Past Due Reduction on 37mm Syringe Filters Manufacturing Line

Alejandro Miralles
Master of Engineering Management
Dr. Héctor J. Cruzado
Graduate School
Polytechnic University of Puerto Rico

Abstract *— In Pall Life Sciences Puerto Rico, the past due on the 37mm manufacturing line was at $262,000 and continues increasing. The root cause for this issue is due to a mix of material shortage and customer demand increase. After the material arrived, the process on the 37mm manufacturing line was evaluated to increase the manufacturing output to reduce the recovery lead time. It was found that, by including a second manufacturing operator on the line and by creating a new standard work for both manufacturing operators, the line output was almost doubled. The manufacturing line output was measured during three shifts to confirm the sustainability of the improvement. The expected recovery date for this line is by the end of October 2021.*

Key Terms *— Manufacturing line, Recovery, Standard Work, Time Study*

INTRODUCTION

In Pall Life Sciences Puerto Rico, the manufacturing line of 37mm syringe filters got a past due of $262,000. The 37mm manufacturing line got this past due to a combination of material shortage and a demand increase. The average weekly demand (30,600 units/week) exceeds the weekly average output (25,600 units/week). Trying to avoid that the customers stopped their manufacturing lines, the company started the process of evaluating and increasing the line manufacturing output by at least 30% in order to reduce the lead time to the customers.

The purpose of this research was to investigate the alternatives to increase the 37mm manufacturing output by a minimum of 30% to recover the past due by the end of November 2021.

METHODOLOGY

In order to achieve the project goal, four different processes were executed:

- Gemba Visits: Visits to the manufacturing line to observe what was happening and what could be improved.
- Time Study: A time study was done on the 37mm manufacturing line to measure the operator and machine cycle times.
- Waste Analysis: A waste analysis was done to understand which activities were not adding value to the process.
- Standard Work: A standard work process was implemented once all the previous processes were completed, assuring all the operators were going to follow the same procedure to manufacture on the line.

ANALYSIS OF RESULTS

The jump-off point on the 37mm manufacturing line was and average weekly output of 25,600 units. After doing the Gemba Visit and completing the time study, it was found that a second operator on the line was going to double the manufacturing line weekly output. Table 1 shows the time study results for 1 and 2 operators. It demonstrates how the bottle neck was moved from the operator cycle time to the machine cycle time.

Table 1
Time Study Results

Cycle	Time (sec)	Weekly Output (units)
Machine	9	51,120
1 Operator	15	30,672
2 Operators	8	57,510

During the waste analysis,a few actions were identified that were not adding value to the process:

- The raw materials to replenish the line were not close to the replenishment point.
- Scissors, tape, bags and re-stock labels were not present on the line, operator had to go to another place to get these required items.
- Operators were following different sequence on every cycle.

IMPLEMENTED ACTIONS

The main impact to increase the line output was achieved once these actions were implemented:

- Two operators were assigned to run the line.
- A new standard work was established.
- Raw materials and tools were relocated closer to the point of use.

In order to sustain the results, all the manufacturing operators were trained on the new standard work. The purpose was to minimize the variability between operators, reorganizing and balancing the workload were key to achieve this milestone. The weekly manufacturing output on the 37mm line had a clear improvement which can be observed in Figure 1.

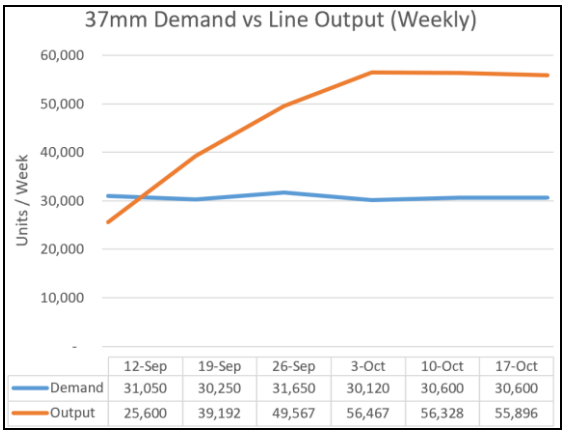

Figure 1
37mm Demand vs Line Output (Weekly)

To avoid that the line stops due to materials shortage again, a meeting with the buyers was conducted in order to communicate them the new strategy. They placed purchase orders to the suppliers to support the recovery reduction plan.

The last action implemented to increase the line output, was to run the line on Sundays as well. To implement this action, a multidisciplinary team was activated to support the initiative, including the Quality Control Laboratory Team, the Maintenance Technician Team, the Facilities Team, etc. The past due recovery projection is expected to be achieved by the end of October 2021, as shown in Figure2.

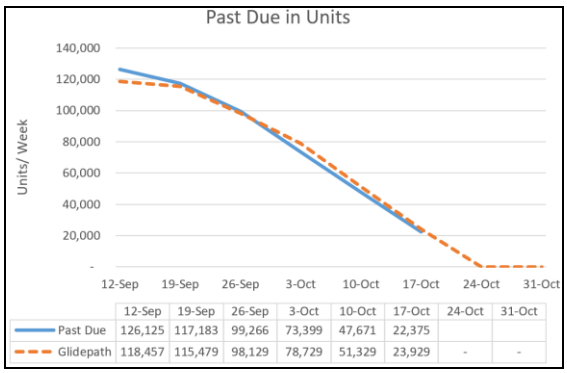

Figure 2
Past Due in Units (Recovery Projection)

CONCLUSION

A total of 220% of the output was achieved in 4 weeks after all the initiatives were implemented. This allowed that the recovery will be achieved by the end of October 2021. The recovery was based on the following assumptions:

- Weekly demand remains steady at 30,600.
- No material shortage impacting the line.
- Mechanical downtime remains below 5%.
- No operator absenteeism.

The analysis was completed to cover the standard work as part of the improvement on the line manufacturing output. Areas pending to evaluate are change overs, Equipment Down time, Material Flow, setup wheels etc. Completing investigation on these processes could be helpful to increase the line manufacturing output.