QIMacros





How To Guide

Simple Tips for Using Our Most Popular Tools

Installation

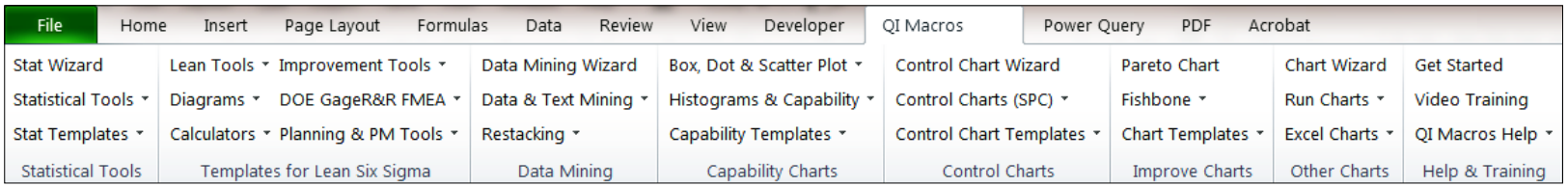
If you're reading this guide, that means you've already taken the first important step towards simplifying Lean Six Sigma tools like control charts and statistics. QI Macros for Excel is easy to use and will provide a wealth of tools to help improve your processes.

If you haven't already completed your download, let's get started:

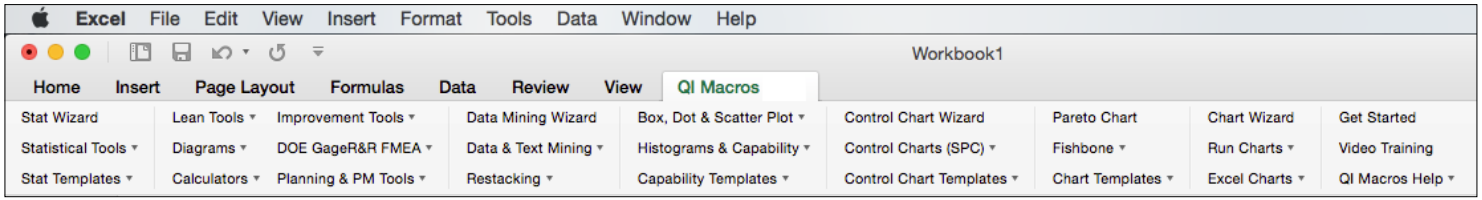
1. Close Excel on your desktop
2. Look for an email with a link to click and download
3. Select either the PC or MAC file
4. Run the Installation Wizard
5. Reopen Excel and look for QI Macros on your tool bar



PC



MAC



Most Commonly Used Tools

QI Macros for Excel has more than 40 charts, 20 statistical tools and 90 Lean Six Sigma tools that you can use to reduce costs and boost profits. This quick start guide will show 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 Ishikawa/Fishbone Diagrams:

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

Statistical Tools for Testing Hypotheses:

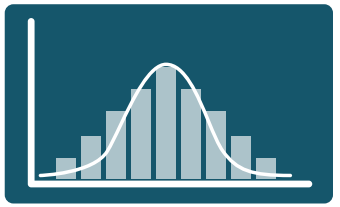
Do two or more data sets have the same or different means and variances? Or is there a relationship between them? Statistical tools can answer these questions.

Gage R&R/MSA:

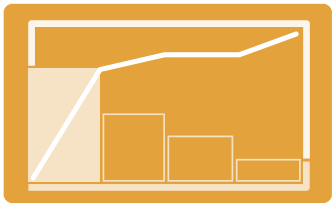
A common cause of variability in manufacturing is measurement error. Gage R&R Studies help determine if measurement processes are a root cause of variation and if the variation is caused by appraisers or equipment.



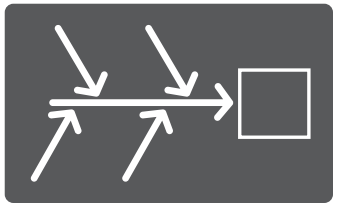
Control Chart



Histogram Chart



Pareto Chart



Ishikawa/Fishbone

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

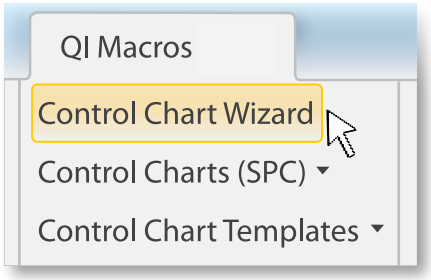
Variable Charts for Measured Data

- 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.

