

CORE TOOLS SELF-ASSESSMENT KEY TERMS



AUTOMOTIVE INDUSTRY ACTION GROUP

INTRODUCTION

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Many automakers and suppliers require use of Core Tools, e.g. SPC, MSA, FMEA, APQP and PPAP. Over time, many organizations including suppliers have developed their own training to support the implementation and/or auditing of these core tools. AIAG has developed a free online self-assessment tool for individuals and organizations that can be used to determine basic competency in these areas. These results can be used to evaluate and improve training materials as applicable as well as plan for individual development or improvement. This key terms document aims to familiarize you with common terms in the assessment so that you may better implement these Core Tools processes.

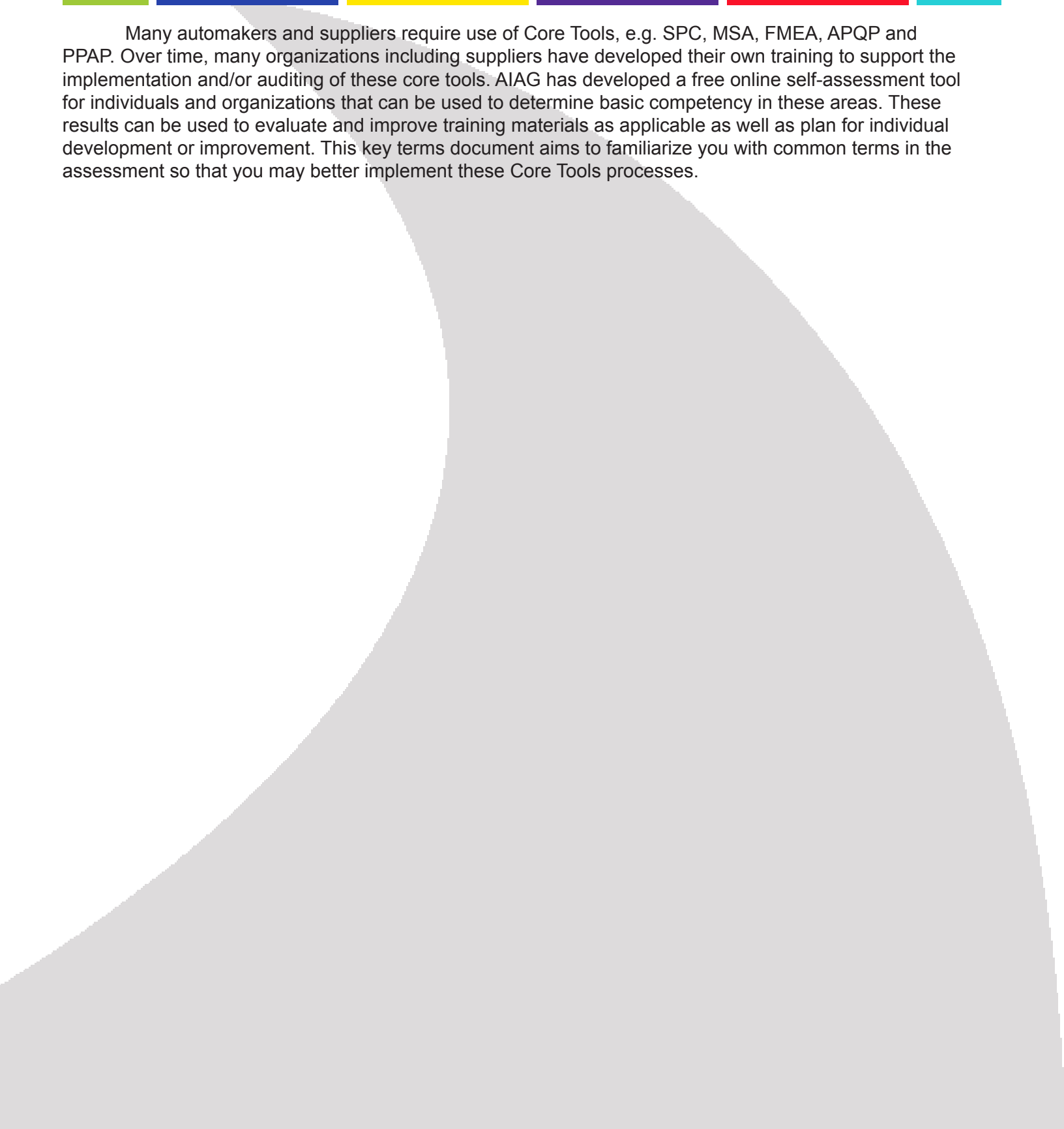
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E2	R6
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H3	U6
Histogram, House of Quality	U Chart, Uncertainty
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Inspection, ISO/TS 16949	Validation, Variable, Variation, Verification
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Job Instruction, Just In Time	Waste, Weibull Distribution
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Key Result Area, Knowledge Management	X, \bar{x}
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Linear Causality, Location, Logarithmic	Yield, $Y=f(x)$
M4	Z8
Manufacturing, Measurement Systems Analysis, Measurement Uncertainty, Median	Zero Defects

A

ADVANCED PRODUCT QUALITY PLANNING: A structured method of defining and establishing the steps necessary to assure that a product satisfies the customer.

