2014

Turnaround time reduction for military certificates of compliance - team 2

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Creative Inquiry

Turnaround Time Reduction for Military COC's

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Abstract: The student members of this senior design project worked specifically with Milliken & Company's Enterprise plant in Marietta, SC. The Enterprise plant is a finishing plant, therefore it receives previously manufactured textiles from other Milliken plants, applies dies and finishing chemicals, tests the products, issues a Certificate of Compliance (COC) and ships the product to the customer. The scope of this project includes optimizing the workflow of Military products through the dry testing lab in order to reduce turnaround time of COC's by at least 25%. The team began by modeling the current system for better understanding. The team then analyzed the losses of the current system and performed the appropriate root cause analyses. The next step in the project is to generate concepts and test them against each other in order to identify the optimal concept. The final step is to implement said concept.

Introduction:

•Milliken & Company

- •Large private textile company
- •Enterprise Finishing Plant applies dyes to textiles and the majority of products are military based

•Key Business Goals:

• Reduce all military Certificate of Compliance (COC) turnaround times by 25%.

•Create a detailed, function system to track the status and cycle times of all products and activities in the testing lab, as well as cycle times by employee

Methods:

- ❑ Studied Current System
- ❑ Created a Mission Statement and Key Business Goals
- ❑ Determined Customer Needs
- ❑ Created Product Specifications
- ❑ Identified System Losses and Root Causes of Losses
- ❑ Generated and evaluated initial concepts

Methods:

• Process Flow Chart

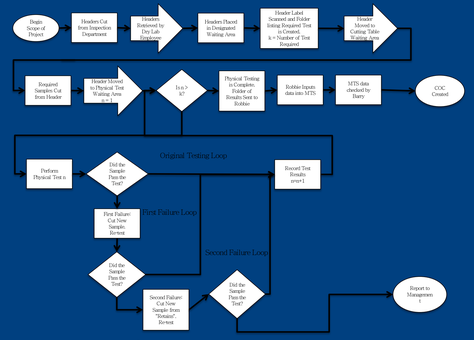

Figure 1: Process Flow Chart

• Product Specifications:

Table 1: Product Specifications

Metric No.	Need Nos.	Metric	Imp	Units	Enterprise Dry Lab	Pendleton Dry Lab	Marginally Acceptable Value	Ideal Value
1	1	Turn around time for Military COC's.	5	Days	14	10	10.5	7
2	1,3	Percentage of orders filled by customer lead time.	5,4	%	100	100	100	100
3	1,3	Percentage of orders forced to be rushed.	5,4	%	25	20	<=20	<=10
4	2	All legally required tests are performed.	5	Binary	Yes	Yes	Yes	Yes
5	4	High volume products have a standardized test order.	4	Subj.	2	4	>=4	5
6	5	Current calibration standards and testing procedures are maintained.	4	Binary	Yes	Yes	Yes	Yes
7	6	The system inherently prioritizes orders to be tested.	3	Binary	No	Yes	Yes	Yes
8	7	Percentage of tests with standardized cycle times.	3.5	%	0	50	>=50	100
9	8	The system records employee productivity.	4.5	Binary	No	Yes	Yes	Yes
10	9,10	Number of times data is recorded.	3,4	#	2	2	1	1
11	11	The system is organized.	3.5	Subj.	3	4	>=4	5
12	12	The system is run by a self-directed team.	3.5	Binary	Yes	Yes	Yes	Yes
13	13	Time required to access current status of Military COC's.	3.5	Minutes	10	5	<=5	<=1
14	14	Time required to determine testing completion time.	3.5	Minutes	10	5	<=5	<=1
15	15	System Visibility.	3.5	Subj.	3	5	>=4	5
16	16	Additional training time required.	2.5	Days	N/A	N/A	<=14 days	<=3 days
17	17	The system can run independent of management employees.	3	Binary	No	Yes	Yes	Yes
18	18	Layout satisfaction.	3	Subj.	3	4	>=4	>=5
19	19	Time required by lab technicians to retrieve new headers from inspection.	3.5	Minutes	45	0	<=15	0
20	20	Employee Utilization.	3.5	%	N/A	N/A	>=85	>=95
21	21	Number of machines over-utilized.	3.5	#	5	3	<=3	0
22	22	Cost to implement system.	2.5	$	N/A	0	<=30000	<=30000
23	23	Additional yearly maintenance cost.	4	$	0	0	<=1000	0