Watch the Control Chart Wizard Video

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: Point to Select the Data

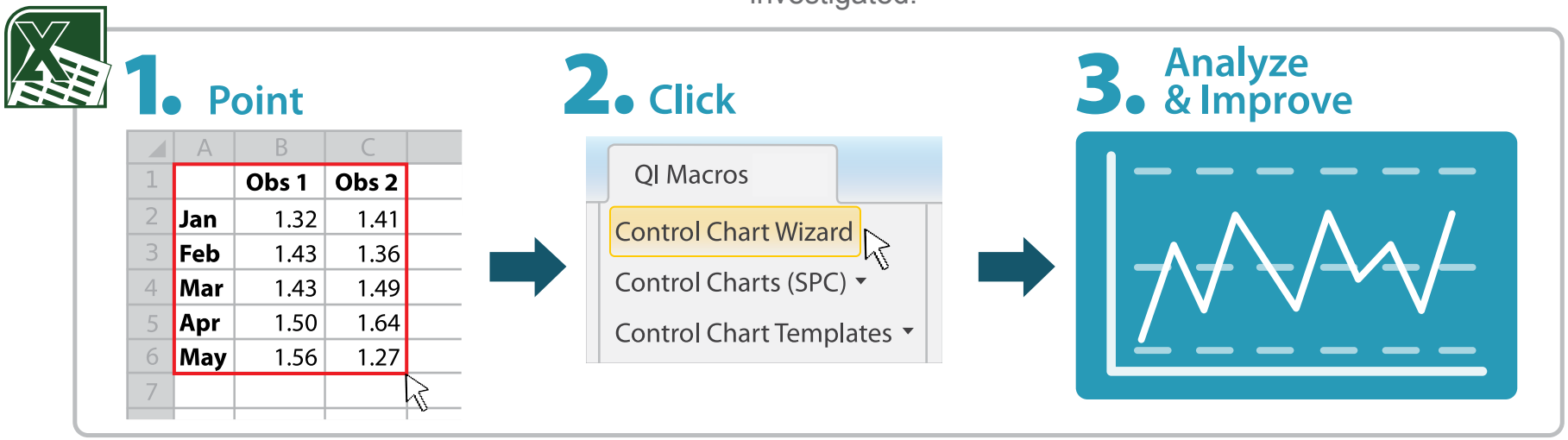
QI Macros loads practice data on your computer in: Documents:QI Macros Test Data:AIAG SPC.xls or select your own data.

Step 2: Click on the Control Chart Wizard

Go to the QI Macros menu in Excel and select a specific type of control chart from the drop down menu, or select the Control Chart Wizard.

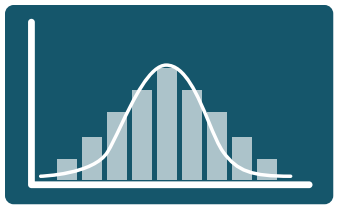
Step 3: Analyze and Improve Based on Control Chart

QI Macros will do the math and draw the graph for you. Red points represent unstable conditions that should be investigated.



Watch the Control Chart Video

QI Macros Control Chart Advantages



Capability Analysis Overview

Histograms are a great tool for evaluating process capability.
There are several different types of histograms:

