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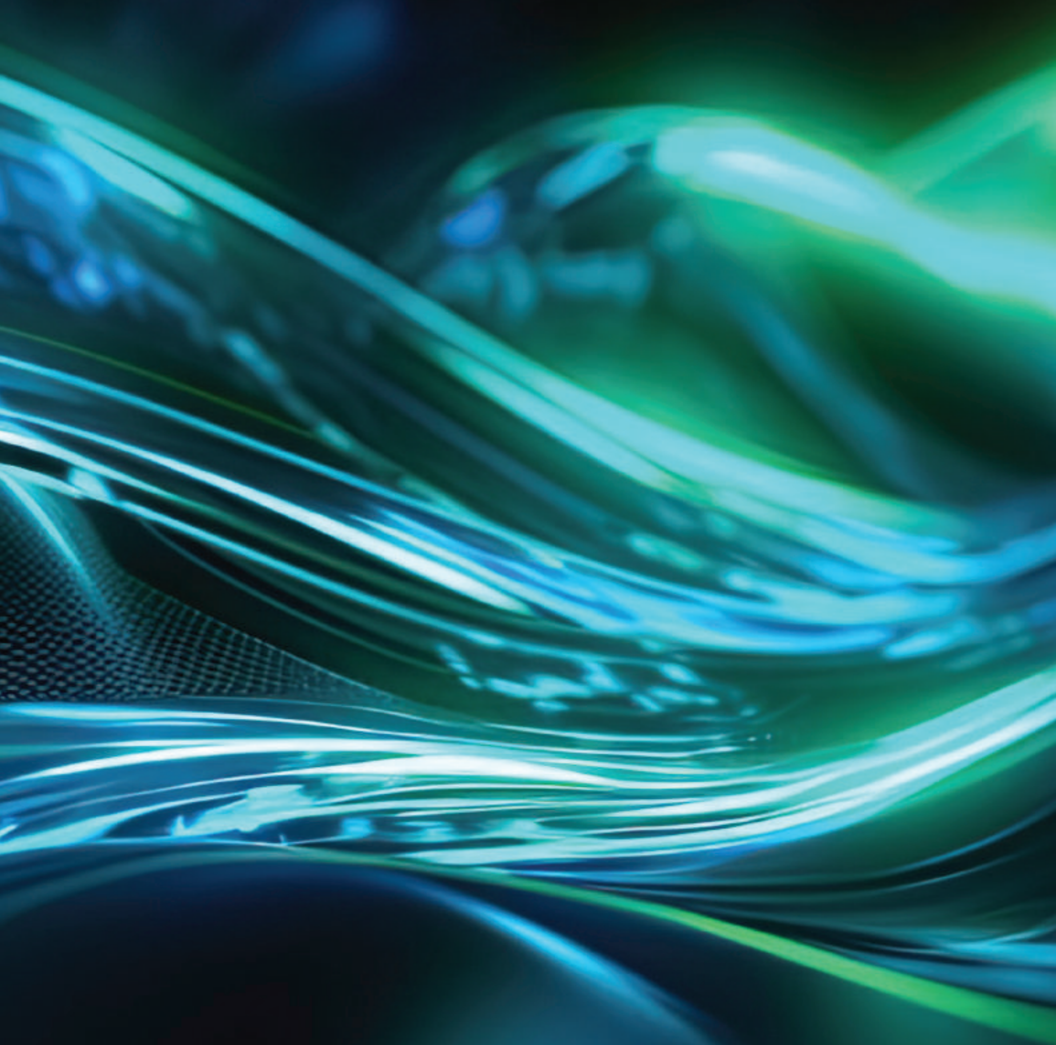


# Get Your Product to Market

Series 2

Design and Development

Product Engineering Guide

# TABLE OF CONTENTS

# HAVE YOU MISSED SERIES 1?

In Series 1 of Get Your Product to Market, we guided you through the process of product discovery in design and development. It outlines the key activities and outputs needed to progress a product to engineering.

By now you will have the details required to identify an order of magnitude for your engineering and manufacturing requirements. Upon review and approval by your key stakeholders, you will be ready to move into the engineering phase of the design and development process.

