

# AUTOMOTIVE WARRANTY MANAGEMENT KEY TERMS



**AUTOMOTIVE INDUSTRY ACTION GROUP**

# INTRODUCTION

A horizontal bar composed of five colored segments: green, blue, yellow, purple, and red, followed by a small cyan segment.

The warranty management project was formed by our members to facilitate a change from a cost-transfer system to a problem prevention system to benefit end users, as well as carmakers and their suppliers. AIAG partnered with OESA to develop a common approach to promote consumer satisfaction and continuous warranty improvement by providing a recommended, robust warranty management program that instills a consumer-centric approach to warranty management.

The output of this group is the newly launched 3rd Edition of the Automotive Warranty Management Guideline. These are the key terms you'll want to be familiar with when taking the CQI-14 Automotive Warranty Assessment Training or Pre-Assessment, or when implementing the CQI-14 processes.

# TABLE OF CONTENTS

<b>A</b> .....	<b>1</b>
Adaptive Control, Advanced Product Quality Planning (APQP), Aftermarket, Anti-lock Brake System (ABS), Axiomatic Design	

<b>B</b> .....	<b>1</b>
Benchmarking	

<b>C</b> .....	<b>1</b>
Claim Data, Claims per 1,000 vehicles (C/1000), Component, Consumer, Consumer Concern Not Duplicated (CCND), Consumer -Centric Warranty, Control Plans, Corrective Action, Cost Per Unit (CPU) or Cost Per Vehicle (CPV), Critical to Quality (CTQ), Cross-Functional Team (CFT), Culture	

<b>D</b> .....	<b>2</b>
Dealer, Deep Dive, Design Failure Mode and Effects Analysis (DFMEA), Design for Assembly (DFA), Design for Manufacture (DFM), Design for Serviceability, Design for Six Sigma (DFSS), Design Of Experiments (DOE), Design Release Engineer (DRE OR DR), Design Review Based On Failure Mode (DRBFM), Design Review Based On Test Results (DRBTR), Design Validation Plan And Report (DVP&R OR DVP), Detection, Detection-To-Correction Measure, Diagnostic Trouble Code (DTC), Directed Source	

<b>E</b> .....	<b>4</b>
Early Warning Tracking (EWT), End of Life (EOL), Error Detection	

<b>F</b> .....	<b>4</b>
Failure Mode, Failure Modes and Effects Analysis (FMEA), Fault Tree Analysis (FTA), Federal Motor Vehicle Safety Standard (FMVSS), Frequency	

<b>H</b> .....	<b>4</b>
Hypothesis Testing	

<b>I</b> .....	<b>4</b>
Ideal Function	

<b>K</b> .....	<b>5</b>
Key Performance Indicators (KPI)	

<b>L</b> .....	<b>5</b>
Labor Operation Codes (Labor Op), Lessons Learned, Look-Across	

<b>M</b> .....	<b>5</b>
Mahalanobis-Taguchi System (MTS), Measurement Systems Analysis (MSA), Months-in-Service (MIS)	

<b>N</b> .....	<b>5</b>
Noise, National Highway Traffic Safety Administration (NHTSA), No Fault Found (NFF), No Trouble Found (NTF)	

<b>O</b> .....	<b>6</b>
Original Equipment Manufacturer (OEM)	

<b>P</b> .....	<b>6</b>
Paynter Chart, Parametric Design, Pareto Chart, Part, Partner Organization, Parts Return Center (Returned Parts Center), Plan, Do, Check, Action (PDCA), Poka-Yoke, Product Service Manual, Production Part Approval Process (PPAP), Production Preparation Process (3P), Production Validation Test (PV), Pugh Analysis	

<b>Q</b> .....	<b>7</b>
Quality Function Deployment (QFD)	

<b>R</b> .....	<b>7</b>
Read-Across or Replication, Regression Analysis, Repair Codes, Risk Priority Number (RPN), Road Maps, Robustness, Root Cause	

<b>S</b> .....	<b>8</b>
Sub-system, Supplier, Supplier Quality Assurance (SQA), Supplier Quality Engineer (SQE), Supplier Technical Assistance (STA), Supply Chain, Swim Lanes, System	

