Software Architecture

ReenDocS – ReenDoo Design & Document System

For

[Automotive] Project Design & Management Module

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Contents

1. Introduction

1.1 Purpose

The purpose of this document is to identify any requirements related to the development of the application module system, including the website and database development model. In particular, this document is intended for:

- as a general guide for development team members to understand all project development needs
- as a benchmark and maintain the application development orientation to any change requests

1.2 Scope of Work

This application system will be implemented in every branch of the company in various countries. In general, application features that will be developed in this system include **Project Planning, Designer Assignment, Design Process,** and so on. The development of this system also includes data synchronization between the branches and the center.

2. General Description

2.1 Product Description

The development of ReenDocS :: Project Design & Management Module system includes 3 (three) major data processes and 1 (one) major data master. Major data flow is a process which controls the system from start until ready to be produced. Major data master is used for maintain and manage raw data so it can be processed in application system.

2.1.1 Project Data Entry

Project Data Entry is the first from three phase of major data process. In this phase, users need to determine, configure, define, and generate some information for project data so that data can be produced well.

a) **Project Planning**
   Project Planning is the very first process in application system to produce the project data. In this process, there is form that include some sections to generate and define many informations about the designate project. There are about three until five sections in Project Planning depend on user requirements, **Project Detail, Application, Planning,** and **Customer Specific Technical Requirements,** where **PPAP** or **Feasibility Commitment** is an additional requirement.

b) **Designer Assignment**
   The next process is Designer Assignment which handles everything about project design. From here, the role job is taken by **Design Manager** and **Assigned Designer** for processing the project design. There are some sub process in this step, **View Design, Sample Process, Feasibility Commitment,** and **Prototype Build**. Some of them will appear only if the previous step has been completed, because almost all steps must be done in sequence generally.

c) Process Design & Development

Just like some previous step, Process Design Development is used for generating and defining project data information. The difference is in uploading file. Almost all of the subprocess in Process Design Development need file to be uploaded as a completeness data information. There are four steps in this process, **Process Design, Pilot Production Run, PPAP,** and **Part Submission Warrant (PSW)**.

d) Production, Feedback, and Variability

Production, Feedback, and Variability is the final process of **Project Data Entry**. So, there is no more maintaining, generating, and processing data information afterwards. This step is corresponding with the name, *feedback*, where involves all action about giving feedback, analysis, and correction to the project one step before completion. There are 2 steps in this process, **Production** and **Feedback, Asessment, and Corrective Action**.

2.1.2 Project Summary

Different with first phase (Project Data Entry), Project Summary collects summaries of project record especially for the date of project completion. In here, an index table which consist of some project records will be shown, including the information about the project, customer, responsible, product manager, design manager, and so on. Furthermore, the core of this phase lies on **Timeline** feature. Each project record has timeline to describe duration of project work and activities in more detail.

2.1.3 Reporting

Reporting is the third phase of major data process which is used for report the project record, either all projects or just one of them. User can see anyone who involved in the project, the date (start date / end date), and many more.

2.2 System Architecture

Systems Architecture is a response to the conceptual and practical difficulties of the description and the design of complex systems. User create an architecture to describe the structure of the system to be built and how that structure supports the business and service-level requirements.
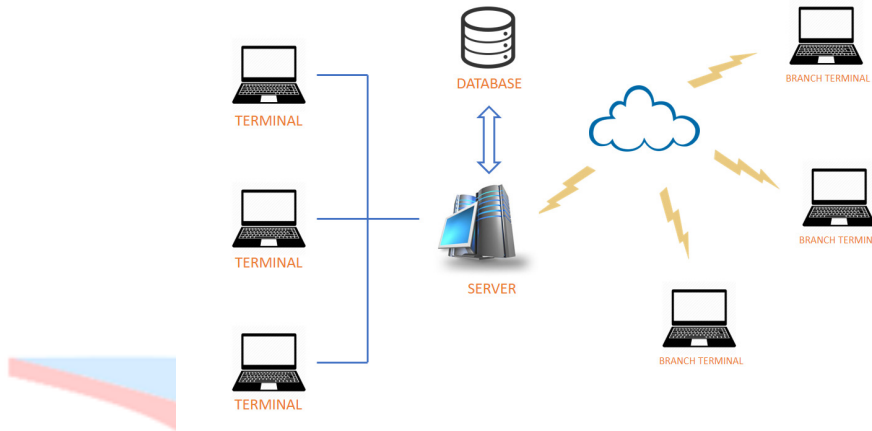
Picture 1. ReenDocS :: PDMM System Architecture