• System Losses and Pareto Analysis

Table 2: System Losses

	System Loss	Frequency	Magnitude	Importance	Frequency Times Magnitude (% of total)	Cumulative Percentage
1	Re-recording of test data	15/week	120 minutes	5	56%	56%
2	Wait time to use test equipment (washer/dryer)	10/day	7.5 minutes	3	12%	68%
3	Time determining order of tests	15/day	5 mins	3	12%	79%
4	Retrieve new headers	1/day	45 minutes	5	7%	86%
5	Recutting samples	200/day	225 minutes	4	7%	93%
6	Checking completion of tests (washer)	30/day	1 minute	2	5%	98%
7	Access current status of Military COC's	4/week	10 minutes	4	1%	99%
8	Time adjusting Cut machine	4/day	1 min	3	1%	100%
9	Time spent initiating rush order procedures	4/week	<1 min	2	0%	100%

Importance Scale
1 - Very Unimportant; 2 - Unimportant; 3 - Neither Important nor Unimportant; 4 - Important; 5 - Very Important

Figure 2: Pareto Analysis Graph

• Root Cause Analysis

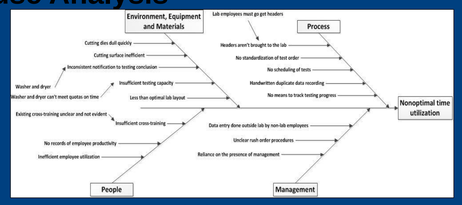

Figure 3: Fishbone Diagram

Results:

Table 3: System Losses and Corresponding Concepts

System Loss	Concept that Addresses System Loss
SL1: Re-recording of Test Data	2, 18
SL2: Wait Time to Use Over-Utilized Machines	7, 9, 11
SL3: Time Determining Order of Tests	3, 4, 5, 6
SL4: Retrieve New Headers	12
SL5: Recutting Samples	8, 13, 14
SL6: Checking Completion of Tests	1, 2
SL7: Access Current Status of Military COC's	3, 4, 15
SL8: Time Adjusting Cutting Machine	8, 13, 14
SL9: Time Spent Initiating Rush Order Procedures	3, 4, 17

• Initial Concepts:

1. Implement system using tablets that tracks all orders in progress
2. Tablet computers for testing data entry instead of folders
3. Implement existing Milliken scheduling systems (from Pendleton benchmark
4. Create and implement new scheduling system for the Enterprise Dry Lab
5. Implement Cross-Training structure
6. Make Cross-Training visible
7. Beeping timer for the washer
8. Increase durability of cutting dies
9. Establish testing compatibility lists (Ex. lists of which fabrics can be tested together)
10. Record cycle times for tests by individual employee
11. Track equipment utilization
12. Have a non-lab employee perform the header delivery
13. Obtain new cutting press surface that does not wear out dies
14. Obtain sharpening equipment for the Enterprise plant to maintain cutting dies themselves
15. Create visual display of work in progress
16. Optimize lab layout
17. Establish standardized rush order procedure
18. Desktop computers for testing data entry instead of folders
19. Implement 5S in the testing lab
20. Add capacity for over-utilized testing processes

Conclusions:

After the team had spent significant time and effort understanding the current state of the system, analyzing key losses of the current system, and conducting a root cause analysis, the team moved forward with concept generation. Through methods of internal brainstorming, external brainstorming, interviews with the client, interviews with key business personnel, and benchmarking, the team generated 20 initial concepts. After the initial analyses and evaluation of the concepts, the team plans to move forward with combining, refining, and conducting a more extensive evaluation of scoring the concepts based on the project metrics and product specifications. The team will then recommended their final solution to the client and move forward with implementation.

Acknowledgements:

We are grateful for the help of our client Gordon Cannon, Barry Wood, and our project mentor Reshmi Koikkara

References

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