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SQP 0 - 3

Quality Planning for Suppliers

0 Contents

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1. General

The SQP 0 - 3 description explains the requirements of the MTCE Supplier Quality Planning (SQP).

There are 4 procedures in use:

SQP - 0; SQP - 1; SQP - 2; SQP - 3 for details see point 2: Overview - Requirements SQP 0 - 3

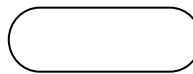
Application of SQP-Procedure

Those parts are subject to the SQP – Procedure which have enclosed the form SQP – Agreement. Which step of SQP is applied is indicated in the order and noted in the form “SQP – Agreement”.

Marking of Special and Critical Characteristics

Special characteristics are marked with a * frame symbol which notes the dimensions in a frame.

***Frame – Symbol**



Critical characteristics which are subject to a long-term Process Capability Control (SPC) are marked with a „black point (CTF)“.

CTF - Symbol • (for long-term Process Capability Control)

Notice: Additional explanation in Formular 0252

Record Retention Periods for Documents and Data

The record retention periods for notes / certificates and reference samples resulting from SQP1 – 3 cover

Product Life Cycle + 1 year

The record retention periods for suppliers of parts to be used in automobiles, for documents / certificates and reference samples resulting from SQP1 – 3 cover:

The Record Retention Periods of MTCE’s customers apply, but at least 10 years.

The serial parts must correspond in all characteristics (optical, mechanical, etc.) to the reference samples. The serial parts must be checked accordingly by the supplier.

The supplier guarantees the observance of these characteristics to MTCE by acceptance of the offer.

No changes with respect to

- the production process
- the production place
- the tools
- the materials and consumables
- the geometry
- the surface
- the sub-supplier

may be carried out without prior release of MTCE.

All forms mentioned in this document are available as data-files and can be requested with MTCE.

2. Overview – Requirements SQP 0 - 3

Step	Requirement	SQP-0	SQP-1	SQP-2	SQP-3
1	Feasibility Study (Confirmed with FO 0765)		<input type="checkbox"/>	X	X
2	Design – FMEA			<input type="checkbox"/>	<input type="checkbox"/>
3	Process – FMEA		<input type="checkbox"/>	<input type="checkbox"/>	X
4	Control Plan		<input type="checkbox"/>	X	X
5	Capability of Test and Measuring Equipment values: dimensions with <input type="checkbox"/> or • Variation of max. 10% acceptable without any further action			<input type="checkbox"/>	X
6	Capability of Machines / Tools (Short-time Capability): C _m , C _{mk} values: dimensions with <input type="checkbox"/> ; 50 parts			<input type="checkbox"/>	X
7	First Article Inspection Report (FAIR): all dimensions and specifications include of capability confirmation of defined critical items, capability <input type="checkbox"/> of connected critical items is allowed by measure of one critical item, the used item for this confirmation must be a part of the SQP agreement and confirmed from both parties. These Items need to get confirmed from the Die and Serialmanufacturer	<input type="checkbox"/>	X	X	X
8	Inspection Certificate 3.1 according to DIN EN 10204 The Contractor is obligated to ensure the performance of a final outgoing goods inspection. Therefore, with regard to deliveries provided by the Contractor, MTCE will only perform an outward examination of the delivery, including the shipping documents, and will only check the consignment for signs of transport damage, wrong or short delivery. Provided that an acceptance is agreed upon, an inspection obligation does not exist. The applicability of § 377 HGB (German Commercial Code) is excluded.		<input type="checkbox"/>	<input type="checkbox"/>	X
9	Materials Declaration (Documentation of the ingredients by CAS number, chemical name and volume weight in %) Not: include of SQP Level 3 is an IMDS Database entry mandatory (MTCE ID 35377)		<input type="checkbox"/>	<input type="checkbox"/>	X
10	Coating Thickness Measuring Protocol		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Reference Sample		<input type="checkbox"/>	X	X
12	Preliminary Process Capability: P _p , P _{pk} values: dimensions with • or <input type="checkbox"/> over min. 125 samples.(after consultation with MTCE other alternative possibilities for confirmation are allowed to use)			<input type="checkbox"/>	<input type="checkbox"/>
13	Proof of Process Suitability: ➤ cp, cpk Values: Dimensions with • or <input type="checkbox"/> must remain in the specified limits considering the long term trend			<input type="checkbox"/>	X
14	SPC Control: dimensions with • or <input type="checkbox"/> Reference Sample comparison with batch			<input type="checkbox"/>	X
15	quality objective - zero defects –			<input type="checkbox"/>	X
16	Packaging (Confirmed with FO 1192)			X	X
		X	Must be carried out		
		<input type="checkbox"/>	Depending on requirement and as agreed		