<b>T</b> .....	<b>9</b>
Technical Service Bulletin (TSB), Test to Failure, Things-Gone-Right (TGR), Things-Gone-Wrong (TGW), Tier Supplier, Time-to-Detection, Transportation Recall Enhancement, Accountability and Documentation Act (TREAD), Trend (Run) Chart, TRIZ, Trouble Not Found (TNF)	

<b>V</b> .....	<b>10</b>
Value Analysis (VA), Value Engineering (VE), Value Stream Mapping, Vehicle Identification Number (VIN), Verbatims, Voice of the Customer (VOC)	

<b>W</b> .....	<b>10</b>
Weibull Analysis	

<b>#</b> .....	<b>10</b>
8 D, 5 Phase, 5 S [Methodology], 5 Why, 7 Step	

## A

**ADAPTIVE CONTROL:** The ability of a system to measure, identify, decide and adjust to changes in the operation or environment to provide the desired output.

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

**AFTERMARKET:** The part of the automotive industry concerned with the manufacturing, remanufacturing, distribution, retailing, and installation of all vehicle parts, chemicals, tools, equipment and accessories for light and heavy vehicles after the initial sale of the vehicle.

**ANTI-LOCK BRAKE SYSTEM (ABS):** A braking system that prevents wheels from locking while braking.

**AXIOMATIC DESIGN:** A systems design methodology using matrix methods to systematically analyze the transformation of customer needs into functional requirements, design parameters, and process variables. The method gets its name from the use of design principles or design axioms governing the analysis and decision making process in developing high quality product or system designs.

## B

**BENCHMARKING:** Systematic approach to identifying standards for comparison. It provides input to the establishment of measurable performance targets, as well as ideas for product design and process design.

## C

**CLAIM DATA:** Record of data associated with vehicle repairs and claims.

**CLAIMS PER 1,000 VEHICLES (C/1000):** Metric equivalent to 1000 ppm and used in association with exposure to measure quality of vehicles in service.

**COMPONENT:** A constituent element of a system on the vehicle.

**CONSUMER:** The end customer who leases/purchases and uses the vehicle.

**CONSUMER CONCERN NOT DUPLICATED (CCND):** The designation applied to a consumer concern that, when investigated by the dealer service organization, cannot be reproduced. This does not discount the concern; rather, it indicates that the condition(s) that caused the concern was not reproduced and/or no data was captured by the in-vehicle diagnostic system indicating such a concern.

**CONSUMER-CENTRIC WARRANTY:** A claim rate reduction focus that aligns all value chain members to collaboratively and continuously approach warranty improvement through best practices, recommended tools and a root cause culture.

**CONTROL PLANS:** Written descriptions of the systems for controlling parts and processes. Control plans provide a written summary description of the systems used in minimizing process and product variation.

**CORRECTIVE ACTION:** Any action taken by an organization that is designed to permanently prevent the occurrence of the failure mode, detect when the failure mode or effect occurs, and to plan for the failure mode and its risk.

**COST PER UNIT (CPU) OR COST PER VEHICLE (CPV):** The calculated cost of warranty related repairs by totaling the sum of the repair costs divided by the number of vehicles produced to determine a per vehicle cost.

**CRITICAL TO QUALITY (CTQ):** The key measurable characteristics of a product or process whose performance standards or specification limits must be met in order to satisfy the customer.

**CROSS-FUNCTIONAL TEAM (CFT):** A group that contains people with different skill sets all working together toward a common goal. This team could include operations, finance, quality, design engineering, process engineering, supply chain management, commercial, legal, warranty, etc.

**CULTURE:** Refers to norms of behavior and shared values among a group of people. Culture is behavioral change over time.

## D



**DEALER:** The retail organization that sells the vehicle to the consumer; also can be referred to as Retailer.

**DEEP DIVE:** A technique used to rapidly and deeply immerse a team into a situation for problem-solving or idea creation.

**DESIGN FAILURE MODE AND EFFECTS ANALYSIS (DFMEA):** An analytical methodology used to ensure that potential problems have been considered and addressed throughout the product design and development phase.