2.3 Operational Environment

ReenDocS :: Project Design & Management Module is a web-based application system which has minimum system requirement as follows:

- Web Server : Internet Information Service (IIS) 7
- Programmming Language : ASP.NET 4.5
- Database : SQL Server 2012
- Operating System : Windows 7 / 10
- Browser : Internet Explorer 11 (min)

2.4 Application Development Limits

ReenDocS :: Project Design & Management Module developed specifically for ReenDocS :: Microbattery Company and implemented at head office as well as branch offices which are scattered in various country. The number of branches to be used for application system implementation will be agreed upon later.

3. Application System Design

Application System Design in ReenDocS :: Project Design & Management Module will be explained on the following description. And general system design will be illustrated by using diagram flow and user interface of the application, so hopefully user (reader in this context) able to understand about work flow of the application system better.

3.1 General System Design

In general, a system design of ReenDocS :: Project Design & Management Module has main flow process. What main flow process meant is the first from three phase of major data process which called Project Data Entry. There are several processes inside Project Data Entry phase that involve some user role (Project Creator, Responsible, Product Manager, Design Manager, and Assigned Designer). More detail illustration can be seen in the following diagram.
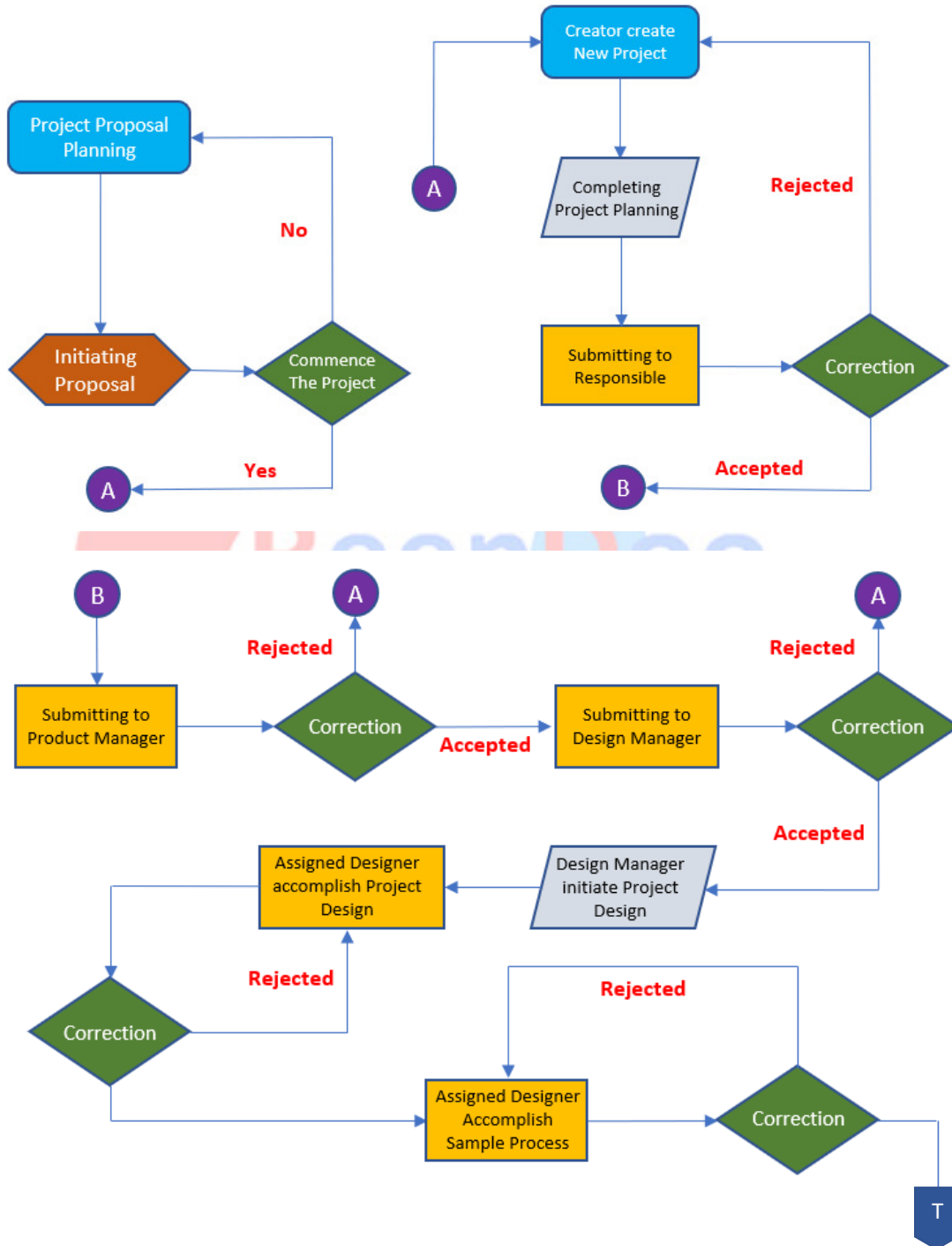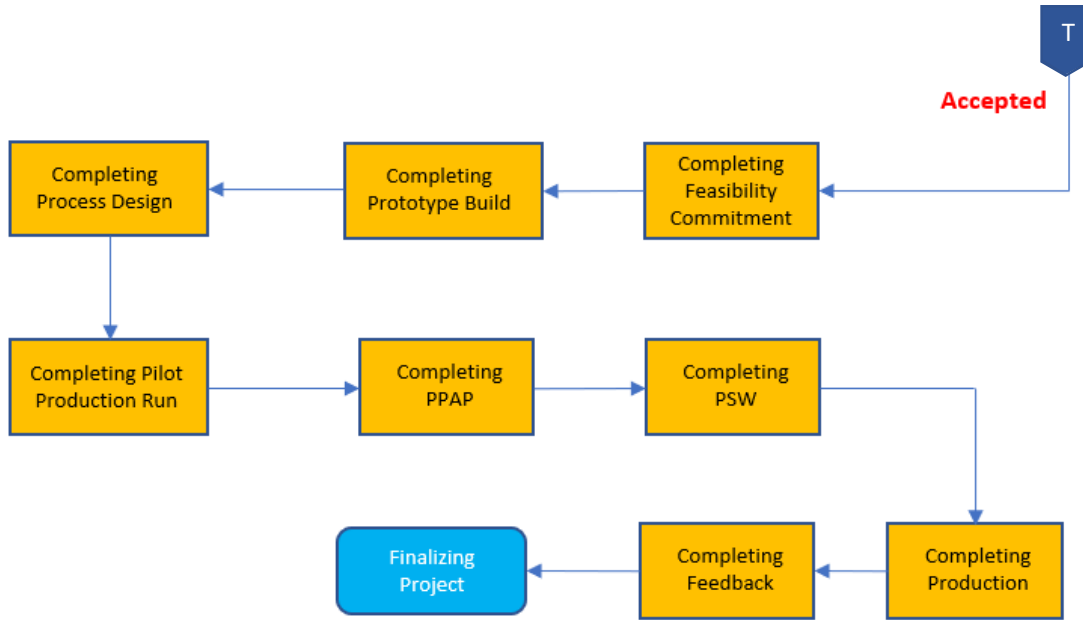
Picture 2. Project Data Entry - Flowchart

After all of the process which are shown above (in flow diagram), there are 2 more feature process on the application, Project Summary and Reporting. Their function is simpler, unlike Project Data Entry which has a complex process. Project Summary is used for collecting summaries of project record especially for the date of project completion.

Picture 3. ReenDocS :: Project Summary - Timeline

Then, Reporting is used for report the project record so user can see anyone who involved in the project, the date (start date / end date), and so on. Before arriving at project record page, user need to fill reporting form page to rearrange some filters about the project record data.

