14 Quality Principles for the Value Stream

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Value Stream Q-Basics

We want
our customers
to be satisfied!

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Principle 1
Stop Sign

Customer complaints are communicated within the production site and, if possible, displayed directly at the station in question. Using problem-solving techniques, they are processed in a fast and systematic manner. The supply chain is promptly informed.

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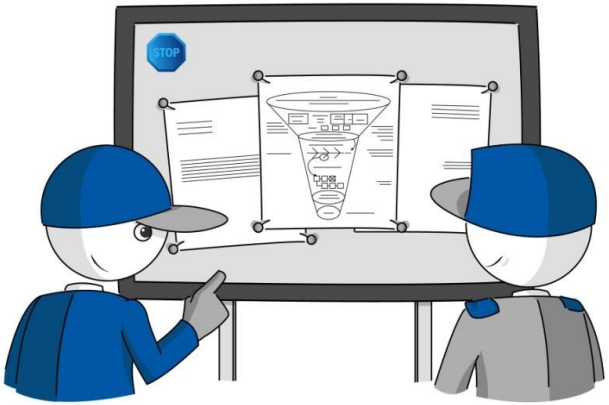
Principle 1
Stop Sign



A STOP sign process with all of the 8D elements is displayed on the shop floor.

A standard review process involving the production/logistics management and quality management takes place.

The decision to end the STOP sign process is taken by production/logistics management after a review of the measures' effectiveness.

It is necessary to ensure that customer complaints are communicated quickly over the entire supply chain from supplier to customer.

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Principle 2
Andon Cord

In the event of deviations in quality or if control limits are exceeded in the value stream (source, make, deliver), the employee needs to stop the process or escalate.

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Principle 2
Andon Cord

There is a systematics (e.g. Andon cord, blocking/ escalation process, reaction plan) in place that allows the operator, if he notices deviations, to choose to prevent the passing-on / further processing of parts (by stopping/blocking) and to escalate immediately.

Deviations can occur if control limits are exceeded, and also based on subjective observations (for example, the power screwdriver is not running smoothly, material has been funneled into the incorrect chute, or the associate is not working to the standards set, label badly readable or incomplete).

After stopping the system there needs to be a well-defined process governing the restarting and release of the system by shop floor management.

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Principle 3
Instructions

Safety, health, production, and inspection instructions are complied with.
5S standards are put in place and observed.

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Principle 3
Instructions

The work, production and inspection instructions are clearly visible at every work place. A consistent set of symbols is available. If appropriate, the right/left hand movement becomes evident from the instruction. The failure modes from the FMEA and special characteristics from the control plan are taken into account. Detailed photos support the process.

There is a feedback loop in place that ensures the consistency of the control plan, FMEA, and directions. Health and safety instructions are carried out according to the plan. Participation is compulsory and will be documented.

All deviations regarding safety, work, production and inspection instructions or safety and health briefings shall be resolved using the 8D method.

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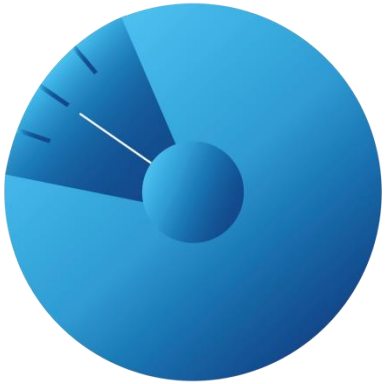
Principle 4
Process Parameters



The target values/tolerances for all stated process parameters are observed.

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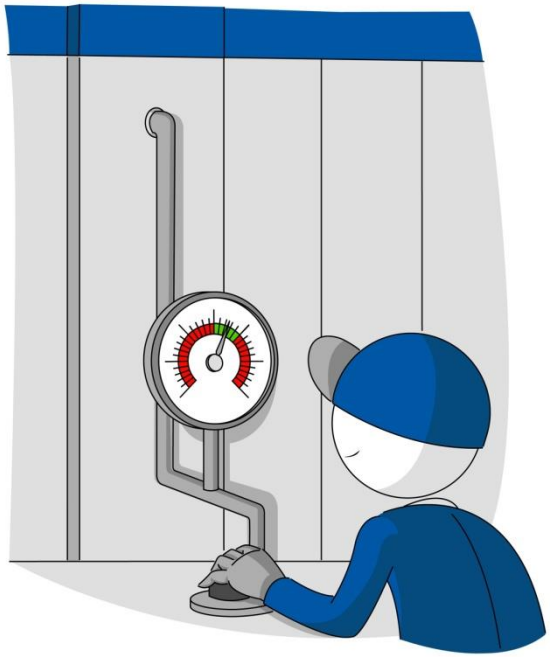
Principle 4
Process Parameters



All process parameters (e.g. press-in force, maximum storage time) that affect product quality are clearly defined and systematically checked on basis of the control plan. All required inspection criteria are implemented according to specification.

