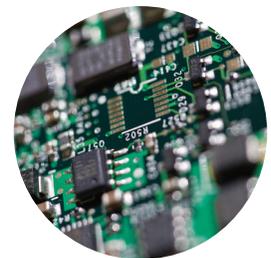




# HOW TO IMPROVE QUALITY AND EFFICIENCY USING TEST DATA ANALYTICS

Discover 8 ways in our guide for advanced manufacturers

Do you perform advanced manufacturing in an industry such as aerospace, automotive, medical devices or telecoms? Is product testing part of your manufacturing process? If you can answer yes to these questions, keep reading to learn how test data analytics can enable many improvements.



Simplicity 

# Gain Value From Test

In many organizations production test is seen as an unfortunate necessity for ensuring shipped products meet the required quality standards. It's very common to state that testing adds no value to an operation, which can encourage organizations to minimize their activities around it. Although there are clear reasons to perform testing, when we're up against a deadline to ship units, it's very easy to see test as a hindrance and certainly not as a powerful tool.

In this guide, our aim is to show by examples how production test can be used for more than checking individual units are built correctly. Specifically we'll be looking at applying modern data analytics to test results, to provide greater insights and enable improvements in an organization. We'll show how test can add value, by improving efficiency and reducing costs, provided you make good use of the information it provides.

## COPQ (Cost of Poor Quality)

The *hidden factory* is closely linked to COPQ, which is a measure of the costs associated with producing defective units. This costs include extra labor, materials and equipment, as well as lost sales and reputation.

## 1. Better Yield Monitoring

Do you have an accurate view of right-first-time yield? How many times are units being re-worked? Is there a *hidden factory* in your organization?

With test data analytics we can use serial numbers to easily track your yield information. There's no need to bring in extra data entry processes for your operators; they simply test the products as they've always done. We then collate the data into centralized storage and perform analysis on it to extract the yield figures.

In high-value low-volume manufacturing, units are rarely scrapped, so repeated re-work operations can be typical. If some of these re-work operations aren't visible to the management they become known as the hidden factory. Test data analytics can give you a better insight into these resource hungry activities, enabling you to take steps to reduce them and improve your efficiency.

## 2. Detect Equipment Issues

Is there a link between particular line equipment or measurement instruments, and issues with production units? Do equipment maintenance or calibration intervals need to be shortened? Could they be lengthened to reduce down-time?

By looking at a handful of test reports it may be difficult to answer these questions. However by aggregating across all your test data, long and short-term trends can be revealed.

When the identity of line equipment or measurement instruments used during production is logged, correlation between them and any issues can be clearly identified. If we plot measurements over time we can spot drifts that could indicate calibration issues and shifts that might show faults.

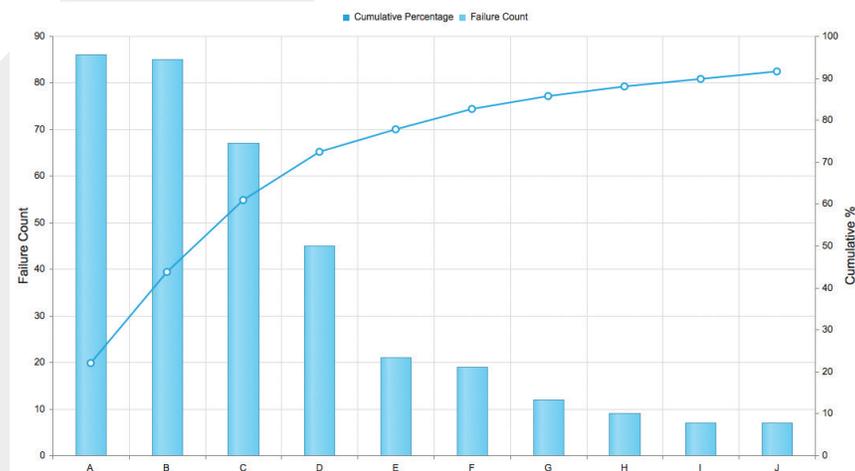
## 3. Focus Engineering Resources

Is your team prioritizing efforts on production issues that have the biggest impact first? Do you have real-time visibility on the most common failure types? Could you rank them in order of frequency? All this information can be found in test data, but many organizations don't take full advantage of it.

With a management system for your data, real-time Pareto analysis can reveal an up-to-date picture of your most common issues. The list is ordered by frequency, so you can focus valuable resources on the issues with the biggest impact first.

### Pareto Chart

Issues are ranked by frequency of occurrence, with the most common appearing on the left. Whilst the bars show frequency of individual issues, the line gives a cumulative percentage.