**DESIGN FOR ASSEMBLY (DFA):** The process of considering how the product will be assembled, potential problems that could occur and simplifying by revising the design and assembly procedure to reduce the risk of these problems, lowering costs and making it easier to assemble.

**DESIGN FOR MANUFACTURE (DFM):** The process of considering how the product will be manufactured and potential problems that could occur and then optimizing the design to be easier to produce, have higher throughput and improved quality.

**DESIGN FOR SERVICEABILITY:** Engineering process used to optimize the serviceability of a design.

# AUTOMOTIVE WARRANTY MANAGEMENT KEY TERMS



**DESIGN FOR SIX SIGMA (DFSS):** A design philosophy of systematic methodology, tools, and techniques which enables the ability to design products and processes that meet customer expectations and can be produced at a six sigma quality level.

**DESIGN OF EXPERIMENTS (DOE):** A test or sequence of tests where potentially influential process variables are systematically changed according to a prescribed design matrix.

**DESIGN RELEASE ENGINEER (DRE OR DR):** The engineer that approves and releases a component, sub-system or system design for use.

**DESIGN REVIEW BASED ON FAILURE MODE (DRBFM):** A philosophy of reviewing the potential impact of a design change based on 1) how can an unintended function occur as a result of the change, 2) cross-functional discussion regarding the details of the design change, controls to mitigate an unintended function and 3) design review to determine additional improvement actions that would prevent the change from causing an unintended function.

**DESIGN REVIEW BASED ON TEST RESULTS (DRBTR):** A formal process for conducting proactive design reviews when tests results are available or with field returns. The review assesses performance on various tests or field conditions, review of actual end of test or field return component conditions, potential cause(s) of resultant conditions and improvements that can be made as well as tracking implementation and verification of these improvements. The intent is to uncover all hidden problems and can work either independently or in conjunction with Design Review Based on Failure Modes (DRBFM).

**DESIGN VALIDATION PLAN AND REPORT (DVP&R OR DVP):** A method to plan and document testing activity through each phase of product/process development from inception to ongoing refinement.

**DETECTION:** An assessment of how well the product or process controls detect the cause of the failure or failure mode.

**DETECTION-TO-CORRECTION MEASURE:** The time it takes to correct an unintended condition after it has been detected.

**DIAGNOSTIC TROUBLE CODE (DTC):** A code number generated by a vehicle's onboard computer that corresponds to a specific fault. Most computerized engine control systems have a certain amount of self-diagnostic capability. When the engine is running and the computer detects a problem in one of its sensor or output circuits, or even within itself, it triggers a trouble code. In some systems, the code number is retained in memory. In others, the code is not stored but is regenerated when a mechanic runs the system through a special self-diagnostic test. The only indication of trouble is when the "Check Engine" light on the instrument panel lights up.

**DIRECTED SOURCE:** A supplier in a supply chain that is identified by a vehicle manufacturer (or higher tier supplier, e.g., Tier 1 supplier) as an essential member of the supply chain for a particular part or component. Generally, when a supplier is awarded business, it is able to select its own lower tier suppliers. However, in this case, the inclusion of a "directed source" supplier is dictated by the vehicle manufacturer or higher tier supplier.

## E

**EARLY WARNING TRACKING (EWT):** FCA US LLC's process for tracking early field returns for new vehicle launches.

**END OF LIFE (EOL):** Condition or state of the product system at the end of the vehicle service life.

**ERROR DETECTION:** Refers to any devices and practices that prevent a failure mode from being passed along in the process once it has occurred.

## F

**FAILURE MODE:** The way or manner in which a product or process could fail to meet design intent or process requirements.

**FAILURE MODES AND EFFECTS ANALYSIS (FMEA):** An analytical methodology used to ensure that potential problems have been considered and addressed throughout the product and process development process.

**FAULT TREE ANALYSIS (FTA):** Technique for system analysis where system faults are analyzed from a single potential failure to identify all possible causes.