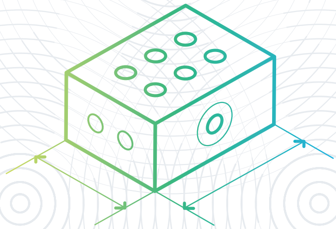
## YOU SHOULD HAVE ALREADY ESTABLISHED THE FOLLOWING BEFORE MOVING ON TO THIS STAGE:

- Signed off requirements specification
- Program of Works to reach "DFx" (ability to transfer design and development manufacture as the output)
- Order of magnitude


If you do not have the above assets in your product development toolkit, please download:

GetYour Product to Market - Series 1
Product Discovery Guide

emsynergetics.com/resources



# PRODUCT DESIGN AND DEVELOPMENT – PRODUCT ENGINEERING

Having a design that considers the constraints and goals of manufacturing is essential to a successful manufacturing process.

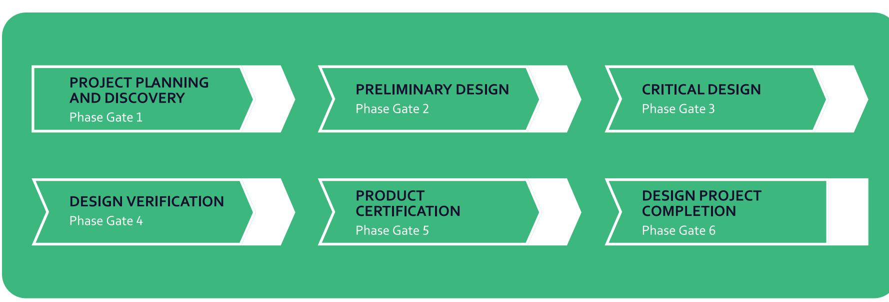
Before you submit a prototype to your contract manufacturer (CM) to build, there are some steps you need to take. During this design and development stage of your product journey, it is important to work with qualified engineers who have experience in design for manufacturing (DFM).

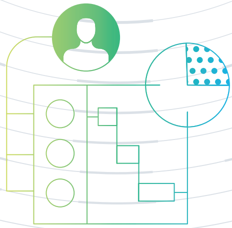
## DFM ACHIEVES THREE IMPORTANT GOALS:

- Improve the manufacturing feasibility of a product
- Reduce the overall costs of the product
- Improve the overall quality of the product

It is mandatory to follow a structured design process to achieve a successful product. Failure to follow a strict process will result in projects being over budget, over time, and possibly failure to reach market. Synergetics employs the Phase Gate (or waterfall) process that is widely used within the industry. As an ISO 13485 medical compliant design facility, the design control implemented has been developed using the US FDA quality systems to ensure high reliability devices.

The Phase Gates can be customized to avoid overhead for simpler designs and whilst specific activities with the Phase Gate are unique to the product requirements the gates generally used are:





# PHASE GATE 1: KICK OFF PROJECT PLANNING AND DISCOVERY

## PROJECT MANAGEMENT PLAN

The success of your project depends on the success of your project management plan. It is impossible to complete your project on time and deliver it successfully without a plan. The cost of unplanned and failed projects is high in terms of lost time, lost money, and lost resources. Managing electronic product manufacturing requires specialized resources, tools and processes. You need to leverage these resources in your project management plan. Included in this are (but not limited to):

### Project Scope

Outlining the project scope is important because now taking your high-level requirements and translating this into work packages for various disciplines within the team it's also critical to have a detailed understanding of the timeline and dependencies. The project scope will identify the:

- Project background
- Project governance
- Device overview
- Scope of works
- Any reference documentation (e.g. project schedule)
- Project schedule used by the project manager and communicating with internal and external stakeholders

## Roles and Responsibilities

Identifying the roles and responsibilities of your team and your solution provider's team is important because each contributor brings a unique skill set that will add value to the project, albeit in adding value to the product engineering or managing the team, stakeholders, process, and the project timeline. Clearly defined responsibilities ensure the meeting of project milestones and important calendar dates.This section in a project management plan will include:

- Internal team structure and responsibilities
- Solution provider team structure and responsibilities
- Roles and responsibilities of all members at a project level

## Design Stages

Although your solution provider will use a specialist phase gate approach for your design for manufacturing project, the precise activities involved in each stage will vary depending on the unique product requirements. Your phase gate stages, and associated activities should be clearly explained and reiterated in this section.

