

Controlled environmental Area room B Layout for Acuity X4 Subassemblies manufacturing line transfer

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Abstract

Boston Scientific is part of a competitive environment and strives to find methods to reduce cost, waste and improve quality. A methodology for reduction is Lean manufacturing. This methodology is used to reduce “muda” which eliminates waste in a production process and is known as Japanese term in the Toyota Production System. The layout of the manufacturing plays a big role on the maximization of the space resource. This article discuss the optimization of the manufacturing space by using the Lean Manufacturing methodology and the DMAIC (define, measure, analyze, improve and control) tool as a systematic approach. To optimize space layout of the selected manufacturing lines, equipment and workstations tables were consolidated, eliminated, or reduced. The results revealed that 2,080 square ft were able to be cleared for new products.

Introduction

The objective of this project is to better the manufacturing lines flow, consolidate workstations, and reduce occupied space for future Acuity X4 Subassemblies transfer. Also, to accomplish the implementation of the new layout while the manufacturing lines perform flawlessly after the results.

Background

At Boston Scientific Dorado site, there is a limitation with space to transfer and incorporate new or existing products from other Boston Scientific’s sites. In this case, the specific challenge is that the manufacturing line that needs to be transferred must be in a controlled environmental area, and all the CEA rooms are occupied. After problem-solving sessions, it was found that a few manufacturing lines have opportunities for layout redesigns. It was noticed that some workstations could be consolidated or eliminated, and some improvements could be made to liberated space in the CEA rooms for new products.

Problem

The problem that will be presented for this research is based on the Controlled environmental Area room CEA-B Layout development and implementation to have space to move Tachy Reliance IS4 manufacturing line from CEA-C to CEA-B on the next layout project, making space in CEA-C for Acuity X4 Subassemblies manufacturing line transfer from Boston Scientific’s Arden Hills Site to Dorado Site. This issue is costing money to the company since it is unable to acquire new products and maximize space utilization.