- **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 ≥ 1.33 is desirable

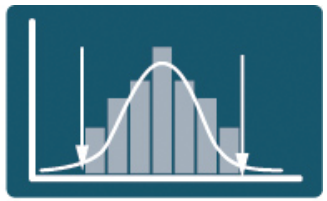
Cpk – Centering Index

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



Does not fit

Cp



Fits between LSL and USL



Not Centered

Cpk



Centered

Watch the Capability Suite Video

About Capability Analysis

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: Point to Select the Data

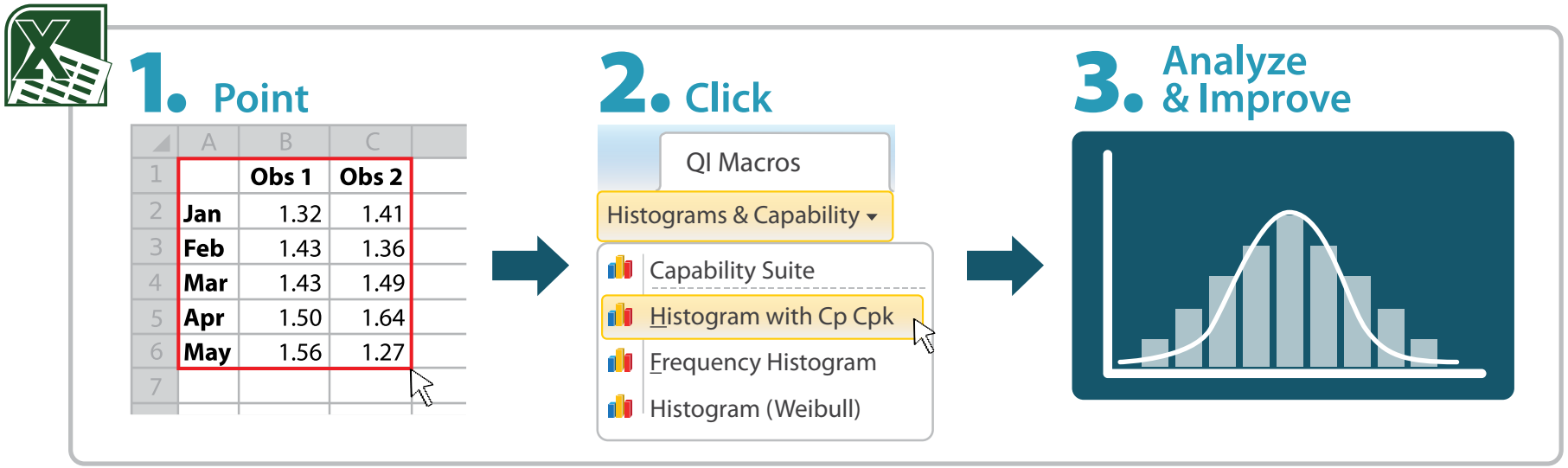
QI Macros loads practice data on your computer in: Documents:QI Macros Test Data:histogram.xls or use your own.

Step 2: Click on the Chart You Want

Go to the QI Macros menu in Excel and select Histograms and Capability. Choose from one of the histograms or the Capability Suite. Enter the Upper Specification Limit (USL) and Lower Specification Limit (LSL).

Step 3: Analyze and Improve Based on the Chart

QI Macros will do the math and draw the graph for you.



Watch the Histogram Video

QI Macros Histogram Advantages

Lean Six Sigma Tools Overview

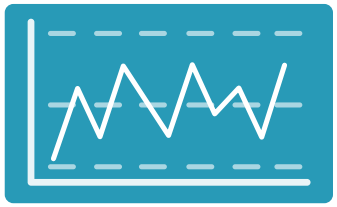
There are more than 40 charts and 90 fill-in-the-blank templates for Lean Six Sigma. Improvement projects fall into two main categories: reducing defects or reducing deviation (i.e., variation):

Reducing Defects

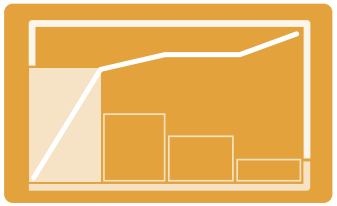
- XmR, p or u Control Charts
- Pareto Chart
- Ishikawa/Fishbone Diagram

Reducing Deviation

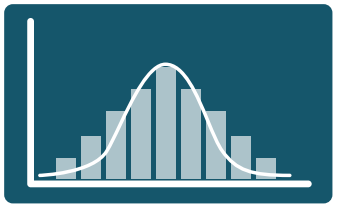
- Capability Suite
- XbarR Control Charts
- Histograms
- Ishikawa/Fishbone Diagram



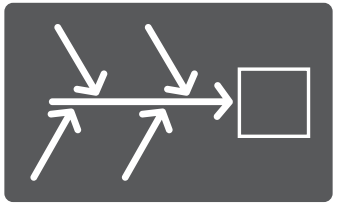
Control Chart



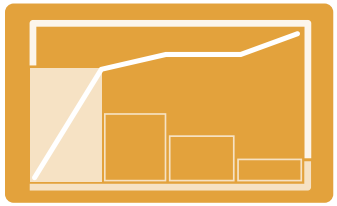
Pareto Chart



Histogram Chart



Ishikawa/Fishbone



Creating a Pareto Chart

Creating Pareto charts to identify the biggest causes of defects, mistakes and errors is simple. Just follow these steps and you'll have the charts you need to: create powerful improvement projects.