Picture 4. Reporting Form

Normally, according to reporting form, user need to filter the project data record whom user involved in there. But, User can also let the form to setup the filter by default, so all project data record will be shown on the page (not specifically) in table list.

Project Number	Project Title	Customer	Drawing Number	Battery Type	KAM	Country	Design Manager	Designer	Start Date	End Date	Total Duration (Week)	Project Status
17-62-GE-0044	Testing Micro	100129 - VARTA Microbattery Japan	PD - 002	17S10P/CR 1/3 N C MC CD DT	Titis Wahyuni	Indonesia	Titis Wahyuni	Sunil Siddannavar	2017-11-02			New
17-62-AU-0043	TESS	100018 - WIPOTEC		/V 130 H2 Type No. 4690 -- BE - -		Indonesia						New
17-62-AU-0032	Project Testing 33	101061 - Ryoka Sangyo Co, Ltd	qqq	/V 130 H2 Type No. 4690 L BE PCBD NS	Titis Wahyuni	Indonesia	Titis Wahyuni	Ian Ariyanto	2017-08-21			New
17-03-AU-0029	SAIC-CCU	101060 - System Marketing Inc		4S/V 600 HRT LM S WC -	Robert Hieber	Korea			2017-04-11			New
17-03-GE-0025	Project Update	101051 - Toni Parts K.K.	14-1167	1S6P/CP 300 H NHS C S RT DT	Robert Hieber	Korea	Titis Wahyuni	Ian Ariyanto	2017-04-16			New
17-03-AU-0022				/V 130 H2 Type No. 4690 -- BE - -		Korea						New
17-03-GE-0017	Battery Futubata Denki	101040 - Futaba Denki	PDrawing 02135	1S1P/HVC 90F SK MC CD PCM	Titis Wahyuni	Indonesia	Titis Wahyuni	Titis Wahyuni	2017-04-16			New
17-03-AU-0016		100018 - WIPOTEC	7777	/V 130 H2 Type No. 4690 -- BE - -	Titis Wahyuni	Korea	Titis Wahyuni	Titis Wahyuni	2017-04-06			New
17-03-AU-0014		100018 - WIPOTEC	PD 002	/V 130 H2 Type No. 4690 -- BE - -	Titis Wahyuni	Indonesia	Titis Wahyuni	Titis Wahyuni	2017-04-04			New
17-03-GE-0013		100018 - WIPOTEC	12	/V 130 H2 Type No. 4690 -- BE - -	Titis Wahyuni	Indonesia	Titis Wahyuni	Ian Ariyanto	2017-04-17			New
17-03-GE-0012				/V 130 H2 Type No. 4690 -- BE - -	Titis Wahyuni	Indonesia	Titis Wahyuni	Titis Wahyuni	2017-04-06			New

Picture 5. Reporting Page - Project Data Record

3.2 Specific System Design

3.2.1 Project Planning

Project Planning is the first process of this application system where user (project creator) creates and defines project. In this process, user will be shown an application form which need to be filled. There are 4 until 5 sections that include different field information.

a. Project Detail

This is an appearance of Project Detail section. Open **Help Page** for more detail description and user guide.

Picture 6. Project Detail Section

b. Application

This is an appearance of Application section. On **Estimate Annual Usage (EAU)** part, there are some fields that called **Year**, **Forecast**, **Sketch**, and **Reference Drawing**. Especially on **Sketch** field, user need to upload file to complete this part. If user want to open (download) the file again, just click the name of file then it will be downloaded.

Open **Help Page** for more detail description and user guide.

Picture 7. Application Section

c. Planning

This is an appearance of Planning section. Open **Help Page** for more detail description and user guide.

