Lightspeed System 5 Cell Capacity Increase, RWDD Corporation

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Abstract *— The Company RWDD is working in a new product release in 2021. Alongside this release, the marketing team is expecting a 10% increase in demand for this product. This forecast will require a project team is dedicated in the research and implementation of capacity increase driven initiatives that enable the plant to attain to this new demand. The focus of the Team will be in System 5 of the Lightspeed Cell and its current capacity and how to increment such capacity in at least 10% for 2021. Quality standards and procurement strategies with external suppliers will be critical to the success of the project.*

Key Terms *— Capacity increase, demand, quality.*

INTRODUCTION

RWDD is a company that manufactures electronic components with more than three hundred thousand units produced daily. It consists of two main facilities: one in Haina, DR. and a second one in Las Piedras, PR.

RWDD is expecting to receive a significant increase in demand for specific components associated with a newly developed product. Due to this reason, a multidisciplinary project team will be appointed for the evaluation and subsequent implementation of initiatives that enable the plant to satisfy this new demand in the Lightspeed cells at the Las Piedras plant.

The methodology to follow during the execution of this project is the Waterfall methodology [1]. This methodology allows the monitoring of the execution of actions under predetermined approval levels for each project phase.

OBJECTIVES

The overall objective of this project is to conduct a thorough capacity analysis in the current production plan of System 5. Using sourcing strategies, the project team will reallocate with external supplier's low volume production styles currently been built in the System, thus freeing space for the new product catalogs coming to the plant in 2021.

The scope baseline objectives for the project are divided as follows:

- **Technical requirements:**
  - Material usage and specifications compliance to the standard.
  - Functional testing approval.
- **Quality metrics:**
  - CTQ's (Critical to Quality) dimensions definition withing the tech spec of the part.
  - PPAP (Product Part Approval Process) documentation submittal.
- **Manufacturing metrics:**
  - Internal capacity analysis.
  - Supplier production plan.
- **Cost & capital requirements:**
  - Capital approval request submittal.
  - Cost base line adherence.

LITERATURE REVIEW

As any other ISO 9001 certified manufacturing company [2], RWDD has implemented and controlled standardized procedures for both Project Management and material/ parts outsource.

Project execution procedures

The standard methodology used in RWDD for Project Management is the waterfall methodology, as the name implies it lets the project Team cascade through a series of phases, gates or iterations that

allow them to set achievable deliverables for each phase and receive inputs and approval from the sponsors and the end of each one. Figure 1 shows a clearer representation on each phase structure and purpose.

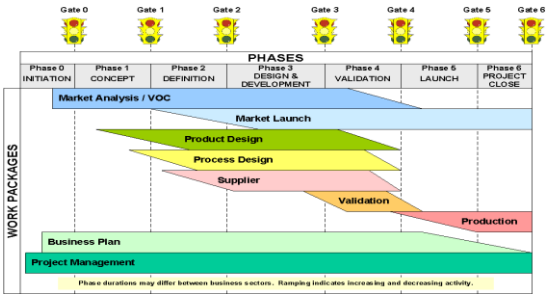

Figure 1
Waterfall Project Phase Structure

ANALYSIS APPROACH

Based on the business case for this project, one of the key elements to initiate the analysis approach from the team is the study of the current capacity available in System 5 for which its production plan, capacity and forecast are briefly explained.

Capacity Analysis

System 5 is a high-speed automated manufacturing machine that produces specific parts required for the full assembly process of the product. This part produced are daily planned and produced according to the demand and The Plant's schedule. As represented in Figure 2, System 5 has 5.8 MM parts planned for 2020 out of which 12% are low volume styles (G03 & G05).

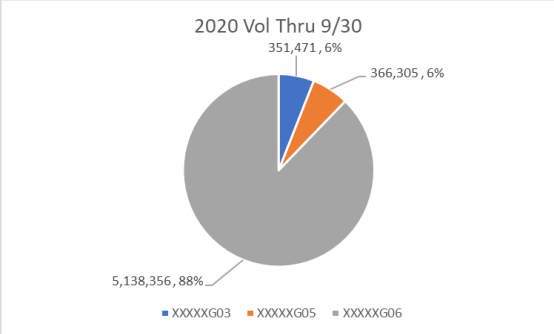

Figure 2
Production Plan 2020, System 5

Forecast Analysis

For the RWDD business the forecasting exercise is conducted and controlled by the Marketing Team, from their original statement System 5 will require a 10% total capacity increase to keep up with the upcoming demand of 2021. Coming from this analysis and the information displayed in Figure 3 is safe to assume that by mid. 2021 System 5 won't be able to keep up with the business needs.

