INDUSTRIAL, MANUFACTURING, & SYSTEMS ENGINEERING

CAPSTONE PROJECT/INTERNSHIP
SUMMARY

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Type of Capstone (research, teaching, practical application): Practical Application

Capstone Project Title: *Site Master Plan* at Johnson & Johnson (Independencia Plant in Ciudad Juarez)
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INTRODUCTION

The purpose of this report is to introduce our group project called Site Master Plan at Johnson & Johnson located at Ciudad Juarez, Chihuahua. This company gave us the opportunity to apply our engineering skills in a real life project with the purpose to improve ourselves successfully. We were assigned three different lines: Trident (Line 150), Brick Shaft in conjunction with Brick Device (Lines 147 and 149), and lastly Buccaneer (Line 146). A description of the actual situations, the problems and opportunities identified within the improvements and decisions made are presented in continuation of the report. The aim of this report is to provide a background, and actual situation of what it is founded in a problem, giving a description of a complete picture of what is the base in which the project was focused. Our intention is providing our perspective of what we saw when this project came to us, this is because we got to experience real problems in production lines. This paper describes the problems we confronted, the methodology we followed and the way we organized our time to finish the project with successful results according to the deadlines of the company.

We had a situation at Johnson and Johnson with two different needs, the first one is referred to a standardization problem on the process of handle, control and update information about production lines, and the second one is a need of optimizations on three production lines assigned by the company. These two needs are going to be described in the following sections.

Background Problems on Standardization:

On the plant, we identify the necessity of a process where the information of the production lines can be standardized because we noticed that there is no clear information about labor cost on each line, also there is no any data base that can show the actual metrics in which lines are working, for example headcount, flow, inventories, number of stations and capacities. Because of that, there is a lack of communication between departments when someone due some changes on line, or if someone is working in lines there is no opportunity to know about the modifications planned on lines, that why we need a standardization system of the process in which information is actualize, update and control about the lines. The first main objective of the project is to standardize the production lines by improving the communication between departments, especially between manufacturing and finance departments. Another point related with this is to standardize headcount to avoid unnecessary labor and we believe that the associates have to be more pending of what going on with the line referring to take care of the products.

Background Problems on lines at Energy Room:

The critical lines assigned from the company to us were Line 150 “Trident”, Line 146 “Buccaneer”, and Line 147 “Brick”. This decision was taken because for 2018 those lines are prognosticated with a significant increment of production volume, so it is important for the company to find the best production outputs to meet the customer demands for those products.

Figure1

On Line 150 “Trident”, the device manufactured is an electro surgery tool, conformed by a handle for irrigation and suction (figure 1). Also, is packaged another device manufactured in a different line, this device is called shaft (figure 2) is part of the line 150 from cleaning station to the unit sell inspection which is the final step of the process. Line 150 consists in 20 process stations, two of those stations are out of the line because those are located 192 ft. far from the line and the product is transported by a cart to continue with the process flow, at final the product has a total distance traveled during process of 240 ft., this line has officially 21 associates working on line by turn, this line work first and second turn. The metrics in which we found the line was with an OEE of 40%, Scrap rate of 13%, capacity of 628 pieces for both turns and a bottleneck of 55.9 seconds. For 2018 the company has a forecast of a volume of 117216 pieces for year only working first turn so it is important assure this production to satisfy client demand.

Figure2

The next line assigned is “Brick” composed by line 147 and 149. On line 149, the device manufactured is called ENSEAL used for open surgeries as tissue sealer (figure 3). And on line 147, a shaft subassembly of the Enseal component is made (figure 4). A total of 16 stations compose line 149 and it presents an historical OEE of 79.35%, scrap rate of 9.48 %, capacity of 423 for first turn and a bottleneck of 64.19 seconds with a total of 12 associates. For line 147 the metrics are the following: OEE of 62%, scrap of 1.3% with a bottle neck of 62.03 seconds and daily capacity of 342 pieces for turn, the line has a total of 10 associates working

Figure 3

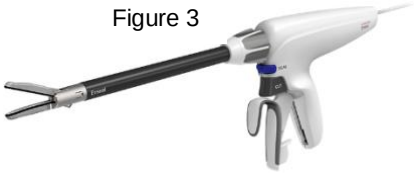


Figure 4

with 13 process stations. Both lines are considered only for work on first turn. For this device, the company estimates a duplication of demand so they are considering improve capacity until 1200 pieces for day, even if this implicates invert resources bringing another pair of production lines. Evidentially, those lines need to be analyzed together because line 147 is a subassembly of a part used in line 149 where the final assembly for the device is due.

The third line is number 146 named Buccaneer, here is where the “Harmonic ACE” (Figure 5) is manufactured, and this dispositive has the functionality for coagulation and transection of vessels at medical surgeries. This line consists on 19 stations, those stations are perfectly aligned forming a straight line, with 17 associates, this line is available to work first and second turn, with a scrap rate of 10.2% and OEE of 43.6% and works with a bottleneck of 39.6 seconds. The line has a capacity 713 pieces for day, and is estimated that for 2018 the demand for year will be 147221 pieces.

