



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

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AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

INTRODUCTION

This document contains requirements consistent with AM General's expectations for jointly planning, designing and maintaining product reliability with our suppliers. These requirements are intended for our suppliers who have responsibility at any level for the design and control of design for a component or sub-system. Successful planning, implementing and validating compliance with these requirements will drive reliability improvement with the goal of exceeding our mutual customer's expectations. These requirements are primarily based on systems and guidelines developed by Automotive Industry Action Group (AIAG) and Society of Automotive Engineers (SAE). References for their documents can be found in Appendix A.

1.0 RELIABILITY ASSURANCE REQUIREMENTS

This document details key activities required of a managed Reliability Program. This requirement places an emphasis on reliability as a philosophy and process that AM General requires with suppliers and internal to itself. Most of the reliability effort is required in the development phase of a component or assembly's life cycle. Maximizing reliability into the design early in the program reduces the need for failure analysis, corrective action plans and field retrofits later in the life cycle. AM General's adoption of this philosophy establishes a formal reliability process to assure contractual reliability requirements.

1.1 RELIABILITY PROGRAM

The Reliability Program is a managed activity focusing on continual component reliability improvement throughout the life cycle. A formal Reliability Program ensures that AM General products are reliable and contribute to overall customer satisfaction. The program is divided into three major phases: (1) the Reliability Development Program, (2) the Reliability Production Program, and (3) the Reliability Product Support Program. The Reliability Program must be supported by qualified organizations responsible and responsive with resources available to accomplish reliability objectives throughout the life of a component.

2.0 RELIABILITY DEVELOPMENT PROGRAM

The Reliability Development Program defines a managed plan whose objective is to meet or exceed the reliability assurance requirement by rigorous validation activities. The scope of this program should include reliability inputs from early design and development until production. This program schedule governs all developmental reliability-based plans by setting important actions, milestones, and committed completion dates (Ref. 6.0).

2.1 RELIABILITY DEVELOPMENT PROGRAM PLAN

A Reliability Development Program Plan is a formal document submitted to AM General Product Reliability for approval. A Reliability Development Program Plan includes a governing plan putting all reliability development program activities to schedule. This plan will detail the reliability milestones and commitment dates needed for component reliability validation. Validation is accomplished when the component meets or exceeds the reliability performance level (see section 2.1.1) and continues this performance. This program plan must align with the AM General development schedule.



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RELIABILITY DEVELOPMENT PROGRAM PLAN DELIVERABLE

Required 60 days after contract award -

Provide a plan that ensures the customer requirements are fully understood and defined. This plan should include activities, milestones, timing and responsibility for all items contained in section 2. Also included should be activities for establishing a mutual customer/supplier agreement for the following: Description of Conditions of Use that identify relevant product usage profiles and environmental conditions for all stages of the product life cycle; Definition of Maintenance and Service; Established Metrics that assess the ability of the product to meet customer requirements and are tracked throughout the program; Defined Product Specifications that reflect the intended performance and use of the product.

2.1.1 RELIABILITY PERFORMANCE LEVEL

Reliability/Confidence (R/C) levels will be established for components. If the number and /or type of components are not known, system levels must be provided. Individual component levels must contribute to meet the system requirement. Supplier must state R/C values when not provided by AM General Product Reliability.

RELIABILITY PERFORMANCE LEVEL DELIVERABLE¹

Required 60 days after contract award -

State R/C value of component / sub-system; R90/C50 unless otherwise specified.

Product Performance Specifications will be established for components. The specifications will include environmental conditions which are operational limits and may not reflect the normal vehicle environments sustained over time. This is necessary to evaluate reliability levels. Special cooling, mounting location and other requirements to obtain the reliability levels must be given consideration. Other pertinent information can be provided when appropriate or requested.

RELIABILITY PERFORMANCE LEVEL DELIVERABLE²

Required 60 days after contract award -

Provide documentation that shows product performance specifications have been developed and released for the product for which you are design responsible. Specification should contain, as applicable, functional description, duty cycle operation requirements, reliability requirements (B life, failure rate and percent confidence), durability (such as miles/time/cycles – whichever is representative), environmental requirements (temperature, humidity, vibration, etc.), and applicable statutory and regulatory requirements.