**FEDERAL MOTOR VEHICLE SAFETY STANDARD (FMVSS):** Federal mandate defined by the U.S. Department of Transportation's National Highway Traffic Safety Administration that motor vehicle manufacturers and equipment manufacturers must comply.

**FREQUENCY:** The rate at which a problem is occurring or is being experienced by the customer.

## H

**HYPOTHESIS TESTING:** An evaluation of two mutually exclusive statements about a population to determine which statement is best supported by the sample data.

## I

**IDEAL FUNCTION:** The information or energy transformation that occurs to the input signal to achieve the desired output response.

## K

**KEY PERFORMANCE INDICATORS (KPI):** Financial and non-financial metrics used to help an organization define and measure progress toward organizational goals.

## L

**LABOR OPERATION CODES (LABOR OP) :** Code used to describe a specific repair, alignment, adjustment, replacement, or reinstallation done on a vehicle to a specific part or assembly.

**LESSONS LEARNED:** The collection of knowledge for an organization based on past successes, failures, and experiences. The form of this knowledge can take many forms; databases, paper records, suggestion programs, etc.

**LOOK-ACROSS:** The process of applying lesson's learned across similar processes, products or systems in the organization as a preventive measure to reduce risk and improve performance and customer satisfaction.

## M

**MAHALANOBIS-TAGUCHI SYSTEM (MTS) :** A measuring or evaluating tool used to recognize a pattern from multidimensional data by applying the Mahalanobis Distance, a process of distinguishing one group from another, into a process of defining a reference group and measuring individual subsets.

**MEASUREMENT SYSTEMS ANALYSIS (MSA):** A collection of tools which seek to identify the components of variation in measurement devices.

**MONTHS-IN-SERVICE (MIS):** Measurement of the time interval in which a vehicle is exposed to consumption. Approximately 30 days = 1.0 MIS, also commonly referred to as Time-In-Service (TIS).

## N

**NOISE:** A consistent level of reported failure performance that cannot be attributed to one single cause or defect.

**NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION (NHTSA):** The agency within the Department of Transportation that is responsible for establishing and enforcing safety standards for passenger vehicles.

**NO FAULT FOUND (NFF):** See "No Trouble Found".



**NO TROUBLE FOUND (NTF):** The designation applied to a part (component, system or module), replaced during a service event that, when analyzed by the vehicle or parts manufacturer, meets all requirements of a “good part.” This does not discount the concern; rather, it indicates that the condition(s) that caused the concern was not reproduced or identified in the statement of requirements, qualification tests did not challenge the component sufficiently and/or no data was captured by the in-vehicle diagnostic system or part intelligence system indicating such a concern. (Also see “No Fault Found” or “Trouble Not Found.”)

## O

**ORIGINAL EQUIPMENT MANUFACTURER (OEM):** Typically a company that uses a component made by a second company in its own product, or sells the product of the second company under its own brand. The specific meaning of the term varies in different contexts. In the automotive industry, OEMs are the industry’s brand name auto manufacturers, such as General Motors, Ford and Toyota.

## P

**PAYNTER CHART:** A long-term validation tool that displays the history of a problem. It is used to monitor and track multiple problems and occurrences of failure and validate the impact of containment and corrective actions over an extended period of time.

**PARAMETRIC DESIGN:** A technique based on Design of Experiments that provides a low cost way of achieving product robustness i.e., making the product insensitive to the effect of noise. P-Diagrams are a means of reducing complex systems to understandable elements in order to capture potential internal and external influences on system, sub-system, assembly or component functionality. Parametric design is applied to reduce the impact of these influences.

**PARETO CHART:** Shows the frequency of occurrence of items and arranges them from the most frequent to the least frequent. Pareto Charts are a visually effective means of displaying the relative importance of causes, problems, or other conditions.

**PART:** An individual automobile component; an essential element or constituent that can be separated from or attached to a system; a detachable piece which can be replaced.

**PARTNER ORGANIZATIONS:** Includes all members of a specific supply chain plus the dealers or other organizations involved in the sale or servicing as well as manufacturing of a vehicle manufacturer’s automobiles. (Also see “Supply Chain” and “Original Equipment Manufacturers (OEM).”)