Process validations are performed to determine whether target values/tolerances of the defined parameters have been observed. Deviations are systematically recorded and eliminated permanently.

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Principle 5
Measurement/Test Equipment

Measuring and test equipment is defined,
and monitoring intervals are observed.

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Principle 5
Measurement/Test Equipment

The type of measuring and test equipment (e.g. gages, scanners) incl. auxiliary means and its uses is defined for all processes in the control plans.

All measuring and test equipment is calibrated and only utilized within the permissible inspection interval.

The inspection status of the measuring and test equipment is recognizable at its place of usage (e.g. marked by inspection certificate sticker, tag).

In case of suspected malfunctions/damages this has to be notified.

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Principle 6
Check the Checker

The “check the checker” principle is applied,
and the “checker’s” suitability is ensured.

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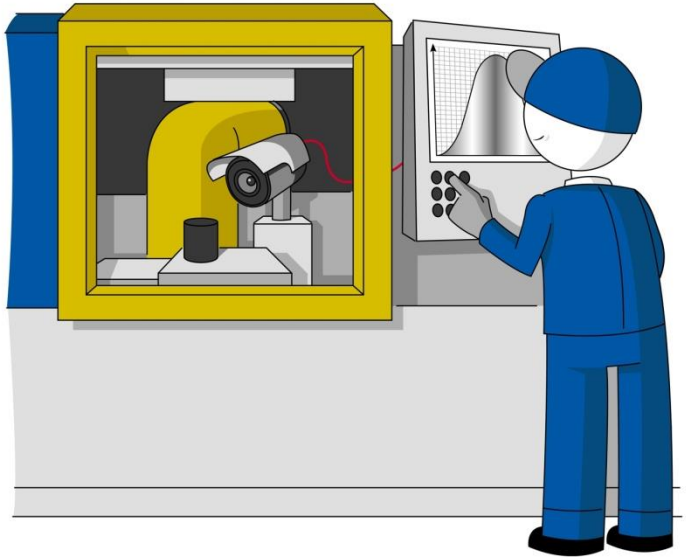
Principle 6
Check the Checker



The suitability of processes used to prevent or detect errors (e.g. camera-monitored processes, sensor-based measurements, inspection processes, scanning of labels) needs to be checked according to a predefined standard.

Possible errors, such as loading the incorrect camera software/testing program or incorrect MAE software versions/updates, entry of wrong inspection parameters, or improper sensor calibration, need to be prevented by carrying out the inspection. These inspection processes, need to be evaluated using appropriate methods (e.g. FMEA).

Check-the-Checker-parts are included in the control of inspection measurement and test equipment.

Generally speaking, mistake-proofing is always preferable to error detection (e.g. Poka Yoke).

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Principle 7
Total Productive Maintenance

A maintenance standard is installed and observed at every station.

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Principle 7
Total Productive Maintenance

The four-pillar TPM model, particularly the autonomous and preventative maintenance, is instituted at every machine, device, facility. This contains both the roles and responsibilities for production and the supporting areas.

Systematic damage and dirt built-up on machinery and device components (e.g. workpiece carriers, storage facilities, stackers) need to be consistently analyzed, recognized, and remedied.

The restart after maintenance (see principle 9), has to consider potential influences on product quality.

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Principle 8
Tools

Each tool has a defined service life; the current status must be recognizable.
A quality evaluation must be carried out during installation, removal or disassembly.

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Principle 8
Tools

Wear-prone tools with influence on product quality (e.g. processing, assembly, molding tools, workpiece fixtures/carriers) have been recorded and are controlled (e.g. defined service lives, control on basis of product characteristics, inspection during maintenance).

A warning system promptly displays when tools need to be replaced or serviced.

Each tool needs to be inspected when installed, removed or disassembled to check for recognizable abnormalities (e.g. damage/wear and tear). In case of deviations, it is necessary to follow measures to ensure product quality is maintained.

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Principle 9
Restart

Restart after disruptions is clearly regulated for all machinery and equipment.