## 4. Identify Training Requirements

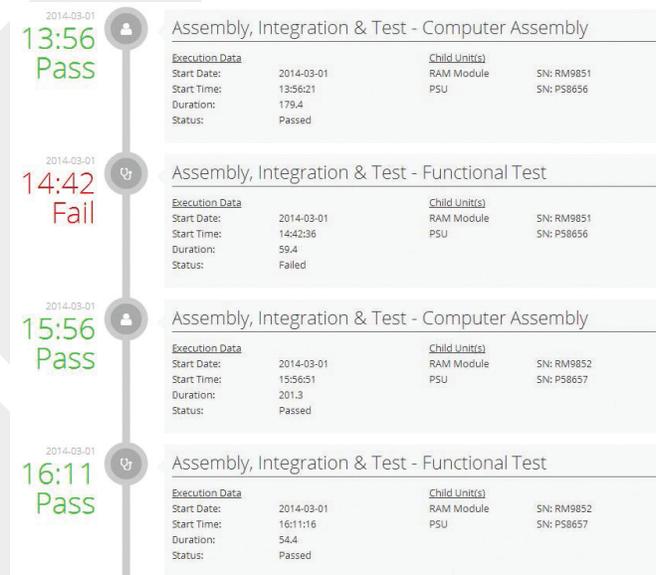
Do you know of particular teams or individuals who have process training requirements? Could this be leading to units built or tested by them failing more often? What are the most common failure types, which you need to focus training efforts on first?

Operator, shift, or process line identifiers can be easily logged with production test data. By correlating between unit failures and this information, patterns can be revealed that may indicate training deficiencies in particular areas. Following your training actions, you'll be able to quantify what improvements have occurred using the same procedure.

## 5. Long and Short Term Unit Tracking

What's the test history of a unit that has been reworked or come back for repair? What sub-assemblies or components were originally fitted and have any been changed? How did it perform when it was first manufactured compared to now? Can we prove a unit was compliant when it left the factory?

By storing test results in a searchable archive you can easily retrieve all this information and much more. For example: timelines for units can be built-up, compliance history can be checked and the effect of component aging monitored.



## 6. Quality Monitoring and Process Improvement

### Cpk

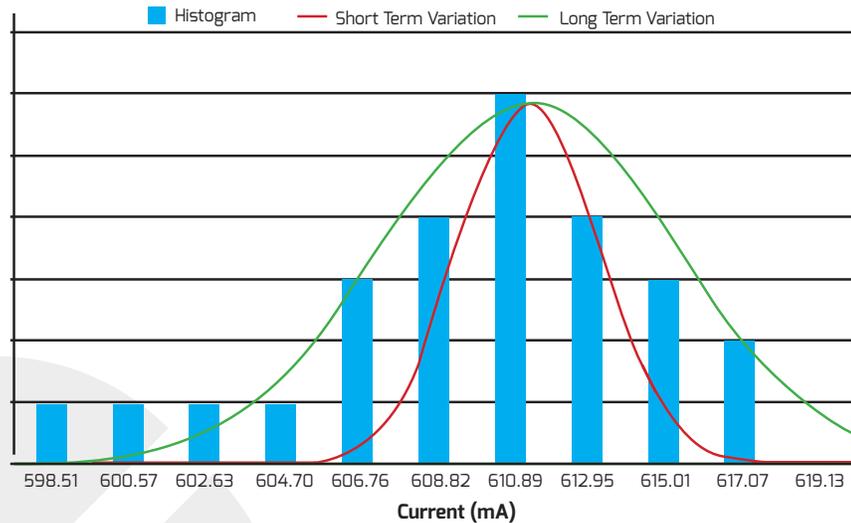
Commonly known as a process capability metric, it represents how well measured values fit within specification limits over the short-term

Do you have an up-to-date picture on the short or long-term variability of your products? Can you quickly get access to standard quality metrics such as Cpk and Ppk? Can you quantify how that last process change has improved product quality?

With real-time test data analytics you can get a snapshot of all this information at the click of a button. Individual test reports won't give you the information, but by combining test data into a database it can all be available instantly.

### Ppk

Represents process performance, which shows how much variation there is in a measurement over the long-term



## 7. Check Supplier Performance

Is there a link between supplier changes and production issues? Are your suppliers consistently maintaining the quality you expect?

With aggregated test data analytics you'll have the information you need to monitor your suppliers, and if needed, commence an issue investigation. Any trends or shifts can be plotted as graphs ready for reports or meetings. As a further step, for full traceability, you could even import your supplier's component test results and combine it with your own test data.

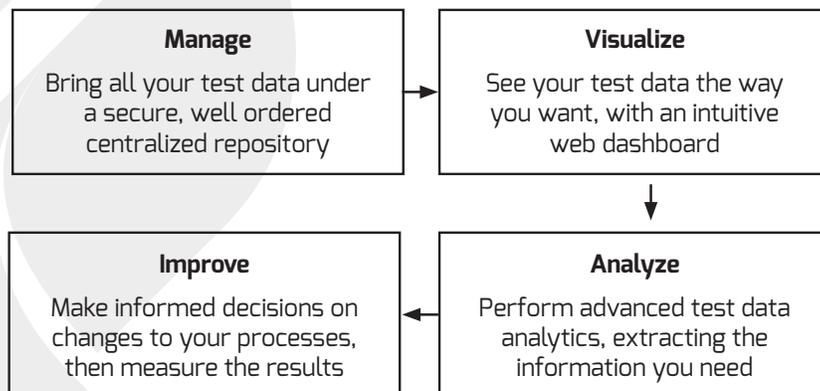
## 8. Predict & Prevent Early Field Failures

You have a list of units that have failed in the field, but do they all have something in common? The units were all originally in tolerance, but did tell-tale signs of premature failure exist, hidden in the test results?