**PARTS RETURN CENTER (RETURNED PARTS CENTER):** Area where warranty parts are returned to. Here they are evaluated and/or tested and made available or sent out to the supplying party for investigation.

**PLAN, DO, CHECK, ACTION (PDCA):** Deming continuous four step quality problem-solving process cycle of plan, doing the planned activity, checking/verifying the results met expectations and the action of implementing the improvement.

**POKA-YOKE:** The practice of designing products or processes in a manner that prevents or minimizes the probability of human or mechanical error. This is also called Error-Proofing or Mistake-Proofing and prevents defects by detecting and correcting the errors that cause them before they occur.

**PRODUCT SERVICE MANUAL:** A set of instructions that defines the components in the sub-system or system of the vehicle, diagnostic steps, disassembly and assembly steps of the component when it needs to be serviced or replaced.

**PRODUCTION PART APPROVAL PROCESS (PPAP):** A generic requirement for production part approval, including production and bulk material. PPAP's purpose is to provide the evidence that all customer engineering design record and specification requirements are properly understood by the organization and that the manufacturing process has the potential to produce product consistently meeting these requirements during an actual production run at the quoted production rate.

**PRODUCTION PREPARATION PROCESS (3P):** A clean sheet tool for designing production processes that facilitates a lean culture, eliminating waste.

**PRODUCTION VALIDATION TEST (PV):** Engineering tests that validate that products made from production tools and processes meet customer engineering standards including appearance requirements.

**PUGH ANALYSIS:** Charts similar to pros vs. cons lists. These are used for evaluating multiple options against each other, in relation to a baseline option.

## Q



**QUALITY FUNCTION DEPLOYMENT (QFD):** A systematic tool for translating customer requirements into appropriate company requirements at each phase from concept to engineering development to manufacturing to sales and distribution.

## R



**READ-ACROSS OR REPLICATION:** Reproducing the improvements in other areas of the organization and updating the corporate knowledge base. (Also see "Look-Across.")

**REGRESSION ANALYSIS:** A correlation measure of the strength of the relationship or association between variables.

# AUTOMOTIVE WARRANTY MANAGEMENT KEY TERMS



**REPAIR CODES:** Trouble codes used to classify repairs in the warranty data system and / or trouble codes stored in the cars computer system, when tripped a service light often comes on letting the driver know the vehicle needs to be taken in for repair.

**RISK PRIORITY NUMBER (RPN):** The product of the severity (S), occurrence (O), and detection (D) rankings.  $(S) \times (O) \times (D) = RPN$ . Within the scope of the individual FMEA, this value (between 1 and 1000) can be used to assist the team in ranking the concerns in the design of the product and process.

**ROAD MAPS:** The defining and documentation of activities in sequential process steps, typically through diagrams, that helps the understanding of how an objective or end result is to be achieved.

**ROBUSTNESS:** The quality of being able to withstand stresses, pressures, or changes in the procedure, environment or circumstances. A system or design may be said to be “robust” if it is capable of coping well with variations (sometimes unpredictable or unplanned variations) in its operating environment with minimal damage, alteration or loss of functionality.

**ROOT CAUSE:** The underlying cause(s) of the problem. Root cause is what is happening that results in the failure mode and effect on the product.

## S

**SUB-SYSTEM:** Any system that is part of a larger system; component system on the vehicle.

**SUPPLIER:** A Company engaged primarily in the manufacture of components, systems or modules for use in light duty (passenger car and light truck) automobiles.

**SUPPLIER QUALITY ASSURANCE (SQA):** Organization to assist supply partners with quality and launch performance as well as problem-solving activity.

**SUPPLIER QUALITY ENGINEER (SQE):** The functional position within the Supplier Quality Assurance organization that interfaces with the supply chain.

**SUPPLIER TECHNICAL ASSISTANCE (STA):** This is another term used for the functional position within the Supplier Quality Assurance organization.

**SUPPLY CHAIN:** All suppliers and the vehicle manufacturer that represent the flow of raw materials and finished products that go into the vehicles sold by the vehicle manufacturers.

