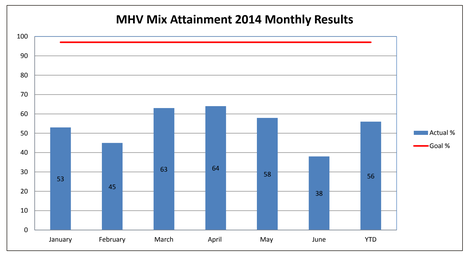
MIX ATTAINMENT IMPROVEMENT

Industrial Engineering Department
St. Jude Medical, Caguas P.R.
Gabriel López, Marco García
IE 5905: Capstone Design Course Extension – FA 14
Mentor: Prof. Carlos Gonzalez

DEFINE

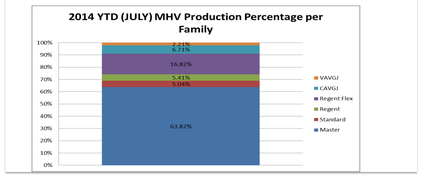
Problem Statement

Presently, the St. Jude Medical Cardiovascular Division can't reach their Weekly Mix Attainment goal of 75% based on product Lead Time, which is currently at 56%. This results in low inventory levels, customer service problems, overtime work and planning problems.

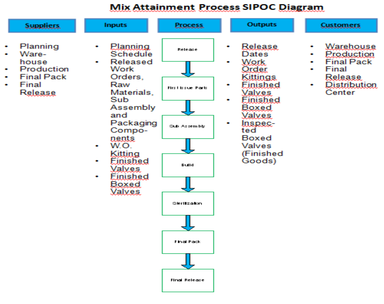


Project Description

This project looks to improve the Mix Attainment percentage in order to reach the established goals. To achieve this the team will use the DMAIC method along with other Lean Six Sigma tools to determine the causes for this low Attainment percentage. The Master MHV Family will be used as the pilot as it represents a 63.82% of the total production.



Process Description

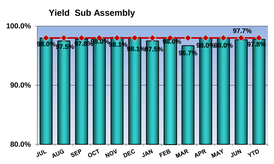


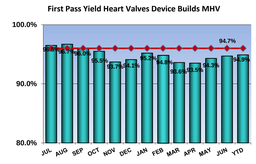
Objective

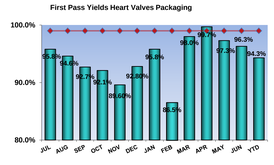
The objective of this project is to improve the Mix Attainment metric to 75%.

MEASURE

Data Collection Plan



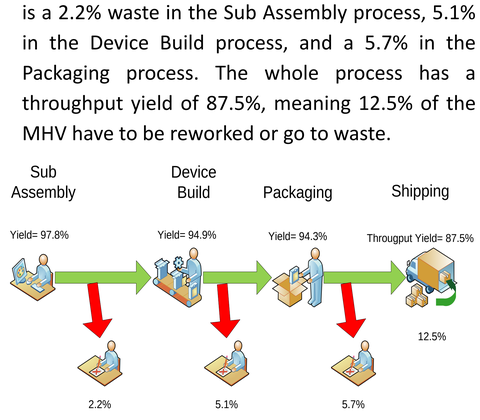




This graphs represent the Year to Date until June for the Sub-Assembly, Device Build, and Packaging phases.

First Pass Throughput Yield

This Figure shows the total first pass throughput yield form Sub-Assembly through Packaging. There is a 2.2% waste in the Sub Assembly process, 5.1% in the Device Build process, and a 5.7% in the Packaging process. The whole process has a throughput yield of 87.5%, meaning 12.5% of the MHV have to be reworked or go to waste.



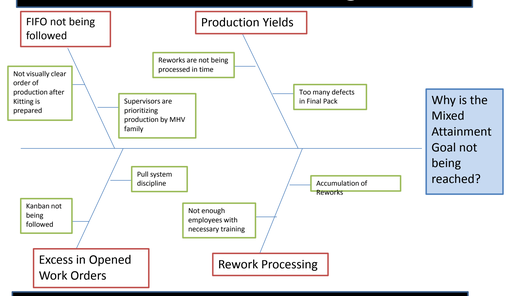
Expected Mix Attainment

The expected mix attainment using the total manufacturing yield, downtime, and operator efficiency will be 77.9% with the Year to Date data and 81.3% if all the goals are met.