2.1.2 RELIABILITY VALIDATION PLAN

The Reliability Validation Plan details and governs activities associated with demonstrating component reliability. The supplier must show that the component(s) can meet the reliability level specified (ref. 2.1.1). The level is to be demonstrated, at a minimum, 90 days prior to delivery of the first production components *unless a reliability growth is specified*. The supplier may use one or more of the following methods, depending on the circumstances at the time of procurement. All reliability validation plans integrating reliability testing must be submitted to AM General Product Reliability for approval.

RELIABILITY VALIDATION PLAN DELIVERABLE

Level to be demonstrated, as a minimum, 90 days prior to production delivery -

Provide the plan for one or more of the demonstration methods listed in “a - d” that is used to validate the design meets product performance requirements using the agreed upon sample size. Include names of test(s), selected method(s), sample size, tasks and associated timing, and responsibility. Design Validation Plan and Report format can be used.



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The following is the proposed order of demonstration methods.

- a) Service History
- b) Service Test
- c) Test Method
- d) Analysis

2.1.2.1 **Service History** is defined as historical usage data of component performance. Historical data is information supporting conclusions that the component will likely meet or exceed its required reliability level. This data must include the number of units in the population or sample population, the usage population, failure modes and failure analysis and any corrective action of product improvements. In addition to historical data, technical data may be requested by AM General to detail component application and usage.

SERVICE HISTORY DELIVERABLE

Provide a report that shows number of units produced, number of units from this population that are in use, failure modes, failure analysis and corrective actions for same. The report should support that the component or sub-assembly meets or exceeds the required reliability level.

AND / OR

2.1.2.2 A **Service Test** is conducted by installing a sufficient number of units into representative vehicle(s) and operating as intended for the AM General application for sufficient time to demonstrate the required reliability levels. The operation and failure history must be collected and analyzed during the test program. The supplier will provide a Service Test Plan that must align with the development schedule.

SERVICE TEST DELIVERABLE

Provide evidence that “x” units were installed into vehicles and the units were operated as intended to demonstrate the required reliability levels (must include record and analysis of the operation and failure history during the test program). If the deliverable represents a product not yet tested, you would present your test plan.

AND / OR

2.1.2.3 **The Test Method** must test to substantiate the stated confidence level. The test procedure must be approved by AM General Product Reliability prior to the start of the reliability validation test. The validation test demonstrating reliability must be conducted in a manner that will simulate the component(s) in its intended use environment. Acceptable reliability test methods include Reliability Demonstration Test and Accelerated Life Test. A test plan must be submitted for any method of test and must align with the development schedule.

TEST METHOD DELIVERABLE

Provide a test plan and results that demonstrate the component(s) meets the stated reliability levels (ref. 2.1.1). Test(s) must demonstrate reliability requirements were met in an environment that simulates intended use through Demonstration Testing or Accelerated Life Test.

2.1.2.3.1 **The Reliability Demonstration Test** is accomplished by subjecting a production configuration unit to the expected operational conditions over the required period of time. Sufficient test time is required to demonstrate the stated confidence level.

Reference 2.1.2.3 for deliverable.



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2.1.2.3.2 **Accelerated Life Test** is accomplished by subjecting a production configuration unit to increased stresses outside normal operating levels. By increasing stresses, a component can demonstrate the reliability level in a shorter test time by a known acceleration factor.

[Reference 2.1.2.3 for deliverable.](#)

2.1.2.3.3 **Highly Accelerated Life Testing** can be used to insure a robust design. This testing method does not demonstrate a reliability level. HALT has the advantage of producing a robust product in a short time. The process is used to identify potential weaknesses in the design by stressing the component until failure occurs and then designing the failure out of the component thereby increasing failure margin. When the component fails during testing, a root-cause failure analysis will be performed. The failures found during HALT must be designed out of the component. Because HALT does not demonstrate a reliability level, a reliability growth plan can be established targeting mature reliability levels for new components not currently installed on AM General vehicle(s).