Step 1: Point to select the data

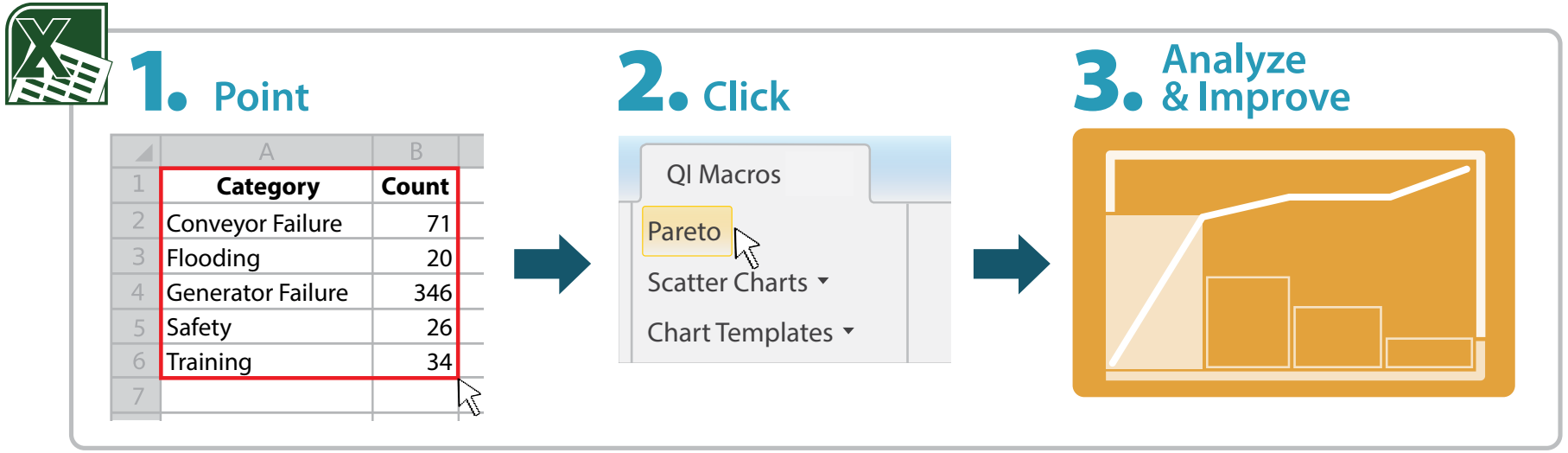
QI Macros loads practice data on your computer in:
Documents:QI Macros Test Data:Pareto.xls or select your own data.

Step 2: Click on the Pareto Chart

Go to the QI Macros menu in Excel and select Pareto Chart from the drop down menu.

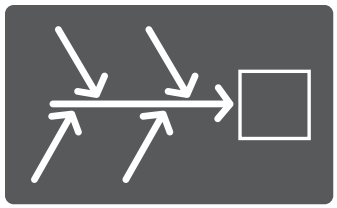
Step 3: Analyze and Improve Based on the Pareto Chart

QI Macros will do the math and draw the chart for you. Each colored bar on the left side of the chart could be used as the problem statement in the head of the Ishikawa/Fishbone diagram.



