Implementation of Quality Control in a New Product for Aerospace Industry

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Abstract *— Aerospace Industry provides products to P&W. Now they are providing a new product, a Thermal Management System. Since it is a new product, it needs a Quality Assessment to ensure that Aerospace Industry provides defects-free products. To accomplish the defects-free goal, they need to increase the quality control in the Thermal Management System product by reaching Quality Level II by the end of the year 2016.*

Key Terms *— SIPOC, Thermal Management System, Quality Level*

INTRODUCTION

This document does not have technical data and the analysis is based on a fictional business. The confidence that the customer has in a product suppliers relays in the quality of their product. You can approach to multiple possible customers and have the opportunity to have business with them if you ensure the quality of the product that you offer. There are multiple certifications like ISO9000. ISO9000 is a quality certification that ensures the quality of the product by the implementation of a standardized work [1]. Is very good for business to ensure the quality of a new product to guarantee the customer satisfaction.

Putting in practice the intrapreneurship, Aerospace Industry, (AI), has now a new product. The company provides engineering services as a third party to one of the major jet engines manufacturers, Pratt & Whitney. Since now Pratt & Whitney is outsourcing part of their Thermal Management System (TMS) work to Aerospace Industry, this new product needs to be identified by management to ensure that the TMS product meets the Quality Control requirements. Since this is a new product for AI, the Quality Level is 0 on a scale of I to V, V being the highest score.

LITERATURE REVIEW

Aerospace Industry is introducing a new service to the company and it needs to be assessed by the quality department to increase the process maturity level. One of the early steps that Aerospace Industry has to do is work with their quality tools called Lean Six Sigma.

Lean Six Sigma

The application of Lean Six Sigma Methodology in Software Continuous Integration as a tool to improve quality, efficiency, customer satisfaction and costs is very common these days [2]. They establish a case study in this paper to demonstrate how Lean Six Sigma tools help a particular department to improve product quality and reduce development cost. At the end they show to Aerospace Industry some key success factors that are critical to the implementation of an effective Green Belt program are examined, and solutions are provided.

Since Aerospace Industry is going to assess their new service and assign a maturity level in their department, Aerospace Industry looked into a model that consist of 148 multiple choice question to measure the Project Management Maturity [2]. They analyses multiple companies from Engineering Construction to Informational System. With the answer they rated the companies in a scale of 1 – 5, where 5 is the highest score that you can get. After this study they provide the tools for an organization to use in identifying the areas of opportunity for improvement in project management.

How AS9100 and SIPOC diagram can be used to map process

One of the tools that Aerospace Industry is going to use is the SIPOC. This is a requirement by the LSS and AS9100 [1]. They describe how SIPOC diagrams can be used to map, interrelate and help one to manage key processes from a customer-centric perspective. They also state the benefits of using SIPOC.

ANALYSIS

Since the amount of work from the customers continues flowing down, TMS has being identified by management as a new product that they can offer.

Achieving Quality Level I

Management needs to place this product in the Product Quality Chart and categorized it as low profit or high profit product. The profit evaluation has been done by analyze the amount of work in hours between January 2013 – September 2016 and compared it to the 2080 theoretical working hours in a single year by practitioner, TWH.

$$TWH = 8.0 * 5.0 * 52 \quad (1)$$

In order to classify a product as high profitable the amount of hours worked in a year needs to be five times the theoretical working hours in a single year by practitioner. According to that number management will assign a Quality Level Goal between I – V. After assigned the Quality Level Goal, the process will reach Quality Level I, QL-I.

Achieving Quality Level II

The first step to reach QL-II is assigning a process owner. This will be based on the most experience practitioner on the product. Now Aerospace Industry need to map the process using the SIPOC tool. This product has one supplier that is P&W. The process is TMS. TMS is in charge to keep the fluids temperatures under operational limits to ensure the reliability of the engine. The input for this process is the physical components and their performance. The output is the temperature at the requested stations. The customer is P&W as well.

Once established the SIPOC the customer needs to approve it to proceed to define the product defects. The products will have two defects

- **No energy balance**: The TMS model needs to have energy balance.
- **No mass balance:** The TMS model needs to have mass balance.

The last step in order to achieve QL – II is defining the product metrics. In this phase Aerospace Industry have two metrics that Aerospace Industry need to accomplish, more than 173.3 worked hours per month and zero defects. In order to have zero defects Aerospace Industry need to inspect the 100% of the product before release it.

RESULTS

After gathering the worked hours between January 2013 and September 2016 and comparing them to the TWH, Aerospace Industry can plot it and see how profitable this new product is, as showed in Figure 1. It can be seen that the amount of hours worked on TMS by year is around 2000 hours. It represent a single practitioner working on this new product after. Aerospace Industry need to remember that in a year Aerospace Industry have holidays, vacation and sick days.

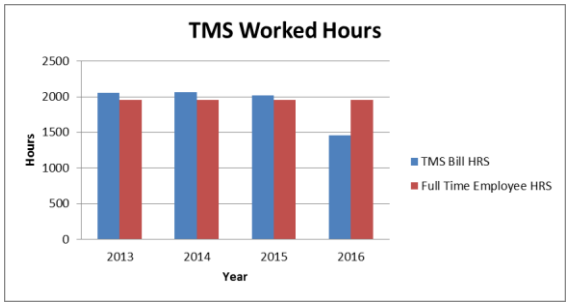

Figure 1
TMS Worked Hours Profitability Assesment

Table 1 shows the approved SIPOC by the customer. As you can see this is a cycle process where the supplier and the customer is the same.

Table 1
TMS SIPOC

Thermal Management System SIPOC				
Suppliers	*Inputs*	*Process*	*Outputs*	*Customers*
P&W TMS	TMS Components	TMS	TMS Temperatures	P&W TMS

CONCLUSION

When Aerospace Industry started the quality assessment for TMS that is a new product for the company, placing the product in the Product Quality Chart and doing the Profitability Assessment Aerospace Industry already reach Quality Level I. Since management found out that only one practitioner work with this product, management classified the product as a Low Profit. The QL goal for the end of the year 2016 will be QL – II. The SIPOC is simple because Aerospace Industry only has one supplier so far. It automatically gets approved by the customer and Aerospace Industry already knew the defects for this process. Aerospace Industry needs to inspect 100% of the product before release to ensure zero defects. Quality Level II before EOY 2016 has been accomplished.

REFERENCES

[1] Pedro A. Marques, Jose G. Requeijo, “SIPOC: A Six Sigma Tool Helping on ISO 9000 Quality Management Systems”, 3rd International Conference on Industrial Engineering and Industrial Management, XIII Congreso de Ingeniería de Organización, Barcelona-Terrassa, September 2nd-4th 2009

[2] Young Hoon Kwak, Ph.D. and C. Williams Ibbs, Ph.D. “Assessing Project Management Maturity”