2.1.2.3.4 **Analysis** may be done in addition to the previous validation methods. The analysis shall be based on engineering and statistical data, when available. AM General must approve the analysis and its conclusions. In cases when there is no history, similarity or time for testing, AM General may allow validation to be based solely on analysis. This will be allowed only at the discretion of AM General. In these cases, AM General will determine if the analysis is acceptable.

ANALYSIS DELIVERABLE

[Provide an analytical model \(and its conclusions\) to compliment one or more of the test methods listed in this section.](#)

2.1.3 RELIABILITY GROWTH PLAN

2.1.3.1 The Reliability Growth Plan details and governs the activities associated with maturing component reliability levels during production and in the field.

2.1.3.2 Component reliability levels must be mature for production vehicles unless an exception is requested. If a reliability growth period is to be expected, ***a reliability growth plan must be clearly defined in the proposal.*** The following must be addressed as part of the growth program:

- a) The initial reliability performance (i.e., MTBF, Mean Life, B₁₀) expected on the first customer units must be specified.
- b) The reliability growth rate that is expected during the growth period must be specified. The growth rate must reflect a rate indicative of an on-purpose reliability improvement program.
- c) The method of data collection that will be used to identify areas of improvement (i.e., demonstration testing, field failure analysis and etc.) must be outlined.



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2.1.3 RELIABILITY GROWTH PLAN (continued)

- d) A detailed plan for product upgrade to obtain the mature reliability performance must be provided. This should include expected costs and vehicle downtime.

RELIABILITY GROWTH PLAN DELIVERABLE

When specified, this is required 30 days after contract award.

This deliverable is only pertinent when the product is not mature at the time AM General goes into vehicle production. The deliverable would be a growth plan that includes items a-d above.

2.1.4 DEVELOPMENT FAILURE REPORTING

All failures of development units that occur during testing or screening must be documented and reported to AM General. A reporting method will be determined by the supplier. Failure Review meetings may be called at AM General's discretion.

DEVELOPMENT FAILURE REPORTING DELIVERABLE

Required 30 days after request -

Provide a report showing failures recorded from developmental testing or infant mortality screening.

NOTE: Deliverables for Sections 2.1.4 and 2.1.5 may be combined.

2.1.5 DEVELOPMENT / EVALUATION CORRECTIVE ACTION PLAN

This section applies to components that are installed into AM General's test articles and prototype vehicle, which means AM General Product Reliability determines the reliability performance. In the event that a component is removed and an investigation is determined to be necessary by AM General, a root cause failure analysis is required at no cost to AM General. Root cause failure analysis may include identification of failures through physical, chemical and/or electrical failure analysis techniques. In the event that corrective action is necessary and warranted, a corrective action plan must be initiated.

DEVELOPMENT / EVALUATION CORRECTIVE ACTION PLAN DELIVERABLE

Required 30 days after request -

Provide a corrective action plan, related to root cause failure analysis, in the event a component is/was removed from a customer's test or proto-type vehicle.

2.1.6 RELIABILITY DEVELOPMENT PROGRAM RISK ASSESSMENT REPORT

A written report is required identifying the risk elements associated with the reliability development program. Risk elements may include activities or issues that may have an impact on the success of the Reliability Development Program. This report should be included as part of the Reliability Development Program

RELIABILITY DEVELOPMENT PROGRAM RISK ASSESSMENT REPORT DELIVERABLE

Required 90 days after contract award -

Provide a written report disclosing activities or issues that may have an impact on the success of the "Development" program.



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2.1.7 LIFE COST ANALYSIS

An important part of the reliability component evaluation is Life cost Analysis. Life Cost Analysis is expressed as parameters influencing cost with respect to component life. The intent is to compare design opportunities and optimize designs during the concept and development cycles. The supplier is to provide an estimate of the parameters below:

- a) exchange cost [actual (or estimated) cost of a service part, if available, as part of the product support agreement];
- b) average repair time and repair turnaround time (if not repairable, then, amount of time to remove and replace the component in the event of a failure during life of the vehicle and expected frequency of remove/replace within vehicle life). If component is designed to meet vehicle life, determine the amount of time required to remove/replace the component in the event there is an external cause.
- c) any scheduled maintenance required (i.e. inspections, recalibrations, overhaul, etc.), if none required, show “none required” and reason.
- d) estimates of vehicle maintenance times required to perform the tasks identified in letter (c).