## Deliverables

Establishing design deliverables is important because it forms the project governance between all parties and builds steering group expectations. This section of your plan should detail the following outputs as a minimum, depending on the project and product requirements:

- Project documentation
- Design sign-off reviews
- Design inputs provided by your team
- Design output/s
- Delivery method/s
- Project schedule

This section should also include any exclusions or parts of the project that are nominated as out of scope.

## Design Documentation Controls

Having controls in place to manage your design documentation is important because the work commences based on agreed requirements and so not defining this at the outset can lead to confusion, delays, and cost blow out. Design documentation can include but is not limited to:

- Device Master Record
- Project Management Plan
- Requirements and verification matrix (including firmware)
- Program Risk Management Plan
- Integrated Master schedule
- Quality Management Plan
- Firmware Architecture
- Hardware Design Description
- Verification test plan
- Verification test report
- Compliance test plan for applicable regulatory standards
- BOM master
- Desktop application software
- Design Specification (drawings, schematics, etc)
- 3D CAD models
- PCB design
- Design review records
- Meeting Minutes

Whilst this section in a project management plan will be unique to the processes incorporated by your company and your solution provider, however, they include aspects such as:

- What documentation will be created
- Where documentation is stored
- How the documentation will be governed via process, people and/or technology

## Scope Management

By this stage, your scope should be considered final (see our Series 1 guide for more information on the importance of scope confirmation in the earliest possible stages of your project) however there can, at times, be amendments to the scope throughout the DFM stage. To ensure changes to the scope are managed effectively and with as little impact as possible, this section will outline how suggested scope changes will be managed including the people involved, project impact and the submission and approval of scope changes.

# QUALITY MANAGEMENT PLAN

In electronics design and engineering, the quality management plan assures the quality of the design deliverables by describing the necessary information required to effectively manage the design project quality. As a part of ensuring the quality, the plan also incorporates the procedures used to manage and develop the design deliverables. The quality management plan should include but not be limited to:

## Quality Objectives

By documenting your quality objectives up front, all key stakeholders will be across each of the objectives. This will typically include clear statements regarding the expected outcome or result, as well as enable stakeholders to determine the success of the quality objectives and how they will be aligned to the Integrated Master Schedule.

## Quality Management Approach

The quality management approach will ensure that all personnel in the project "do the right things, correct, the first time" thus avoiding misunderstandings of what to produce and how, resulting in productivity losses, quality losses and schedule delays. This is achieved by early identification and reviews of all quality-impacting documents and deliverables such as:

- Requirements in the requirements analysis/requirements verification matrix
- Risk management plan and assessment
- System architecture
- Design reviews

Importantly, if you have not already done so, you should be seeking a better understanding of the quality accreditations held by your solution provider as the accreditation will guide the standard of the quality management approach.

## Quality Control

Quality Control in your design project focuses on the project deliverables and monitors them to verify they are complete, correct, and of acceptable quality. The list of deliverables where quality control is applied should be those listed in Stage 1: Design Documentation Deliverables on page 6 of this guide.

## Quality Assurance

Unlike Quality Control which focuses on the documentation aspect of your project, Quality Assurance focuses on the processes used in the project. Quality Assurance ensures that the processes in your design project are used effectively to develop quality project deliverables. This section will outline:

- What those activities are such as an internal project review or design review
- The regularity of these activities
- Who is involved
- What the result of these activities are
- How the progress of the activities will be documented

## Roles and Responsibilities

This section will outline the roles and responsibilities of the key stakeholders involved in the quality management processes. Although specific to your project and your specialist supplier, you should include the:

- Project Manager
- Quality Manager
- Project team members

## Documented Quality Procedures

The Quality Management Plan should provide you with insight regarding what quality procedures your specialist supplier has embedded within their design project processes as a part of their standard operating procedures. It may include procedures such as:

- Design control
- Design risk management
- Device master record
- Design changes notice
- Design and development project documentation control
- ESD policy (design)
- Software version control

# INTEGRATED MASTER SCHEDULE

Whilst a high-level Integrated Master Schedule would have been identified in the Discovery Stage (download our Guide 1: Product Discovery for more information) it is developed in full at this stage of your design project. As identified by your solution provider throughout the requirements specification journey, your Integrated Master Schedule includes all task deliverables. Often, the schedule works backward from your planned market deadline and is a critical piece of information to determine what needs to be accomplished and when. Additionally, you should include the lead times and manufacturing requirements for each component in your market deadlines.