All documents must be presented in English!

3. Release, – SQP

In addition to placing the order, the supplier will receive a SQP request completed by MTCE, which he must confirm for compliance. After receipt of the confirmed SQP and successful presentation of all required documentation required characteristics within the sampling request, the supplier receives a release (signed PSW / signed EMPB report) from MTCE.

If the characteristics have not been confirmed for compliance, the supplier can not receive series approval for the presented product! Only after all characteristics have been successfully confirmed can this be granted.

The release by MTCE does not relieve the supplier of his responsibility for the quality of his products, i.e. the observance of all specifications (e.g. drawings, materials information, prohibited substances)

If no release is granted the rejected parts have to be sampled again resp. the missing documents have to be provided. In the case of a renewed sampling due to a deviation of dimensions a new first article inspection report has to be produced in which the dimensions complained about are presented again.

In the series SPC dimensions must continually be monitored and be sent to MTCE on request. In the case of significant process deviations (e.g. SPC dimensions are not continually monitored in the production of the supplier) the serial release is revoked by MTCE.

If necessary MTCE carries out process audits after the serial release. The serial release continues to be valid only if conditions resulting from the process audit are met.

A confirmation of the SPC verified characteristics may be requested in the SQP requirement in addition to any delivery under point 8 (Test Certificate 3.1) of MTCE, is defined separately in the SQP Agreement.

4. When must an SQP be carried out?

Depending on the SQP step requested (SQP 0 excluded) an SQP or single steps of the SQP must be carried out in the following situations:

- New revision index of the MTCE drawing: 7-11 (as necessary: 4, 5, 12, 13) for the changed dimensions resp. parameters.
- A sampling must be carried out in any case if the revision index is increased. If the modification of the drawing does not result in a modification of the part for the supplier a so-called “cover sheet sampling” must be done.

In the case of a “cover sheet sampling” only the cover sheet of the first article inspection report form is filled in mentioning:

- new revision index
- reference to the valid first article inspection report
- notification of the reason for the cover sheet sampling (e.g. no significant change, does not apply to supplier (packaging regulations are observed and kept).
- When producing an additional tool with form-bound parts steps 6 – 14 are to be carried out.
- When a tool is replaced by a new one or revised steps 6-14 must be carried out.
- If the machine type changes steps 6, 7, 12-14 must be carried out.

A complete SQP must be carried out with the following changes:

- New part
- Planned process changes
- Planned change of material or consumables
- Change of sub-supplier

The serial delivery may only be carried out after release by MTCE!

5. The 16 Steps of SQP

5.1 Feasibility Study

Definition

Feasibility Study: Check if the design is suitable for manufacturing the product in large quantities at low prices.

Purpose

- To closely scrutinize the suitability of the design for serial production.
- To guarantee a systematic communication between supplier and MTCE.
- To make sure that in the dialogue between supplier and MTCE the requirements and possibilities of the supplier are considered.
- To help MTCE find designs which are suitable for production and cost-effective.
- To make sure that the products of the supplier in the series show the characteristics required by MTCE.

Requirements

- The feasibility study has to be documented in form 5.1-Feasibility Statement (**Document 0765**) and must be sent to MTCE.