Watch the Pareto Chart Video

QI Macros Pareto Chart Advantages



Creating an Ishikawa Diagram

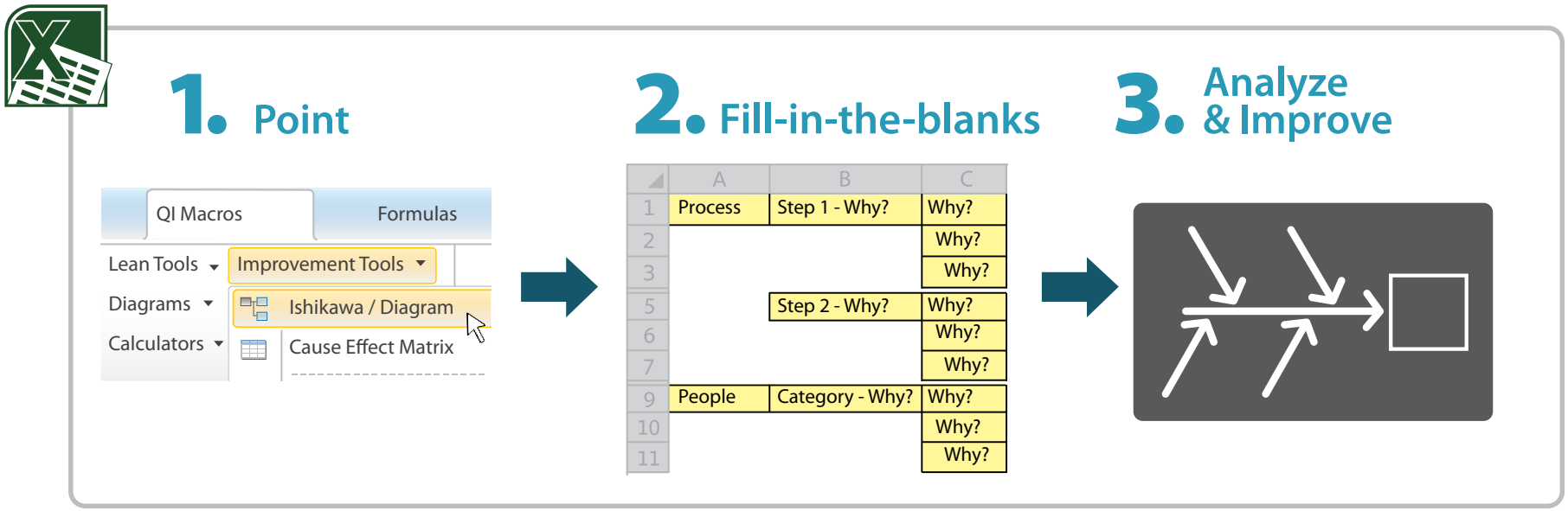
Creating Ishikawa/Fishbone Diagrams for root cause analysis is easy. Just follow these steps and you'll have the diagram you need to identify the root causes of defects and deviation.

Step 1: Point to Select the Ishikawa/Fishbone Template

Go to the QI Macros menu in Excel and select Ishikawa/Fishbone diagram from the Improvement Tools Menu.

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

Step 3: Click the Create Ishikawa/Fishbone button.



Watch the Ishikawa Fish-bone Diagram Video

QI Macros Ishikawa Fish-bone Diagram Advantages

Statistical Tools Overview

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

Means

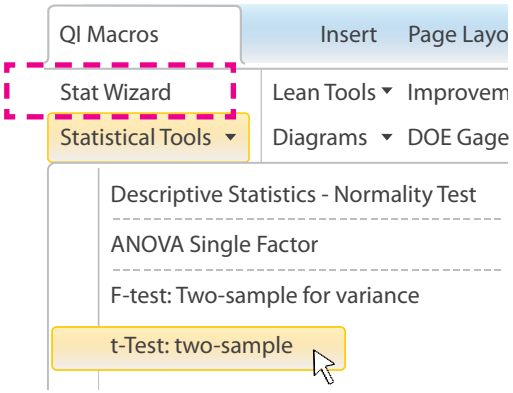
- ANOVA
- t-Test

Variances

- F-Test
- Levene's Test

Relationship

- Correlation
- Paired t-Test
- Covariance
- Regression



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

Watch the Stat Wizard Video

Performing Statistical Analysis

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

Step 1: Point to Select the Data to Analyze:

QI Macros loads practice data on your computer in: Documents:QI Macros Test Data:anova.xls

Step 2: Click on the Statistical Test:

Go to the QI Macros menu in Excel and select a specific type of statistical analysis from the drop down menu or select Stat Wizard.