# RISK MANAGEMENT PLAN

Risk management is an ongoing process throughout the life of a project. The Risk Management Plan provides a management framework to ensure that levels of risk and uncertainty related to your design project are managed effectively.

The Risk Management Plan will define thefollowing:

- A complete risk assessment containing all risks identified for the project
- The current gradings of the risks and the identified risk mitigation strategies to reduce the likelihood and seriousness of each risk
- How often risks will be reviewed, the process for review and who will be involved
- How reporting on risk status, and changes to risk status, will be undertaken within the project
- How risk mitigation strategies will be developed and deployed to reduce the likelihood and/or impact of risks
- The process that will be adopted by the project team to identify, analyze and evaluate risks during the design and development phase of the project
- Roles and responsibilities for risk management

It is important to recognize that risks can occur at any time throughout a project and a risk assessment must be considered a “snapshot” of relevant risks at one point in time. Regular risk assessments at key stages of the design project are the only way to reduce the chance of risk within your project.

# REQUIREMENTS VERIFICATION MATRIX

From capturing the product requirements through to verification of each requirement, a Requirements Verification Matrix (RVM) provides a thorough trace of the agreed requirements. Typically, an RVM consists of:

- Unique requirement identification number for traceability
- Each requirement description
- Acceptance, Exception, or Modification to each requirement
- Requirement traceability to design specification
- All standards that are required for design, verification, and compliance
- Verification methods to be used
- Test traceability to verification reports
- Verification acceptance

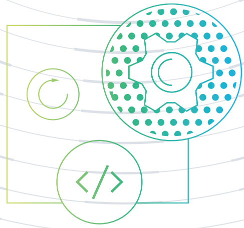
Your team should regularly review this document to track your solution provider's progress in meeting your requirements, and therefore bringing your product to life.

# STAGE 1 SIGN-OFF

Upon completion of the project management plan, the project team and key stakeholders are provided with a formal description of the product development plan, key outputs, and management framework that will facilitate efficient and effective delivery.

## Considerations throughout the sign-off stage with your solution provider:

Only progress to Phase Gate 2 once all stakeholders have agreed that all Project Planning and Discovery documentation is complete and signed. This stage is critical as it will set the stage for your expectations of further Phase Gates. It's important to review all vendor accreditations and request a copy of their Quality Manual.



# PHASE GATE 2: PRELIMINARY DESIGN DESIGN SPECIFICATION

## HARDWARE REQUIREMENT SPECIFICATION

A Hardware Requirements Specification describes the electronic hardware on which the software and firmware of your product may reside, as well as how it will be connected to any existing equipment (e.g., vehicles, towers, devices). The purpose of this document is to define the requirements derived from the Requirement Verification Matrix. The RVM captures all requirements as agreed between both parties. The Hardware Requirements arise from constraints, consideration of issues implied but not explicitly stated in the requirements, and factors introduced by the selected architecture.

Each derived requirement is traceable up to one or more RVM UID and traceable down to one or more test case ID. This provides a traceable link between agreed product requirements through to verification that the requirement has been satisfied. Hardware Design Specifications may include:

- Comprehensive specifications for all such equipment and instrumentation and details on all modes of process inputs and outputs
- Selected components to fulfill objectives.
- Safety considerations required for the design.
- Redundancy and failure mode considerations
- Environmental constraints
- Design considerations for testing and manufacturing

The document will typically follow a technical specification format such as:

**Purpose**

Clearly defined objectives of the hardware requirements specification.

**Scope**

What is the extent of influence and impact of the hardware under development and revision.

**Definitions and Acronyms**

This is important to list as you may not be fully familiar with the terminology used by your solution provider.