APPRAISER VARIATION: The variation in average measurements of the same part (measured) between different appraisers (operators) using the same measuring instrument and method in a stable environment.

ATTRIBUTE GAGE: Attribute gages compare part characteristics to specification limits and either accept or reject the part based on whether the limits are satisfied.

B

BIMODAL: Having or involving two modes, in particular (of a statistical distribution) having two maxima.

BLOCK DIAGRAM: A diagram of a system in which the principal parts or functions are represented by blocks connected by lines that show the relationships of the blocks.

C

CHARACTERISTIC: A distinguishing feature of a process or its output.

COMMON CAUSE: A source of variation that affects all the individual values of the process output being studied; this is the source of the inherent process variation.

CONTROL CHART: A graph of process characteristic, based on sample measurements in time order, used to display the behavior of a process, identify patterns of process variation, assess stability, indicated process direction.

CONTROL LIMITS: Control limits are derived from actual process performance and are designed to show whether or not the process is in statistical control.

CONTROL PLAN: Written description of the system for controlling processes for production of parts or materials.

D

DESIGN FAILURE MODE & EFFECTS ANALYSIS: An analytical technique used by a design responsible organization as a means to assure, to the extent possible, that potential failure modes and their associated causes/mechanisms have been considered and addressed.

DISTRIBUTION: Describes the amount of potential variation in outputs of a process; it is usually described in terms of its shape, average and standard deviation.

E

END USER: The individual who uses a product after it has been fully developed and marketed.

EXTERNAL FAILURE COSTS: Costs associated with defects found during or after the delivery of the product or service.

F

FAILURE MODE AND EFFECTS ANALYSIS: Systematized group of activities intended to: 1) recognize and evaluate the potential failure of a product/process and its effects, 2) identify actions which could eliminate or reduce the chance of the potential failure occurring, and 3) document the process failure occurring.

FLOWCHART: A graphical representation of the steps in a process. Flowcharts are drawn to better understand processes. The flowchart is one of seven basic tools of quality.

G

GAGE: A device used to obtain measurements.

GEOMETRIC DIMENSIONING AND TOLERANCING (GD&T): A method to minimize production costs by considering the functions or relationships of part features in order to define dimensions and tolerances.

H

HISTOGRAM: A graphical representation (bar graph) of the frequency of grouped data to provide a visual evaluation of the data distribution.

HOUSE OF QUALITY: A diagram (named for its house shaped appearance) that clarifies the relationship between customer needs and product features. Also known as Quality Function Deployment (QFD).

I

ISO/TS 16949: The Automotive sector specific ISO technical specification aimed at the development of a quality management system that provides for continual improvement, emphasizing defect prevention and the reduction of variation and waste in the supply chain.

INSPECTION: Measuring, examining, testing, and gauging one or more characteristics of a product or service and comparing the results with specified requirements to determine whether conformity is achieved for each characteristic.

J

JOB INSTRUCTION: Describes work performed by one role or position in a company (e.g. setup, inspection, rework, operator).

JUST IN TIME: A material requirements planning system that provides for the delivery of material or product at the exact time and place where the material or product will be used.

K

KEY RESULT AREA (KRA): Critical customer requirement(s) that is (are) important for the organization's success. Also known as Key Success Factor (KSF).

KNOWLEDGE MANAGEMENT: Involves transforming data into information, the acquisition or creation of knowledge, as well as the processes and technology employed in identifying, categorizing, storing, retrieving, disseminating and using information and knowledge for the purposes of improving decisions and plans.

L

LINEAR CAUSALITY: A causal pattern in which cause precedes effect and there is a clear link between one cause and one effect.

LOCATION: A general term for the typical values of central tendency of a distribution.

LOGARITHMIC: A continuous probability distribution derived from the Maclaurin series expansion.

M

MANUFACTURING: Process of making or fabricating production materials, production or service parts, assemblies, or heat treating, welding, painting, plating or other finishing services.

MEASUREMENT SYSTEMS ANALYSIS: MSA is a collection of tools which seek to identify the components of variation in measurement devices.

MEASUREMENT UNCERTAINTY: Normally reported as a bilateral quantity, measurement uncertainty is simply an estimate of how much a measurement may vary at the time of measurement.

MEDIAN: The middle value in a group of measurements when arranged lowest to highest.

N

NONRANDOM VARIATION: In quality control, defect caused by factors that are few in number, intermittent, and large enough to be detected, identified, and eliminated for bringing a process under control.

NORMAL DISTRIBUTION: A continuous, symmetrical, bell-shaped frequency distribution for variables data that is the basis for the control charts for variables.

O

OBSERVATION: An item of objective evidence found during an audit.

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ORIGINAL EQUIPMENT MANUFACTURER: An original equipment manufacturer or OEM is typically a company which uses a component made by a second company in its own product, or sells the product of the second company under its own brand.

P

PART SUBMISSION WARRANT: An industry-standard document required for all newly tooled or revised products in which the organization confirms that inspections and tests on production parts show conformance to customer requirements.