LIFE COST ANALYSIS DELIVERABLE

Required 60 days after contract award -

Provide an example of comparing overall life cost of two different design options on a program. In addition to the reliability and maintenance costs above, the following may be included.....costs associated with development, test, maintenance, replacement..... values should be recorded for each design option.

3.0 RELIABILITY PRODUCTION PROGRAM

3.1 RELIABILITY PRODUCTION PROGRAM PLAN

The Reliability Production Program Plan details and governs activities during component production. The reliability production plan’s objective is to detect reliability issues early and implement corrective action to minimize impact. Key activities include reliability screening, strict failure reporting, root cause failure analysis, and corrective action of production units.

RELIABILITY PRODUCTION PROGRAM PLAN DELIVERABLE

Required 60 days after contract award -

Provide a plan that shows the key activities employed to detect reliability issues early and implementation of corrective action. Items to include are product screening for infant mortality – this could be driven by the DFMEA/PFMEA, failure reporting, root cause failure analysis and corrective action (short term containment and long term fix). This plan would show the activity, timing that process will be complete or the event will be begin (or reviewed for update if existing) and responsible party.



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

3.1.1 RELIABILITY SCREENING

Reliability screening or “burn-in” is a proactive process, when tailored, detects component defects before reaching AM General. The supplier should respond with the capability of conducting reliability screening tests for production units. Capability may include temperature cycling or thermal shock, power-cycling, or random vibration. A reliability screening plan is required by AM General Product Reliability for approval when reliability screening is required by the Engineering Specification Drawing. The screening methodology will be proposed by the supplier and approved by AM General Product Reliability.

RELIABILITY SCREENING DELIVERABLE

Required when a deficiency impacts product reliability -

This deliverable shows the plan to accelerate the infant mortality period of a product to screen out defects that would have resulted in early failures at the customer. Generally used in manufacturing of electronic or electromechanical components or assemblies to find weak components and workmanship errors that impact product reliability. Technically, this activity is driven by the PFMEA.

3.1.2 PRODUCTION FAILURE REPORTING

All failures of production units that occur during testing or screening prior to shipment to AM General must be documented and available to AM General Product Reliability for review. Failure Review meetings may be called at AM General’s discretion.

PRODUCTION FAILURE REPORTING DELIVERABLE

Required when applicable -

Provide records/reports showing production units that fail during test.

3.1.3 PRODUCTION ROOT CAUSE FAILURE ANALYSIS

Production Root Cause Failure Analysis is an investigation process to determine the cause of a production unit failure. All failures that occur during production will have a root cause failure analysis performed. All failure analysis reports must be documented and available to AM General Product Reliability for review.

PRODUCTION ROOT CAUSE FAILURE ANALYSIS DELIVERABLE

Required when applicable -

Provide documentation of the company’s investigation process used to determine root cause of a production unit that failed during test. Should include: Problem identification/description, possible causes, data gathering, investigative/analytical testing and result of investigation.

3.1.4 PRODUCTION CORRECTIVE ACTION PLAN

Production Corrective Action Plan is the actions required to correct a deficiency identified during root cause failure analysis. The plan includes methodology to identify true root cause, actions required to contain the deficiency, corrective action and verification the implemented corrective action is effective. AM General Product Reliability must review Production Corrective Action Plans that may impact product reliability.

PRODUCTION CORRECTIVE ACTION PLAN DELIVERABLE

Required when applicable -

Provide the company’s plan that includes all of the items listed above in 3.1.4.



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

4.0 RELIABILITY PRODUCT SUPPORT PROGRAM

4.1 RELIABILITY PRODUCT SUPPORT PROGRAM PLAN

The Reliability Product Support Program defines a plan that focuses upon measurable reliability issues of the supplier components in the field. This program's objective is to ensure components meet or exceed specified reliability requirements in the operational environment. The program includes reliability-based plans that set important actions, milestones, and committed completion dates that support the program schedule.

