Engineering and design application impact on sub-assembly line

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Abstract *— A global company producer of medical devices and therapies was under process development of the sub-assembly line #2 for new product introduction and was having a long-time lead time for improved machine replicates drawings and schematics. This project consisted of reducing costs and avoiding the job not being delivered on time through the implementation of an engineering and design application. Meetings were performed to obtain data. Also, historical supplier quotes were collected. The data collected was analyzed for the dates, cost of the drawings and schematics, and how many times revisions were made to them. An engineering and design application for electrical schematics was installed at no cost, since the company has Solidworks Electrical Schematic add-in. A costs analysis was performed between the data collected and Solidworks add-in. The Solidworks add-in led to a reduction in cost of $1,200 daily per drawing revision. Additionally, the implementation ensured project timeline schedule on time.*

Key Terms *— Cost reduction, process optimization, process improvement, electrical schematic software*

INTRODUCTION

A global company producer of medical devices and therapies was under process development, implementing new manufacturing lines and sub-assembly lines for new product introduction. Processes or machines of manufacturing line and sub-assembly line 1 were already validated. The project was under validation of manufacturing line and sub-assembly line 2 in which machines were improved. Due to improvements in the machines, drawings and schematics have been affected and needed to be revised.

The objectives of this project were to reduce 1-month lead time to 2 weeks, reduce costs and avoid job not delivered on time through the implementation of an engineering and design application.

Removing non-productive time can translate to complete validations on time that equates to quickly launch of the new manufacturing lines. The project performed reduced the long-time lead time by installing an engineering application which was used and managed by the Innovation Center of the global company to complete drawings and schematics revisions on time.

LITERATURE REVIEW

The best alternatives in terms of cost reduction and process improvement can be obtained through an economic analysis [1]. The case study approach, as a method of scientific research, has provided an innovative solution increasing productivity and reducing costs [2].

Inventory models, related to methods to optimize production and shipments between supplier and customer reduced costs, have translated in lead time reduction. [3]. A new method called PROPER (Product Redesign, Optimization of Processes, and Effectiveness Review) has been used effectively to reduced manufacturing costs and lead time [4].

A mathematical model based on fuzzy logic modeling solved by MATLAB predicted the performance measurement level and lead time reduction. Fuzzy modeling has anticipated the data avoiding lead time [5].

METHODOLOGY

To identify the problem, projects impacting the project timeline of new manufacturing lines for new

product introduction were evaluated. One of the projects with long-time lead time was selected.

As the problem was identified, a meeting with the project coordinator was set up to discuss the current state of the situation and the data needed. The project coordinator is in charge of receiving supplier's quotes that will be discussed with the program managers and, if accepted, the project coordinator places the orders. The project coordinator helped to understand the process of how quotes and purchase orders were processed to gather data. This was important to obtain drawings and schematics quotes related to the sub-assembly line 2. Other resources helped providing more quotes for the sub-assembly line 2. The data collected was added to the data provided by the project coordinator. Data collected from supplier quotes regarding drawings and schematics was obtained through historical data.

After understanding the process of how quotes are processed, the root cause was analyzed. Supplier quotes collected were filtrated by orders related to drawings and schematics to analyze the dates, cost of the drawings and schematics and how many times revisions were made to them. The bar chart shown in Figure 1 was created to filtrate quotes and prove that supplier quotes for drawings and schematics have been the most requested and to know how many quotes has been requested to the supplier.

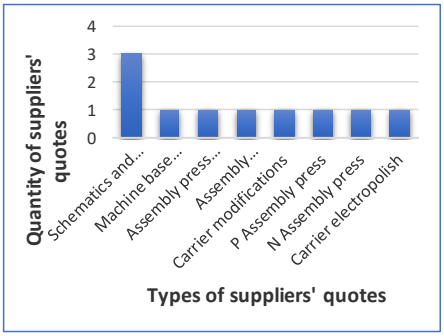

Figure 1
Supplier quotes for the sub-assembly line

To implement the solution, an evaluation of an engineering and design application was performed. A resource from the software department of the company was contacted to ask if the company have Solidworks Electrical Schematic add-in. The company have the add-in and was installed in the computers of the Innovation Center that belongs to the company without any additional cost.

COST ANALYSIS

Engineering and Design application for electrical schematic was installed at no cost, since the company have Solidworks Electrical Schematic add-in. Drawings and schematics were made in the Innovation Center of the global healthcare with personnel with knowledge developing drawings in which no cost in training was incurred and ensuring project timeline schedule. The company implementation had a cost reduction of $120 per hour for every drawing that has to be modified by the supplier. The supplier takes 10 (hours) to modify a drawing, being $1,500 daily, while a resource from the company did it in 10 hours for $30 per hour as per Table 1.

Table 1
Application Advantage and Costs at the company

Application Advantage	Costs
Engineering and Design application in house	$0
Drawings and schematics made in the Innovation Center of the global healthcare company.	$30 per person/hour
Personal working in the Innovation Center has the knowledge to develop drawings. With resources available no training is required.	$0

CONCLUSION

Costs included in the historical data were evaluated through an economic analysis to be compared with an engineering and design application used at the global company. The Solidworks Electrical Schematic add-in led to a reduction in cost of $1,200 daily per drawing revision. Additionally, the implementation ensured project timeline schedule on time. Engineering and design applications are a great advance in manufacturing processes. Medical devices

industries are taking advantage of this, especially in new product introduction since engineers can sketch ideas, make changes, develop models, and manage or store information. Every time more industries are acquiring engineering design tools software applications to avoid lead times with suppliers and reduce costs. The intent of exploring an engineering and design application in this project was to decrease the company's expenses to maximize profits, and it was confirmed that it was satisfactorily done.

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