**SWIM LANES:** Method of displaying a process flow with the responsibilities organized into vertical organizational/functional lanes.

**SYSTEM:** A set or arrangement of things so related or connected as to form a unity or whole. Typically, an integration of a number of components on the vehicle to perform the desired function such as braking, steering, fuel delivery as examples.

## T

**TECHNICAL SERVICE BULLETIN (TSB):** Recommended repair procedure issued to dealers for specific problems. These are issued when there are several occurrences of the same issue.

**TEST TO FAILURE:** A test in which the system being assessed is subjected to sufficient stress for a long enough time or large enough number of cycles to cause it to fail.

**THINGS-GONE-RIGHT (TGR):** Product attributes or characteristics that produce a positive reaction from customers. Usually expressed as a rate: TGR/100.

**THINGS-GONE-WRONG (TGW):** Product attributes or characteristics that produce a negative reaction from customers. Includes both component malfunctions and “correct” component functions that don’t meet customer expectations.

**TIER SUPPLIER:** Suppliers are, at times, referred to as Tier n suppliers, where n is a number from 1 to 3 and represents the closeness of the supplier to the vehicle manufacturer when tracking the supply of parts. For example, a Tier 2 supplier supplies parts to a Tier 1 supplier, which in turn adds value and supplies the parts to the OEM. (Also see “Supplier.”)

**TIME-TO-DETECTION:** The time between the occurrence of an undesirable condition until the detection of that undesirable condition.

**TRANSPORTATION RECALL ENHANCEMENT, ACCOUNTABILITY AND DOCUMENTATION ACT (TREAD):**

The TREAD Act was enacted on November 1, 2000, as a direct consequence of hearings before the Committee on Energy and Commerce on the safety of tires and related matters. The TREAD Act contains provisions requiring vehicle and equipment manufacturers to report periodically to NHTSA on a wide variety of information that could indicate the existence of a potential safety defect and to advise NHTSA of foreign safety recalls and other safety campaigns.

**TREND (RUN) CHART:** A simple graphic representation of a characteristic of a process. A Trend Chart combines the information on a Run Chart with a calculated “best fit” line to track the magnitude of change in a characteristic (whether it is improving, remaining stable, or deteriorating over time).

**TRIZ:** A Russian acronym for the “Theory of Inventive Problem-Solving.” A methodology, tool set, knowledgebase, and model-based technology for generating innovative ideas and solutions for problem-solving. TRIZ provides tools and methods for use in problem formulation, system analysis, failure analysis, and patterns of system evolution (both “as-is” and “could be”).

**TROUBLE NOT FOUND (TNF) :** See “No Trouble Found.”

## V

**VALUE ANALYSIS (VA):** A systematic, cross-functional team approach to maximize product/process value by identifying functions and their related costs.

**VALUE ENGINEERING (VE):** See “Value Analysis”

**VALUE STREAM MAPPING:** Data resulting from the measurement of a parameter or a variable.

**VEHICLE IDENTIFICATION NUMBER (VIN):** A unique serial number used by the motor vehicle industry to identify individual motor vehicles.

**VERBATIMS:** A text associated with a claim detailing a consumer’s concern or the technician’s diagnosis and repair process.

**VOICE OF THE CUSTOMER (VOC):** Customer feedback both positive and negative including likes, dislikes, problems and suggestions.

## W

**WEIBULL ANALYSIS:** A probability plot of failures versus time measured (in time to failure, cycles to failure, miles to failure, etc.).

## #

**8 D:** 8D is a problem-solving methodology for product and process correction and improvement that is structured into eight disciplines (D1–D8), plus one preparation step (D0).

**5 PHASE:** The name of a General Motors problem-solving tool.

**5 S [METHODOLOGY]:** A lean philosophy method for creating and maintaining an organized, clean, safe and standardized work place. The English terminology is roughly taken from the Japanese five steps of: Seiri (separate), Seiton (straighten or simplify), Seiso (sanitize or shine), Seiketsu (standardize), Shitsuke (sustain).

**5 WHY:** The name of a problem-solving tool.

**7 STEP:** The name of a FCA US LLC problem-solving tool.