PRODUCT SUPPORT PROGRAM PLAN DELIVERABLE

Required 60 days after contract award -

Provide a reliability based plan that shows the company's actions, milestones and completion dates for how product will be supported in the field. "Field" is defined as product that is released from the company for customer use. The plan should contain items listed in this section.

4.1.1 RELIABILITY PRODUCT PERFORMANCE LEVELS

Reliability levels are specified (as appropriate) for each component or system provided to AM General. The tracking of reliability performance levels is the responsibility of AM General Product Reliability. If reliability performance falls below the requirement, AM General will initiate a Field Reliability Corrective Action Plan **with** the supplier.

RELIABILITY PRODUCT PERFORMANCE LEVELS

Required as part of Product Support Program Plan -

Provide a plan that shows the company is prepared to work with the customer to do what is necessary when Field Reliability Corrective Action is required. This could be a flow chart of the process used by the company showing how a customer request/complaint (or a Request for Corrective Action) is processed in regards to production part failures that are reported from the field. Should include all actions short and long term.

4.1.2 FIELD RELIABILITY and FAILURE ANALYSIS REPORTING

In the event that the component's reliability performance drops below the requirement, all subsequent removals which are returned to the supplier will undergo root cause failure analysis. Failure Analysis reports shall be sent to AM General Product Reliability for review.

FIELD RELIABILITY AND FAILURE ANALYSIS REPORTING DELIVERABLE

Required 30 days after requested by AM General and disposition to supplier -

Provide documentation showing recording and processing of failed production parts that are removed and returned to the company from the field. Report should include the quantity, description of reported defect, method of analysis and findings.

4.1.3 FIELD RELIABILITY CORRECTIVE ACTION

When reliability performance, as determined by AM General Product Reliability, falls below the required level, the supplier and AM General will jointly investigate to determine the causes. Should this review indicate the supplier is responsible or substantially responsible, the **supplier shall**, at no cost to AM General, **initiate a field corrective action plan**.



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

4.1.3 FIELD RELIABILITY CORRECTIVE ACTION PLAN (continued)

- 4.1.3.1 The field reliability corrective action plan should be implemented for the purpose of improving reliability to the level specified.
- 4.1.3.2 Additional consignment spares will be provided to AM General inventory so as to preclude out-of-stock situations that may result from product support demands.
- 4.1.3.3 The field corrective action plan must be continued until the reliability performance improves to the level required. All units containing the deficiencies that caused the reliability performance experience to fall short of the required level, including all future products not yet delivered to AM General, the in-service fleet and spares inventories, must be purged by either modification or replacement.

FIELD RELIABILITY CORRECTIVE ACTION PLAN DELIVERABLE

Required when applicable -

This plan will include steps to be taken by the company in the event the company is found responsible for the cause of field failure. The plan would include execution of all items listed in 4.1.3.1-4.1.3.3.

5.0 NO FAULT FOUND (NFF) POLICY

Once failure analysis has been conducted on removed components, they can be categorized and grouped by issue. A Pareto analysis by ranking the issues from greatest to least is required to address the significant issues that make up 80% of the removals. If the NFF issue falls within the 80% category, the removals are considered excessive and an investigation followed by corrective action (see Section 4.1.2) is warranted to reduce the No Fault Found rate.

AM General policy states that a NFF removal is to be considered a chargeable event as part of the reliability tracking of a component. Testing and verification costs related to NFF cannot be charged to AM General.

NO FAULT FOUND (NFF) POLICY DELIVERABLE

Required 30 days after AM General request

Provide a pareto analysis of the failure analysis for "removed" components (reference 4.1.2). Provide an example of comparing the issues originally reported of the "No Fault Found" components against the actual analysis within the pareto of "removed" components. Show the actions taken when a NFF part issue is within the 80% area of the pareto.