The feasibility study must contain the following information:

- MTCE – drawing number
- Revision status of MTCE drawing.
- Supplier
- Discussion of feasibility according to form 5.1-Feasibility Statement

The supplier informs MTCE which design characteristics make the production of the parts difficult, expensive or impossible. The supplier shall above all check and compare the dimensions with the tolerance requirements.

Some examples of common problems which are discussed in a feasibility study:

- Requirements to galvanic coatings (e.g. solderability)
- Galvanic coating thicknesses (above all in blind holes)
- Materials requirements
- Requirements to dimensions of parts after hardening
- Requirements to measurements
- SPC – dimensions and requirements to process capability

Presentation Feasibility Study:

- The feasibility study must be sent to MTCE purchasing dept. along with the offer.
- In the feasibility study (form 5.1) point (A) must be ticked under 6. If points (B), (C) or (D) are ticked, MTCE must be contacted. After an adaptation of the drawing or other relevant changes the feasibility study must be carried out anew until the result of the analysis corresponds to point (A) or a decision is reached that the product cannot be manufactured.

5.2 Design - FMEA (D-FMEA)

Definition

Design - FMEA: Risk-assessment and analysis for the complete design process including a plan of measures to eliminate the major risks.

Purpose

- To recognize and eliminate the risks of the design
- Preventive design modification to avoid faulty design and high costs

Requirements

- The D-FMEA can be sent to MTCE as an attachment on any suitable FMEA – form in accordance with VDA or on the form D-FMEA 5.2.

At least the following information must be given:

- MTCE – drawing number
- Revision status of MTCE drawing.
- Supplier
- Discussion of feasibility according to form 5.1-Feasibility Statement
- Date and revision status of D-FMEA

For each design – function the following information must be given:

- Source(s) of the fault
- Fault(s)
- Consequence(s) of the fault
- Actual state of the measures already carried out
- Risk priority number RPN
- Recommended measures to abolish the fault including responsibility and deadlines
- Planned measure(s) with improved state
- If the B-evaluation is ≥ 8 this order of faults must be specially considered no matter how high the RPN is.

Remarks

- It often makes sense to draft the D-FMEA together with the sub-supplier.

Presentation Design - FMEA

- The D-FMEA must be sent to the person responsible in project technology / quality with MTCE after completion of the design verification or together with the offer.

5.3 Process - FMEA (P-FMEA)

Definition

Process-FMEA: Risk-assessment and analysis for the complete production process including a plan of measures to eliminate the major risks.

Purpose

- To recognize and eliminate risks of every step of the process
- Preventive process modification to avoid serial faults

Requirements

The P-FMEA can be sent as an attachment to MTCE on any suitable FMEA - form in accordance with VDA or on the form P-FMEA 5.3.

At least the following information must be given:

- MTCE – drawing number
- Revision status of MTCE drawing.
- Supplier
- Date and revision status of P-FMEA

For each step of the process the following information must be given:

- Fault(s)
- Consequence(s) of the fault
- Actual state of measures already carried out
- Risk priority number RPN
- Recommended measures to abolish the fault including responsibility and deadlines
- Planned measure(s) with improved state
- If the B-evaluation is ≥ 8 this order of faults must be specially considered no matter how high the RPN is.

Remarks

- It often makes sense to draft the P-FMEA together with the sub-supplier.
- In a P-FMEA transports resp. storage between process steps must also be checked as potential faults.
- On request of MTCE a Logistics-FMEA must be carried out and presented to MTCE.

Presentation Process - FMEA

- The P-FMEA must be sent to the person responsible in project technology / quality with MTCE after completion of the process planning (sequence of partial processes) and before the actual implementation of the process.

5.4 Control Plan

Definition

Control Plan: Sequence of all process steps including testing steps from the receiving of goods to the shipment.

Purpose

- Overview of the control mechanisms of the process
- Securing an orderly process

Requirements

- The control plan can be sent as an attachment to MTCE on any suitable form or on the form 5.4-Control Plan.