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Principle 9
Restart

Each disruption to the continuous production process (tool change, set-up, break, shift change, maintenance, power failure, upgrade, MAE software update, parameter changes) presents a potential risk to quality. A predefined standard for post-restart is therefore necessary. This should detail how to deal with products in the process after a disruption.

All devices have been inspected according to a defined standard for quality risks in connection with disruptions (for example, an unplanned disruption to the welding process, the injection molding process stops unexpectedly, a product remains in thermal treatment for too long, the silicone bead is exposed to the air for too long). The standard also includes the analysis of critical wear parts (for example, drill bits or welding electrodes).

Following longer disruptions (e.g. station upgrade, control software update), it is necessary to newly release the process.

Set-up processes, need to be evaluated using appropriate methods (e.g. FMEA).

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Principle 10
Labeling

Products and containers are labeled according to the set standard.

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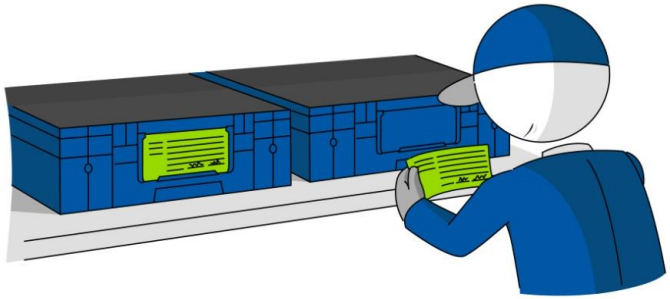
Principle 10
Labeling



In the entire value stream products must always have a clear status. Therefore, a consistent identification/labeling concept at the production site and adherence to the following rules are necessary.

Within the production flow:

- Filled boxes must always be labeled (e.g. card, sticker, RFID).

Outside the production flow:

White card with a red diagonal stripe: Product blocked;
Green card: Product after additional test back in production flow and in good condition;
Yellow card: Product for rework;
Red card: Product is scrap;
White card: Product in good condition.

- Rejected parts in the red box (scrap container).
- Red boxes must be secured against unintended access (e.g. by locking them, covering, spatial separation, covering during transport).
- Containers for rejects must be emptied in line with standards and the parts must be analyzed.
- Parts at the analysis station are spatially separated from the production flow and clearly identified.
- Only parts with the same status in the same container
- No good parts in the red box.
- A blocking process for production and logistics is defined.
- Products are protected against environmental influences (e.g. contamination) in line with regulations.

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Principle 11
Rework / Scrap

The handling of rejected parts and those to be reworked is clearly regulated.

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Principle 11
Rework / Scrap

Basic rule: Inspection or processing of a part that, contrary to the control plan, is removed from the standard process, is rework.

If rework is unavoidable it takes place on an approved device and is limited in time or quantity. A concession is necessary.

A rework process that is permanently required must be transferred to a standard process.

Sorting inspections require a
- risk assessment,
- description of the workplace,
- work / inspection instruction.

They are approved by the responsible for production and the responsible for quality.

Scrap must be disposed of in line with the standard and unauthorized further use of these products must be prevented (for example, by destroying them).

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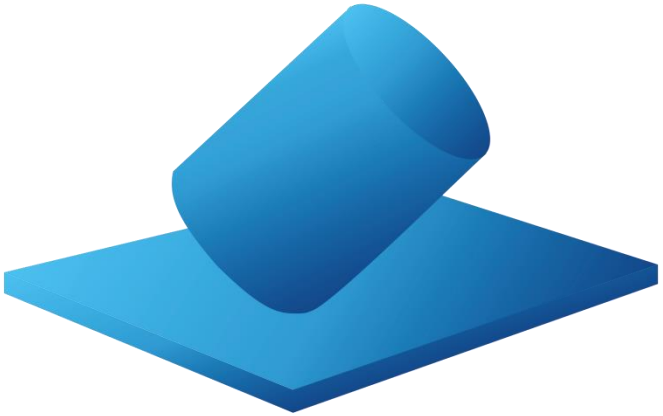
Principle 12
Dropped Parts



Any products that fall on the floor,
into the machine or cannot be classified
must be scrapped.

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Principle 12
Dropped Parts

Each individual employee must adhere to this standard regardless of what part of the organization he/she belongs to or his/her position within the company.

In case of repeated occurrence the shop floor management must be notified by the employee. Repeat events are analyzed regarding systematic causes and improvement measures are implemented.

Nonconforming products or products that cannot be classified must be scrapped according to procedure.

