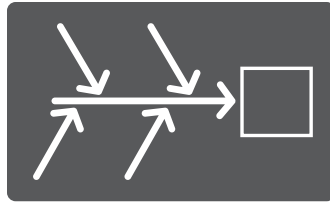


2. Click



3. Analyze & Improve





Creating a Fishbone (Ishikawa) Diagram

Creating Fishbone diagrams for root cause analysis is easy. Follow the steps below and you'll have the diagram you need to identify the root causes of defects and deviation.

Step 1: Select the Fishbone Template

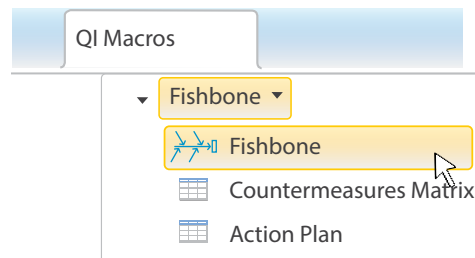
Select Fishbone from the QI Macros Menu.

Step 2: Fill in the text for the main bones and 5 Whys.

Step 3: Click the Create Fishbone button.



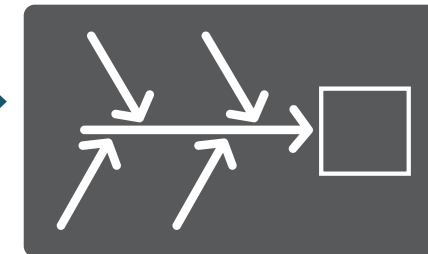
1. Point



2. Fill-in-the-blanks

	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 - Why?	Why?
10			Why?
11			Why?

3. Analyze & Improve





Statistical Tools Overview

Hypothesis testing is a great way to evaluate two or more methods of production or materials. QI Macros has over a dozen types of statistical tools. Most fall into three main categories: 1) comparing means, 2) comparing variances, and 3) analyzing relationships.

Means

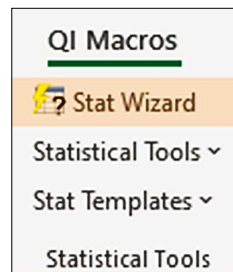
- ANOVA
- t-Test

Variances

- F-Test
- Levene's Test

Relationship

- Correlation
- Paired t-Test
- Covariance
- Regression



Not sure which statistic to use?
The QI Macros Stat Wizard analyzes your data and select the most appropriate statistical tests for you.



Performing Statistical Analysis

Doing hypothesis testing couldn't be easier. Follow these steps and you'll have the analysis you need to identify optimal results.

Step 1: Highlight Your Data:

Highlight your Excel data or access sample data sets from the QI Macros help menu.

Step 2: Select a Statistical Test:

Select a statistical tool from the QI Macros menu or select Stat Wizard.

Step 3: Analyze and Improve

QI Macros does the math and interprets the results for you. A p value of less than 0.05 indicates significant differences in means or variances.



1. Point

	A	B
1	Batch 1	Batch 2
2	91.50	89.19
3	94.18	90.95
4	92.18	90.46
5	95.39	93.21
6	91.79	97.19
7		

2. Click

QI Macros | Insert | Page Layout

Stat Wizard | Lean Tools ▾ | Improvem

Statistical Tools ▾ | Diagrams ▾ | DOE Gage

Descriptive Statistics - Normality Test

ANOVA Single Factor

F & t-Tests

3. Analyze & Improve

t-Test	a	0.05
	Batch 1	Batch 2
Mean	92.255	92.733
Variance	5.688	8.901
t Stat	-0.302	
P(T<=t) one-tail	0.386	

**Cannot Reject Null Hypothesis:
p > 0.05 (Means are the same)**



Gage R&R Study Overview

Gage R&R Studies are great tools for evaluating if your measurement system is repeatable and reproducible. Several types of Gage R&R Studies exist in QI Macros:

- Average and Range } 2-3 Appraisers and 2-5 Trials of 10 parts
- ANOVA } 2-3 Appraisers and 2-5 Trials of 10 parts
- Type 1 50 trials of a single part
- Attribute Used for Pass/Fail Gages – 3 Appraisers and 3 trials

The QI Macros Gage R&R Template contains a separate tab for each of these study types.



Performing a Gage R&R Study

Performing a Gage R&R study is easy. Follow these steps to determine if your measurement system is okay or needs improvement.

Step 1: Gather Your Data

Use your own data or access Ford's sample data (AIAG SPC.xls) from the QI Macros help menu.

Step 2: Select the Gage R&R Template

Select Gage R&R. from the QI Macros menu.

Step 3: Input The Data Input your data in the yellow cells provided.

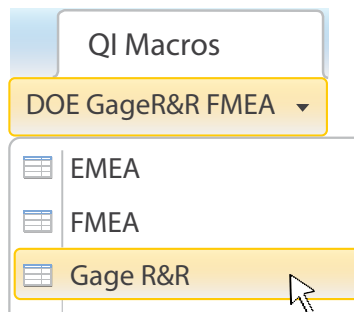
Step 4: Analyze and Improve:

NDC < 5: You need to use parts with more variation.

NDC > 5: Evaluate the %R&R. A %R&R less than 10% is acceptable.



1. Point



2. Fill-in-the-blanks

Appraiser 1	Trial 1	3.64	3.94
	Trial 2	3.58	3.93
	Trial 3	3.62	3.90
Appraiser 2	Trial 1	3.59	3.92
	Trial 2	3.63	3.91
	Trial 3	3.63	3.95

3. Analyze & Improve

%EV	17.6%
%AV	20.0%
%R&R	26.7%
%PV	96.4%



Other Resources

Click on links below to download Quick Reference Cards and User Guide

[QI Macros Wizards](#)

[Control Charts](#)

[Capability Analysis](#)

[Statistics](#)

[Gage R&R](#)

[QI Macros User Guide](#)

[View All of Our Free Training Resources](#)