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

APPENDIX A - REFERENCES

RELIABILITY DEVELOPMENT PROGRAM PLAN DOCUMENTS

2.1 Reliability Development Program Plan

- *AIAG Reliability Methods Implementation Guide*

2.1.1 Reliability Performance Level

- *AIAG Potential Failure Modes and Effects Analysis - Manual*
- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 11 Failure Modes and Effects Analysis*
 - *Tool 26 Product Performance Specifications*
 - *Tool 42 Test Plan and Reports*

2.1.2 Reliability Validation Plan

- *Reference Section 2.1*
- *Practical Reliability Engineering, by Patrick O'Connor - Reliability Demonstration*
- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 1 Accelerated Testing*
 - *Tool 16 Highly Accelerated Life Testing and Stress Screening*
 - *Tool 9 Environmental Stress Screening*

2.1.3 Reliability Growth Plan

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 34 Reliability Growth Modeling*

2.1.4 Failure Analysis Reports

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 12 Failure Reporting, Analysis, Corrective Action*
 - *Tool 23 Problem Solving and Root Cause Analysis*

2.1.5 Development / Evaluation Corrective Action Plan

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 12 Failure Reporting, Analysis, Corrective Action System*

2.1.6 Reliability Program Risk Assessment Report

- *Reference Section 2.1.6*
- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 31 Reliability Allocation Model*

2.1.7 Life Cost Analysis

- *AIAG THE-7 Reliability Methods Guideline - Tool 17 Life Cycle Cost Analysis*



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

RELIABILITY PRODUCTION PROGRAM DOCUMENTS

3.1 Reliability Production Program Plan

- *AIAG THE-7IG Reliability Methods Implementation Guide - Product Reliability Plan*

3.1.1 Reliability Screening Plan

- *Reference Section 3.1*
- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 8 Early Warning Problem Identification*
 - *Tool 9 Environmental Stress Screening*
 - *Tool 16 High Accelerated Life Test / Stress Screening (HASS)*

3.1.2 Production Failure Reporting

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 12 Failure Reporting, Analysis, Corrective Action*
 - *Tool 23 Problem Solving and Root Cause Analysis*

3.1.3 Failure Analysis Reports

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 23 Problem Solving and Root Cause Analysis*

3.1.4 Production Corrective Action Plan

- *Tool 23 Problem Solving and Root Cause Analysis*

RELIABILITY PRODUCT SUPPORT PROGRAM DOCUMENTS

4.1 Reliability Product Support Program Plan

- *Reference Section 4.1*

4.1.1 Reliability Product Performance Levels

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 8 Early Warning Problem Identification*
 - *Tool 43 Warranty Database*

4.1.2 Field Reliability Reporting and Failure Analysis Reports

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 12 Failure Reporting, Analysis, Corrective Action*
 - *Tool 23 Problem Solving and Root Cause Analysis*

4.1.3 Field Reliability Corrective Action Plan

- *AIAG THE-7 Reliability Methods Guideline*
 - *Tool 23 Problem Solving and Root Cause Analysis*

NO FAULT FOUND

- PRACTICAL RELIABILITY ENGINEERING
Author: Patrick D. T. O'Connor, Fourth Edition, February 2005



AM GENERAL SUPPLIER RELIABILITY ASSURANCE REQUIREMENTS

APPENDIX A - REFERENCES

AUTOMOTIVE INDUSTRY ACTION GROUP (AIAG)

- ~ THE-7 Reliability Methods Guideline
Contains Reliability Tool Matrix and description of each tool
- ~ THE-7IG Reliability Methods Implementation Guide
Contains templates of program plans, forms, Reliability Tool Matrix, etc.
- ~ AIAG Advanced Product Quality Planning and Control Plan
- ~ AIAG Potential Failure Mode and Effects Analysis
- ~ AIAG Production Part and Approval Process

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

- ~ SAE JA 1000 Reliability Program Standard
- ~ SAE JA 1000-1 Reliability Program Standard Implementation Guide
Reliability Methods and Descriptions

PRACTICAL RELIABILITY ENGINEERING

Author: Patrick D. T. O'Connor, Fourth Edition, February 2005