**Specific hardware requirements**

Information on the hardware which permits development and testing to be performed to your expectation.

**Regulatory and Compliance Requirements**

Details of regulations, licenses, corporate and industry standards which need to be met.

The hardware functional requirements, reliability expectations, usability expectations, performance requirements, maintainability, design constraints, interface expectations (hardware, software, communication, etc.), input and output devices, and display information may be included here.

In addition, performance expectations should be identified based on environmental factors, shocks, and wear and tear.

## FIRMWARE REQUIREMENT SPECIFICATION

In the Firmware Requirements Specification, functional requirements for your product firmware are identified in sufficient detail for firmware engineers to design it without ambiguity, and these requirements are also identified in sufficient detail so that verification test procedures can be designed accordingly. Firmware requirements are highly unique to your product, however, there is a quality standard to follow when developing your firmware requirements. It should include:

**Purpose**

Clearly defined objectives of the firmware requirements specification.

**Scope**

What is the extent of influence and impact of the firmware under development and revision.

**Definitions and Acronyms**

This is important to list as you may not be fully familiar with the terminology used by your solution provider.

**System Block Diagram**

The system block diagram will be a visualization of information or control flows within your product.

**Required States and Modes**

This describes the containers that define the control of the system's functions. State changes occur from outside the system, whereas Mode changes occur within it.

**Behavioral Requirements**

It is also imperative that each behavioral requirement is both unambiguous and testable. An unambiguous requirement statement does not require further explanation. Every effort should be made to make your behavioral requirements as clear and concise as possible.

**Interface Requirements**

This includes how the firmware interfaces with elements such as hardware, other firmware, users etc.

**Manufacturing Tests**

This details each test that is to be executed at manufacturing stage to ensure all aspects of your product firmware is working as it should.

## HARDWARE DESIGN DESCRIPTION

This describes the hardware functionality and features and functional description including a block diagram with inputs and outputs defined.

The design is described in detail on decisions made including component selection and all calculations to ensure all required requirements in the HRS are met and satisfied. This intellectual property enables future changes or modifications to be performed without reverse engineering. This evidence can also be used for the basis of patents if desired. The Hardware Design Description may include:

- Hardware architecture
- Interconnections and interfaces for all components including off-board connectors
- Firmware/Software design considerations
- Power topology including power budget and management
- User feedback and interfaces
- PCB construction, including stack up and impedance control
- EMC design considerations
- Manufacturing design considerations
- Environmental considerations

# FIRMWARE AND SOFTWARE ARCHITECTURE

The firmware and/or software architecture documents are individual documents as needed. They describe the architectural approach and system block diagram required to meet your unique firmware requirements. This is typically achieved with a collection of block diagrams describing how the high-level code will function. This is an outermost design layer that forms the basis of code use and the design for the remainder of the project. The firmware and/or software architecture documents may contain:

- Block diagrams with directional arrows connecting subsystems
- Hardware interfaces utilized
- Memory partitioning and allocation
- Data flows and protocols
- Device drivers, middleware, and application components

## System Block Diagram

The system block diagram will be a visualization of information or control flows within your product.

# FIRMWARE AND SOFTWARE DESIGN DESCRIPTION

The firmware and/or software design description documents are individual documents as needed. They define the middle layer of the design. This layer adds detail to the architecture that enables structured code to be written by a team of developers by predefining specific design details. The firmware and/or software design description may include:

- Function and variable names
- Names and responsibility of tasks within a subsystem
- RTOS details
- Device drivers
- CRC methodology
- Global parameters and arrays
- Data flow and protocol detailed design

# SCHEMATIC DESIGN

Your specialist provider is responsible for designing the schematics that define logical connections between components on a circuit board and all other components of your product. The diagram shows how the components are connected electrically. Engineers use schematic diagrams to document the elements of a complex circuit in an easy-to-read and understand format. The schematic design may include the following:

- Graphical component creation
- Discrete component selection
- Component pin allocation
- Every component connection defined
- Sub-system simulation
- PCB design notes

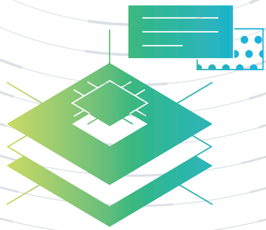
The completion of the schematic design provides a clear phase gate milestone where the design can be reviewed graphically. This enables a final review to ensure that the hardware design topology satisfies all hardware requirements. The schematic output is a generated netlist that can then be used for the PCB design and layout.