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Principle 13
Correct Product

Only the correct product may be provided for removal and assembly.

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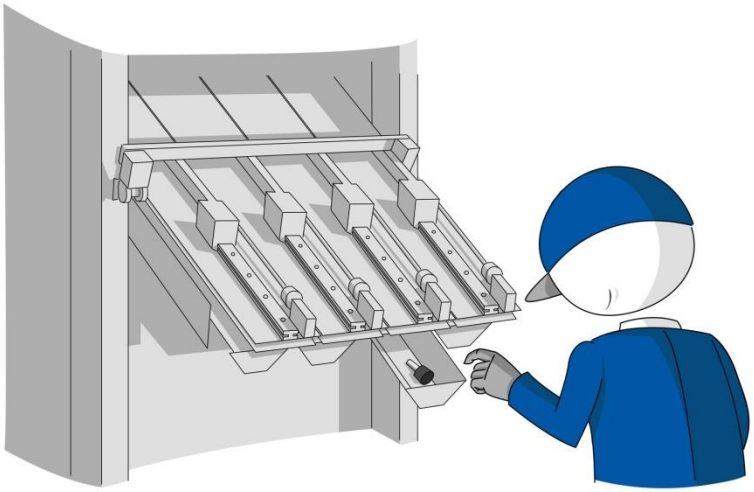
Principle 13
Correct Product



Only the correct product may be available to the associate at the time of assembly.

All other variants or versions that are stored at the assembly station/workplace must not be accessible to the employee (e.g. closed/covered containers).

If several variants need to be available (e.g. mating of parts), an inspection takes place after the handling operation.

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Principle 14
Remaining Items

The handling of remaining items/ quantities is clearly regulated.

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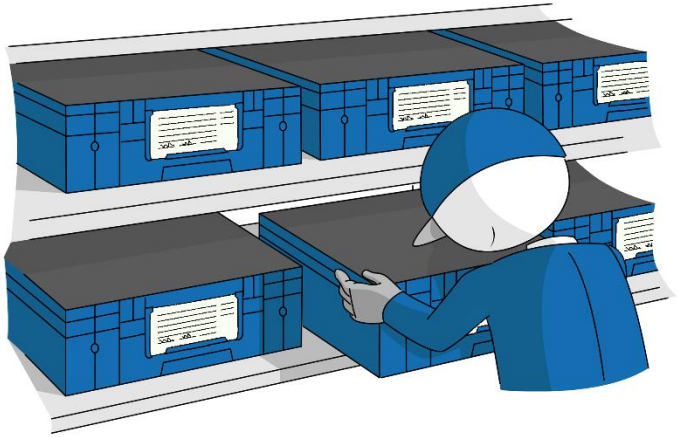
Principle 14
Remaining Items



Remaining quantities must be clearly labeled (e.g. white card with part number, number of units, date, name, remaining quantity in the comments field) and stored securely (e.g. shelf for remaining items).

The “First In, First Out” principle must be observed. Maximum storage times must not be exceeded.

Close attention must be paid to ensure tidiness and cleanliness as the goods have yet to be placed in the final packaging.

The quantity of remaining items must be taken into consideration with regard to engineering change requests.

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Terms and Abbreviations
(for information only)

5S: Approach for improvement of order and cleanliness at the workplace described by 5 Japanese words all beginning with S

8D: Method for structured problem solving in 8 steps

Andon Cord: Term derived from Japanese for a system (e.g. rip cord, switch, systematics) enabling an employee to stop a device.

Audit (lat. hearing): systematic and independent investigation of the actual state e.g. of a quality management system, production process or product in comparison to the requirements

FMEA (Failure Mode and Effects Analysis): Analytical method to identify failure modes of systems, products or processes and to avoid them by appropriate measures

IPN: International Production Network

ISO (International Organization for Standardization): worldwide union of national standardization institutes for the development of international standards

ISO/TS 16949: Summarizing technical specification of the worldwide existing requirements of the automotive industry for management systems, developed by the ISO

MAE: Machinery and Equipment

Poka Yoke (from Japanese): Method to avoid human mistakes, resulting defects and passing on of nonconforming parts

RFID (radio-frequency identification): transmitter-receiver system for contact-free identification of objects using electromagnetic waves

source, make, deliver: short descriptions for the main sections of the value stream (purchase, production, delivery)

TPM: Total Productive Maintenance

VDA: German Association of the Automotive Industry

GB/QM: Division / Head of Quality Management

HSE: Health, Safety, Environment

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