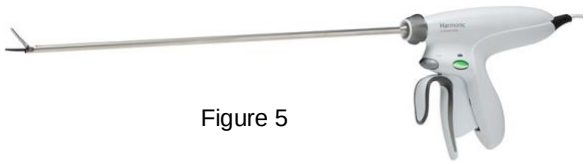
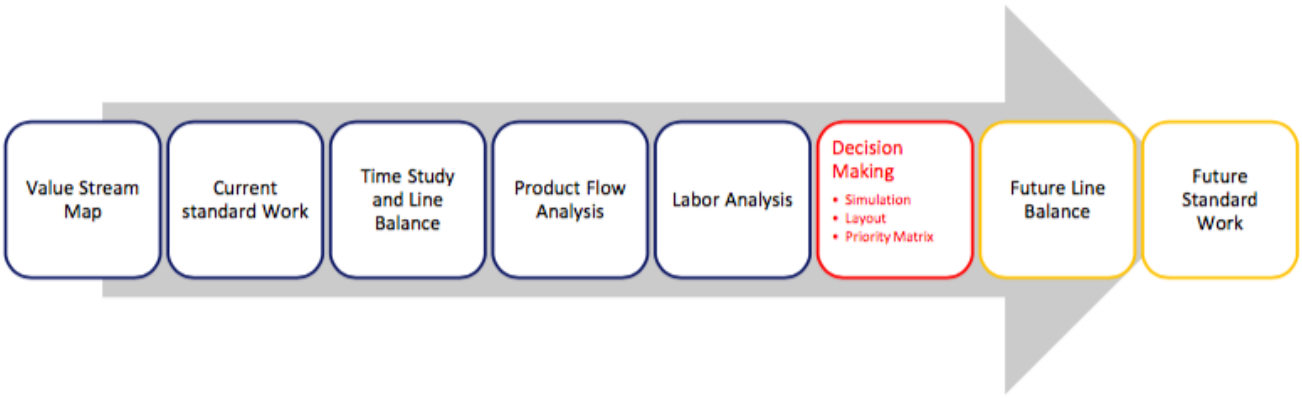


Figure 5

This was the actual situation of the lines; all the problems described are those in which we focused for our project with the optimization of these three production lines by improving line efficiency such as reducing defective production, avoid over processing, reduce the waiting time between processes, use the maximum potential of employees, avoid unnecessary material transportation, reduce or remove material inventory between processes, avoid unnecessary movements by people and lastly avoid more work or higher quality than required by customer.

Project Data Collection Methods, Tools and Analysis:

For our project methodology we planned to follow 6 steps where different tools learned and research are used to accomplish our objectives, the analysis, tools and methods are listed above.



PROJECT OUTCOMES

After having identified the problems for each line and finishing the Value Stream Maps, Current Standard Work, taking Time Studies and create a current Line Balance, following the Product Flow and Labor Analyses for the three lines. We were able to identified possible opportunities located to improve that helped us to make the lines more efficient and productive, but each line was at a different situation and this is when it comes the decision making. In case of Trident (Line 150) there was a need to make an improved layout, where all the flow material is now in the same line, also by making a new Line Balance result a reduction of 2 headcounts, the distance travel was reduce by a 58.2%, the OEE increased from 41% to 68% and a reduction of Scrap rate was a 72%. For Brick Shaft (Line 147) an implementation of duplicating some stations were necessary due to a high amount of idle time of the workers, a new Line Balance was also required in order to leave the future bottleneck as minimum as possible. As a result the production capacity incremented by 100%, an avoidance of 6 headcounts addition was calculated to supply the forecast demand with no additional space required (within the same area parameters). In conjunction with Brick Device (Line 149) the production capacity incremented by 77% and a reduction of 2 headcounts was made. These two lines joint together and with these improvements there's a cost avoidance of $1,300,000 USD in total plus savings in space. Lastly, on Buccaneer (Line 146) one of the most costly lines in the entire company. There was a need to make a new Line Balance of the line due to slow flow and problems on the software. A reduction of 3 headcounts and distributions of activities was made causing an increment of an 18% in output.
In summary of our outcomes we are deeply satisfied that our collaboration got to be reflected in a really positive way that will be implemented from now on for the company and for us in the future. This project impacted our lives and we impacted the company with our contributions and results.

INDUSTRIAL ENGINEERING PROGRAM ASSESSMENT

From the beginning of the project, we knew that several challenges were going to be confronted. But first we would like to mention that we were fortunate to be assigned a mentor who is involved in a number of exciting new initiatives in the Site Master Plan Project. First and foremost, she is a fundamental piece for the Process Excellence Department. The production field, especially working for the first time in the production floor where a specially dressing was required and new regulations needed to be follow was much more than we expected. It was totally a new environment for all of us, which we actually really enjoyed working with new people such as the administrative, engineers and operators, we get to collaborate and learned a lot from each one of them. We are thankful that Johnson & Johnson gave us the opportunity to apply our engineering skills in a real life project. Even though we got to do challenging analysis that required assistance and approval, we experienced a very good and efficient work environment where we got to improve ourselves satisfactory. Another important comment is that we learn a lot about lean tools and how this is so useful for industrials engineers, so this experience gave us the desire of do a Lean certification in order to learn more about this tool, and also because we develop a lot of tools in our project that gave us the experience of a lean project.