Expected Mix Attainment					
		Manufacturing Yield	Downtime	Operator Efficiency	Total Yield
Y Actual	YTD	87.5%	1.1%	90.0%	77.9%
Y Ideal	Goal	93.1%	3.0%	90.0%	81.3%

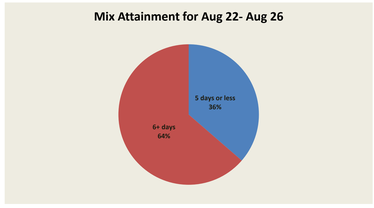
ANALYZE

Cause and Effect Diagram



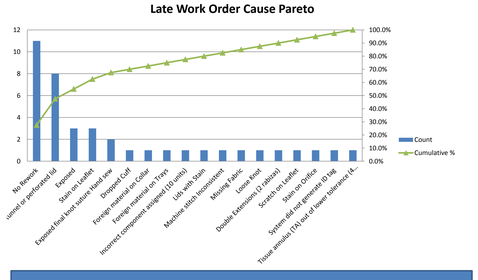
Data Samples

August 22-26 Mix Attainment Sample



During this period a total of 66 Masters work orders were released. Out of all the work orders, 24 were completed in 5 days or less, this means only 36.4% of the work orders complied with the Mixed Attainment period. The average completion date for this sample was 7.03 days, and they took 21 days to reach 100% completion.

August 22-26 Late Work Order Cause Pareto



August Mix Attainment Sample

Completion Percentage	
%	Days
50%	7
75%	9
85%	11
90%	13
95%	15
100%	27

Out of the 727 work orders released in August, 91 were completed in 5 days or less, this means only 13% of the work orders complied with the Mixed Attainment period.

IMPROVE

Potential Solutions

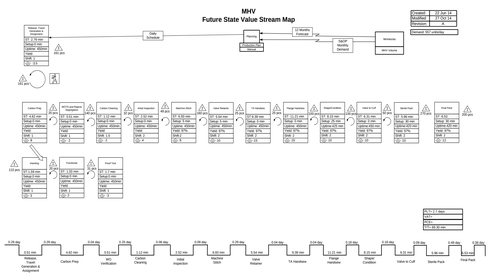
- Improve FIFO process
- Improve Rework Process so the reworked hearth valves can be completed in the established time and comply with the Mix Attainment
- Improve the value stream process to reduce lead time in order to comply with the Mix Attainment Goals

Value Stream Improvements

Eliminate Backtracking

Value Stream Improvement			
	Current State	Future State	% Improvement
Lead Time (Days)	5.36	2.69	49.81%
WIP Kanban (units)	2982	1493	49.93%
Takt Time (min)	72.10	69.30	3.88%

After the team eliminated the backtracking in the Kitting preparation operation, improved FIFO and Rework processes, and reduced the Work in process, the improvements were: 49.81% in Lead Time, 49.93% in WIP Kanban, and 3.88% in Takt Time.



Financial Impact

Cost Analysis			
	Current	Future State	Difference
WIP	2982	1493	1489
WIP Costs	$647,213.28	$324,040.72	$323,172.56
WIP Savings	$97,081.99	$48,606.11	$48,475.88
MH Labor	2.00	1.52	0.48
MH Costs	$50,000.00	$38,000.00	$12,000.00
Total Savings			$60,475.88

Payback Period		
Savings	Costs	Payback (Days)
$60,475.88	$7,491.97	46

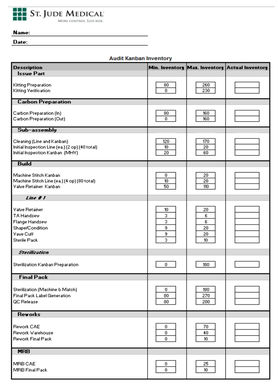
CONTROL

Rework Process Reports

Rework Process Report			
Step	Goal (Hours)	Week Average (Hours)	% Difference
Line Pickup	0.50	0.40	20.00%
WOTS Scan	0.50	0.84	-68.00%
Quality Signature	0.50	0.58	-16.00%
Product Rework Process	8.00	6.50	18.75%
Total	9.50	8.32	12.42%

- To control the rework process a report like the one on this example will be used to compare weekly results with the goals established in the improve phase.

Kanban Audits



A weekly Kanban audit will be conducted and planned by the Planning Department and reported to all Production Supervisors.

Project Conclusion

If all the improvement recommendations are implemented and controlled the Lead Time will be reduced to 2.7 days. In addition, the improved rework process will be no longer than 9.5 hours. This improvements will give St. Jude Medical the ability to achieve a 100% Mix Attainment.

References

•Witt, C.E. (2006). Improve Inventory Data Accuracy. Material Handling Management, 61(9), 28-32.
•Rossetti, M., & Buyurgan, N. (2008). Inventory Archive. Industrial Engineer (Norcross, Ga.:2003),40(6), 32-37.
•Rodriguez, J. A., & Vidal, C. J. (2009). A heuristic method for the inventory control of short life-cycle products. Ingenieria y Competitividad, 11(1), 37-55.