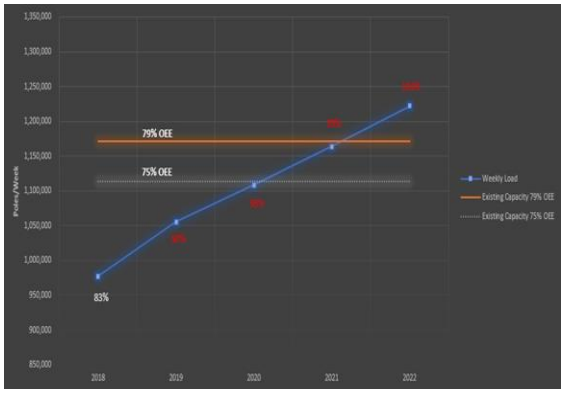

Figure 3
System 5 Demand Forecast

Project Scope

Now that System 5's current production plan has been analyzed as well as received from Marketing the projected forecast from 2021 to 2022, the team and the stakeholders are ready to set scope for the project.

The team stablish target will be to increase by at least 10% the capacity of System 5 through the outsource process of G03 & G05 thus freeing enough capacity in the System to sustain the demand until 2022. As part of the scope budgetary and human resources constrains have been identify as well as high risks coming from supplier Quality and the procurement strategies.

Schedule Base Line

With the project scope and base line requirements and activities set, the team can now proceed to construct and discuss into detail the project schedule. In Figure 4 is flow diagram of each gate and its due date.

Figure 4
System 5 Capacity Increase Schedule

Each Gate will be at the end of each iteration and will have the following results:

- **Gate 0**
  - Charter approval.
  - Business case presentation.
- **Gate 1**
  - Project resource allocation.
  - Project scope approval.
- **Gate 2**
  - Part design approval.
  - Procurement strategy.
  - External supplier proposal.
  - Quality metrics definition.
- **Gate 3**
  - Part approval.
  - Tools FAT.
- **Gate 4**
  - Production release.
  - Inventory ramp up.
- **Gate 5**
  - Requirements closing.
  - Lessons Learn.
- **Gate 6**
  - Project results review
  - Cost benefit analysis

Cost benefits for this project are evaluated and classified as a cost avoidance project. This means that by executing this project the business will not have to incur in high priced long time delivered equipment instead just pay for the parts needed for the production plan on a FFP (Fixed Firm Price) contract with the selected supplier for the part.

RESULTS

To this point in the project the team has already gone through Gate 5 meaning it has achieved the following key milestones from the project thus far:

Gates 0 to 2

In the early stages of the project the Team presented the scope, schedule and analysis approach to the Sponsors as well as the key Stakeholders from which the Team received full approval to move ahead into a Gate 3.

Part design displayed on Figure 5 is one of the most critical deliverables of Gate 2.

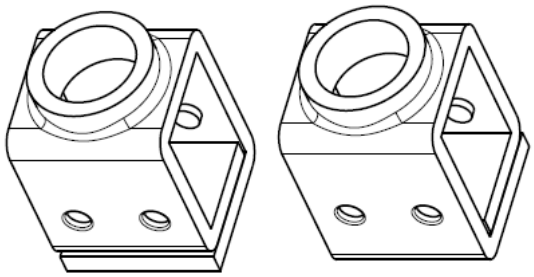

Figure 5
Part Design Isometric G03&G05

This approved design was shared with multiple number of suppliers until Supplier X submitted the proposal that will later become the selected winner of the RFP.

Gates 3 to 5

Gate 3 is one of the most critical gates of any type of project since it is in this gate that CTQ's requirements are validated from the supplier and the Part approval process (PPAP) takes place. To accomplish this last part the Team requires the supplier for production builds and standardized procedures sharing in order to ensure the process is under control [3].

Figure 6 show's us the standardized procedure that the supplier will follow during present and future builds.

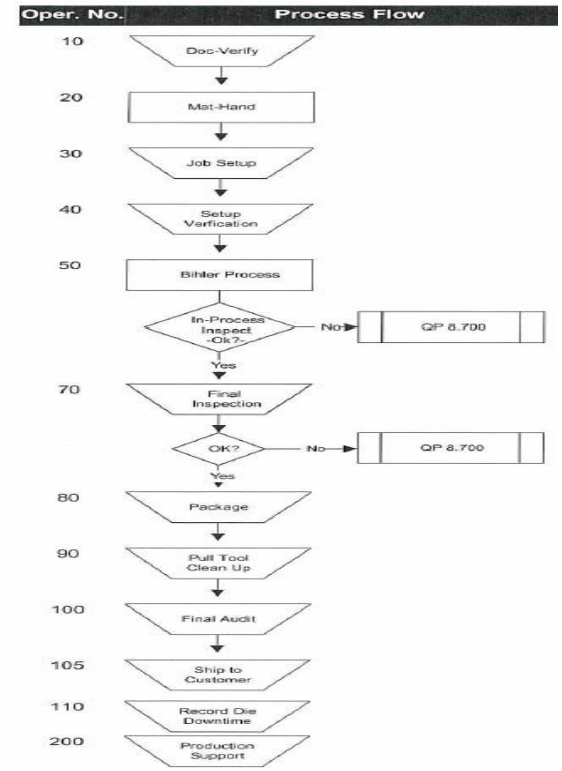

Figure 6
Supplier Standard Process Flow

Table 1 is the results from the initial production build executed by the supplier and its CTQ's dimensions results in 24 parts.