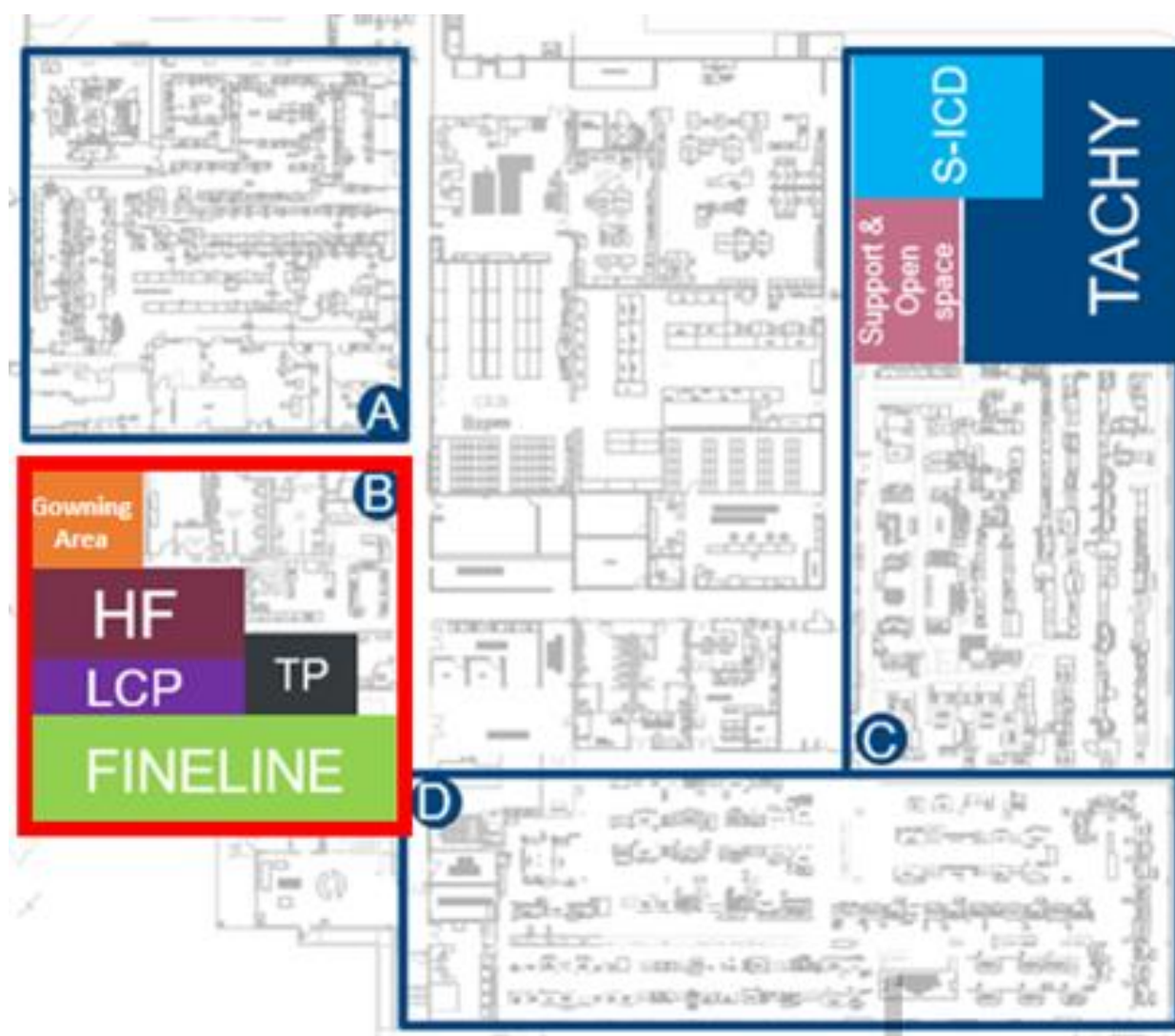


Figure 1. CEA-B current detailed Layout

Methodology

The methodology to achieve the goals of the project that established purpose are the Lean Manufacturing methodology and the Six Sigma DMAIC which is a data driven improvement cycle designed to be applied to business processes to find flaws or inefficiencies particularly resulting in output defects and to combat them. This tool is defined in the five steps, Define, Measure, Analyze, Improve and Control. [1] of the DMAIC methodology to be used in the project [2] are:



Figure 2. DMAIC 5 Steps [1]

As part of the Research, manufacturing line balancing, spaghetti diagrams, 5S audits and cost analysis took place as part of the DMAIC tool to achieve the goal of making approximately 2000 square ft of floor space for future growth.

As part of the Research, below is the proposed plan were manufacturing line balancing, spaghetti diagrams, 5S audits and cost analysis will be taking place as part of the DMAIC methodology to achieve the goal of making approximately 2000 square ft of floor space for future growth.

DMAIC Methodology Strategy

- Define: Here the problem will be defined which it already has been identified since the beginning.
- Measure: In this step the current State Map will be taken into consideration. Also, a Spaghetti Diagram which is a visual representation using a continuous flow line tracing the path of an item or activity through a process enabling the team to identify redundancies in the workflow and opportunities to expedite process flow.
- Analyze: In this step 8 forms of waste will be taken into consideration which will allow to identify any waste is any action or step in a process that does not add value. Also, brainstorm which is a mix of random ideas that comes to mind at the moment of discussing possible approaches or solutions.
- Improve: In this step the Future State Map will be taken into consideration which represents the goal of the improvement process and provides shared vision of what the team is hoping to achieve and an objective to work towards. Also, Implementation which breaks down the implementation process into smaller steps, while defining the timeline, the teams and the resources that will be needed.
- Control: This phase will evaluate with 5S audits that the changes or improvements implemented maintain. Each step will be further discussed with its respective results on chapter 4 titled Results and Discussion.

Results and Discussion

The current state was mapped, providing a clear view of the layout to understand and identify opportunities of improvement. This current state map helped to have a better overall view of the manufacturing lines and identify which workstations and areas could be rearranged, consolidated, or eliminated for better used of the floor space on CEA-B room.

In addition, a Kaizen which is a Japanese term that means continuous improvement, was performed with the team including line coordinators, product builders, technicians and engineers to analyze the potential opportunities. The goal was to interview the people that are constantly on a daily basis performing the process and interacting with the manufacturing lines. Their suggestions were very valuable and made de identifying task much easier, maximizing the opportunity of making more floor space.

One of the suggestions was that the equipment was able to perform more than one process eve thought each equipment was just being used for one. This gave the opportunity to eliminates as much similar equipment as possible without impacting output or quality. It was also suggested that workstations could be consolidated since the same person performs it and the line clearance process and controls avoid any mix-up, mismatch or any step being skipped.

With these suggestions and the utilization of the resources to optimize production and maximize efficiency eliminating the different types of waste, it was confirmed that there was a significant improvement. After performing the required tasks to complete the improvements these are the layout’s results:



Figure 3. Before and After layout for CEA-B room



Figure 4. Before and After Spaghetti Diagram for CEA-B room

The goal to achieve floor space, was met. Now, is not only improving but maintaining. For these manufacturing lines 5S audits are performed biweekly not only to assure the improvement is in place, but also to find new opportunities of optimization, maximization of resources, minimization of space used, elimination of wastes, growth, and consolidation opportunities.

Conclusions

In conclusion, for a company to maintain competitive, continuous improvement is essential. This assure that constant upgrade of the process, technique and utilization is maximized while waste is reduced gaining beneficial results for the employees, the company and most important, the patient. For this project Lean Six Sigma was used because it was the ideal methodology to reach the desired goal. On BSC facilities is \$350.00 per square foot, each square foot inefficiently used represents a deficiency in the utilization of the space which results in limiting the capacity to increase production output and bring additional volume into the site. Thanks to the DMAIC tool the reutilization of the existing space having a smaller footprint avoids spending additional capital on the construction of new facilities to relocate new products. Also, as additional benefits people flow was reduced due to walking distance shrinkage and material flow reduction. However, since the purpose of this project was to make floor space available for new products that will be transferred to the facility, the cost avoidance was obtained considering that a construction of a new facility was no longer needed. As a result of the layout for CEA-B, 2,080 ft² were liberated meeting the goal of 2,000 ft² required and consequently a cost avoidance of \$728,000 was achieved.

Table 1
CEA-B room Layout Cost Avoidance VIP 72327

Area before (ft ²)	Area after (ft ²)	Available space	ft cost	Saving (Cost Avoidance)
9043	6963	2080	\$350.00	\$728,000

Future Work

For future work, in the next layout Tachy manufacturing line will be moved to the space liberated in the CEA-B room. Then, Acuity X4 Subassemblies will finally be able to be transferred from BSC site on Arden Hills, MN to Dorado, PR site.

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