A control plan must at least contain the following information:

- MTCE drawing number
- Revision status of MTCE drawing.
- Supplier
- Date and revision status of control plan
- Dimensions and parameters which are used to prove the process suitability

For each process step:

- Process step with description
- Machine, device
- Product- and / or process characteristics
- Product- / process specification
- Identification of the critical characteristics
- Measuring and test equipment
- Measuring regulation (if applicable)
- Type of testing (sample, 100%, SPC - testing: type of rule card)
- Test frequency (frequency and scope of testing)
- Corrective action, if the measuring is outside of the specification
- Critical characteristics •

Remarks

- The control plan must be continually adapted to current requirements. Especially due to the results of the proof of process capability (steps 6 and 13) changes in the control plan may become necessary.

Presentation Control Plan

- The control plan must, together with a first article inspection report, be sent to the person responsible for project technology / quality with MTCE.

5.5 Capability of Test and Measuring Equipment

Definition

Capability of Test and Measuring Equipment: An evaluation to find out if a test / measuring equipment or a test facility is suitable for being used for a certain measuring task under real conditions. The Reproducibility and the Repeatability are evaluated.

Purpose


- Statement about the correctness of measuring results
- To make sure that the results of the process capability check are correct and thus form the correct basis for suitable measures

Requirements

- The capability of test and measuring equipment can be sent to the person responsible in project technology / quality with MTCE in any suitable manner (according to the MSA – guidelines).

For all test equipment used for SPC or process capability measurements at the corresponding part a test equipment capability test must be performed.

The test and measuring equipment capability test must at least meet the following requirements:

- The characteristics must be defined.
- The resolution of the measuring facility must at least be $\%RE \leq 5\%$ of the characteristic tolerance. The standard value is 2% of the characteristic tolerance.
- For each test and measuring equipment first procedure 1 and then procedure 2 must be carried out. With fully automatic test facilities first procedure 1 and then procedure 3 must be carried out. Fully automatic test facilities are only test facilities if the feeding of parts is fully automatic.
- Remark: Procedure 1 can also be carried out by the manufacturer of the measuring facility (this is usually the case with standard measuring facilities).
- Procedure 2 has to be carried out with the corresponding measuring facility at least for all dimensions marked with  resp. ●. In agreement with MTCE measurements of comparable parts with comparable dimensions can be used.
- It is recommendable in the interest of the supplier to carry out procedure 2 with all dimensions.

Procedure 1:

- The reference parameter is 20% of the characteristic tolerance and the reference $4 \cdot s_g$. Indices for the capability of measuring equipment C_g and C_{gk} see capability indices matrix. To determine C_g and C_{gk} usually 25 measurements must be performed. In exceptional cases (after consulting MTCE) fewer than 25 measurements can be performed. In any case, however, there must be at least 20 measurements. The true value of the Gage Master must be in the magnitude of the dimensions of the part to be measured.

With procedure 1 at least the following data must be presented:

- Supplier
- Date of performance
- Data on the measuring equipment (term, manufacturer, number, resolution)
- Data on the normal used (term, number, actual value)
- Measuring values
- Characteristic tolerance
- C_g and C_{gk}

Procedure 2:

- Procedure 2 is carried out according to the Average Range Method (ARM). For that purpose 10 parts are numbered. The parts are measured twice in the same sequence by one tester. This procedure is carried out with the same parts by two different testers.
- In order to exclude the influence of the object of measurement, e.g. the part geometry, the measuring position is marked or documented. After that repeatability, reproducibility and measuring system (R&R) are calculated. Reference parameter is the tolerance.

With procedure 2 at least the following data must be presented:

- Supplier
- Date of testing
- Data on measuring / testing equipment (term, manufacturer, number, resolution)
- Measuring values
- Characteristic tolerance (reference parameter)
- %Repeatability (%EV), %Reproducibility (%AV) und %Measuring system (%R&R)

Procedure 3:

- Procedure 3 is carried out by finding the total variance %R&R across the ranges. 25 parts are measured in the same order in two runs by the automatic measuring facility. After that the repeatability (EV) is calculated. In this case %EV=%R&R applies since the influence of the operator is neglected in this case. Reference parameter is the tolerance.