Picture 8. Planning Section

d. Customer Specific Technical Requirements

This is an appearance of Customer Specific Technical Requirements section. In addition, this section still has four subsections to classify the type of product information. Open **Help Page** for more detail description and user guide

Picture 9. Customer Specific Technical Requirements Section

1. Charging Conditions

NO	DESCRIPTION	
1.1	Charging Voltage [V]: (What is the maximum voltage available? Is it adjustable? If yes, in which range)	(with + Tolerances)
1.2	Charging Time [Minutes]: (What is the maximum charging time that is acceptable?Why ?)	
1.3	Charging Current [mA]: (What charging current is available? Is it adjustable? If yes in which range?)	
1.4	Information to Charging Technique (IC): (General information, what is possible for the customer. Only cc? cc- cv? Trickle charge? Timer? Temperature compensation? Combination of techniques possible?)	
1.5	Information to Power Source: (Wallplug/USB,...)	Available Voltage [V]: Current [mA]: Power [W]:
1.6	Temperature Range at Charging[°C]: (Additional information is welcome, does the temperature change during a single charge process, if yes profile etc....)	Min Max: Typical: Remark

Picture 10. CSTR - Charging Conditions

2. Discharging Conditions

NO	DESCRIPTION	
2.1	Operating Temperature Range [°C]: (for a wide distribution, a detailed temperature profile would be helpful)	Min Max: Typical: Remark
2.2	Operating Voltage [V]: (What is the minimum/maximum voltage, required by the application? When does the processor stop workingor when is the deep discharge cut –off activated)	Min Max: Typical: Remark Cut Off Voltage :
2.3	Required Power[W]: (Is it constant? If not, profile like pulse duration etc.)	Min Max: Typical: Remark
2.4	Required DischargeTime [sec/min/h.]:	
2.5	Required Energy [J = Ws]:	
2.6	Pulse profile: (please specify current and time profile for discharge.e.g. 1500mA/0,5ms+200mA/4.5ms)repeat 10 timesthen 0,1mA 1h then repeat.	

Picture 11. CSTR - Discharging Conditions

3. Other Operating Conditions

NO	DESCRIPTION	
3.1	Expected Cycle Life [Cycles per Time]: Please specify the number of charge / discharge cycles that is required	
3.2	Expected Life [Years]:	
3.3	Shelf-Life (before use)[Month]: (How long is the board with connected battery on shelf before the next recharge. Please note that deep discharge has to be avoided, e.g. leakage current when connected to board, ...)	
3.4	Other Requirements: Please let us know if there are any special requirements / approvals / environmental requirements that need to be considered	

Picture 12. CSTR - Other Operating Conditions

Picture 13. CSTR - Product Design

e. Feasibility Commitment (Additional)

This is an appearance of Feasibility Commitment section. Feasibility Commitment section is an additional section because user has to check Feasibility Commitment field in the Project Detail section before so this section can appear. Open **Help Page** for more detail description and user guide.

Picture 14. Section - Feasibility Commitment

3.2.2 Designer Assignment

Designer Assignment is the second process of Project Data Entry phase which is used for handle everything about design process (the beginning step). Reviewing, correcting, defining the project content, filling some requirements, editing and creating the project design, and submiting them are parts of project designer responsibility in here. After Design Manager create design project (in Project Review process), the project record will appear on Designer Assignment index page and already to be processed. From here, the role job is taken by Design Manager and Assigned Designer for processing the project design.

There are some process in this page (Designer Assignment), **Design, Sample Process, Feasibility Commitment,** and **Prototype Build**. Some of them will appear only if the previous step has been completed, because almost all steps must be done in sequence generally.

a. Design

Now here, the chosen Assigned Designer has to proceed the form. Reviewing, fill some requirements, upload data, determine the finish date, etc. There are 3 sections that Assigned Designer need to check (Design, Preliminary BOM P/N, and Deviation).

Picture 15. Designer Assignment - Design Section

The downloaded file path (for user to open) is located in:
- ✓ Special Component Dwg
- ✓ Component Quotation
- ✓ Tooling Quotation →

If necessary, Assigned Designer also can define some requirements (P-Drawing and SPF Number), then upload some files which are needed in the next process. Assigned Designer can also click **Save** button to continue in other time if the process is still not finished yet. Generally, this process need more than just one day to be finished.

Picture 16. Designer Assignment - Preliminary BOM P/N Section

For **Deviation** section, Assigned Designer can choose open, in progress, or closed status. **Deviation** is used for the project that need extra time to be finished. In other words, deviation status will active when the project past the deadline. Assigned Designer can also add the comment while assign the deviation status.