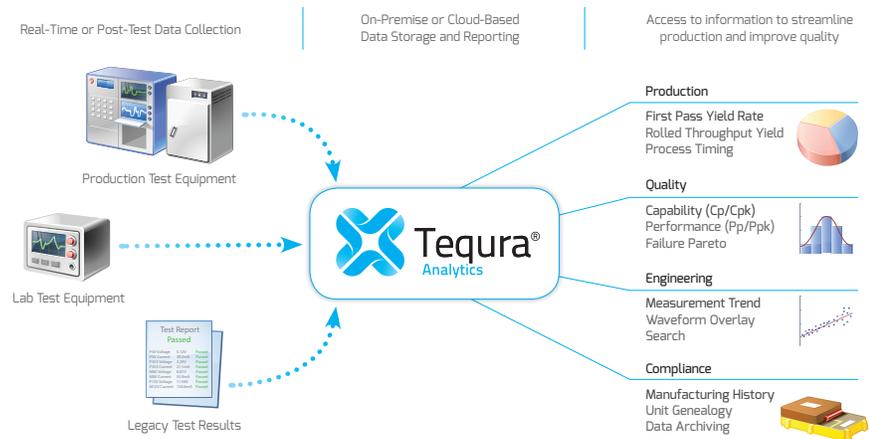
By using powerful Root Cause Analysis technology it is possible to identify what these signs are, enabling you to improve your processes to prevent them. Using the technology you'll be able to identify fault regions, which are a combination of test results ranges that could lead to premature failure. With this valuable information your investigation team will know where to focus, ensuring a quick resolution of the issue. Root Cause Analysis can even cope when returns are reported as no fault found, or customer fault reporting contains incorrect information.

### How Do I Start Getting All These Benefits?

If you're already doing computer driven automated testing or are logging test results to data files, you are half way there. The next stage is to bring all the data together into a well-structured database, which can be searched and sorted. Finally add in powerful analysis functions to extract the information you need and smart data visualization to present it.



# Tequra Analytics



Tequra Analytics can provide you with all these capabilities right out of the box. It's a combination of an advanced data management solution with a powerful analysis dashboard.

For growing businesses it provides a low barrier to entry through a low-cost cloud solution, while for established organizations it can be available on-premise, integrated into your existing infrastructure and software tools.



To learn more about the capabilities of Tequra Analytics please visit [tequraanalytics.com](http://tequraanalytics.com)

# Tequra Eco-System

Tequra Analytics is a key part of the Tequra suite, which is a set of software tools for management of manufacturing test lifecycles. These tools are broadly split into 4 areas.

## Requirements

Bridges the gap between test requirements definition, test software development and verification. Features include auto-generation of test software from test requirements.

## Framework

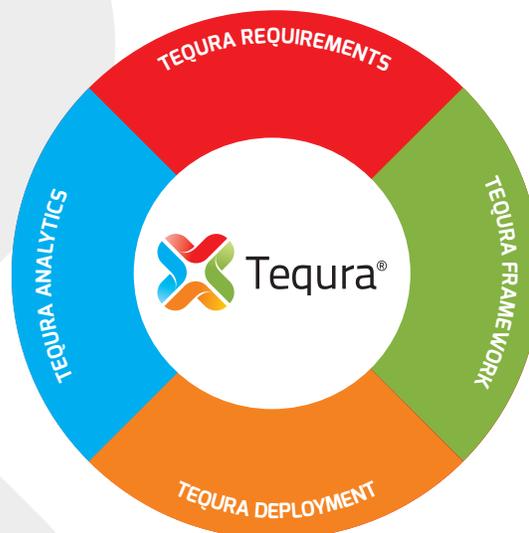
Extends the functionality of the industry standard NI TestStand platform, reducing test software development time and providing enhanced functionality.

## Deployment

Manages deployment of manufacturing test software solutions within an organization. Provides verification of software deployments, to ensure integrity and specification compliance is maintained.

## Analytics

Provides test data management and analytics capabilities via a web-based dashboard.



# Simplicity

## About Us

Simplicity AI are a test and measurement solutions specialist, with a history of serving advanced manufacturing customers in industries such as aerospace, automotive and medical devices. We offer a range of powerful test engineering software products which includes the Tequra suite. Our tailored test and measurement integration services ensure we can deliver complete solutions to our customers.

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