# DESIGN REVIEW AND UPDATE

Design reviews shall be conducted throughout the design process for all engineering disciplines to ensure correct integration and compliance to all requirements. At the completion of this Phase Gate, a formal review with all parties involved as identified within the PMP will be conducted. This provides the design authority with the opportunity to demonstrate how the system functions and how the requirements have been met through critical design.

All supporting management, systems, and engineering documents are updated and presented at this stage. The meeting conducted with all representatives is captured and signed off as complete before commencing with the next phase gate. Document changes may include:

- Personnel changes within PMP
- Review of current project risks within risk register
- RVM traceability updates



# PHASE GATE 3: CRITICAL DESIGN FUNCTIONAL DESIGN

## PCB DESIGN

Considering that a PCB holds all the components of a circuit, its design is determined by how complex the circuit is. A single-layer board design may be sufficient for a simple circuit. A multilayered or double-layered board may be recommended as the circuit complexity increases. The following main aspects will be considered when designing your PCB:

1. Requirements documentation
2. Schematic design
3. Component placement
4. Routing and output generation
5. Electrical safety
6. EMC layout considerations
7. Impedance & trace length control

The PCB is routed and designed in accordance with the Hardware Design Description. Correct PCB design is critical for a successful product. The CAD software package provides a design rule checker for verification of product specific design rules. PCB design through collaboration and internal peer reviews provides a structured development process whilst working to a strict schedule. The review process along with the final review checklist ensures the PCB is compliant with the project requirements, regulatory requirements, and manufacturing requirements.

## MECHANICAL DESIGN

The mechanical design of your product will ultimately determine its aesthetics. As PCB design impacts mechanical design, the mechanical engineer should incorporate the following considerations when producing your mechanical design:

- PCB outline, mounting, component height, and connector positions
- Materials used in the design
- Colors and finishes
- Product weight and dimensions
- Ingress protection and environmental considerations
- Design considerations for manufacturing
- Design considerations for human factors

## HEAT DISSIPATION

Through manual calculations and thermal analysis, mechanical designers can improve PCB heat dissipation. Heat dissipation can improve PCB life, reduce product development time, and reduce costs.

### Working Environment

During your product lifecycle, products including their electronics often need to withstand harsh environmental conditions. Layout considerations can be included to withstand environmental conditions such as:

- High and low temperatures, including solar radiation
- Humidity
- Shock or vibrations
- Exposure to solid or liquid particles

## PCBA AND MECHANICAL PROTOTYPE

Fundamentally, prototyping prevents product failure. Developing a prototype allows you to analyze the design and functionality before mass production.

Prototyping is not only a risk reduction technique, but it can also be a crucial step in the process of securing funding. It is often necessary to present prototypes at investor meetings or trade shows in order to demonstrate the look and value of your product.

## VERIFICATION TEST PROCEDURE

Before commencing the next project phase, the plan for completion of verification is required. This is captured in verification test plans. A plan for the electronic assembly, mechanical assembly, firmware, and/or software is captured in verification test procedure for each discipline.

The verification testing will ensure that all product requirements are satisfied as well as verify implied requirements that result from the final design. This includes signal integrity, power consumption, and reliability.

Although the testing mechanisms are highly dependent on your unique product, your specialist provider will apply the following format to the test procedure:

- Unique test case IDs
- Pre-conditions for each test
- Clear test steps to be conducted
- Pass/fail criteria

# COMPLIANCE PLAN

Compliance is conforming to a rule, such as a specification, policy, standard or law.

Some examples of regulatory compliance regulations include HIPAA - The U.S. Health Insurance Portability and Accountability Act, and GDPR - the European Union's General Data Protection Regulation.

ISO 13485 is designed to be used by organizations involved in the design, production, installation and servicing of medical devices and related services.

Medical device makers must adhere to Current Good Manufacturing Practice (CGMP) regulations, which FDA inspectors use to determine if a manufacturer has the facilities, skills, and equipment to produce and pack its product.