With procedure 3 at least the following data must be presented:

- Supplier
- Date of testing
- Data on measuring / testing equipment (term, manufacturer, number, resolution)
- Measuring values
- Characteristic tolerance (reference quantity)
- %Repeatability (= %Measuring system)

Remarks

- Details of procedures 1, 2 and 3 are described in the suggested reading (see chapter 8).

Presentation Capability of Test Equipment (MSA)

- The capability of test equipment must be sent to the person responsible in project technology / quality with MTCE along with the FAIR.

5.6 Capability of Machines / Tools (Short-time Capability)



Definition

Short-time capability analysis: A procedure to assess the process location and variation

Purpose

- Assessment if the processes and tools of the supplier are capable of meeting the specifications and requirements
- Forms the basis of process improvements in Hardtool

Requirements

- The short-time capability must be sent to MTCE in a customary way.
- The short-time capability analysis must at least meet the following requirements:
- All dimensions or specifications marked with  in the drawing must be considered in the analysis.
- All dimensions or specifications marked with  in the drawing must reach **Cm** and **Cmk** according to the capability indices matrix.
- The dimensions resp. specifications must be measured / assessed with 50 parts per cavity / use and per machine. The parts must be taken from the process one after the other.

In the header data of the analysis at least the following information must be given:

- MTCE drawing number
- Revision status of MTCE drawing
- Supplier
- Place of production
- Date

Variable characteristics: In the analysis at least the following information per dimension / specification must be included:

- Cm
- Cmk
- Average
- Standard deviation
- Minimum value
- Maximum value
- Histogramm
- Desired value
- Upper tolerance limit
- Lower tolerance limit
- Measured values
- Measuring equipment used

Attributive characteristics: In the analysis at least the following information (per attributive feature) must be included:

- Number of parts within the specification
- Number of parts outside the specification
- If applicable reason why the parts are not in accordance with the specification
- Assessment procedure used
- With the short-time capability analysis hardtool the dimensions resp. specifications must be measured / assessed with 50 parts per cavity. The parts must be taken from the process one after the other.

Remarks

- For each soft- and hardtool a separate short-time capability analysis must be performed.
- If there are changes of the hardtool the dimensions or specifications involved must be subject to a new analysis.

Presentation Short-time Capability Analysis

The short-time capability analysis must be sent to the person responsible in project technology / quality with MTCE along with the first parts.

5.7 FAIR – First Article Inspection Report

Definition

Softtool first article inspection report (FAIR): Measuring report of all dimensions (with sample) from the pilot lot tool (softtool).

Hardtool first article inspection report (FAIR): Measuring report of all dimensions (with sample) from the serial tool (hardtool).

First article inspection report (FAIR): Measuring report of all dimensions (with sample) produced under serial conditions.

Purpose

- To furnish the MTCE designer evidence that the supplier can manufacture the part according to the standards of MTCE.
- The softtool-FAIR serves as the basis for the requirements with the production serial tool (hardtool).
- The softtool-FAIR serves as the basis for potential improvements of the serial tool (hardtool).
- The FAIR serves as the basis for the recognition of systematic faults.

Requirements

The first article inspection report can be sent to MTCE in any suitable way or on the forms 5.7 – 5.7.1 FAIR in the appendix.

The first article inspection report must at least meet the following requirements:

Cover sheet with at least the following information (Form-5.7 - FAIR-Result):

- Address of supplier
- Type of report
- MTCE drawing number, revision status, designation of the part
- Date of issue
- Number of samples
- Reason for first sampling
- Place of production
- Name and telephone number of person responsible with supplier
- Signature
- Possibility of release for MTCE on cover sheet

MTCE Drawing:

All dimensions and further specifications (e.g. spring forces, materials, hardness, optical characteristics) numbered consecutively. All dimensions and specifications must be measured or assessed.