PLAN, DO, CHECK, ACT: The continuous four step quality problem-solving process cycle of planning, doing the planned activity, checking/verifying the results met expectations and the action of implementing the improvement.

PRELIMINARY CAPABILITY STUDIES: Short term studies conducted to obtain early information on the performance of new or revised processes relative to internal or customer requirements.

PROCESS CAPABILITY: A statistical measure of the inherent process variability for a given characteristic.

PROCESS CAPABILITY INDEX: The value of the tolerance specified for the characteristic divided by the process capability.

PROCESS FAILURE MODE AND EFFECTS ANALYSIS: A structured analytical tool used by an organization, business unit, or cross-functional team to identify and evaluate the potential failures of a process.

PROCESS FLOW CHART: A depiction of the flow of materials through the process, including any rework or repair operations.

PRODUCT PLANNING PROCESS: An ongoing process of identifying and articulating market requirements that define a product's feature set.

PRODUCT REALIZATION: Product realization refers to the interconnected processes that are used throughout all product life cycle phases and result in high quality products.

PRODUCTION: The processes and methods used to transform inputs into goods or services.

PRODUCTION PART APPROVAL PROCESS: A generic part qualification process used to determine if all customer requirements are understood by a supplier and if the process has the potential to produce product meeting requirements on a production basis.

Q

QUALITY MANAGEMENT SYSTEM: A collection of business processes focused on achieving quality policy and quality objectives to meet customer requirements.

R

RANDOM VARIATION: Variability of a process caused by many irregular and erratic fluctuations or chance factors that cannot be anticipated, detected, identified, or eliminated.

RANGE: A measure of process spread. The difference between the highest and lowest values in a subgroup, a sample, or a population.

REACTION PLAN: The action specified by a Control Plan, or other quality system documentation, to be initiated when nonconforming product or process instability is identified.

REPEATABILITY: The variation in measurements obtained with one measurement device when used several times by the same person while measuring the identical characteristic on the same product.

RISK PRIORITY NUMBERS: The measure of risk in the Failure Mode and Effects Analysis comprehending the effect's severity, the failure mode cause occurrence and the detection capability of current controls.

S

SEVERITY: The degree to which the customer of the product is impacted by the failure mode and effect.

SHAPE: A general concept for the overall pattern formed by a distribution of values. Shape involves many characteristics such as symmetry (skewness) and peakedness (kurtosis).

SPECIAL CAUSE VARIATION: A source of variation that affects only some of the output of the process; it is often intermittent and unpredictable. A special cause is sometimes called assignable cause. It is signaled by one or more points beyond the control limits or a non-random pattern of points within the control limits.

SPECIAL CHARACTERISTIC: Product characteristic or manufacturing process parameter which can affect safety or compliance with regulations, fit, function, performance, or subsequent processing of product.

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SPECIFICATION LIMITS: Specification limits are derived from customer requirements and should link to what the customer really wants.

SPREAD: The expected span of values from smallest to largest in a distribution.

STATISTICAL PROCESS CONTROL: The use of statistical techniques such as control charts to analyze a process or its output so as to take appropriate actions to achieve and maintain a state of statistical control and to improve the process capability.

STATISTICAL STABILITY: The absence of special causes of variation; the property of being in statistical control.

T

THINGS GONE WRONG: Product attributes or characteristics that produce a negative reaction from customers.

TOLERANCE: Allowable deviation from a standard or nominal value that maintains fit, form, and function.

TRACEABILITY: The ability to trace the history, application, or location of an item or activity and like items or activities by means of recorded identification.

U

U CHART: A count per unit control chart.

UNCERTAINTY: The range assigned to a measurement result that describes, within a defined level of confidence, the limits expected to contain the true measurement result. Uncertainty is a quantified expression of measurement reliability.

V

VALIDATION: A confirmation, through objective evidence, that the requirement for specific parameters, specifications, use or for a product or service has been fulfilled. Design validation follows successful design verification.

VARIABLE DATA: Data resulting from the measurement of a parameter or a variable.

VARIATION: The inevitable differences among individual outputs of a process; the sources of variation can be grouped into two major classes; common causes and special causes.

VERIFICATION: The confirmation of design requirements or specifications through objective evidence which may include but is not limited to calculations, computer modeling, & simulation and prototype testing; followed by Design Validation.

W

WASTE: Activities that consume resources but add no value; includes visible waste (for example, scrap rework, downtime) and invisible waste (for example, inefficient set-ups, wait times of people and machinery).

WEIBULL DISTRIBUTION: A distribution of continuous data that is used to define when the “infant mortality” rate has ended and a steady state has been reached.

X

X: The symbol for an individual value X-bar.

\bar{X} : Term for average or mean of a sample.

Y

YIELD: The ratio between salable goods produced and the quantity of raw materials and/or components put in at the beginning of the process.

Y=F(X): A complex transfer function that describes how process elements are related. Y, the output variable, is a function of the interaction of the X's (input variables).

Z

ZERO DEFECTS: A performance standard popularized by Philip Crosby where a commitment to a quality planning, error proofing, and disciplined execution can deliver quality performance levels close to the goal of perfection.