Table 1
PPAP Measurement Results

Char No:	Specification / Tol.	Tol.	Initial Inspection 1	2	3	4	5	6	Ok	Not OK
1			0.361	0.361	0.361	0.361	0.361	0.361	✓	
2			0.1831	0.1815	0.1821	0.1818	0.1829	0.1810	✓	
3			0.292	0.291	0.292	0.290	0.290	0.291	✓	
4			0.377	0.377	0.377	0.377	0.377	0.377	✓	
5			0.1926	0.1924	0.1924	0.1909	0.1907	0.1928	✓	
6			0.0661	0.0660	0.0663	0.0659	0.0663	0.0653	✓	
7			0.0628	0.0639	0.0650	0.0659	0.0637	0.0645	✓	
8			0.0664	0.0657	0.0655	0.0657	0.0661	0.0659		x
10			0.0295	0.0278	0.0284	0.0281	0.0285	0.0279	✓	
11			0.0146	0.0150	0.0144	0.0140	0.0148	0.0143	✓	
12			0.0178	0.0179	0.0181	0.0184	0.0180	0.0178	✓	
12			0.0176	0.0178	0.0179	0.0179	0.0178	0.0177	✓	
12			0.0168	0.0173	0.0171	0.0173	0.0173	0.0175	✓	
12			0.0185	0.0187	0.0188	0.0191	0.0191	0.0188	✓	
13			0.103	0.103	0.103	0.103	0.103	0.103	✓	
14			0.3130	0.3135	0.3131	0.3139	0.3132	0.3131	✓	
15			0.128	0.129	0.126	0.129	0.129	0.126	✓	
16			NA – Material received with "rounded" edge. Tooling does not coin the edges.							
17			0.0627	0.0628	0.0628	0.0626	0.0629	0.0628	✓	
17			0.0625	0.0624	0.0624	0.0625	0.0624	0.0624	✓	
17			0.0622	0.0622	0.0621	0.0622	0.0622	0.0622	✓	
17			0.0624	0.0624	0.0623	0.0623	0.0622	0.0623	✓	
18			0.0703	0.0702	0.0700	0.0707	0.0697	0.0703	✓	
18			0.0656	0.0661	0.0661	0.0662	0.0660	0.0660	✓	
19			0.0661	0.0661	0.0658	0.0657	0.0658	0.0658	✓	
20			0.0642	0.0639	0.0639	0.0639	0.0643	0.0644	✓	
21			0.383	0.382	0.383	0.382	0.383	0.383	✓	
24			0.384	0.384	0.385	0.384	0.384	0.384	✓	

The results obtain from the PPAP submittal documentation displayed in Table 1, gave the tools to the Quality team to approve the Parts and give the green light for full production to Supplier X. Since this are in the initial steps of Gate 5 production has started in the Plant and inventory levels are ramping up. As it's shows in Figure 7 the results of the project for 2021 and the potential results for 2022 using the same base line and Supplier X's capabilities.

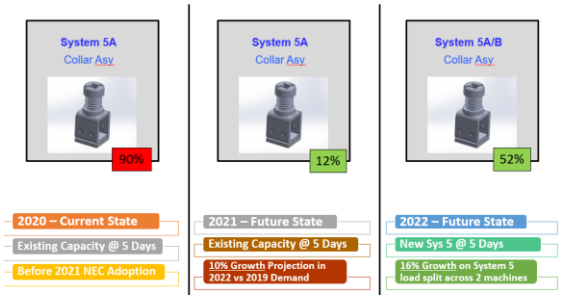

Figure 7
Capacity Increase System 5

In addition to this results the overall cost avoidance of the project went from and estimated capital investment of ***US$2.8 MM to US$ 409k*** of initial cost and expenses from the supplier. The Team also set the foundations for a ***52% capacity increase*** on the current manufacturing plan with the support of Supplier X in 2022 if needed.

CONCLUSIONS

Through the correct use the standardized tools from the RWDD business and a well implemented project and procurement strategy the Team could achieve all the expected requirements from the business case.

Quality controls and procedures adherence are the most important requirement to achieve thus ensuring the needs of the costumers are met. In projects of this nature the support from sponsors, stakeholders and expert subject matters are critical for success, this project was not the exception and the Team is grateful for all the support received.

REFERENCES

[1] Cervantes J. (2012). “Taxonomy of the most widely used software development models and methodologies”

[2] ISO - International Organization for Standardization https://www.iso.org/home.html

[3] Supplier X – “PPAP rev018 marked up Submittal”