Measuring Report with at least the following information (Form - 5.7.1 FAIR-Test Results):

The target dimensions and target specifications including tolerance must be given in accordance with the numbering on the drawing.

- With every target dimension the measuring results must be given.
- Measuring results beyond the tolerance must be discussed with the respective designer. The deviating dimensions must be clearly marked (e.g. asterisk, underlined, in bold type), and a reference to the discussion with the designer must be given on the FAIR. If the designer has then changed the drawing accordingly a so-called “cover sheet sampling” must be performed.
- Deviations from this procedure have a negative influence on the supplier evaluation.
- capability confirmation of connected critical items is allowed by measure of one critical item, the used item for this confirmation must be a part of the SQP agreement and confirmed from both parties.

Number of parts:

- With form-bound parts at least 10 parts per cavity / use must be measured. The parts must be assignable to the cavity. The measured parts must be marked (numbered) and enclosed to the inspection report.
- With parts not form-bound usually 10 and at least 5 parts must be measured (only after consulting the person responsible for project technology / quality with MTCE).
- The measured parts must be marked (numbered) and enclosed to the inspection report.

Remarks

- The parts which were measured must be enclosed as samples.
- Parts which were cut apart due to an internal contour to be measured must be enclosed.
- In case of changes in the softtool resp. in the hardtool or in case of changes of the process the dimensions or specifications involved must be sampled anew.
- For each softtool resp. hardtool a separate first article inspection report must be written.
- If several machines (processes) are in parallel use for production a separate FAIR for each machine has to be written.
- With changes of drawings (new revision status of MTCE drawing) the changed dimensions resp. parameters must be sampled in a FAIR. In each case a "cover sheet sampling" must be performed (see section 2).
- When presenting the FAIR (A) must be ticked under point 6 of the feasibility declaration (see appendix).

Presentation First Article Inspection Report

- Declaration of the delivery note with „first article“
- The first article inspection report must be sent to MTCE – purchasing dept. along with the first parts.

5.8 Inspection Certificate 3.1

Requirements

- Inspection Certificate 3.1 according to ISO 10474 resp. DIN EN 10204 of the manufacturer

Cover sheet with at least the following information (Form-5.8 - Inspection Certificate):

- Product designation
- MTCE drawing number, drawing index
- Material used
- Order no.
- Testing feature
- Description
- Desired values
- Actual values
- Test specification
- Furthermore, the processor must make the certificates of the manufacturer available to MTCE according to EN 10204 resp. to ISO 10474 without modifying them.
- The processor must make material data sheets of the materials used available to MTCE. Presentation Inspection Certificates

Presentation Inspection Certificate

- The Inspection Certificates must first be presented together with the FAIR.
- All documents (Inspection Certificate of the processor and of the manufacturer as well as the data sheets) must be collected and numbered consecutively in an enclosure or file.
- MTCE may renounce the sending of the Inspection Certificates with each delivery (after consultation only). The supplier has to guarantee, however, that the certificates can be made available within one working day.

5.9 Materials Declaration

Requirements

At least the following information must be given (Form-5.9 FAIR-Materials Declaration)

- Weight (in kilograms, 4 decimal places) incl. tolerance of the purchased parts
- Materials declaration and materials composition of the purchased parts

Prohibited substances according to Europe-wide regulations and laws may not be used.
Furthermore, the MTCE guidelines and regulations must be observed:

see „Supplier Requirement Environment“ doc. no. 0078

Presentation Materials Declaration

- The presentation of the materials declaration must be sent to the person responsible in project technology / quality with MTCE together with the FAIR.

