

The 7 Most Frequent Errors in Machine and Production Facilities Acceptance






When purchasing machines and production facilities and when upgrading or maintaining them, the following question always comes up. “Is the machine or the facility capable or not according to the respective specifications?”

In the past, the geometric specifications of facilities have been evaluated, for example as described in ISO 282. Today, real parts are normally produced first, then the relevant characteristics are measured and finally the measurement results are evaluated statistically. By means of these results, the facilities can be accepted or not.

You can distinguish between machines producing different parts and facilities producing parts for a small, specific product range (e.g. engine blocks, camshafts, etc.). The purchasers of facilities define the specifications of the parts to be produced. They provide the most important characteristics of the part (one-sided or two-sided specification limits). The characteristics, if necessary, are allocated to different classes such as critical, significant, important or similar. Each class is allocated to a specification limit for the capability index that must be kept. The machine or facilities are accepted when every characteristic complies with the required capability index. If a characteristic does not reach the defined limit value, corrective actions must be taken. The process owner can also decide whether the machine is accepted despite deviations from the defined specifications.




The manufacturer of the machine or facility normally conducts the first Acceptance Test. The same procedure is repeated when the facility is set up at the purchaser's. In these cases, the limit values for the capability index are different.




In case of a universal machine, you have to define first which characteristics the parts shall have when they are produced by the machine. Apart from that, proceed as described above.




Error	The acceptance modalities are not clearly determined and not specified sufficiently.
	
Consequence	Acceptance processes often lead to unnecessary discussions about how to proceed. In particular, people do not agree on the limit values concerning the capability indices of the respective characteristic.
	
Solution	Associations like VDMA, VDA or conglomerates brought guidelines to the market concerning acceptances. These guidelines are based on several years of experience. The book called “Statistical Procedures for Machine and Process Qualification“ includes Bosch, Daimler, GM and VW guidelines. You should either use one of those guidelines “one-to-one“ or determine an own procedure based on these guidelines.
	

The 7 Most Frequent Errors in Machine and Production Facilities Acceptance






Error	The acceptance at the manufacturer's is not prepared properly. Perhaps, the raw material is missing, the machine does not run properly or the cold or warm start was not made.	
		
Consequence	The customer wastes a lot of time which causes costs of an unnecessary or new journey and waiting time.	
		
Solution	Create a checklist containing all the tasks that shall be done before the machine is accepted. The checklist must be filled in and signed by the manufacturer. The manufacturer has to send the list to the purchaser. Not till then, the purchaser travels to the distributor for acceptance. If the required tasks have not been done properly, the manufacturer bears the risk of possible acceptance costs.	
		




Error	Before the run-off, the machine is only adjusted intuitively.	
		
Consequence	Too many attempts are required. Raw materials and time are wasted unnecessarily.	
		
Solution	The one-part report helps to adjust the machine exactly. When the machine passes the five-parts report afterwards, it is most likely that the whole test can be completed successfully. The one-part report and five-part report and their respective limits should become part of the acceptance guidelines. These reports are done in qs-STAT [®] and can be displayed or printed at any time.	
		




Error	The measuring devices are not interfaced to the Q-DAS [®] product qs-STAT [®] or do not provide the data in the Q-DAS [®] ASCII Transfer Format.	
		
Consequence	In case of complex parts with many characteristics, it is complicated to transfer measurement values. This leads to error messages and costs a lot of time.	
		
Solution	The interface to measuring devices is defined in the "AQDEF" guideline of the automotive industry. Q-DAS [®] offers an interface certification. The certification ensures that the desired data is transferred correctly and that it is available for evaluation in qs-STAT [®] . Now, a real-time evaluation of results is possible. Required corrective actions can be taken quickly and properly.	
		

The 7 Most Frequent Errors in Machine and Production Facilities Acceptance



Error	The acceptance of the used measurement system was not verified.
	
Consequence	Possibly, the results may be regarded as incorrect. The consequences are permanent discussions whether the deviations or the fact that the limit values have not been reached results from the product itself or from the measurement process.
	
Solution	Verify the acceptance of the measurement system according to MSA or GUM/VDA5 with the help of the Q-DAS [®] product solara [®] . Find more information in the book called "Measurement Process Acceptance" or in the company guidelines.
	




Error	Frequently, the calculation method for the capability index is not specified properly.
	
Consequence	Frequent discussions about calculated capability indices.
	
Solution	The definition of the capability index is based on the DIN ISO 21747. Most of the company guidelines named above have adopted them. qs-STAT [®] includes the calculation method and the procedure. The calculation can be validated.
	




Error	Many non-validated Excel form sheets with macros for the determination of results are erroneous.
	
Consequence	Depending on the constellation, the calculated results are wrong or imprecise which makes them useless.
	
Solution	Use a validated evaluation strategy in qs-STAT [®] .
	

The 7 Most Frequent Errors in Machine and Production Facilities Acceptance



Further errors are

Error	Multidimensional characteristics like positional tolerances are treated like one-dimensional characteristics.
	
Consequence	The capability indices are wrong.
	
Solution	To define P_o and P_{ok} , use the method contained in qs-STAT [®] . See also the draft standard DIN 55319 part 2.
	

Error	The technical documentation is incomplete. In particular, the environmental conditions are undefined.
	
Consequence	In case of later complaints, the causes of deviations and of errors cannot be retraced anymore.
	
Solution	Use the checklist to define all the required environmental conditions.
	

Many of the errors listed above can be avoided by using the Q-DAS[®] software qs-STAT[®]. Here you can find more information about the correct acceptance of machines and production facilities

- [Book: „Statistical Procedures for Machine and Process Qualification“ including company guidelines](#)
- [Pocket Power: Production Facilities Acceptance](#)
- [AQDEF – Automotive Quality Data Exchange Format](#)
- [Flow Chart: easy2use | Machine Acceptance](#)
- [Q-DAS[®] Poster \(Capability Indices / Distributions\)](#)
- [Seminars](#)
- [Hotline](#)