AS9100 compliance is the Aerospace Standard and is based on the ISO 9001 quality requirements and demonstrates your ability to consistently provide products that meet customer and regulatory requirements for Aviation, Space and Defense Organizations.

RoHS REACH compliance is a directive for products to be environmentally friendly. RoHS restricts the use of 10 specific substances from being used within a products assembly.

Electronic labelling compliance is required for products sold or used worldwide. The compliance requirements differ depending on the region the product is used. FCC, CE, and RCM are the most common compliance labels required. These are required for the United States, Europe, and Australia respectively. The labelling shows compliance to local regulations, which must be identified at the start of the project and incorporated in the design. The compliance plan will identify how this testing will be conducted and what custom firmware or software is required to complete the testing.

## Considerations throughout the critical and functional design stage with your solution provider:

The above considerations in conjunction with the project requirements will form the detailed mechanical design. As required by the project, the concept model is initially developed in CAD. Often 3 rendered models that meet the requirements will be produced and presented to the client. The design direction can then be considered, and the products industrial design and aesthetics refined. Finally, the detailed design and DFM can be incorporated to produce a complete mechanical design that satisfies all project requirements and personalized product styling.

At the completion of the detailed design phase, all aspects of the design should be complete. This includes a plan for verifying the design and a plan for ensuring regulatory compliance can be achieved.

The requirements traceability will demonstrate how all agreed requirements are satisfied by linkage from the RVM to the derived requirements and then to the corresponding test case in the verification procedure. The remaining verification and regulatory compliance phase will not incorporate any further design.

# PHASE GATE 4: VERIFICATION
# DESIGN VERIFICATION

## VERIFICATION REPORT

Your specialist supplier will utilize this stage to thoroughly test your product prototype for design flaws or bugs and address these before the product is approved for manufacture.

The verification report will document all aspects of the testing process including:

- List of equipment utilized for testing
- Device information
- Environment testing conditions
- Detailed verification results of each tested function of the electronic product

Your specialist provider should be updating you after each verification test however once all tests conducted are passed successfully, your product will be signed off as verified and ready to move to the next stage.

# FIRMWARE VERIFICATION & RELEASE

The embedded firmware will be completed during this phase gate. The initial release candidate will be used for firmware verification testing to ensure all requirements are satisfied as well and useability and stability. The firmware implementation is also a key factor for the products power consumption.

Once satisfied, the firmware is formally released, and User Acceptance Testing (UAT) can be conducted by all parties involved. This process will often form multiple test cycles to ensure firmware implementation is correct and ready for deployment.

The final release firmware will be delivered with all accompanying source code and build instructions. This IP is critical for the product owner to receive. It enables future firmware modifications and firmware support to be achieved.

# PROJECT MANAGEMENT DOCUMENTATION UPDATE

The phase gate is completed with a phase review and delivery sign-off. This delivery consists of completed verification reports supporting a successful product verification. Firmware/software and associated supporting documents including, source, build instructions and environment setup will be included.

All project management documents will be updated as required at the end of this phase gate as per all previous gates. All IP associated with the product from the design documentation through to CAD and firmware source to manufacturing data will have been submitted, reviewed and signedoff.

The product design and verification of the correct design is complete. Once this is achieved the product certification for regulatory compliance can commence.

# PHASE GATE 5: CERTIFICATION
# PRODUCT CERTIFICATION

## CERTIFICATION REPORT

The CE Mark is globally recognized and is valid in all European Countries. FDA approval is valid only in the USA. Most companies apply for the CE Mark first, due to this reason. Many products require CE marking before they can be sold in the EU. CE marking indicates that a product has been assessed by the manufacturer and deemed to meet EU safety, health and environmental protection requirements.

It is required for products manufactured anywhere in the world that are then sold in Europe. The UL mark is often considered to be the equivalent of the CE mark in Europe.

The UL mark is a voluntary certification. UL certification demonstrates the product has been tested by UL to nationally recognized safety and sustainability standards.

The Australian market requires a Regulatory Compliance Mark (RCM). This testing is similar to those required for CE and FCC accreditation. It consists of Electromagnetic Compliance (EMC) and product safety testing. The safety testing incorporates all safety aspects to prevent users from harm. The standards to follow for testing are dependent on the products power source and intended operational use.

