Appendix x

*Quality Assurance Plan*

Revision History

|  |  |  |  |
| --- | --- | --- | --- |
| Date | Version | Description | Author |
| 12th October, 2017 | 1 | The software quality management plan is created in MS office Microsot Word. | - |

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# Introduction

This document contains the plan for quality assurance. The software under development is ABS system which is part of automotive system. In this documents the managent process, different documentations regarding ABS system and the methods and tools required to use are explicitly reported.

## Purpose

This Quality Assurance (QA) Plan details the overall approach to quality assurance activities for Automotive ABS System. This QA Plan documents how the project defines, implements and assures quality during the software development process.This QA Plan is a communication vehicle for the entire project team, including the project manager, development manager, developers, test analysts, SQA analysts, technical writers, functional analysts, other project teams, and users.

## Scope

This QA plan document is about the planning of software system quality management. This document is associated with Automotive ABS software System. This document plans the quality checking criteria for the selected software system.

The items which lies under this document is software system for Electronic Control Unit (ECU). The other systems like sensors, modulators or hardware items etc, are out of the scope of this document.

## Definitions and Abbreviations

### Definitions

|  |  |  |
| --- | --- | --- |
| No. | Term | Description |
|  | Process | Series of actions or steps taken in order to achieve a particular goal. |
|  | Proactive | A person or action creating or controlling a situation rather than just responding to it after it has happened. |
|  | Staff function | A staff function is an alternate function of people that do not partake instantly in an activity as they help the line functions to reach their targets. |
|  | Prevent defects | Getting the critical risks defined allows people to know the types of defects that are most likely to occur and the ones that can have the greatest system impact. |
|  | Quality Audit | Quality audit is the process of systematic examination of  a quality system carried out by an internal or external quality auditor or an audit team. |
|  | Training | The action of teaching person a particular skill. |

### Abbreviations

|  |  |  |
| --- | --- | --- |
| No. | Term | Description |
|  | ABS | Anti-lock Braking System |
|  | QA | Quality Assurance |
|  | SQA | Software Quality Assurance |
|  | RS | Requirement Specifications |
|  | QUEST | Quality Assurance and Testing |

## References

Below are the referenced documents which can be used in multiple sections of QA document.

|  |  |
| --- | --- |
| ID | Tittle |
|  | System specifications |
|  | Performance specifications & performance data manual |
|  | System qualification test report |
|  | ISO – 26262:10 – Guidelines and methods for conducting the safety assessment process on automotive systems |
|  | Functional Safety Assessment Plan |
|  | PMAS Guide Section 6.4.1 |

# Quality Objectives

The document refered in as system specification document, which contains all of the system requirement. During that stage we have also developed the quality requirement as well.

# Management

## Organization

The organization responsible for the quality assurance is QUEST lab private limited. The evaluation of the software product would be done by the representative of this lab. Following documents would be provided on demand of certification organizations

* QA Organization Chart (to include Program Management, Program Executive Office, Portfolio and Software Development)
* Project Team Organization Chart (to include the project SQA team)
* Additional supporting organizational documents, to include other internal teams, external vendors, and any other teams/organizations participating in the project’s QA process.

## Reviews

The reviews to be conducted in quality assurance activity are listed below. These reviews will assure the implementation of software system upon the standard ISO-26262.

* **Peer Review** - the evaluation of an artifact or its performance by peers in order to maintain or enhance the quality or performance of the artifact.
* **Formal Review** - a structured examination of an artifact by an assigned formal review team.
* **Milestone Reviews** - Milestone Reviews are mandatory and ensure that the work required in the current state is complete and the project is ready to enter the next state. PMAS Guide Section 6.4.1. Defines these reviews.

1. The Milestone 0 Review occurs in Project Initiation after the Formal Review of the requirements.
2. The Milestone 1 Review occurs in Project Planning after review by the project responsobles. Projects require a Milestone 1 review to establish if in full compliance before transitioning to Active.
3. The Milestone 2 Review occurs after the Initial operational capability. The review also ensures the project is ready to enter the active Implementation stage. Projects can deliver multiple increments and each increment would receive a Milestone 2 Review.
4. The Milestone 3 Review occurs at the end of the active state and establishes that the project has completed all of its Active state activities. The review also ensures the project is ready to enter the closed state.
5. The Milestone 4 Review occurs at the end of the closed state. The review ensures that the project has completed all of the activities of the closed state. It also ensures that the project is ready to end all activities. At this review, the project is closed and the delivered capabilities are in use.
6. A Milestone 4 Review is also required if a project is closed-stopped; no other review is necessary.

# Documentation

The number of planning documents have been reported in the reference section. All of the refered documents are related to the ABS system under development.

# Standards and Guidelines

|  |  |
| --- | --- |
| ID | Title |
|  | Parent standard for template documents i.e. IEC - 61508 |
|  | ISO 26262 Automotive standard to follow |
|  | PMAS Guide Section 6.4.1 |

# Documentation Reviews

## Artifacts

The project artifacts that will be the subject of the review would be software system models developed in matlab, the modified models according to the software requirements and the final source code generated from these model used.

## Review Plan

The review plan for each of the artifact would be followed according to the table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Artifact | Resources | Method | Time Line |
| Requirement Specifications (RS) | Domain Experts Personal | Peer Review, Milestone Review | 2 weeks |
| Model Development from RS | Project Manager, Developers | Milestone Review | 2 weeks |
| Model Refinement | Domain Experts Personal, Project Manager | Formal Review, Milestone Review | 2 weeks |
| Source Code | Domain Experts Personal, Project Manager | Formal Review, Milestone Review | 1 weeks |
| End Product | End Users, Domain Experts Personal, Project Manager | Peer Review | 1 weeks |

## Review Schedule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Artifact | Version | Modifcation | Milestone | Time Line |
| Requirement Specifications (RS) | 1…n | Changed requirement details | Milestone 0 | 2 Weeks |
| Model Refinement | 1…n | Modification document details | Milestone 1, 2 | 1 Weeks |
| Source Code | 1…n | Updated versions | Milestone 3, 4 | 1 Weeks |
| End Product | 1…n | Running Application | Milestone 4 | 1 Weeks |

## Organization and Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| Group / Indivisual | Review Activity | Task | Standard |
| Project Manager | Formal Review | Manage the development according to standard | ISO-26262 |
| Team Lead | Milestone Review, Formal Review | Implement rules according to standard | ISO-26262 |
| Quality Assurance | Milestone Review, Formal Review | Implement rules according to standard | ISO-26262 |
| Domain Experts | Peer Review | Provide feedbacks, Assign tasks | ISO-26262 |

## Tools, Techniques and Methodologies

|  |  |
| --- | --- |
| Tools | PinPoint Review |
| Techniques | Inspections, UML Class Diagrams Reviews |
| Methodology | Checklist Document |

## Quality Records

Quality records include documentation established and maintained to provide evidence of conformance to requirements and to the effective operation of the quality management system In this plan we will use checklist, meeting agendas and meeting minutes documentations.

# Test and Evaluation

Test and Evaluation plan is separately developed i.e. Appendix y.

# Tools, Techniques and Methodologies

|  |  |
| --- | --- |
| Tools | Matlab, PinPoint Review |
| Techniques | Code inspection, UML Diagrams |
| Methodologies | Check list, Reviews |

# Configuration Management

The configuration plan for the ABS software system is developed seperatly according to the ISO-26262 standard i.e. Appendix z.

# Risk Management

The Risk management plan is the sub section in functional safety assessment plan document i.e. Appendix A.

# Standards

We’ll be following the standards defined below in our project

* IEEE requirement standard
* Misra C++ 2008 standard