

The following is a list of just some of the documentation developed and used to design, build and ship electro-mechanical products. This list includes purpose of document and department generally responsible for producing it.

1. Documents

1.1 Marketing Requirements Document

Created by Marketing to define the product. This is the initial document that completely defines the product, it's intended use, marketplace, MTBF requirements, configuration(s), shipping requirements, color, cost/price target(s), environmental requirements, agency approvals, end of life, etc. It is used by Engineering to create the Product Specification(s) and by Manufacturing to determine configurations to be produced, method of packaging, overall product requirements and if cost/price targets can be met.

1.2 Marketing Forecast

Created by Marketing and is used for material planning, capacity planning, resource allocation etc. The forecast is used to drive the MRP system.

1.3 Product Specification

Created by Engineering to define the product design based on the Marketing Requirements Document. This is the primary design document that is used by Manufacturing to determine if the product produced is acceptable. Product Specifications should be created for the top level product and any major assemblies such as Printed Circuit Board Assemblies.

1.4 Theory of Operations

Created by Engineering to explain how the product functions. It is used by Manufacturing to troubleshoot assembly failures. Theory of Operations should be created for any assemblies requiring testing.

1.5 Test Specification

Created by Engineering to specify the test parameters that must be met in order for the tested product to be considered acceptable. This may be a stand alone document or be included in the Product Specification or the Theory of Operations. Test Specifications are required for any assemblies requiring testing.

1.6 Trouble Shooting Test Matrix

Created by Engineering or Test Engineering to define both the most common failure modes and a systematic method of trouble shooting. This may be a stand alone document or be included in the Product Specification, Test Specification, or Theory of Operations and should be created for any assemblies requiring testing.

1.7 Design Maturity Testing/Analysis (MTBF)

Performed by Engineering to determine if MTBF meets the Marketing Requirements Document. The results are used by Customer Service to create the Service, Customer Support, and Warranty Plan for product /customer returns and warranty repair.

1.8 Worst Case Design Analysis

Done by Engineering to determine if the design tolerances are acceptable and to determine assembly compatibility. Used by Manufacturing to determine vendor/part selection.

1.9 Design Verification / Acceptance Test Plan

Created by Engineering to determine if the design meets the Marketing Requirements Document and the Product Specification(s). Used by Manufacturing to determine if the design is ready for production.

1.10 IRT / ORT Plan

The Initial Reliability Test Plan is created by Engineering and Manufacturing to determine if the initial product meets the Marketing Requirements Document. The Ongoing Reliability Tests are performed to determine if ongoing production meets Marketing Requirements Document and the Product Specification(s).

1.11 Assembly Drawing

Created by Engineering and Manufacturing to show how each assembly is assembled. Used by Manufacturing to assemble the product and by Quality Assurance to determine if Manufacturing has assembled it correctly. Each assembly requires a drawing.

1.12 Bill of Materials

Created by Engineering to define the components/items required to build each assembly. The Bill of Materials usually includes internal part number(s), Manufacturer's name, Manufacturer's part number(s), and Description(s) for each component listed. Used by Manufacturing to plan part procurement and to assemble assemblies.

1.13 Component Specification

Created by Engineering for all non-standard and/or custom components to define that component. Used by Manufacturing to procure and inspect non-standard and/or custom components.

1.14 Mechanical Drawing

Created by Engineering for all fabricated items including Printed Circuit Board. Used by Manufacturing to procure fabricated items and Quality Assurance to determine if the fabricated item meets Engineering design.

1.15 Schematic

Created by Engineering for all electrical/electronic assemblies. Used by Engineering to create Artwork (Gerber files) for Printed Circuit boards and by Manufacturing for trouble-shooting assembly failures. Required for each electrical/electronic assembly.

1.16 Artwork

Created by Engineering for the production of Printed Circuit Boards or to produce Silk screens for marking fabricated items. Used by Manufacturing to produce Printed Circuit Boards or fabricated items.

1.17 Net list

Created by Engineering and used by Manufacturing for the development of test fixturing.

1.18 Software Specification

Created by Software to define product software requirements. Used by Manufacturing to understand how the software works for trouble-shooting.

1.19 Software Test Document

Created by Software to define testing required to determine if the software meets the functionality requirements of the Product Specification.

1.20 Manufacturing Plan

Created by Manufacturing Engineering to define all aspects of production implementation. This plan includes but is not limited to personnel training, assembly tooling, capital equipment appropriation, assembly and test documentation, capacity planning etc.

1.21 Quality Assurance Plan

Created by Quality Assurance to define all aspects of product and process qualification. It also includes implementation of statistical systems to insure adherence to desired acceptable quality levels (AQL).

1.22 Service, Customer Support and Warranty Plan

Created by Customer Service to define all aspects of customer service, customer support, and warranty repairs.

2. Addition Items / Requirements

2.1 Master Software

Created by Software on a suitable media and used by Manufacturing to produce software for shipping, or to produce preprogrammed components for assembly.

2.2 First Articles

Created by Quality Assurance and approved by Engineering and Manufacturing Engineering to qualify the production of each fabricated item and/or assembly produced by an outside vendor. This includes but is not restricted to preprogrammed components, fabricated items, custom components, and assemblies. This is the Manufacturing process used to qualify a vendor to make or assembly an item. All such items must have a first article completed and approved in order for Manufacturing to know that the design is producible. First Article reports must be completed and approved anytime the design changes or a new vendor is used.

2.3 Agency Approvals

Agency approval requirements are defined in the Product Specification and completed by Engineering.

2.4 Shippable Documentation

Created by Marketing. This includes all end user documentation shipped with the product such as user manual(s), installation guide, pamphlets, labels, warranty/registration cards, etc.

2.5 Single Source List and Plan

A plan created by Engineering and Manufacturing to identify all single source items and a contingency strategy if parts become unavailable.