Typically, RCM is all that is required unless the product is intended to be exported to overseas markets. Compliance to other markets should only be considered if necessary. Additional compliance is a costly process and dependent on the product it may require periodic re-compliance to the latest standards.

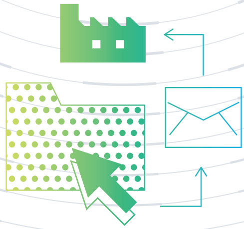
Additional compliance may be requested that is not regulatory mandated. This includes environmental testing, accelerated lifecycle testing, or industry specific testing.

## PROJECT MANAGEMENT DOCUMENTATION UPDATE

The completion of this phase will be supported by the relevant documentation updates. The RVM will now show compliance to all requirements through verification and compliance testing.

The compliance reports are the final engineering report required for a complete product.

The compliance report will identify if any additional modifications are required for the production units and what information is required on the products label and manual.



# PHASE GATE 6: DESIGN PROJECT COMPLETION

## COMPLETE DESIGN HISTORY FILE (DHF) HANDOVER

Design History files are provided once a project is complete, and they typically include but are not limited to files such as a Project Management Plan (PMP), Integrated Master Schedule (IMS), Requirements Verification Matrix, Risk Assessment Plan (RAP), Bill of Material (BOM), Hardware Schematic(s), Design Descriptions - Hardware and Mechanical, Verification Test Plan (VTPP), Verification Test Procedure (VTP), Verification Test Report (VTR), Assembly Work Instructions (AWI), Interface Control Document (ICD).

The complete DHF also includes all documentation created to design the IP of the product. As well as all source files and compiled or generated outputs. Extel provide access to the complete product design in an indexed catalog. This data pack can then be used for future product enhancements or modifications by the product owner, using the same contract designer, in-house or an alternative supplier.

It is important for the product owner to understand what ownership of the design they will have at the end of the project. It is critical to have defined ownership of the following:

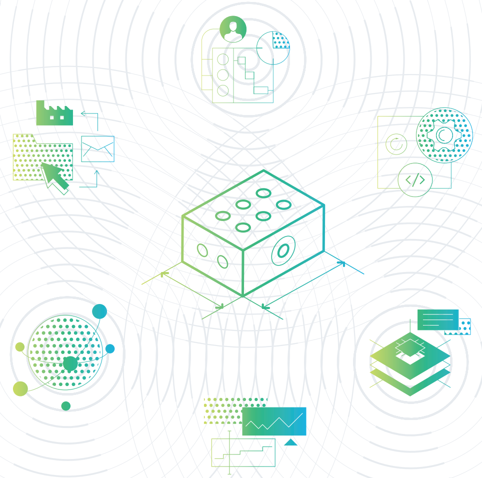
- Schematic and PCB source
- PCB fabrication files (including Gerber & BOM)
- Software source
- Firmware source
- Any licenses required
- Mechanical detailed drawings
- Mechanical source
- Assembly documentation
- Design documentation
- Proprietary / custom design implementations

# TRANSFER TO MANUFACTURING

Once your product satisfies all the pre-requisites, consisting of the previous stages, the design can be transferred to production. The production pack that is included in the DHF is delivered to the manufacturing facility. This delivery is receipted by the designer and product owner during a production transfer meeting.

The design engineers will hold a transfer meeting with the manufacturer to discuss the manufacturing pack. All aspects of the manufacturing and assembly process will be documented and discussed. This ensures the expected capability vs actual capability of the manufacturer are aligned. As well as an opportunity to clarify any steps within the process.

This completes the final phase of the design process. Each phase gate will now be signed off with the product owner and in possession of the entire design. The manufacturing facility will now be set-up to produce the design product to the correct specifications.



# CONTACT US TODAY

While product development in the electronics sector is a complex process, it does not have to be difficult or more time consuming on your resources than necessary if you know how to best approach it from the start.

Leverage our vast experience in getting your product to market and begin exploring your product development journey with us.

We hope this guide has been helpful in understanding the key stages and considerations involved in getting your product to market.

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