

STATISTICS: YOU ASK. WE ANSWER.

DR.-ING. EDGAR DIETRICH | Q-DAS GMBH



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The meaning of statistics in industrial production

Q-DAS software for the statistical analysis of data is a quality assurance standard in industrial production. Using Q-DAS software, various industries tap the potential of correct and reliable statistical evaluations. Q-DAS experts answer important questions about statistics in the following article.

WHY DO WE NEED STATISTICS IN INDUSTRIAL PRODUCTION AT ALL?

Companies produce many parts in relatively short periods of time, especially in mass production. Typical examples are the production of 800 engines a day or several thousands of cutting teeth for chainsaws a shift. It requires too much effort and it is too expensive and even unnecessary to check all these parts based on a 100% inspection. This is the reason why we monitor a manufacturing process based on samples. This approach is referred to as SPC or statistical process control.



HOW DOES STATISTICAL PROCESS CONTROL WORK?

The first step is to establish machine performance or manufacturing process capability based on statistical procedures. ISO standards, association guidelines such as AIAG and VDA and general reference manuals specify the respective approach.

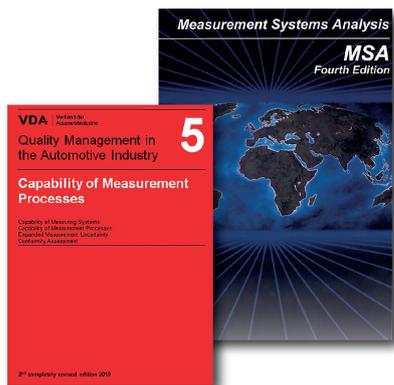


Figure 1 VDA Volume 5 “Capability of Measurement Processes” and MSA 4

After establishing process capability, you take representative samples of parts from the process at regular intervals. A sample normally consists of three to four parts. You measure these parts and plot the results on a previously calculated quality control chart. As long as the specified criteria are not violated, the process is assumed to be stable and the production just continues. In case of limit violations, the operator needs to be informed. He tries to find out why the process violated control limits and takes respective corrective action. This ensures that the on-going production process does not change significantly, and the process is considered to be capable or suitable to produce the single parts.

 Do not trust any statistics you did not fake yourself.
Winston Churchill

THIS IS WHAT WINSTON CHURCHILL IS SUPPOSED TO HAVE SAID. WHAT IS YOUR OPINION?

This statement does not apply when users apply Q-DAS products. For example, in the field of capability analysis and machine/process qualification, qs-STAT is able to adopt specified guidelines without any modifications and saves them in form of specific configurations. Customers only have

to use the intended configuration to evaluate data and can always be sure that they will gain comparable results, no matter whether a company in Germany or a plant in China, Australia or in the US makes the evaluation. The results are thus not subjective, but they are always based on the same specified configuration of evaluation. The respective configuration of evaluation is always indicated in reports and forms providing the respective results. Users will always know that the displayed results meet their requirements.

IS ANYBODY ABLE TO MANIPULATE SUCH A CONFIGURATION?

No, we know several levels of protection against manipulation. Big companies such as Mercedes, VW, General Motors or Ford specify their configuration of evaluation together with us. OEMs approve this configuration and specify a certain name for this configuration that only Q-DAS is able to change.

As an alternative, each customer is able to create an individual evaluation configuration. They just have to enter a customer-specific password. As long as a customer does not release and share this configuration in a way that anyone is able to modify it, no one is able to manipulate it.

The default version of Q-DAS products we provide to customers always includes several evaluation strategies of OEMs. This is of particular interest for suppliers since these strategies help them check whether their processes meet the requirements of the respective customer. They can thus be sure that the products they supply will not be rejected by their customer. Even the suppliers' customers appreciate these strategies since they help them minimise the risk of assembling erroneous parts that they might supply to their own customers in the end.

HOW DO YOU KNOW THAT THE CALCULATIONS OF Q-DAS PRODUCTS ARE CORRECT?

When SPC was introduced in industrial production in the 1980s, there were quite a lot of statistical packages available on the market. However, when applying a specific approach, the results they provided differed. Ford were the first to identify this mismatch and in collaboration with Q-DAS the company published the Ford test examples in 1992. These examples covered almost any kind of typical process

situation and contained the data and results to be calculated based on this data set. This was the reason why the market of statistical software faced a drastic shake-out in the end. Many software packages were not able to meet the requirements.



Figure 2 EU 883 B by Ford Motor Co. / Q-DAS GmbH

Nowadays, it seems once again that there are quite a lot of software packages available on the market. Most of them, however, do not seem to waste any time with ensuring correct evaluations. This is the reason why an ISO committee collected the Ford test examples and added more examples to prove that software packages calculate correctly. ISO/DTR 11462-3 is still a draft but due to this standard, users will be able to load the data in their software. In addition, the data will be available on the ISO website. Users may thus compare the results their software provides with the documented results of this ISO standard. Only if a software packages shows and calculates the very same results, the statistical evaluation is correct. What is the alternative? Applying Q-DAS software, of course, since it provides correct statistical evaluations based on specified guidelines.

HOW DOES STATISTICS WORK IN SINGLE PIECE PRODUCTION OR WHEN SMALL LOT SIZES ARE CONCERNED?

Let us talk about the aircraft industry, for example. The lot size is rather small but there are many parts that are identical in construction having similar or the same characteristics. In this case, we combine characteristics that are identical or similar for the purpose of relative

measurements. This once again leads to mass data and gives us an overview of the capability of this type of manufacturing process.



Figure 3 Aircraft construction

HOW DOES IT APPLY TO THE ASSEMBLY OF CAR BODIES?

You normally apply white-light sensors in this field. They measure the entire component within seconds and provide the result in graphics. This approach, however, generates huge amounts of data for each part. Now it is about filtering out the most important information and evaluating them statistically.

Companies often apply 100% inspections in assembly controlling the assembly process in real time in case a specified limit is violated. These violations always indicate significant product changes. Any other characteristics may still be considered stable. The process owner knows which corrective action to take in this case



Figure 4 3D measurement in car body construction

Interested in this topic?

Q-DAS GmbH
Eisleber Str. 2
69469 Weinheim
HexagonMI.com | q-das.de
edgar.dietrich@hexagon.com