5.10 Coated Parts

If parts are coated the following objects have to be presented together with the FAIR

- 5 raw parts (exception: pre-galvanized bands) and
- 5 coated parts

Furthermore, the following information must be given:

- Name of coating company (MTCE reserves the right to audit the company)
- Layers and composition of surfaces [%]
- Coating Thickness Measuring Protocol

If the supplier changes the coating company he must inform the purchasing department of MTCE and present a new FAIR.

Each coating must be sampled anew.

5.11 Reference Samples

With form-bound SQP-2 and SQP 3 parts an additional set of parts (one part per cavity / use) must be enclosed whereas one set of parts and the „last shot“ of the production must remain with the supplier as reference samples. With non form-bound SQP-parts additional 5 parts must be enclosed whereas 5 parts must remain with the supplier as reference samples.

5.12 Preliminary Process Capability

The preliminary process capability is carried out as described in step 5.13. The requirements differ only in the following point:

- Samples with $n=5$ parts have to be taken from the process. The minimum interval between the samplings must be 30 minutes (after consulting MTCE other intervals can be chosen as well). At least 20 samples must be drawn.
- Pp instead of cp ppk instead of cpk
- Desired values see capability indices matrix

5.13 Proof of Process Suitability

Definition

Proof of process suitability : Analysis of stability, capabilities and capacities of the supplier processes. The analysis must cover at least 50 hours or a product interval to be defined after consultation.

Purpose

- Proof that the processes of the supplier are stable and capable of meeting the specifications and the capacities over a longer period of time
- Basis for potential further improvements

Requirements

The proof of process suitability must be sent to MTCE in a customary way.

- The proof of process capability must be carried out under serial conditions.
- All dimensions or specifications which are marked with a ● on the drawing must be considered in the analysis and meet the following requirements according to the capability indices matrix:

Process potential	Cp
Process capability	Cpk

- Samples of the process with $n=5$ parts must be drawn over a period of at least 50 hours. If a different period must be chosen (e.g. too low number of pieces) this must in any case be discussed with and agreed by a person responsible for project technology / quality with MTCE. At least 50 samples must be drawn (with form-bound parts: from all cavities / uses).

In the header data of the analysis at least the following information must be given:

- MTCE drawing number
- Revision status of MTCE drawing
- Supplier
- Date
- Period of production
- Place of production

Variable characteristics: In the analysis at least the following information per dimension / specification must be included:

- C_m
- C_{mk}
- Average
- Standard deviation
- Minimum value
- Maximum value
- Shewart-control chart with action control limits to assess stability
- Histogramm
- Desired value
- Upper tolerance limit
- Lower tolerance limit
- Measured values
- Measuring equipment used

Attributive characteristics: In the analysis at least the following information (per attributive feature) must be included:

- Number of parts in the specification
- Number of parts outside the specification
- If applicable reason why the parts are not in accordance with the specification
- Assessment procedure used

With the short-time capability analysis hardtool the dimensions resp. specifications must be measured / assessed with 50 parts per cavity. The parts must be taken from the process one after the other.

Capacity: At least the following information must be given:

- MTCE drawing number
- Revision Index of MTCE – drawing
- Supplier
- Guaranteed maximum capacity per week
- Number of shifts per week
- Point of time when the capacity will be available at the earliest
- Idle times including maintenance must be considered and indicated in per cent
- If capacities are changeable this must be presented in a plan

Remarks

The proof of process capability must be provided per machine type resp. per tool. Exceptions are only allowed after consulting MTCE.

Presentation Proof of Process Suitability

The proof of process suitability must be sent to the person responsible for project technology / quality with MTCE along with the FAIR.

5.14 SPC Control – Long-time Process Capability – Reference Samples

Definition

SPC Control: continuous control of production by use of quality control charts
With SQP-3 parts the series must in addition be regularly checked by comparing with reference samples to make sure that the product characteristics haven't changed.

Purpose

- Control of production
- To make sure during the complete production that the process capability achieved and certified remains at least the same or, if possible, improves.
- Quick action in case of deviations

Requirements

- The proof of SPC Control must only be sent to MTCE at the request of MTCE. The proof of SPC Control must be sent to the person responsible for project technology / quality with MTCE in a customary way.