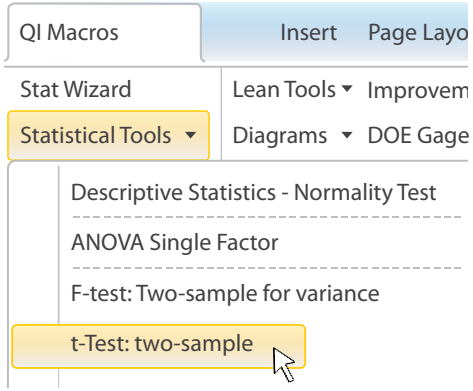
Step 3: Analyze and Improve Based on the Results:

QI Macros will do the math and interpret the results for you. P values less than 0.05 indicate 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



3. Analyze & Improve

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)

Watch the QI Macros t-Test Video

QI Macros Statistics Tool Advantages



Gage R&R Study Overview

Gage R&R Studies are great tools for evaluating if your measurement system is repeatable and reproducible. There are several types of Gage R&R Studies:

- Average and Range
- 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. Just follow these steps to determine if your measurement system is okay or needs improvement.

Step 1: Run a Gage R&R study to gather the data

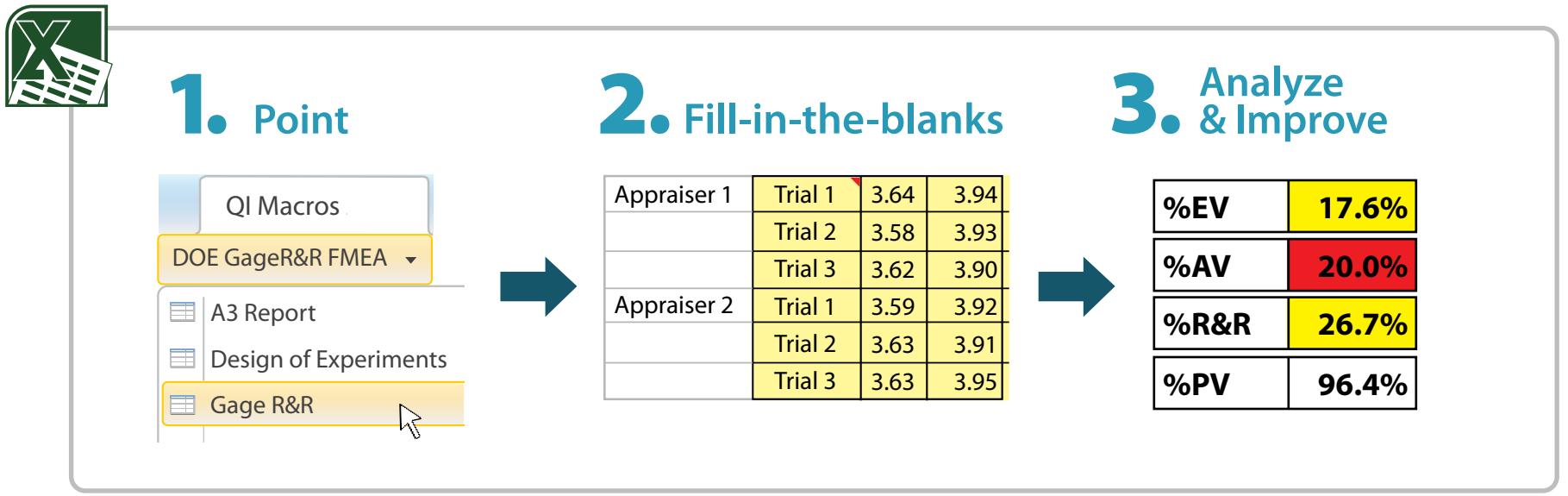
QI Macros loads Ford's test data on your computer in:
Documents: QI Macros Test Data: AIAG SPC.xls or use your own data.

Step 2: Point to Select the Gage R&R Template

Go to the QI Macros menu in Excel and select Gage R&R.

Step 3: Fill the data into the yellow cells provided.

If NDC < 5, then you need to use parts with more variation. If the NDC > 5, then evaluate the %R&R. A %R&R less than 10% is acceptable.



Watch the Gage R&R Video

QI Macros Gage R&R Advantages



Other Resources

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

Control Charts

Capability Analysis

Statistics

Gage R&R

QI Macros User Guide

View All of Our Free Training Resources