Picture 17. Designer Assignment - Deviation

b. Sample Process

Creating Sample Process has to be executed by Design Manager while filling requirement, uploading data is Assigned Designer's task.

Picture 18. Designer Assignment - Sample Process (Creating)

After Sample Process has been created, Assigned Designer has to fill some requirements, upload data, and submit the form back to Design Manager. Assigned Designer can also click **Save** button to continue in other time if the process is still not finished yet. Generally, this process need more than just one day to be finished. After form has been submitted, Design Manager need to re-check, and process (accept) the form.

Picture 19. Designer Assignment - Sample Process (Filling Requirements)

The downloaded file path (for user to open) is located in:
- ✓ Confirmation Documents
- ✓ DFMEA → Control Plan Document →

c. Feasibility Commitment

Different with previous process, there is no data flow between users in Feasibility Commitment. For example in Design Form or Sample Process Form where user have to accept / submit the form, then waiting other user to reviewing and submitting it back. On this step (Feasibility Commitment) to the next until final process, there is no more data flow. So the activity is just reviewing, editing, filling requirement, uploading file, and clicking **Save** button at the last. No more mail notification and waiting other user to confirm it.

Picture 20. Designer Assignment - Feasibility Commitment

But anyway, this process is still need just only one executor. So there is only one between **Design Manager** and **Assigned Designer** who will handle the task until finished. There is something like a deal or decision about who will handle the task.

Picture 21. Designer Assignment - Feasibility Commitment Requirements

The downloaded file path (for user to open) is located in:
- ✓ Upload Comment →
- ✓ Upload Signed Feasibility Commitment→

There is one main section on this form, **Feasible Commitment for Automotive Design In Project**. This section has 2 informations (Expected Date to Finish & Table Information) and 1 table requirement. Fill the requirement and upload the file which is necessary. Also don't forget to look at the **Conclusion** field. The field must contain **Let's Go!** statement so that it can be processed on the next page **(Design Process Index & Production Index)** page. So, don't let it blank.

d. Prototype Build

There are two sections in Prototype Build form, **Details** and **Conclusion**. On **Details** section, there are some fields and requirements that need to be filled and uploaded. For example there are 3 fields which need requirement, **Document Verification**, **Engineering Document**, and **Special Characteristic** based on each SPF number. On **Conclusion** section, user can write some statements as a conclusion and click **Save** button.

Picture 22. Designer Assignment - Prototype Build (Details)

3.2.3 Process Design and Development

Process Design is the next process after completing **Designer Assignment** process. Just like some previous process, **Process Design** doesn't need data flow, there is no more acceptance, submitation, sending email notification, or waiting for other user (Design Manager or Product Manager) confirmation to continue the process.

a. **Process Design**

This step is not different from before. User (Design Manager / Assigned Designer) just need to upload the required files. Open **Help Page** for more detail description and user guide.

b. **Pilot Production Run**

After completing Process Design form, user (Design Manager / Assigned Designer) need to continue the process in Pilot Production Run. There are 2 sections (**Special Approval Documents** and **Details** section) in this form. In **Special Approval Documents** section, the requirement field is based on project planning when project creator created the project. If there is none of them which are checked, user cannot upload the file on that component. User only can upload data on the component which is checked in Project Planning form before.

c. **PPAP**

The third step is PPAP form which is so crucial and also important to create project documentation. There are 3 main sections (**Cover Sheet**, **PPAP Checklist**, and **Deviation** section). Firstly, in **Cover Sheet** section, user can see many fields that need to be completed. This section is used for project documentation where user can print and report it in a PDF format in more detail. This section is divided into several parts based on data that user will set and upload.

d. **Part Submission Warrant**

PSW is an abbreviation of Part Submisson Warrant. After user open the **PSW** form there is the form that just contain one section, **Details** section. On this section, there are one requirement field which need to be completed. The field contain of 2 upload data requirement, **PSW** and **Quality Planing Sign Off**. Complete this section and click **Save** button.

3.2.4 Production, Feedback, and Variability

Production, Feedback, and Variability is the last process of Project Data Entry phase. In here, there are two subprocesses which is no more acceptance, submitation, sending email notification, or waiting for other user confirmation to continue the process.