Under the principle of „continuous quality improvement“ and a target value oriented use of tolerance only the application of Shewart-charts makes sense.

- A two-lane SHEWART-quality control chart must be kept. Normally an average standard deviation card shall be used. In exceptional cases (manual recording without EDP-support) a Median-Range card can be kept.
- The sampling number must be $n=5$. In exceptional cases (long measuring time) $n=3$ can be used.
- The time between the samples depends on the process capability and the stability of the process.
- For all dimensions which are marked with ● on the drawing a quality control chart must be kept, i.e. for each dimension resp. specification marked an SPC – proof must be created.

In the header data of the proof at least the following information must be given:

- MTCE drawing number
- Revision status of MTCE drawing
- Supplier
- Period of SPC Control
- Place of production and machine number
- Measuring equipment used

Variable characteristics: At least the following information must be included:

- Shewart-average value chart (with action control limits)
- Shewart-standard deviation chart (with action control limits)
- cp and cpk values calculated over the period of SPC Control
- Average value and standard deviation over the period of SPC Control

Attributive characteristics: The following information must be included:

- Inspection chart with all possible sources of error and the number of errors per source
- Period of control
- Frequency of control

Remarks

- Only after consulting MTCE other types of SPC control are possible.

Presentation of Proof of SPC Control

- On request of MTCE within one working day.

5.15 Quality Objective 0 Failure

The expectation of MTCE to a supplier is to have a worked out and proper installed 0 failure strategy on hand. The Action and Improvement plan is worked out from the supplier independent from MTCE request to met the customer aim, the action and improvementplan is adjusted by own accord from the supplier as soon when it's detectable that the target can not reached. The supplier must communicated the Improvemenetplan to MTCE when negative supplier rating happenend.

5.16 Packaging

A correct packaging is mandatory that the provided part can get secured transported to the place where it's needed. Packing of critical parts must be defined in advance and confirmed in the SQP agreement. The complete documentation will be documented within the Formular 1192 and provided to MTCE include all needed information and signatures from supplier. The usage of unapproved packing is not allowed.

6. Requirements for Serial Delivery

Before any serial delivery all documents (filled in and signed) must be at the disposal of MTCE. In the case of coated parts a coating thickness measuring protocol must be added to all goods received.

7. Conservation

Definition

Conservation: Protection of products from corrosion and rust

Purpose

The parts must have a corrosion-free and rust-free surface.

Requirements

The following substances may not be used:

- oil-containing slushing compounds with a water pollution class > 2
- silicone-containing substances, also silicone-containing lubricants and consumables for the production process

The products may not get in touch with or be stored next to or above silicone-containing products. Furthermore, the regulations mentioned in the MTCE form „Supplier Requirements Environment“ (doc. no. 0078) must be observed and applied.

8. Suggested Reading

- [1] Dietrich/ Schulze: Statistische Verfahren zur Qualifikation von Messmitteln, Maschinen und Prozessen, 3. Edition, Carl Hanser Verlag, Munich, Vienna: 1998
- [2] Dietrich/ Schulze: Richtlinie zur Beurteilung von Messsystemen und Prozessen, Abnahme von Fertigungseinrichtungen, Carl Hanser Verlag, Munich, Vienna: 1998
- [3] Dietrich/ Schulze: Pocket Guide 1 Eignungsnachweis von Messsystemen, Carl Hanser Verlag, Munich 2000,
- [4] All books mentioned above can also be found under www.hanser.de
- [5] Dr. Edgar Dietrich: Leitfaden zum Fähigkeitsnachweis von Messsystemen, Q-DAS GmbH, Birkenau

9. Appendix

1. 0557 - Document set -SQP 0-3 is a separate document which consisting of all form sheets mentioned in this guideline.
2. 0553 - Capability indices requirements
3. 0554 - SQP 0- 3 Agreement
4. 0765 - Feasibility Statement